TECHNICAL PROPOSAL

SWEETWATER AUTHORITY
Sweetwater Reservoir Aeration/Destratification System

USBR WaterSmart Drought Program:
Drought Resiliency Projects for Fiscal Year 2025

Applicant:
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Technical Proposal

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Acronyms and Abbreviations

AACE	Association for the Advancement of Cost Engineering
AFY	acre feet per year
CEQA	California Environmental Quality Act
CPSD	Coastal Plain of San Diego
CRA	Colorado River Aqueduct
DDW	Division of Drinking Water
EIR	Environmental Impact Report
GDF	groundwater desalination facility
MWD	Metropolitan Water District of Southern California
NEPA	National Environmental Policy Act
QSA	Quantification Settlement Agreement
RGDF	Richard A. Reynolds Groundwater Desalination Facility
SCH	State Clearinghouse
SDCWA	San Diego County Water Authority
SDF	San Diego Formation
SGMA	Sustainable Groundwater Management Act
SR	State Route
SWP	State Water Project
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
USBR	U.S. Bureau of Reclamation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Society
UWMP	Urban Water Management Plan
WRMP	Water Resources Master Plan
WTP	water treatment plant

Chapter 1. Executive Summary

Date: October 4, 2024 **Applicant Name:** Sweetwater Authority

City: Chula Vista **County:** San Diego **State:** California

Applicant Eligibility: Sweetwater Authority is a publicly-owned water district whose mission is to provide its current and future customers with a safe and reliable water supply.

Task Area: Sweetwater Authority is applying under Task A: Increasing the Reliability of Water Supplies Through Infrastructure Improvements.

Funding Group: Sweetwater Authority is applying in Funding Group II as a Category A applicant.

Project Summary: Sweetwater Authority (Authority) is intent on improving local water supply availability as up to 55 percent of the Authority's water supply comes from imported sources. The imported water sources from the California State Water Project (SWP) and the Colorado River Aqueduct (CRA) are threatened by several factors including drought, climate change, seismic vulnerabilities, flow restrictions, and overallocation. The Authority is proposing the installation of a new aeration and destratification system in Sweetwater Reservoir to improve water quality and increase the yield of treatable water from the reservoir. The Sweetwater Reservoir serves as a local surface water supply source for the Authority. The new aeration system will create oxygenated water and uniform water quality throughout the reservoir, resulting in the ability to treat an additional 1,790 AFY of local surface water. In turn, the improved water quality will allow for reduced power and chemical costs associated with surface water treatment. The Authority has evaluated this project in numerous studies including a Feasibility Study, Site Facilities Master Plan, and Water Resources Master Plan, all of which identify the importance of this project to mitigate future supply challenges by increasing the reliability of local water supplies.

Project Length: 7-9 months

Estimated Start Date: October 2025 **Estimated Completion Date:** April 2026

Federal Facility or Land: The proposed project is not located on a federal facility and will not involve federal land.

Applicant Background: Sweetwater Authority provides safe, reliable potable water service to a population of approximately 200,000 people across 29 square miles through more than 37,000 service connections. Agriculture in the service area is not widespread, primarily due to the highly urbanized nature of the region. Most of the land is used for residential, commercial, and recreational purposes. The Authority currently has access to the following supply sources:

- Imported water, including CRA and SWP, purchased from the San Diego County Water Authority (SDCWA) via the Metropolitan Water District of Southern California (Metropolitan).

- Groundwater from the Coastal Plain of San Diego (CPSD) Groundwater Basin by way of the National City Wells and the San Diego Formation north Chula Vista brackish wellfield that supplies the Richard A. Reynolds Groundwater Desalination Facility (RGDF).
- Senior water rights (pre-1914 and appropriative) to the Sweetwater River which feeds two reservoirs (Sweetwater and Loveland) and is treated at the water treatment plant.

Since 1955, local surface water and groundwater sources met approximately 45 percent of the water demands in the Authority's service area, while the 55 percent balance has been met with imported supplies. During wet years when there is sufficient water storage in Sweetwater and Loveland Reservoirs, the Authority is able to rely on a higher percentage of local supply sources. The historic mix of supplies used by the Authority is shown in Figure 1 and Table 1.

Figure 1 Sweetwater Authority Historical Water Supply by Source (AF)

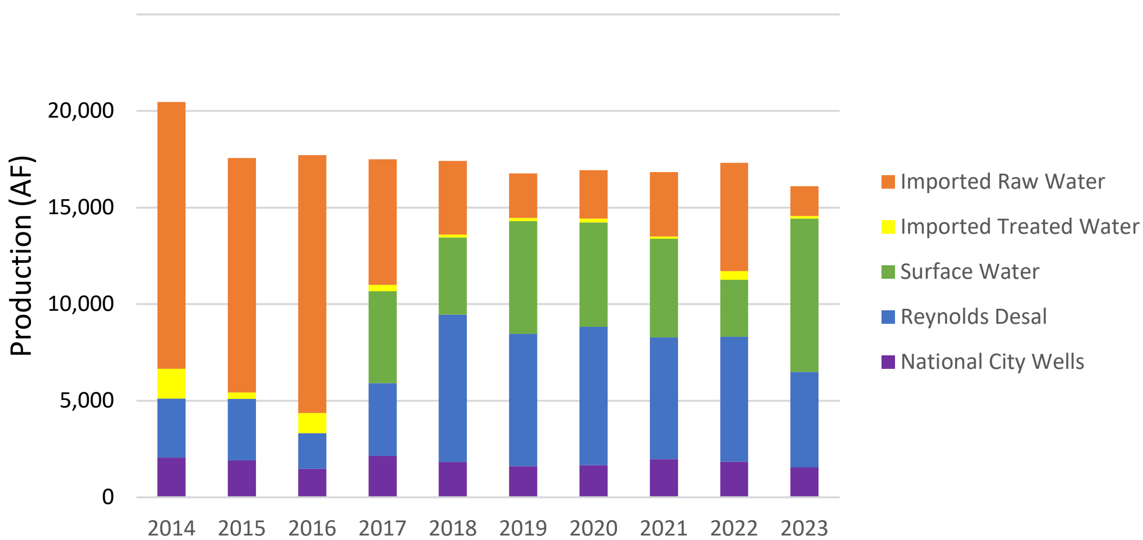


Table 1 Sweetwater Authority Historical Water Supply by Source (AF)

Year (CY)	National City Wells	Reynolds Desal	Surface Water	Imported Raw Water	Imported Treated Water	Total
2014	2,059	3,051	0	13,812	1,548	20,472
2015	1,913	3,176	0	12,134	345	17,568
2016	1,474	1,855	0	13,348	1,036	17,713
2017	2,148	3,764	4,761	6,495	333	17,505
2018	1,823	7,633	4,002	3,816	138	17,412
2019	1,618	6,843	5,842	2,309	164	16,776
2020	1,671	7,161	5,408	2,505	196	16,941
2021	1,983	6,295	5,116	3,341	105	16,840
2022	1,846	6,473	2,945	5,602	455	17,321
2023	1,550	4,947	7,930	1,548	133	16,108
Total Average Annual Water Supply for 2013-2023 (AFY)						**17,466**

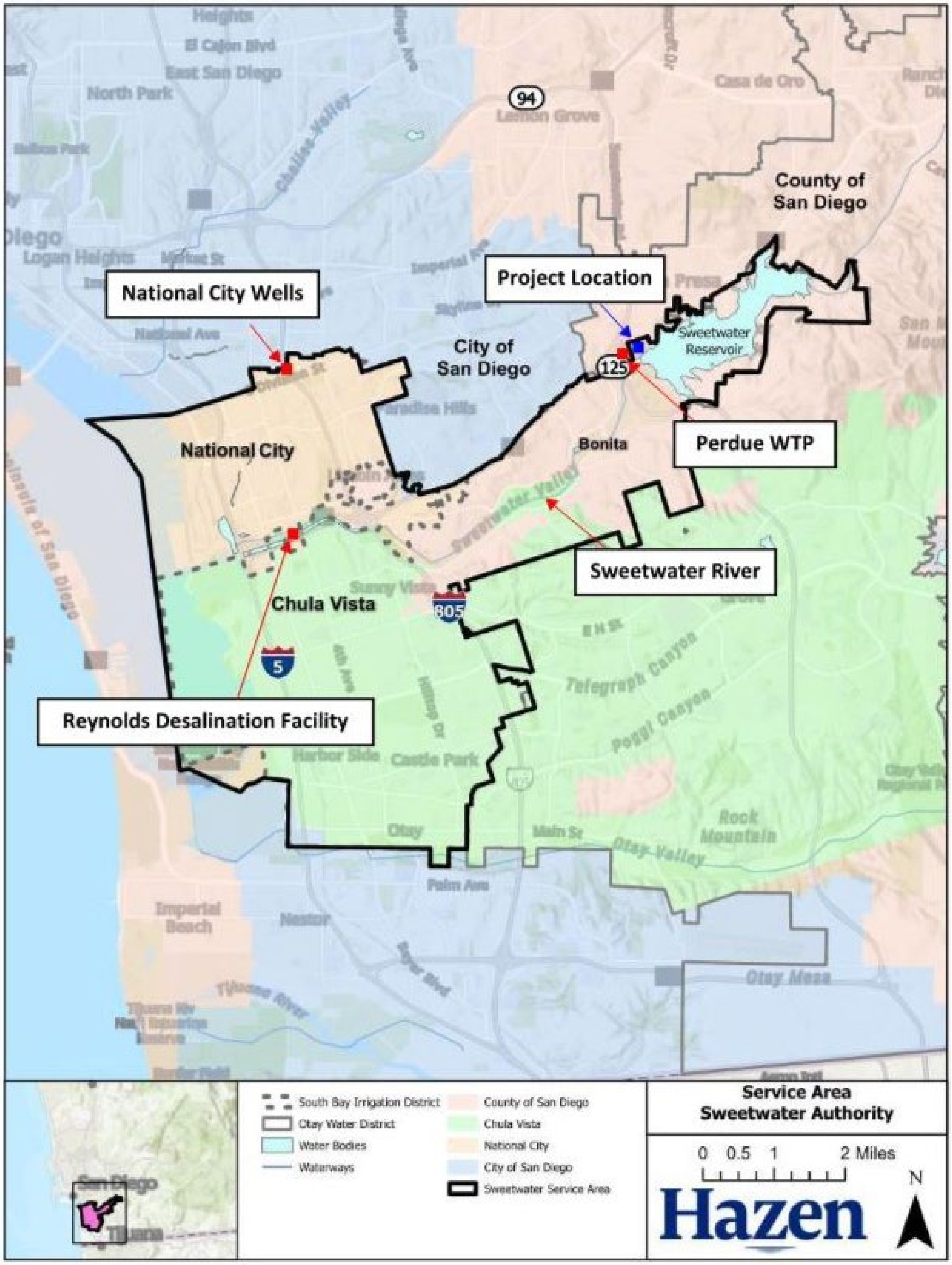
Chapter 2. Project Location

Sweetwater Authority is in arid Southern California and serves parts of southern San Diego County including the cities of Chula Vista, National City, and portions of Bonita, which are located just south of downtown San Diego. The proposed project site, shown in Figure 2, is located on the western edge of the Sweetwater Reservoir, just east of the Sweetwater Dam. Sweetwater Reservoir is in San Diego County seven (7) miles upstream from the San Diego Bay and is surrounded by the unincorporated communities of Spring Valley, Bonita and Sunnyside. The U.S. Fish and Wildlife Service (USFWS) San Diego National Wildlife Refuge is located east of the reservoir.

The closest highways to the reservoir are State Route SR-125 and SR-54 west of the Sweetwater Dam. Portions of Chula Vista and National City are located downstream from the reservoir.

The Land Use Map associated with the Sweetwater Community Plan and the Spring Valley Community Plan of the San Diego County General Plan designates the entire area surrounding Sweetwater Reservoir as Public Agency Lands. The project site lies within the Jamacha Land Grant on the U.S. Geological Survey (USGS) topographic map with the center point of the project area at 32.69281° North latitude and -117.00701° West longitude.

Figure 2 Project Location



Chapter 3. Project Description

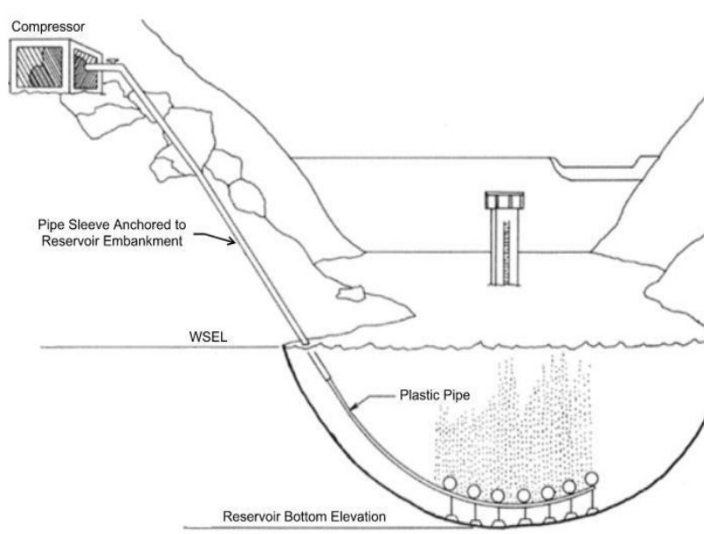
How the project was chosen. Sweetwater Authority is in the enviable position of possessing considerable local water supply assets, a result of farsighted planning and investment decisions by preceding and current generations of leadership. These assets include Loveland and Sweetwater Reservoirs, the Robert A. Perdue Surface Water Treatment Plant (Perdue WTP), the National City Wellfield, and the San Diego Formation Wellfield supplying the Richard A. Reynolds Groundwater Desalination Facility (Reynolds Facility). With imported supplies subject to continuing challenges and growing increasingly expensive, it became prudent to examine additional opportunities to maximize local water supplies and increase their value to Authority ratepayers. A 2020 Water Supply Feasibility Study examined various opportunities and used a fine screening process to make final recommendations on which project option presented the best prospect in terms of economics (including ratepayer expense) and non-cost benefits. Reservoir water quality improvement through the installation of a vertical mixing/destratification system in Sweetwater Reservoir topped this list.

Per the recommendation made in feasibility study, the Authority embarked on this project to improve stored water quality in Sweetwater Reservoir. A diffused aeration system will destratify the water column and improve the water quality challenges faced by the reservoir, including low-quality stormwater runoff, and taste and odor issues. In addition, water quality conditions have often resulted in conditions that constrain production from the Perdue WTP and prevent the local surface supply within the reservoir from being maximized.

Technical description of project. A diffused aeration system includes a linear diffuser consisting of a series of porous bubble tubes which are suspended just above the reservoir bottom, as shown in Figure 3. The planned system will supply a constant stream of air from onshore compressors and is designed to facilitate complete vertical mixing of stored water within the reservoir. As the hypolimnion (anoxic water) is brought to the surface, it mixes with the warmer epilimnion (surface water). Over time, this results in a constant temperature gradient with depth and prevents thermal stratification of the reservoir. The deeper water is exposed to atmospheric oxygen through the mixing action, leading to oxygenated water with uniform water quality throughout the reservoir.

By releasing compressed air at the bottom of Sweetwater Reservoir, the aeration system will induce vertical mixing, which will help maintain healthy levels of dissolved oxygen in the reservoir.

Figure 3 Diffused Aeration System



The conceptual design of the destratification system includes several on-land and under-water components. Figure 4 shows the overall layout of air piping on site, including two alternatives for the line diffuser. On land, two air compressors operated together will generate compressed air which will be stored in an air receiver tank. Air will be released at a constant pressure from the receiver tank to the edge of the reservoir through a buried air supply pipeline. The buried pipeline will be secured to the banks of the reservoir and descend to the deadpool water storage level where it will be attached to a buoyancy tank. The major infrastructure required are shown in Table 2.

Figure 4 Air Piping Layout

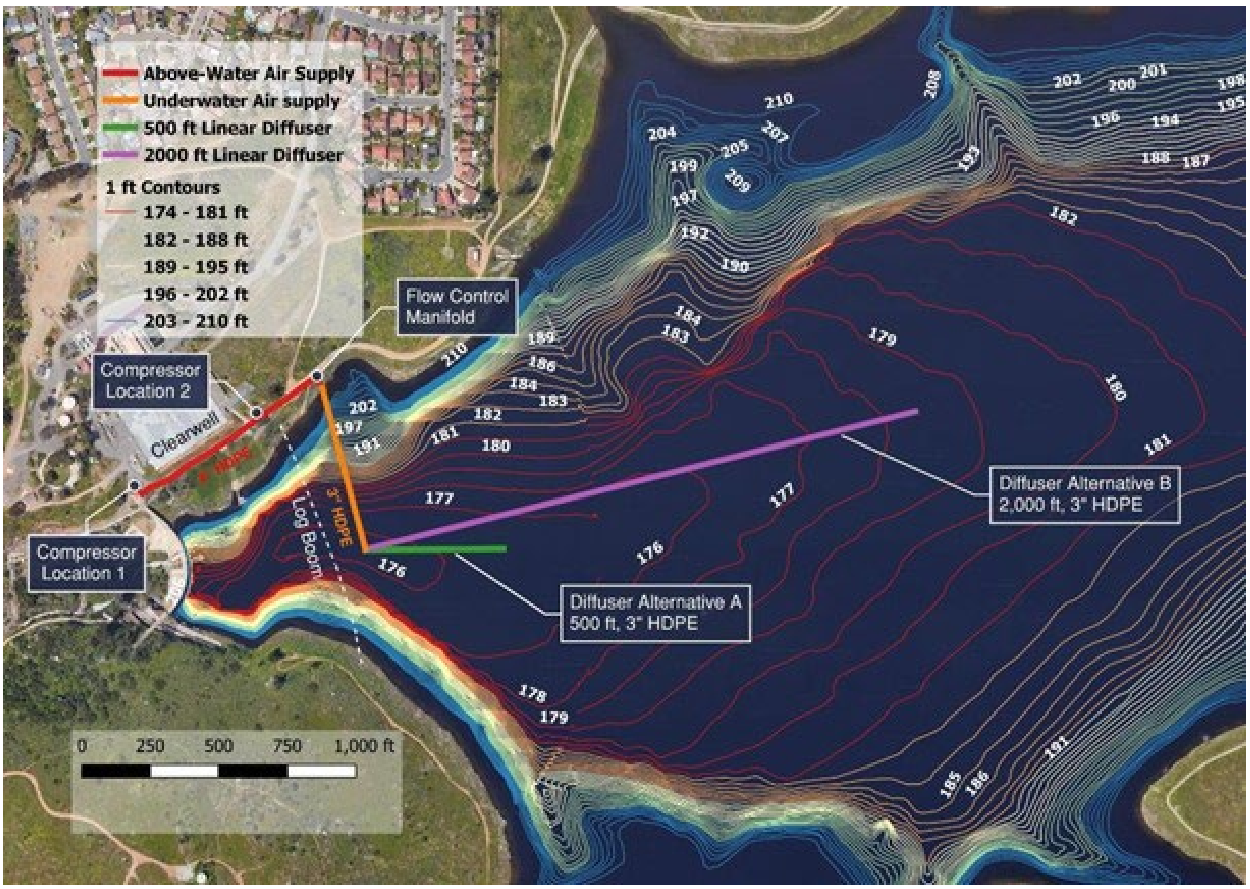


Table 2 Major Infrastructure Components

Infrastructure Component	Description
Air Compressors	On land, two (2) air compressors operated together in series, will generate compressed air, which will be stored in an air receiver tank. The diffuser system requires a total air flow of 680 standard cubic feet per minute (scfm), which will be provided with two 75 horsepower (HP) rotary screw air compressors.
Air Receiver Tank	The air receiver tank will ensure enough system volume is present to limit the number of loading/unloading cycles and prolong the life of compressor components.
On-Shore Compressed Air Supply Main	Air will be released at a constant pressure from the air receiver tank through a buried 4-inch HDPE air supply pipeline to the edge of the reservoir embankment. The air supply piping will transition above ground to a pad-mounted flow control manifold, where it will be secured to the banks of the reservoir down to the dead pool water storage level and attached to a buoyancy pipe.
In-Reservoir Air Supply Piping and Bubble Tube Line Diffuser	Within the reservoir, the 3-inch HDPE air supply pipeline and 4-inch HDPE buoyancy pipe run underwater to the start of the single line diffuser, just east of the log boom. The porous flexible line diffuser extends out into the reservoir 2,000 feet. The diffuser assembly is attached to concrete anchors with steel anchor cables approximately every 15 feet.

Project goals and objectives. A major goal of the Authority is to reduce its dependency on threatened imported supplies from SWP and CRA in the face of significant future water supply challenges, including:

- Compounding impacts of climate change and increased frequency/severity of droughts;
- Seismic vulnerabilities;
- Flow restrictions due to protection of endangered species;
- Overallocation of imported supplies; and
- Increasing costs of imported water.

Work to be Accomplished. The proposed new aeration and destratification system would involve the construction, installation and operation of a 2,500 foot air diffuser line, including 4-inch and 10-inch pipes connected to two 75 horsepower air compressors. Construction would occur over a period of approximately eight (8) months. It is estimated that the majority of this time would be for preparatory efforts and materials staging, with active construction taking as little as four weeks.

The footprint of the proposed compressors will be used as a secondary staffing area for piping and electrical conduit that would be used to develop the utility connections during the first phase of the project. This phase of construction would involve approximately 500 feet of trenching along the perimeter of the Perdue WTP. Following completion of the utility work, the paved pad located adjacent to the project site would be used to stage materials for the construction of the air compressors. The construction of the air compressors would begin with the construction of a retaining wall and minor grading to prepare a level concrete pad. The two air compressors would be constructed on top of this foundation and feed into the diffuser line.

Most of the aeration system piping would be underwater. The shoreside footings for the diffuser line would be permanent and buried in the ground. However, the underwater anchors could be removed if needed. The contractor would then install the diffuser line by floating the pipe bundle with the anchors attached. The line would then be sunk with the anchors, settling on the bottom of the reservoir.

Construction equipment is anticipated to consist of primarily light-duty equipment such as a skid steer loader and telehandler forklift. There is no substantial earthwork that would require soil hauling, so delivery truck trips are estimated to total less than 20.

Approach to Complete Work. To complete this work, the Authority has:

- completed a Project Design Report and final design plans and specifications;
- adopted and filed the Perdue Water Treatment Plant Site Facilities Master Plan Update;
- filed an addendum to the Environmental Impact Report (EIR) for the Perdue Water Treatment Plant Master Plan;
- prepared detailed capital cost estimate that is considered to be an Association for the Advancement of Cost Engineering (AACE) Class 2 level with an accuracy range of -15% on the low side and +20% on the high side. A 20% design contingency has been added to the estimate.

Once project permits are issued, the Authority will prepare and release bid documents to hire a contractor(s) for the construction of the project. The bid documents are tentatively planned for release in late spring of 2025, with a construction start date of no earlier than September 1, 2025.

Chapter 4. Applicant Category and Eligibility of Applicant

Sweetwater Authority is a Category A applicant.

Under the Irrigation District Law of the State of California (Division 11 of the Water Code), Sweetwater Authority was established when the South Bay Irrigation District and the City of National City amended and re-adopted a joint-powers agreement in 1977. The Authority is a publicly-owned water agency with policies and procedures established by a seven-member Board of Directors. The Sweetwater Authority Governing Board is composed of five (5) directors elected by division by the citizens of the South Bay Irrigation District, and two (2) directors appointed by the Mayor of National City, subject to City Council confirmation. Revenues are obtained entirely from water sales, fees for service, and returns on investments. The agency receives no tax revenues.

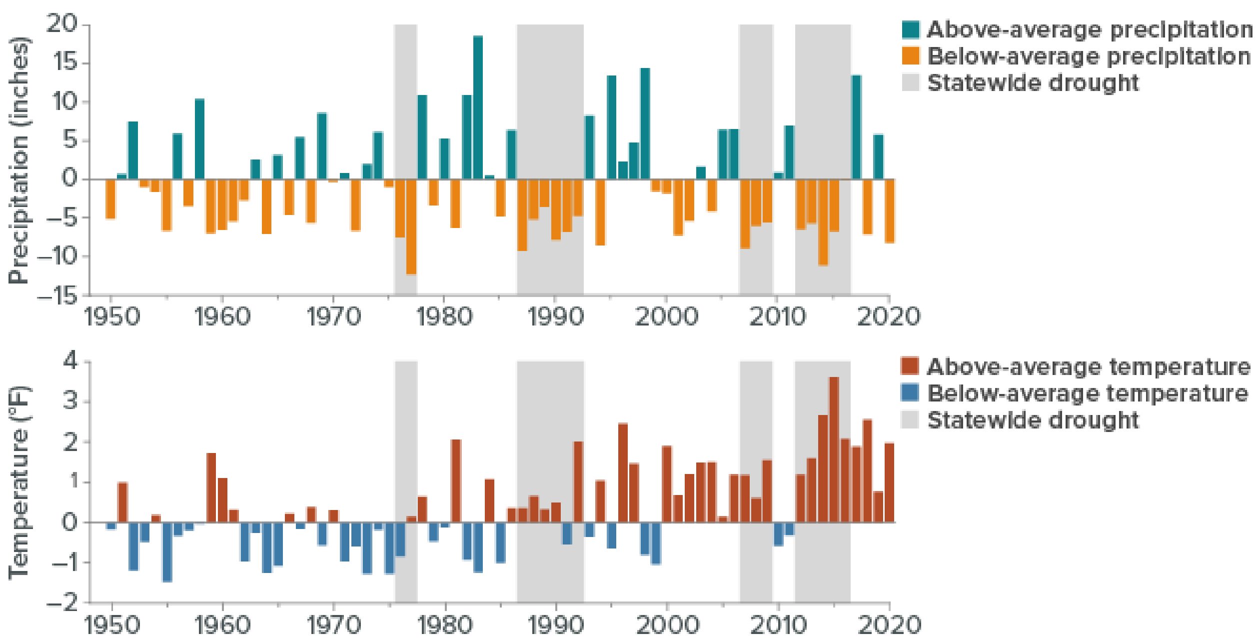
Chapter 5. Evaluation Criteria

A. Severity of Drought or Water Scarcity and Impacts

Frequent droughts in the Southern California region are a stark reminder of the challenges the Sweetwater Authority faces in managing its water resources amid climate change and population growth. Every drought period is marked by rising temperatures, reduced rainfall, and extended durations. The Sweetwater Authority service area climate is considered semi-arid with temperatures peaking at 85°F and annual rainfall averaging 13.5 inches.

Droughts are a recurring feature of California's climate and are arguably becoming progressively more severe with the impacts from climate change. In Figure 5, the upper graph shows below average precipitation in orange and above average precipitation in teal. Before 1950, California's precipitation was highly variable but driven by natural cycles. The area in orange shows the post-1950 frequency and intensity of below-average precipitation when modern climate change intensified this variability, leading to more frequent and severe weather extremes. In addition, temperatures shown in the lower graph show an even more significant trend toward above average temperatures, especially over the last decade.

Figure 5 Significant Droughts in California's History



Source: Western Regional Climate Center California Climate Tracker (2021)

The 2011-2017 drought was one of the driest periods in California's recorded history. During this prolonged period service area temperatures reached 106°F and rainfall was reduced to a record low of 6.6 inches. Fortunately, in calendar year 2013 the Authority was able to draw on local supplies to help serve the needs of its customers, including the withdrawal of 11,335 AF from Sweetwater Reservoir. Between 2014 and 2016, no draws were made from the reservoir.

As reservoir water levels decreased, the concentration of contaminants like total dissolved solids (TDS) increased. The reduced water quality made it difficult to treat the reservoir water to drinking water standards without costly and complex treatment processes. As a result, the Authority opted to rely more on imported water rather than withdrawing water from the reservoir. This decision helped ensure that the water provided to customers remained safe and of high quality. This project will rectify this limitation, supplementing critical and affordable local supplies during droughts or limited availability of imported water.

The proposed project would improve water quality and increase the yield of treatable water from the reservoir, benefitting the Authority's entire service area of approximately 200,000 residents. According to the Climate and Economic Justice Screening Tool (CEJST), 157,558 or 78% of these residents live in disadvantaged communities. Further discussion of the proposed project's benefit to disadvantaged communities is included in Section E.

In addition to reservoir water quality concerns, recent droughts and continuous dry conditions have other significant impacts on the Sweetwater Authority and its customers:

- **Reduced Local Reservoir Levels.** Droughts severely reduce inflows to the Sweetwater and Loveland Reservoirs, which are critical sources of water for the Sweetwater Authority. During these times reservoir levels dropped to historic lows, prompting the Authority to rely more heavily on imported water supplies from the SWP and CRA.
- **Groundwater Supply Stress**. Drought puts stress on local groundwater supplies. Sweetwater Authority must closely manage its wells in the National City and Chula Vista groundwater basins to avoid over-extraction, causing long-term and often irreversible damage to the aquifers. This damage includes land subsidence, reduced storage capacity, saltwater intrusion, surface water degradation and slow or limited recharge recovery time.
- **Mandatory Water Restrictions.** In response to past droughts, the Authority implemented mandatory water use restrictions. Customers who did not meet reduction targets were penalized with surcharges. Restrictions and prohibitions on end users included:
    - Limiting residential and commercial landscape irrigation to certain days and hours.
    - Restricting water use for decorative water features and the refilling of pools.
    - Prohibiting use of potable water for washing hard surfaces.
    - Prohibiting vehicle washing except at facilities using recycled water recycled or recirculating water.
- **Revenue Reductions.** Reduced water sales due to conservation efforts during severe drought periods resulted in reduced revenue to the Authority. To address this, the Authority was forced to implement rate increases to ensure the continued maintenance of the water system.
- **Imported Water Rate Increases.** The Authority has faced significant increases in the cost of imported water purchased from the SDCWA over the past decade. SDCWA's rates will increase by 14% in Fiscal Year 2025, followed by even larger increases projected for 2026 and 2027. These future increases are on top of cumulative increases of nearly 27% since 2020. SDCWA's cost increases are expected to continue into the future due to climate change, inflation, debt service, and rising wholesale water costs from MWD.

If the proposed project is not completed, the Sweetwater Authority could face:

- **Environmental Consequences**. Droughts lead to significant environmental stress on natural water resources in San Diego County, including the depletion of rivers, streams and lakes, and groundwater. These conditions result in habitat loss, fish population declines, disruption to avian migratory patterns, wildlife migration and mortality, the loss of native plant species and coastal erosion.
- **Significant Economic Costs.** As the cost of imported water continues to rise, major industries in the Authority's service area will suffer including agriculture, tourism, and construction. A significant concern is the impact to disadvantaged ratepayers, for which 78% of the Authority's service area falls within the definition of disadvantaged.
- **Groundwater Policy Changes.** California passed the Sustainable Groundwater Management Act (SGMA) in 2014, aimed at managing and protecting groundwater resources more effectively. While Sweetwater Authority does manage groundwater resources in the Sweetwater River Watershed, during times of drought, the groundwater basin is classified as a low-priority basin under SGMA. This designation is subject to change over time as factors like drought, population growth and changes in land use affect the sustainability of the basin.

B. Project Benefits

B.1. Project Benefits

A 2020 feasibility study identified an aeration/destratification system in Sweetwater Reservoir as the best opportunity to enhance local supplies by an estimated 1,790 AFY, thereby reducing the Authority's reliance on imported supplies. Furthermore, the aeration system is expected to have other co-benefits that will improve water quality in the reservoir. Aeration/destratification will reduce the amount of manganese, iron, and phosphorous released from the sediment and increase dissolved oxygen distribution in the water column. The oxygenation and agitation in the water column will reduce algal blooms, as algae typically prefers stratified conditions. The aeration-induced reduction in dissolved inorganic constituents and algal blooms is anticipated to lessen required treatment intensity and improve finished water quality, thus reducing treatment costs and improving customer satisfaction with finished water taste and odor.

As part of its 2023 Water Resources Master Plan, the Authority conducted a supply assessment to estimate the availability and use of the Authority's existing water supply sources. The assessment was conducted using projected water demands between 2025 and 2045 under the hydrologic scenarios shown in Table 3. The assessment concluded that by 2045, if there is no further development of local water supply sources, average annual imported water purchases could range between 4,246 AFY and 7,843 AFY. Maximum annual imported water purchases could exceed 9,000 AFY under extremely dry hydrologic conditions.

Table 3 Average Annual Imported Water Purchases Without Project (AFY)

	2025	2030	2035	2040	2045
Normal conditions	2,514	2,383	2,824	3,404	4,246
Single Dry Year	5,954	5,849	6,321	6,941	7,843
5 Consecutive Dry Years	4,976	4,844	5,442	6,712	7,690
10 Consecutive Dry Years	4,151	4,308	4,866	5,593	6,447

Without this project, the Authority faces the continued purchase of increasingly expensive imported water. At 2023 prices, the project water yield would be 264% less expensive than imported water.

More project benefits are discussed in the ***italicized*** sections below.

Quantity of additional supply. The estimated project yield with aeration is 1,790 AF in a typical hydrological year based on average historical blend ratios (the percentage of imported water in the total treated water flow leaving Perdue WTP) from 2017 to 2022. Under current reservoir conditions, as reservoir levels decrease, the required blend ratio increases. This is because water quality tends to degrade as the reservoir level drops. After implementation of the proposed project, the improved water quality will be consistent at all reservoir levels. Therefore, use of reservoir water will be based on total available storage. Under these improved conditions, local supplies will be of higher quality and blending with imported water will not be required.

Percentage of total water supply by the project's yield. The proposed project will yield 1,790 AFY, equivalent to 10% of the Authority's average annual supply needs.

Table 4 Project Yield

Total Project Water Yield (AFY)	**1,790**
Average Annual Water Supply (AFY)	**17,466**
Percentage Yield	**10%**

The project will build long-term resilience to drought and other water supply reliability issues. Implementing an aeration and destratification system in a reservoir can significantly enhance long-term resilience to drought through several mechanisms as detailed below. Overall, the implementation of such a system in Sweetwater Reservoir will contribute to a more resilient and sustainable water supply, better equipped to handle the challenges posed by prolonged drought conditions. In addition, stable water quality enhances supply predictability for operations. This will allow water managers to better predict and plan for water supply needs, creating greater operational flexibility.

<u>Improved Water Quality</u>

Oxygen Distribution: Aeration ensures that oxygen is evenly distributed throughout the water column. This prevents the formation of anoxic (oxygen-depleted) zones, which can lead to the release of harmful substances like hydrogen sulfide and metals from the sediment.

Reduction of Algal Blooms: Stratified reservoirs often have warm, nutrient-rich upper layers conducive to algal blooms, including harmful cyanobacteria. Aeration disrupts stratification, reducing the conditions favorable for algal growth and thus maintaining better water quality. In addition, the need for emergency interventions such as additional treatment, supply interruptions, temporary shutdowns or costly remediation will decrease.

Improving water quality is a fundamental and unequivocal priority because access to clean water is essential for public health, environmental sustainability, economic well-being and social equity. Ensuring that water is free from contaminants and pollutants is not just a matter of preference but a necessity.

<u>Enhanced Water Storage</u>

Minimized Evaporation: By preventing thermal stratification, the system helps maintain a more uniform temperature across the reservoir, reducing the rate of evaporation. This is particularly important during drought conditions when water conservation is critical.

Maximized Usable Water Volume: Aeration and destratification make more of the water in the reservoir usable by maintaining water quality throughout the entire water column, rather than just the upper layers. This increases the effective storage capacity of the reservoir.

<u>Increased Biological Health</u>

Support for Aquatic Life: Consistent oxygen levels throughout the reservoir support a healthier aquatic ecosystem, which can be more resilient to the stresses of drought.

Prevention of Fish Kills: By preventing low-oxygen conditions, aeration systems reduce the risk of fish kills, which can otherwise disrupt the reservoir's ecological balance and water quality.

Less reliance on brackish groundwater wells. Optimizing Sweetwater Reservoir's water quality and increasing production at the Perdue WTP will allow the Authority to be less reliant on their brackish groundwater wells and the Reynolds Desalination Facility, which would both reduce costs and provide ecological benefit as it would reduce the extent of pumping and thus minimize the effects of potential seawater intrusion in the SDF aquifer.

<u>Operational Flexibility</u>

Better Management During Low Levels: With improved water quality and reduced stratification, water managers can draw from different levels of the reservoir more effectively, providing more operational flexibility during droughts.

Adaptability to Climate Change: As droughts become more frequent and severe due to climate change, the ability to maintain consistent water quality and quantity through aeration and destratification will be increasingly important for long-term resilience.

Sustained Water Supply

Prolonged Reservoir Life: By maintaining water quality and preventing the buildup of harmful substances, the aeration system can extend the lifespan of the reservoir as a viable water source, ensuring a more reliable supply during periods of drought.

Project benefits lifetime. The benefits of an aeration and destratification system in Sweetwater Reservoir can be immediate, resilient, and long-lasting. Table 5 provides a breakdown of the potential longevity of these benefits.

Table 5 Project Benefits Lifetime

Benefit Category	Description
Immediate Benefits	**Water Quality Improvement:** The positive impact on water quality, such as increased oxygen levels and reduced risk of harmful algal blooms, can be observed quickly after the system is installed. These benefits are typically sustained as long as the system is operational.
Medium-Term Benefits (5-15 years)	**Sustained Ecosystem Health:** Over several years, the system will help maintain a healthy aquatic ecosystem, reducing the likelihood of invasive species and promoting a balanced environment. This can have lasting positive effects on the reservoir's overall ecological health. **Enhanced Water Storage:** The system's ability to reduce stratification and improve water quality will continue to maximize the usable volume of the reservoir, aiding in water conservation and management, especially during drought periods.
Long-Term Benefits (15-30+ years)	**Prolonged Reservoir Viability:** If the system is well-maintained, the reservoir's ability to provide high-quality water can be extended for decades. This contributes to the long-term sustainability of the water supply, especially in regions prone to drought. **Climate Change Adaptation:** Over the long term, as climate change leads to more frequent and severe droughts, the aeration and destratification system will be increasingly valuable in maintaining water quality and availability.
Maintenance and Upgrades	**System Longevity:** The lifespan of the system itself can range from 15 to 30 years or more, depending on the technology used, the quality of installation, and ongoing maintenance. Components like diffusers, compressors, and control systems may require periodic upgrades. **Operational Costs:** While the system can provide long-term benefits, ongoing operational costs (energy consumption, maintenance, etc.) must be factored into its longevity. Regular maintenance is essential to avoid system degradation.

Qualitative description of the degree/significance of the benefits associated with the additional water supplies. The degree and significance of the benefits provided by an aeration and destratification system in Sweetwater Reservoir are substantial, with far-reaching implications for water quality, ecosystem health, and long-term resource management. Qualitative benefits include:

- High impact on water quality
- Essential for ecosystem health
- Significant enhancement of water storage capacity
- Crucial for drought resilience
- Major role in climate change adaptation
- Long-term operational benefits
- Enhanced operational flexibility

The project's impact on water quality, ecosystem health, and drought resilience is profound, making it an essential investment in the long-term viability of the reservoir as a key water resource. The significance of these benefits is underscored by their direct influence on public health, environmental stability, and regional water security.

The project will help buffer against water shortages, reduce the need for emergency responses and enhance the resilience of the water system. An aeration and destratification system in Sweetwater Reservoir can play a crucial role in buffering against water shortages, reducing the need for emergency responses, and enhancing the overall resilience of the water system.

The project will buffer against water shortages by ensuring a larger portion of the reservoir's storage is available during periods of drought or low inflow. The aeration/destratification system will ensure consistently high water quality throughout the reservoir, thereby maximizing usable water volume. The system will also maintain a more uniform temperature across the water column, reducing evaporation.

The project will reduce the need for emergency responses by stabilizing water quality. The risk of water quality issues from harmful algal blooms, anoxic conditions and the release of toxic substances from sediment will significantly decrease the need for emergency interventions such as additional treatment, temporary shutdowns or costly remediation. In addition, stable water quality enhances supply predictability for operations. This will allow water managers to better predict and plan for water supply needs, creating greater operational flexibility.

The project will enhance the resiliency of the Authority's water system. The water system will adapt to climate variability by maintaining water quality under changing conditions. In turn, this supports ecosystem health and, thus, a system that is better able to recover from sudden climate changes. The project will also prolong the reservoir's lifespan and storage capacity by preventing sediment buildup and reducing hypoxic conditions.

The project will reduce stress on the region and distant watersheds. The reduced need for imported water during a drought emergency will reduce stress on the region as well as on SWP and CRA watersheds that are vying for imported water during emergencies.

B.2. Project Benefits (Task C projects only)

Not applicable.

B.3. Additional Project Benefits

Water Treatment Plant Cost Savings. The maintenance of healthy dissolved oxygen levels in Sweetwater Reservoir will reduce treatment costs by approximately $27 per acre foot as shown in Table 6. These cost savings arise primarily from reduced power and chemical consumption at the Perdue WTP.

Table 6 Projected Net First-Year Unit Costs of Proposed Project

System/Attribute	Aeration/Destratification
Capital costs	$1.2 million
Annual OMRR*	$120,000/year
First-Year Unit Cost**	$24/AF
Avoided Costs	($27/AF)
Net First-Year Unit Costs (Benefits)	($3/AF)

* Operations, Maintenance, Repair and Replacement
** Capital costs amortized over 30 years at *i* = 3.0%/yr.

In addition to the direct cost savings at the Perdue WTP, the aeration and destratification system would provide valuable non-monetary improvements. These include:

Reduced Greenhouse Gas (GHG) Emissions. The amount of energy required to transport water over long distances depends on several factors, including distance, elevation changes, water volume and friction/resistance. Imported water from the CRA travels 242 miles to Sweetwater Authority, while water from the SWP travels nearly 600 miles. By avoiding the need for 1,790 AF of imported water, the Authority would reduce its GHG emissions from the CRA by up to 1,000 metric tons of CO_2e per year (1,790 AF X 0.56 MT/AF) and from the SWP by 2,600 metric tons (1,790 AF x 1.45 MT/AF).

Reduced Nitrification: Elevated levels of nitrates in water can pose health risks as well as taste and odor issues. The aeration and destratification system will result in better disinfectant residual stability, reducing nitrification problems in the distribution system and thereby further protecting distribution system water quality. Reduced nitrification also produces direct cost savings resulting from the reduced need to purge storage tanks.

Consumer Confidence: The improvements would reduce colored water and taste and odor complaints, leading to improved consumer confidence in the Authority's product.

303(d) Impaired Water Body De-Listing: The improvements provide a pathway for removal of the reservoir from the Regional Water Quality Control Board's list of impaired water bodies (Clean Water Act Section 303(d) designation).

More Reliable Emergency Storage Reserve: Reserved storage in Sweetwater Reservoir is an important component of the Authority's emergency supply reliability planning. For the stored water to serve its intended function, it is essential that the quality of the water be maintained at treatable levels at the Perdue WTP as a sole source of supply, without blending with more costly SDCWA water. Under current conditions, the ability to treat a 100 percent supply of reservoir water at the plant cannot be guaranteed. A system to maintain healthy levels of dissolved oxygen in the reservoir would improve the reliability of the stored water as a source of emergency supply.

In addition, during extended dry periods, the TDS content of the stored water can increase to levels above secondary drinking water standards. Because the treatment plant is not equipped to remove dissolved solids, the only available means to mitigate this effect is to blend SDCWA raw water at the Perdue WTP with water pumped from the reservoir. With a system in place to maintain organic water quality, this blending would be minimized, and the stored water would remain available for its intended use.

B.3.a. Climate Change

As the West is projected to see increasingly severe effects of climate change, the benefits of this project are going to have similarly increased importance. In this section the degree to which the project addresses climate change impacts and increases resilience and adaptation is discussed. The addition of a diffused aeration system is a vital tool for directly mitigating some of the impacts of climate change including:

Mitigating Increased Temperatures. As average and yearly high temperatures continue to increase, so does the rate of evaporation. The aeration/destratification system will keep a continuous water temperature throughout the reservoir, lowering the rate of evaporation.

Improving Water Quality/Mitigating Pollution. In addition to managing temperature, the system will improve the destratification of the water column, dispersing nutrients and mitigating low-quality stormwater runoff. The process will also reduce the risk of dangerous algae blooms, which have become more common in facing climate change. Anoxic conditions and toxic substance releases from abundant sediment will be significantly reduced.

Protecting Water Sources. By increasing the quality and reliance on local water sources, the Authority is able to reduce dependence on imported water from the SWP and the CRA. In doing so, the project helps to protect both local waters and imported water sources other communities and ecosystems rely on.

Reduction in Greenhouse Gas Emissions. Aeration can help reduce the production of methane, a potent GHG, which is often generated in anaerobic conditions at the bottom of reservoirs. By introducing oxygen, aeration systems can mitigate these anaerobic conditions and thus reduce methane emissions.

Enhanced Carbon Sequestration. Aeration can promote the growth of aerobic microorganisms that can enhance the breakdown of organic matter. This process can lead to more stable forms of carbon being sequestered in the sediment, rather than being released as carbon dioxide or methane into the atmosphere.

B.3.b. Ecological Benefits

The project goal of improving water quality and strengthening local water supplies is not solely for the benefit of human communities, but also for multiple ecosystems and the species living within them. This section describes the extent of the ecological benefits from project implementation.

Ecological Resilience. As described above, the addition of an aeration system has a beneficial effect on water quality. Emergency scenarios, such as algae blooms and anoxic conditions, are becoming more frequent and severe in many areas due to climate change. By significantly reducing the risk of these devastating events, the project builds stronger ecological resilience, protecting local wildlife and endangered species. Furthermore, it reduces the need to dose the reservoir with chemicals for algal control that can have harmful environmental impacts.

Quagga Mussel Control. Since 2009, Sweetwater Reservoir has seen impacts from quagga mussels, an aquatic invasive species that poses a threat to the abundance, health and diversity of native aquatic species. Removing quagga mussels is very expensive and time consuming. Once these mussels are established, they are almost impossible to eradicate. The Authority is required by the CDFW, through the Sweetwater Authority Quagga Mussel Monitoring and Control Plan, to implement strategies to control the spread of quagga mussels within the reservoir and in critical infrastructure at the Perdue WTP. The Authority's primary quagga mussel control strategy in Sweetwater Reservoir is to maintain thermal stratification, which currently limits the spread of quagga mussels due to anoxic conditions near the bottom sediment of the reservoir. An updated Quagga Mussel Monitoring and Control Plan was developed and will be implemented with the proposed aeration/destratification system to minimize the proliferation of quagga mussels.

Reduction of Algal Blooms: Aeration helps to increase the oxygen levels in the water, which can inhibit the growth of harmful algae by disrupting their preferred low-oxygen conditions. This can lead to a reduction in the frequency and severity of algal blooms.

Improved Water Quality: By increasing oxygen levels, aeration can enhance the overall water quality. Higher oxygen levels can support the breakdown of organic matter and reduce the levels of harmful substances such as ammonia and hydrogen sulfide.

Removal from the 303(d) List of Impaired Water Bodies: The improvements provide a pathway for removal of the reservoir from the Regional Water Quality Control Board’s list of impaired water bodies (Clean Water Act Section 303(d) designation).

Enhanced Aquatic Life: Aeration can create a more hospitable environment for fish and other aquatic organisms by maintaining higher oxygen levels throughout the water column. This can lead to a more balanced and healthy ecosystem.

Reduction of Odors: Aeration can help to reduce unpleasant odors associated with stagnant water and the decomposition of organic matter. This is particularly beneficial for reservoirs located near residential areas.

Prevention of Stratification: Aeration can help to prevent thermal stratification, where layers of water at different temperatures form and do not mix. This can lead to more uniform water temperatures and oxygen levels, which can be beneficial for aquatic life and water quality.

Decreased Sediment Accumulation: By promoting the breakdown of organic matter and reducing the accumulation of sediments, aeration can help to maintain the depth and capacity of the reservoir.

Mitigation of Toxins: Some algal blooms produce toxins that can be harmful to both aquatic life and humans. By reducing the occurrence of these blooms, aeration can help to mitigate the presence of these toxins in the water.

Support for Beneficial Bacteria: Aeration can promote the growth of aerobic bacteria, which are beneficial for breaking down organic pollutants and improving water clarity.

B.3.c. Other Benefits

Additional project contributions to water sustainability include:

Benefits accrue to all customer sectors. The Sweetwater Authority's water distribution system benefits all customers in all sectors including single-family residential (38% of total water use), multi-family (33%), commercial/industrial (22%), and institutional and governmental (7%). All system improvements will enhance reliability for the service area's more than 200,000 customers.

Benefits address larger sustainability initiatives. California has implemented a broad range of sustainability initiatives aimed at addressing climate change, conserving natural resources, and promoting environmental stewardship. In Southern California, initiatives that address environmental challenges specific to the region include conservation, recycling, groundwater replenishment, pure water and stormwater capture. The project is part of a broader strategy to ensure a sustainable and reliable water supply for its growing population while addressing the region's unique environmental challenges.

Educational Opportunities. These projects can provide educational opportunities for community members, particularly young people, to learn about water conservation, environmental science, and sustainable practices. This can inspire future generations to value and protect their natural resources.

Enhanced Recreational Opportunities. The 500-acre Sweetwater Summit Regional Park, adjacent to Sweetwater Reservoir, offers modern campsites, play areas, an exercise course, picnic areas, a community room, an outdoor amphitheater and fishing at the reservoir. In addition, cyclists and equestrians can enjoy 15 miles of trails that meander up and down the summit through open grasslands and along streamside vegetation. Overall reservoir health is key to the public's enjoyment of these facilities.

Quality of Life. Access to a reliable water supply can significantly enhance the overall quality of life for community members. This includes the convenience of having water readily available, the aesthetic and recreational benefits of well-maintained water sources, and the general sense of security that comes with knowing that water needs are met.

Social Cohesion. Working together on local water projects can strengthen community bonds and foster a sense of collective responsibility and cooperation. This can lead to improved social cohesion and a stronger sense of community identity.

Community Resilience. Local water supply projects can enhance the resilience of communities by providing a reliable source of water during times of scarcity, such as droughts or emergencies. This can reduce the vulnerability of the community to external shocks.

C. Planning and Preparedness

The Authority prepares a variety of drought-focused plans that consider the effects of climate change and outline drought response actions. These long-term planning documents and strategies assesses the reliability of the Authority's water service to meet existing and future demands under various demand scenarios. In addition, these plans include:

- Assessment of seismic risk to water system facilities or multi-hazard mitigation plans.
- Energy use reporting.
- Water loss reporting.
- Preparation or update of a water shortage contingency plans.
- Coordination of groundwater supplies and groundwater sustainability plans.
- Preparation or update of drought response plans that establish drought levels and the actions required by each level.
- Demand reduction methods including restrictions, prohibitions and monetary penalties.

The Sweetwater Reservoir Aeration/Destratification System Project is supported by long-term planning documents and strategies designed to meet the Authority's goal of diversifying its supplies to maximize reliability and minimize cost to consumers. A synopsis of a key document that specifically identifies the project is discussed here.

Sweetwater Authority 2023 Water Resources Master Plan (WRMP). The 2023 WRMP update was conducted in response to the frequency and severity of recent drought events. It serves as the foundational document for projecting the Authority's future water supply reliability and evaluating the efficacy of potential water supply project alternatives in the service area.

The Authority adopted its first Water Resources Master Plan (WRMP) in 2003 and updated it in 2008. The WRMP was supplemented with data from UWMPs in 2010, 2015, and 2020, as well as from the 2020 Water Supply Feasibility Study. Development of the 2023 WRMP began in 2022. After internal review and public comment, the final version was adopted by the Authority's Governing Board in 2024.

The motivation behind this plan update was a collective desire to diversify local water supplies, increase resiliency, and reduce costs for Sweetwater Authority customers amidst the escalating expenses and potential reliability risks associated with imported supplies. The mounting frequency and severity of drought conditions underscore the urgency of this endeavor, prompting the exploration of opportunities for expanding and developing new local water supplies. With a focus on key objectives, the Authority assessed the existing system's reliability under extended drought scenarios, evaluated new or expanded local supply alternatives, and identified cost-effective, reliable initiatives for future planning and design. This forward-thinking approach positions Sweetwater Authority at the forefront of sustainable water management, ensuring resilience in the face of a dynamic and uncertain future.

The WRMP addresses three primary planning objectives:

- Assessment of the reliability of the Authority's existing water supply system using updated demand projections and under a variety of plausible hydrologic scenarios, including those reflecting extended drought conditions.
- Evaluation of the efficacy of new and/or expanded local supply projects.
- Identification of cost-effective, reliable projects to move forward for more detailed planning and/or design.

The plan update was developed by Authority staff with the assistance of professional consultants. The updated WRMP document went through thorough review by the Authority's Governing Board and was accepted in September, 2024.

The updated WRMP specifically identifies the proposed project in Section 6.1 titled, *"Yield Improvements from Sweetwater Reservoir Aeration/Destratification System"*. The project was prioritized out of a field of water supply alternatives based on its direct cost savings and the valuable non-monetary water quality improvements discussed in Section B. Project Benefits. Section 6.1 of the 2023 WRMP is attached to the grant application.

The environmental assessment for the proposed aeration and destratification system project, including Addendum No. 1 to the Environmental Impact Report for the Robert A. Perdue Water Treatment Plant Master Plan for Future Facilities, was presented during two public meetings: the Water Quality Committee on August 19, 2024, and a Special Board Meeting on August 26, 2024. Comments were received from community members during the Special Board Meeting. In addition, Sweetwater Authority met with the California Department of Fish and Wildlife to discuss the project, project benefits, and permitting needs.

Agencies and stakeholders were notified via email of the proposed project's environmental review, and input was requested from all listed stakeholders. This includes:

Federal, state and local agencies:

- California Department of Transportation District 11
- California State Water Resources Control Board
- San Diego Regional Water Quality Control Board
- California Department of Fish and Wildlife, South Coast Region
- California Office of Historic Preservation
- Native American Heritage Commission
- Otay Water District
- San Diego Association of Governments
- San Diego County Planning
- San Diego County Parks and Recreation
- San Diego National Wildlife Refuge
- Bonita-Sunnyside Fire Protection District
- Sycuan Band of Kumeyaay Nation
- U.S. Army Corp of Engineers, Regulatory Division, South Coast Branch, San Diego Section
- U.S. Fish and Wildlife Service, Carlsbad Office
- U.S. Geological Survey, Western Ecological Research Center

Recreation Groups:

- Bonita Road Runners
- Bonita Valley Horsemen
- San Diego Mountain Bike Association

HOAs and Planning/Community Groups:

- Spring Valley Community Planning Group
- Sweetwater Community Planning Group
- Sweetwater Valley Civic Association
- Valle de Oro Community Planning Group

D. Readiness to Proceed and Project Implementation

To complete this work, the Authority has:

- completed the engineering and conceptual design for the aeration system;
- adopted the Perdue Water Treatment Plant Site Facilities Master Plan Update;
- filed an addendum to the Environmental Impact Report (EIR) for the Perdue Water Treatment Plant Master Plan;
- prepared a detailed capital cost estimate that is considered to be Association for the Advancement of Cost Engineering (AACE) Class 2 level with an accuracy range of -15% on the low side and +20% on the high side. A 20% design contingency has been added to the estimate.

Once project permits are issued, the Authority will prepare and release bid documents to hire a contractor(s) for the construction of the project. Permitting, design, bidding and construction schedules are shown in Table 7. Required permits are shown in Table 8.

Table 7 Project Implementation Schedule

Milestone / Task / Activity	Planned Start Date	Planned Completion Date
Environmental Clearance/Permits	**7/3/23**	**8/18/25**
Prep Environmental Document	7/3/23	8/27/24
Certify Environmental Document	8/28/24	8/28/24
Regulatory Permits	8/28/24	8/18/25
Design and Bidding	**7/3/23**	**10/8/25**
90% Design	7/3/23	8/25/23
100% Design	8/28/23	8/23/24
Advertisement	9/2/25	9/29/25
Bid Review	9/30/25	10/7/25
Award Contract / Board Approval	10/8/25	10/8/25
Construction	**10/8/25**	**4/16/26**
Execute Contract	10/8/25	10/28/25
Construction	10/30/25	4/15/26
Completion	4/16/26	4/16/26

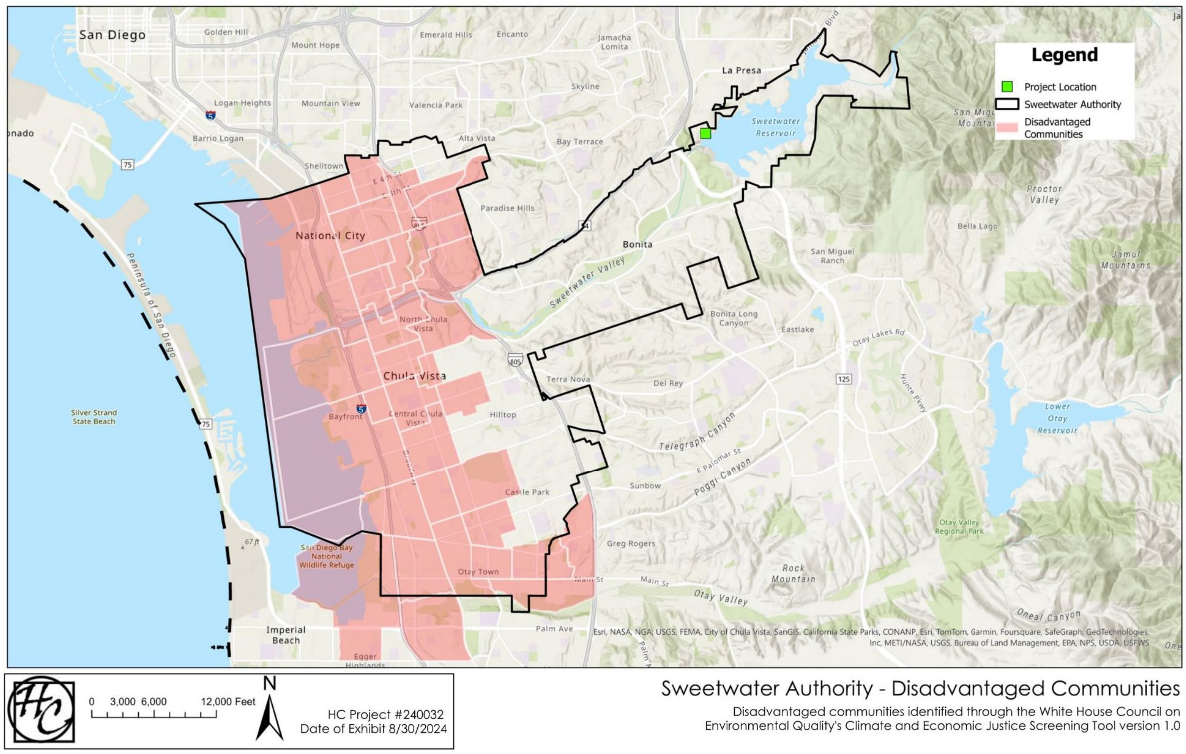
Table 8 Required Permits and Approvals

Agency	Permit/Approval Title	Status
Sweetwater Authority Governing Board	Approval of Perdue Site Facilities Master Plan Update	Completed August 26, 2024
California State Clearinghouse	EIR amendment to Perdue Master Plan	Completed August 26, 2024
California State Water Resources Control Board, Division of Drinking Water	Amendment to Authority's Drinking Water Permit	Permit amendment application submitted
California Natural Resources Agency	California Environmental Quality Act (CEQA) determination	Completed August 26, 2024
San Diego Regional Water Quality Control Board	Clean Water Act Section 401 Certification	Permit application submitted
U.S. Army Corp of Engineers	Clean Water Act Section 404 Certification	Permit application submitted
California Department of Fish and Wildlife	Lake and Streambed Alteration Agreement	Permit application submitted

E. Presidential and Department of the Interior Priorities

The proposed project directly benefits disadvantaged communities within the Sweetwater Authority service area. According to the Climate and Economic Justice Screening Tool (CEJST), 157,558 or 78% of the Authority's 200,000 residents live in disadvantaged communities. Figure 6 shows the project location in the northeastern corner of the Authority's service area near Sweetwater Reservoir (green square). The proposed project will provide locally sourced water from the reservoir for distribution to the densely populated, disadvantaged sectors to the west (shown in salmon).

Figure 6 Sweetwater Authority Disadvantaged Communities



This locally sourced water will be far less expensive than imported water from SDCWA, as shown in Table 9. This aligns with Sweetwater Authority's goal of keeping water affordable for customers in its service area.

Table 9 Water Supply Costs by Source

Water Source	Average Cost per Acre Foot*
Treated Sweetwater Reservoir Water at Perdue WTP	$506
Groundwater from National City Wells	$338
Treated Brackish Groundwater at Reynolds GDF	$561
SDCWA Imported Water	$1,338

*Costs are from September, 2023

F. Nexus to Reclamation

Reclamation plays a crucial role in the management and development of the Colorado River, which is one of the most important water sources in the western United States. The Colorado River is a key resource for water supply, irrigation, hydroelectric power, and recreation across seven U.S. states (Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming) and two Mexican states (Baja California and Sonora).

Water used in the Sweetwater Authority's service area comes from various sources including imported water from the Colorado River. Imported water delivered to the Authority from SDCWA can either be purchased as treated water or as untreated water, with treatment at the Authority's Perdue WTP. The percentage of local to imported water can vary greatly year to year due to local rainfall amounts. However, it is estimated that the proposed project will offset the need for up to 1,790 AF of imported water supplies from the Colorado River.

SDCWA receives water from the Colorado River through a combination of water transfer agreements and delivery infrastructure. SDCWA secures and receives its Colorado River water through:

- **Colorado River Water Transfer Agreements** including the 2003 Quantification Settlement Agreement (QSA), a landmark water transfer agreement with the Imperial Irrigation District, and the All-American Canal Lining Project through which SDCWA lined two major water delivery systems and in exchange was allocated a portion of the additional water saved.
- **Delivery via the Colorado River Aqueduct** which is owned and operated by Metropolitan. The water flows from the Colorado River to Lake Havasu, where it enters the Colorado River Aqueduct, traveling across the desert and through the mountains to Southern California. SDCWA, as a member agency of Metropolitan, utilizes this infrastructure for the final leg of water delivery.

The San Diego County Water Authority (SDCWA) receives water from the Metropolitan Water District (MWD) through the State Water Project (SWP), which sources its water from the Delta in Northern California. The SWP is also home to the Bureau of Reclamation's Central Valley Project (CVP). These two projects operate in coordination, utilizing the Sacramento River and Delta as shared conveyance facilities. This initiative aims to reduce the Authority's dependence on water supplies delivered via SDCWA and MWD, thereby alleviating some of the competing demands on the SWP system and making more surface water available for other uses.

An important component of the 2003 QSA was the allocation of saved water based on the 1988 **San Luis Rey Indian Water Rights Settlement Act**. This act allocated the first 16,000 AF of water to the San Luis Rey Settlement Parties, managed by the San Luis Rey Indian Water Authority and including five Indian bands in northern San Diego County: La Jolla, Pala, Pauma, Rincon, and San Pasqual. The Authority's project will offset the need for 1,790 AF of water annually, providing much needed water from the Colorado River to the Indian Bands.

G. Stakeholder Support for Proposed Project

Stakeholder support since project inception has been high. Sweetwater Authority engaged stakeholders and the public about this project through multiple Board and committee meetings, including the Citizens Advisory Committee, as well as public hearings. The project has received support from the federal, state and local agencies listed in Section C as well as recreational groups, HOAs and planning/community groups, and the nearby community at large. Given the significant use of Sweetwater Reservoir for recreational activities such as fishing, hiking, and birdwatching, this project will also benefit the regional public use of the reservoir.

The Authority's governing board is composed of seven members, five of whom are elected by division by the citizens. Two directors are appointed by the Mayor of National City, subject to City Council confirmation. Together these directors represent the entire Authority service area and have given their approval to this project to improve local supply reliability and lessen the Authority's dependence on imported water supplies.

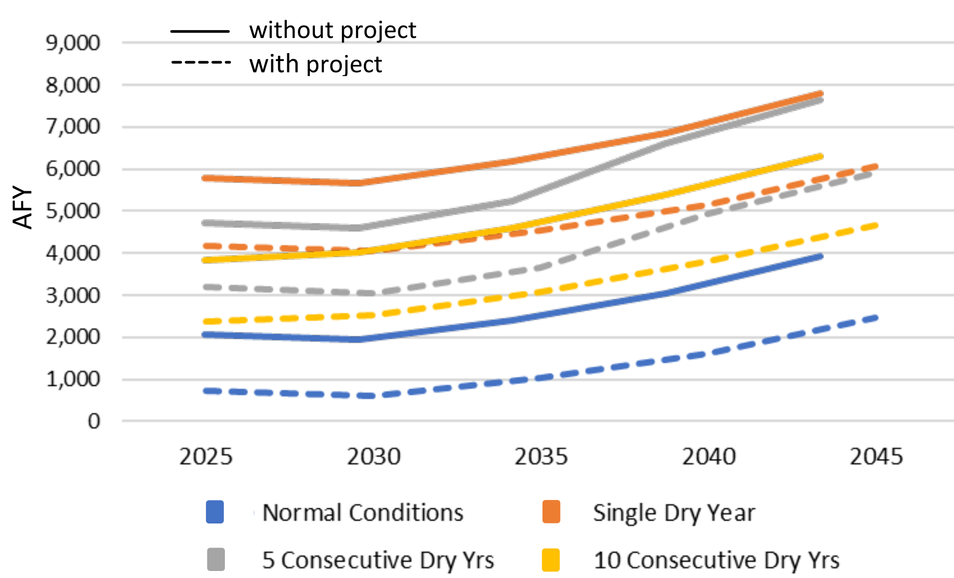
A letter of support from the mayor of Chula Vista is included as Appendix A.

Chapter 6. Performance Measures

The reduction in annual purchases of imported water will be used to measure performance. The proposed project will decrease the need for more expensive imported water purchases. To use the existing water in Sweetwater Reservoir, the Authority often purchases imported water for blending at the Perdue WTP. This blending is necessary due to the water quality concerns caused by algal byproducts that affect taste and odor, and which otherwise render the water unusable. The proposed aeration/destratification system is intended to reduce algal activity by suppressing turnover of different thermal strata and confining sediments to the reservoir bottom. The result is improved reservoir water quality available for treatment at the Perdue WTP. Another result is the elimination of the need for blending with imported water, thereby reducing the use of imported water because of project implementation.

For the period 2013 to 2023, annual average imported SDCWA raw and treated water purchases was 6,511 AF (value extrapolated from Table 1). This average will decline significantly after the proposed project is complete. demonstrates the difference in future imported water purchases with and without the project. Without the proposed project, average annual imported water purchases are predicted to range from 4,000 to 8,000 AFY over the next twenty years. With the completion of the proposed project, the range of imported water purchases will range from 700 to 6,000 AFY. This data is shown under various hydrologic conditions in five-year increments in Figure 7.

The difference in imported water purchases before (starting in 2013) and after project installation will be used to measure performance.



Appendix A. Letter of Support

MAYOR JOHN McCANN

September 27, 2024

Camille Touton, Commissioner
United States Bureau of Reclamation
1849 C Street N.W.
Washington DC 20240-0001

Dear Commissioner Touton:

Our organization is writing to express support for the Sweetwater Authority's grant application to the U.S. Bureau of Reclamation's WaterSMART Drought Response Program: Drought Resiliency Projects for Fiscal Year 2025 Funding Opportunity Announcement [FOA] #R25AS00013. This vital funding would support the Authority's efforts to develop local water supplies and lessen its dependence on imported water.

Through this grant application the Authority is requesting funding to install a new aeration and destratification system in Sweetwater Reservoir to replace an abandoned aeration system and to provide water quality improvements to the lake environment and improve the treatability of water at the Robert A. Perdue Water Treatment Plant (WTP). This project will improve water quality in Sweetwater Reservoir, pay for itself in reduced power and chemical costs at the WTP, and improve local supplies by maintaining Sweetwater Reservoir quality at levels treatable as a sole source of supply to the WTP.

Sweetwater Authority is better positioned to mitigate future supply challenges than many other water suppliers in Southern California due to its diverse portfolio, investments in local projects, and ability to leverage excess local surface water supply in wet years. At the same time, the future presents significant concerns associated with the escalating cost of imported supplies and reliability risks associated with the increasing frequency and severity of drought events, as well with imported supplies from the State Water Project (SWP) and the Colorado River Aqueduct (CRA). For this reason, it is imperative that agencies such as the Sweetwater Authority implement projects like this one to ensure that water supplies are being used efficiently and reduce our impact on the region and planet.

The City of Chula Vista recognizes the valuable role that this project plays in using water wisely. The City of Chula Vista supports the project because we have been a leader in sustainability and have adopted a Water Stewardship Plan, working towards water conservation and learning to use water wisely.

Please accept our recommendation for full and fair consideration, as permitted under law, of application the Sweetwater Authority's request for WaterSmart Drought Resilience funding.

Yours in service,

John McCann

Mayor John McCann

Chula Vista City Hall ▪ 276 4th Avenue ▪ Chula Vista ▪ CA 91910 ▪ jmccann@chulavistaca.gov

Budget Detail and Narrative

Sweetwater Authority

Sweetwater Reservoir Aeration/Destratification System

This budget narrative explains costs in each budget category and the amount of Federal funding requested by the applicant (not over 50% in any category). All costs are based on final designs.

Table 1 Grant Application Budget Detail Summary

Summary			
6. Budget Object Category	**Total Cost**	**Federal Estimated Amount**	**Non-Federal Estimated Amount**
a. Personnel	**$0**		
b. Fringe Benefits	**$0**		
c. Travel	**$0**		
d. Equipment	**$791,980**		
e. Supplies	**$256,009**		
f. Contractual	**$446,870**		
g. Construction	**$702,370**		
h. Other Direct Costs	**$867,770**		
i. Total Direct Costs	**$3,065,000**		
j. Indirect Charges	**$0**		
Total Costs	**$3,065,000**	**$1,532,500**	**$1,532,500**
	Cost Share Percentage	**50%**	**50%**

Category A. Personnel

The cost of project-related work by Sweetwater Authority personnel will be covered by the Authority's general operating budget. ***No grant funds are requested in this category.***

Category B. Fringe Benefits

Allowances and services provided to in-house employees are covered by the Authority's general operating budget. ***No grant funds are requested in this category.***

Category C. Travel

Travel by personnel related to this project is expected to be minimal and will be covered by the Authority's general operating budget. ***No grant funds are requested in this category.***

Category D. Equipment

Construction equipment costing greater than $5,000 per unit totals $791,980. Rental comparisons are not provided since each item is a permanent part of the aeration/ destratification system. All equipment costs are based on final designs. Table 2 lists equipment purchases.

Table 2 Equipment Costs

	Quantity	Unit Cost	Total Cost	Purpose
Underwater Diffuser System	1	$472,561	$472,561	Prevents thermal stratification
Oil Flooded Compressors	2	$84,697	$169,394	Prevents or reduces stratification
Compressor Shelter	1	$68,425	$68,425	Protects equipment from external elements
Air Cooled Dryer	1	$36,936	$36,936	Removes moisture from compressed air
Air Receiver Tank	1	$18,599	$18,599	Stores compressed air
Oil-Water Separator	1	$15,694	$15,694	Removes oil & hydro-carbons from water
Compressed Filters	2	$5,186	$10,371	Removes fine dirt and oil particulates
Total			**$791,980**	
Federal Funding Requested			**$395,990**	

Category E. Supplies

Tangible supplies less than $5,000 per unit total $256,009 and includes components for above- and below-water use that will contribute to the maintenance of destratified conditions. All supply costs in Table 3 are based on final designs.

Table 3 Supply Costs

Supply Item*	Quantity	Unit Cost	Total Cost	Purpose
Valves (ea)	2	$4,218	**$8,435**	Prevents water from entering tubing when not in operation
Flow control manifold (ea)	1	$2,935	**$2,935**	Regulates flow of air and water
Pressure gauges (ea)	2	$1,645	**$3,290**	For accurate pressure readings
Equipment pad (ea)	1	$1,373	**$1,373**	Equipment base
Compressor equipt pad (cy)	12	$1,268	**$15,221**	Equipment base
Air receiver tank pad (cy)	1	$1,268	**$1,268**	Equipment base
Anchors/supports (ea)	5	$1,071	**$5,356**	Equipment base and support
Pipe sleeve (lf)	50	$714	**$35,709**	Prevents damage to pipe
Concrete (cy)	260	$327	**$84,990**	Equipment base and support
Bends/fittings (ea)	7	$288	**$2,015**	Pipeline equipment
Duct bank conduit/wire (lf)	780	$115	**$90,071**	Protection for utility wires
Bedding (cy)	51	$105	**$5,346**	Equipment base
Total			**$256,009**	
Federal Funding Requested			**$128,005**	

** cy=cubic yards/lf=linear feet*

Category F. Contractual

Services for construction and installation provided by contractors and subcontractors are based on final designs and estimated to total $446,870, as shown in Table 4. Contracted services have been and will be secured through the standard open and competitive bid process utilized by the Authority for all contract services.

Table 4 Contractual Costs

Contractor Name	Purpose and Contracting Method	Total Cost	Description of costs	Basis of cost
Hazen	Design (open bid)	**$19,878**	Labor escalation	Final design
Hazen	Design (open bid)	**$54,671**	Prime overhead	Final design
Hazen	Design (open bid)	**$60,138**	Prime profit	Final design
Hazen	Design (open bid)	**$249,747**	Sub Overhead	Final design
Hazen	Design (open bid)	**$62,437**	Prime Profit on Sub	Final design
Total		**$446,870**		
Federal Funding Requested		**$223,435**		

Category G. Construction

Services required during the construction phase are estimated to total $702,370. Tables 5 and 6 cover contracting and materials costs and are based on the project's final design.

Table 5 Construction Contracting

Contractor Name	Description of Services	Total Cost
Hazen	Design consultant support	$36,000
Hazen	Construction management consultant	$192,000
Hazen	Inspections staff	$24,000
Hazen	Survey staking	$12,000
Hazen	Material testing	$24,000
Hazen	Soil testing	$12,000
Hazen	Biological monitor	$60,000
Hazen	Cultural/archaeological monitor	$24,000
Hazen	SCADA integration	$12,000
Hazen	Commissioning	$24,000
Hazen	Project closeout	$5,000
Total		**$425,000**
Federal Funding Requested		**$212,500**

Table 6 Construction Materials

Item Description*	Quantity	Unit Cost	Total Cost	Purpose
Electrical Allowance (ls)	1	$54,503	**$54,503**	Recent design modification cost adjustment
I&C Allowance (ls)	1	$33,465	**$33,465**	Recent design modification cost adjustment
Prep site for equipment pad (ea)	1	$2,787	**$2,787**	Site clearing and grubbing
Repave Roadway over trench (sy)	153	$103	**$15,765**	Final paving
Backfill (cy)	153	$64	**$9,785**	Buried conduits from equipment pad to valve vault
Backfill (cy)	318	$64	**$20,338**	Buried conduits from equipment pad to filter pipe gallery
Haul & Dispose (cy)	29	$50	**$1,443**	Remove asphalt from equipment pad to valve vault
Haul & Dispose (cy)	83	$50	**$4,129**	Remove asphalt from equipment pad to filter pipe gallery
Haul & Dispose (cy)	234	$32	**$7,483**	Excavated soil from equipment to valve vault
Haul & Dispose (cy)	664	$32	**$21,233**	Excavated soil from equipment pad to filter pipe gallery
Install 4" HDPE (lf)	325	$21	**$6,929**	Buoyancy pipe with 3" air supply line
Excavate (cy)	204	$20	**$3,987**	Buried conduits from compressor to valve vault
Excavate (cy)	578	$20	**$11,295**	Buried conduits from compressor to pipe gallery
Excavate roadway pavement (cy)	25	$14	**$355**	Asphalt removal over buried conduits from equipment pad to filter pipe gallery
Excavate roadway pavement (cy)	72	$14	**$1,023**	Asphalt removal over buried conduits from

				equipment pad to pipe gallery
Sawcut roadway (lf)	550	$4	**$1,954**	Cutting pavement from equipment pad to pipe gallery
Sawcut roadway (lf)	1560	$4	**$5,543**	Cutting pavement from equipment area to pipe gallery
Material / Equipment Escalation	1	$75,354	**$75,354**	Contingency
Total			**$277,370**	

**cy=cubic yards/ lf=linear foot/ls=lump sum/sy=square yard/ I&C=Instrumentation and Controls*

Category H. Other Direct Costs

Items not included in previous categories are shown in Table 7 and total $867,770. All costs are based on final designs.

Table 7 Other Direct Costs

Other				
Item Description	**Quantity**	**Unit Cost**	**Total Cost**	**Purpose**
Small tools	1	$4,916	**$4,916**	Drill bits, saw blades, other tools
Incidental overtime	1	$4,916	**$4,916**	Contingency for unexpected labor
General conditions	1	$189,195	**$189,195**	Mobilization, subcontractors, payroll records, tests and inspections, clean up, stormwater permit compliance, submittals, progress reports, as-builts, sanitary facilities
Bond and insurance	1	$59,180	**$59,180**	Bond and insurance for project
Design Contingency	1	$609,563	**$609,563**	Reserved to cover unexpected costs or design issues.
Total			**$867,770**	
Federal Funding Requested			**$433,885**	

Category J. Indirect Charges

Indirect costs, if any, will be covered by the Authority's general operating budget. ***No grant funds are requested in this category.***

Sweetwater Authority
Environmental & Cultural Resources Compliance

To allow Reclamation to assess the probable environmental and cultural resources impacts and costs associated with this application, Sweetwater Authority has addressed the following questions focusing on the NEPA, ESA, and NHPA requirements.

Responses to the questions in this section are based on findings in *Addendum No. 1 to the Environmental Impact Report for the Robert A. Perdue Water Treatment Plant Master Plan for Future Plant Facilities, Sweetwater Reservoir Aeration and Destratification System, State Clearinghouse Number 2004011048* (July 19, 2024).

Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts, as well as any other past, present, or reasonably foreseeable future developments that you are aware of that will affect these same resources in the surrounding area.

Construction of the proposed project will occur over a period of approximately 8 months. It is estimated that the majority of this time will be for preparatory efforts and materials staging with active construction taking as little as 4 weeks. The initial phase of construction would involve approximately 500 feet of trenching along the perimeter of the water treatment plant. The construction of the air compressor shelter and equipment pads will include a retaining wall and minor grading to prepare a level foundation. The compressors will feed the diffuser which will be mostly underwater. The shoreside footings for the diffuser line will be permanent and buried into the ground. Construction equipment is anticipated to consist of primarily light-duty equipment such as a skid steer loader and telehandler forklift. There will be no substantial earthwork that would require soil hauling.

The project has been designed to fully avoid and minimize impacts to endangered species and sensitive habitats. As part of the project's original 2006 Environmental Impact Report, the following mitigation measures were developed to mitigate impacts to biological resources in the vicinity of the project:

1. Consultation with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW) to coordinate permitting needs.
2. Coordination with a biologist for the development of grading and construction materials, and biological resources training before construction.
3. Temporary exclusionary fencing to protect habitat and avoid accidental intrusions into adjoining sensitive habitats.
4. Compensatory mitigation for coastal sage habitat loss.
5. Permanent preservation of replacement habitat to be assured to the satisfaction of the USFWS and CDFW.

6. Revegetation of any and all temporary impacts with appropriate native species.
7. Permitting with the U.S. Army Corp of Engineers (USACE) for any placement of riprap or other materials below the high-water level of the reservoir, and compliance with all permitting requirements required mitigation obligations.
8. Construction shall be scheduled, to the maximum extent practicable, outside of nesting season, to reduce temporary construction noise impacts to nesting birds.
9. Construction noise exceeding 60 dBA shall be minimized or avoided during the nesting seasons for California gnatcatcher and vireo.
10. When construction during nesting season is unavoidable, an adaptive monitoring program shall be implemented with monitoring performed by qualified biologist.
11. Applicable biological mitigation measures for construction blasting, to reduce excessive noise, vibrations, scattering of blast debris.
12. Assessing ambient noise generated from facilities adjacent to California gnatcatcher and vireo habitat. For any noise exceedance (above 60 dBA), a zone of permanent indirect impact shall be calculated, and an acceptable mitigation ratio shall be negotiated with wildlife agencies.
13. Nighttime lighting shall be shielded and directed away from habitat areas.
14. Erosion and sediment BMPs to protect habitat from runoff and sedimentation.

Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?
Within the proposed project area, there were five (5) federally threatened or endangered species detected: California gnatcatcher, least Bell's vireo, California brown pelican, bald eagle, and the peregrine falcon. The coastal sage shrub found in this area is considered a critical habitat for local wildlife, including the two (2) protected species named previously. Disturbance and removal of the coastal sage shrub, along with construction noise, vibration, and dust could affect the listed species. Addendum No. 1 to the EIR, an updated impact assessment to the proposed project, found the construction site to be in a currently disturbed area as it is used to park boats and other lake equipment. Therefore, the proposed project should not add new, significant impacts to the listed species or additional critical habitat. The Authority will carry out all mitigation efforts identified in the Environmental Impact Report and Addendum No. 1, such as mitigation for the removal of coastal sage shrubs through habitat replacement and reduction efforts.

Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "Waters of the United States"? If so, please describe and estimate any impacts the proposed project may have.
The primary surface waters inside the project boundaries include the Sweetwater River and surrounding watershed, collected by the Sweetwater Reservoir. There are no native wetlands found within the proposed project area. Based on an Environmental Impact Report and Addendum No. 1, the proposed project will not have any significant, negative impact on local waters or wetlands. The proposed project is anticipated to benefit local waters as described in the project benefits section of the technical proposal. All project components will comply with

applicable permitting requirements if unanticipated impacts to jurisdictional surface waters occur.

When was the water delivery system constructed?
Sweetwater Authority was established in 1972 and began operating the water delivery system, recently purchased by South Bay ID, in 1977. By 1990, the Sweetwater Authority secured ownership and began making issuing improvements to the water system. The Sweetwater Reservoir was constructed in 1888, while the Perdue Water Treatment plant was put into operation to treat the water from the reservoir in 1961.

Will the proposed project result in any modification of or effects to individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.
The proposed project will not include any modification or impact on individual features of an irrigation system. The project components include the installation of an aeration and destratification system in Sweetwater Reservoir to improve water quality and supply longevity.

Are any buildings, structures, or features in the project area listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.
Within the proposed project area, the Sweetwater Dam, South Spillway, and South Dike are considered eligible for listing on the National Register of Historic Places. Based on an Environmental Impact Report and Addendum No. 1, none of these sites will be at risk of any effects or adverse changes.

Are there any known archeological sites in the proposed project area?
There are no known archeological sites in the proposed project area, based on record searches and pedestrian surveys conducted as part of the Environmental Impact Report and Addendum No. 1.

Will the proposed project have an adverse and disproportionate effect on communities with environmental justice concerns (as discussed in E.O. 14096)?
The Authority's service area includes communities with environmental justice concerns. However, the proposed project activities are not anticipated to have a disproportionately high and adverse effect on low income or minority populations. The proposed project components will directly increase water quality and local resistance to drought and will, therefore, provide benefits to all customers within the service area. Although the benefits will be realized equally by all residents within the City's service area, the degree of benefits felt by low income or minority communities will be higher because the impact of a rate change is more substantial to lower income households than higher income ones. A less-than-significant impact with mitigation incorporated is expected for noise, public services, recreation, transportation/traffic, and environmental justice.

Will the proposed project limit access to, and ceremonial use of, Indian sacred sites or result in other impacts on tribal lands?
There are no known sacred or archaeological sites in the proposed project area. There is no expected impact on access to known sites or other impacts on tribal lands based on surveys conducted as part of the Environmental Impact Report and Addendum No. 1

Will the proposed project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?
The proposed project does not anticipate a contribution to the existence or spread of noxious weeds or non-native species. The Authority will carry out all mitigation efforts identified in the Environmental Impact Report and Addendum No. 1, including the addition of native coastal sage shrub habitat, as well as other non-invasive trees and shrubs to be planted around the new structures.

Sweetwater Authority
Mandatory and Recommended Application Forms and Statements

D.2.2.1.1. SF-424: Application for Federal Assistance. This form is submitted as a webform.

D.2.2.1.2. SF-424A Budget Information Form. This form is submitted as webform.

SF-424B Assurances for Non-Construction Programs and
SF-424C Budget Information for Construction Programs are submitted as webforms.

D.2.2.1.3 SF-424D Assurances for Construction Programs. This form is submitted as webform.

D.2.2.2 Technical Proposal. The technical proposal is submitted as an attachment using the Project Narrative Attachment Form.

D.2.2.3. Budget Narrative. The budget narrative is submitted as an attachment using the Budget Narrative Attachment Form.

D.2.2.4. Environmental and Cultural Resources Compliance. The completed compliance questionnaire is submitted as an attachment using the Attachments form.

D.2.2.5. Required Permits or Approvals. Necessary permits and approvals are listed in Table 8 of Technical Proposal Section D. The issuing authority, permit/approval title and status are included.

D.2.2.6. Project Overlap or Duplication of Effort. The proposed project does not overlap or duplicate any other active or anticipated proposals or projects in terms of activities, costs or commitment of key personnel.

D.2.2.7. Conflict of Interest Disclosure Statement. The Sweetwater Authority is not aware of any current conflicts of interest regarding the proposed project or grant application, nor does it anticipate any future conflicts of interest. If a conflict should arise, Authority Policy 504 – Code of Ethics contains procedures to address potential and existing conflicts of interest by the Authority, its representatives, agents, members of the Governing Board of Directors and employees, as well as vendors, suppliers, contractors and consultants.

D.2.2.8. Uniform Audit Reporting Statement. Sweetwater Authority (EIN 95-2759399) was not required to submit a single year audit statement for the previous fiscal year.

D.2.2.9. Certification Regarding Lobbying. This certification is submitted as a webform.

D.2.2.10. SF-LLL: Disclosure of Lobbying Activities. Not applicable.

D.2.2.11. Letters of Support. These letters are referenced in Technical Proposal Section G. and submitted as an appendix to the Technical Proposal.

D.2.2.12. Letter of Partnership. Not applicable.

D.2.2.13. Official Resolution. Upon notification of award and prior to agreement execution, an official resolution adopted by the Sweetwater Authority Governing Board will be provided. This resolution will verify the identity of the official with legal authority to enter into an agreement, the governing body that has reviewed and supported the application submitted, and that the organization will work with Reclamation to meet established deadlines for entering into a grant agreement.

D.2.2.14. Letters of Funding Commitment. Not applicable.

Attachment to Technical Proposal

Sweetwater Authority
2024 Water Resources Master Plan

Section 6.1 Yield Improvements from Sweetwater Reservoir Aeration/Destratification System

Sweetwater Authority
2023 Water Resources Master Plan

FINAL Report
20178-004
September 5, 2024

6. Local Water Supply Alternatives

This section provides an analysis of seven local water supply alternatives conceptualized in this WRMP including:

1. Yield Improvements from Sweetwater Reservoir Aeration/Destratification System;
2. Otay River Brackish Groundwater Desalination;
3. Recycled Water Purchase from Otay Water District;
4. IPR Groundwater Recharge to CPSD;
5. IPR Augmentation to Sweetwater Reservoir;
6. Additional Yield Optimization at Reynolds Desal Facility; and
7. Potable Water Sales Agreement to Otay Water District.

Each alternative analysis includes a general description, conceptual design, analysis of new yield, and a planning-level cost assessment.

6.1 Yield Improvements from Sweetwater Reservoir Aeration/Destratification System

6.1.1 Alternative Description

As per the recommendations made in the 2020 Water Supply Feasibility Study, the Authority is currently working with Hazen and Sawyer and WQS to improve stored water quality in the Sweetwater Reservoir. A diffused aeration system in the reservoir has been planned to destratify the water column and ameliorate the water quality challenges discussed in Section 2.1.3. The following description is summarized from the Sweetwater Reservoir Aeration/Destratification System Preliminary Design Technical Memorandum prepared by Hazen and Sawyer, dated November 2022.

The diffused aeration system includes a linear diffuser consisting of a series of porous bubble tubes which are suspended just above the reservoir bottom, as shown in Figure 6-1. The system is supplied with a constant stream of air from onshore compressors and is designed to facilitate complete vertical mixing of stored water within the reservoir. As the hypolimnion (anoxic water) is brought to the surface, it mixes with the warmer epilimnion (surface water). Over time, this results in a constant temperature gradient with depth and prevents thermal stratification of the reservoir. The deeper water is exposed to atmospheric oxygen through the mixing action, leading to oxygenated water with uniform water quality throughout the reservoir.

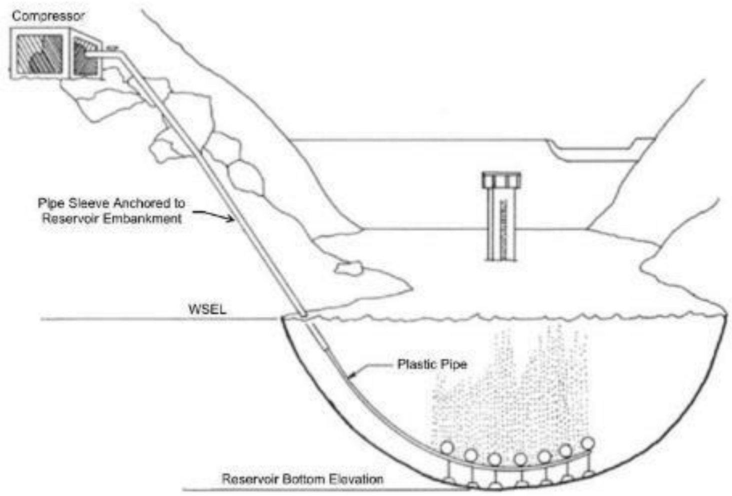


Figure 6-1. Typical Diffused Aeration System with Linear Diffusion (WQS)

By releasing compressed air at the bottom of Sweetwater Reservoir, the aeration system will induce vertical mixing which will help maintain healthy levels of dissolved oxygen in the reservoir. Furthermore, the aeration system is expected to have various other co-benefits that will improve water quality of the reservoir. It is anticipated to reduce manganese, iron, and phosphorous release from the sediment, and increase dissolved oxygen distribution in the water column. The oxygenation and agitation in the water column will reduce algal blooms, as algae typically prefer stratified conditions. The aeration-induced reduction in dissolved inorganic constituents and algal blooms is anticipated to lessen required treatment intensity and improve finished water quality, thus reducing treatment costs and improving customer satisfaction with finished water taste and odor. Importantly, the presence of the quagga mussel species in Sweetwater Reservoir may prevent the aeration system from being operated consistently all year. The current development of anoxia in the lower levels of the reservoir help the Authority in controlling the quagga mussel population. Conversely, improving the reservoir's water quality by preventing anoxic conditions will aid in the proliferation of quagga mussels. To compensate, considerations for controlling the quagga mussel population will need to be made when the aeration system is brought online and operated. For cost estimating purposes, this has been assumed to include mechanical removal and harvesting of quagga mussels from the intake tower cups and screens using divers as needed.

6.1.2 Conceptual Design

The conceptual design described in this section is as is proposed in the Sweetwater Reservoir Aeration/Destratification System final design prepared by Hazen and Sawyer in 2023. The destratification system includes several on-land and under-water components, as depicted in Figure 6-2. The major infrastructure required are described further in Table 6-1.

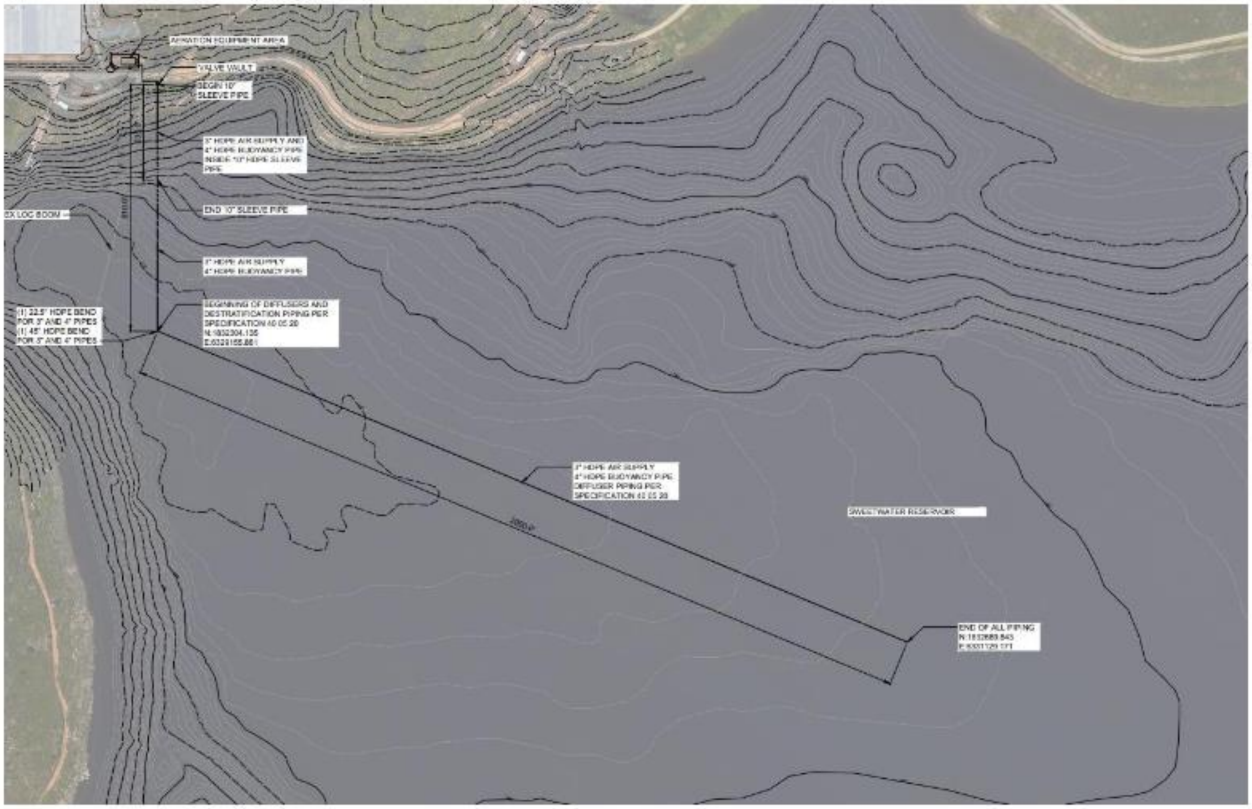


Figure 6-2. Sweetwater Reservoir Aeration/Destratification System Layout (Hazen and Sawyer, 2023)

Table 6-1. Major Infrastructure of Water Sales Agreement Alternative

Infrastructure Component	Description
Air Compressors	On land, two air compressors operated together in series, will generate compressed air, which will be stored in an air receiver tank. The diffuser system requires a total air flow of 680 standard cubic feet per minute (scfm), which will be provided with two equally sized 75 horsepower (HP) rotary screw air compressors.
Air Receiver Tank	The air receiver tank will ensure enough system volume is present to limit the number of loading/unloading cycles and prolong the life of compressor components.
On-shore Compressed Air Supply Main	Air will be released at a constant pressure from the air receiver tank through a buried 4-inch HDPE air supply pipeline to the edge of the reservoir embankment. The air supply piping will transition above ground to a pad-mounted flow control manifold, where it will be secured to the banks of the reservoir down to the deadpool water storage level and attached to a buoyancy pipe.
In-Reservoir Air Supply Piping and Bubble Tube Line Diffuser	Within the reservoir, the 3-inch HDPE air supply pipeline and 4-inch HDPE buoyancy pipe run underwater to the start of the single line diffuser, just east of the log boom. The porous flexible line diffuser extends out into the reservoir 2,000 feet. The diffuser assembly is attached to concrete anchors with steel anchor cables approximately every 15 feet.

6.1.3 Yield Analysis

Based upon average historical data between 2017 – 2022 provided by the Authority, average blending ratios (the percentage of imported water in the total treated water flow leaving the Perdue WTP) were determined as a function of available supply in Sweetwater Reservoir. These blend ratios are presented in Table 6-2. The blend ratios in Table 6-2 exclude any blending that is required based on insufficient local supply quantity, thus meaning that these historical blend ratios are solely to address water quality.

Table 6-2. Perdue WTP Blend Ratios

Available Supply at Sweetwater Reservoir (AF)	Blend Ratio	
	Existing Conditions	Assumed Scenario with Aeration/Destratification System
0 – 2,000	80%	80%
2,000 – 4,000	60%	60%
4,000 – 6,000	45%	25%
6,000 – 8,000	25%	25%
8,000 – 10,000	25%	0%
10,000+	0%	0%

With current reservoir conditions, as the reservoir levels increase, the required blend ratio decreases. This is because water quality tends to be better when the reservoir elevation is higher. In the assumed scenario after the aeration system has been implemented, the water quality of the reservoir would improve to the point that it would lessen the requirement for blending between 4,000 – 10,000 AF of storage. However, at storage volumes lower than 4,000 AF, it is assumed aeration will not have an impact on the required blend ratio. At storage volumes above 10,000 AF, it is still assumed that no blending would be required with or without aeration. As such, under normal hydrological conditions, it is assumed that the aeration system may reduce imported water purchases by approximately 1,790 AF/year.

The true impact of aeration on blending requirements depends on site-specific biological and chemical factors. As mentioned, while eliminating anoxia is advantageous for water treatment operations and overall ecological health of the reservoir, it has the potential to provide more favourable growth conditions for the Quagga mussel population. As such, intermittent operations of the aeration system may be required. Further, quantifying the internal and external nutrient loads is necessary to understand the blending impacts. It is then suggested that the Authority closely monitor actual operations once the aeration system comes online to better quantify the extent of blending that aeration can help reduce.

6.1.4 Cost Assessment

Summarized costs for the aeration system are provided in Table 6-3 below. Detailed capital cost estimates were developed for the Sweetwater Reservoir Aeration/Destratification System Hazen is currently designing for the Authority. The engineer's opinion of probable construction cost for this alternative is $2.3 million and includes the installation of air compressors, piping, and appurtenances. The estimate serves for budget baseline and is considered to be an Association for the Advancement of Cost Engineering (AACE) Class 2 level. Class 2 has a typical accuracy range of -15% on the low side and +20% on the high side. A 20% design contingency has been added to the estimate based on current status of the design documents, the nature of the alternative and the estimate classification.

Table 6-3. Sweetwater Reservoir Aeration/Destratification System Cost Summary

Attribute	Cost
Capital Cost	$2.3 million
Annual O&M	$146,000/year
Avoided Costs from Improved Treatment Intensity	$41/AF
	$410,000/year[1]

1. Assumes historical average annual production at Perdue WTP from 2017 to 2022 plus expected yield increase due to aeration

It is estimated that the maintenance of water quality in Sweetwater Reservoir will reduce treatment costs by approximately $41 per acre-foot when treating local surface supply. The cost savings is primarily attributed to reduced power and chemical consumption at the Perdue WTP. It assumes that a quarter of the year will observe full benefits from the aeration system and another quarter of the year to observe half of the benefits from aeration system. This unit cost was applied to the historical average annual production at Perdue WTP plus the expected 1,790 acre-feet of expected yield improvements to anticipate approximately $410,000 per year in cost savings from improved treatment intensity.

Additionally, because the aeration system will improve the treatability of the reservoir water at the Perdue WTP, the Authority may also save on avoided costs associated with spilling from Sweetwater Reservoir (approximately $1 million per 1,000 acre-feet) and evaporative losses. This cost savings is primarily attributed to reduced power and chemical consumption at the Perdue Water Treatment Plant. Optimizing the production of the Perdue WTP would also allow the Authority to be less reliant on their brackish groundwater wells and the Reynolds Desalination Facility, which would both reduce costs (Table 2-9) and provide ecological benefit as it would reduce the extent of pumping and thus, the seawater intrusion occurring in the SDF aquifer.

6.2 Otay River Area Brackish Groundwater Desal Alternative

6.2.1 Alternative Description

For decades, the Authority has relied on groundwater as one of its primary local supply sources. The Authority is interested in expanding its use of local groundwater supplies due to its reliability and drought resistance.

The Authority, in collaboration with Otay Water District, conducted a feasibility study for a brackish groundwater desalination alternative located in the Otay River area in 2009, which would withdraw groundwater from the SDF aquifer. The alternative would include construction and operation of a series of wells, raw water conveyance pipelines, a desalination plant (similar to the Authority's existing Reynolds Desalination Plant), and conveyance facilities to deliver the product water to the distribution system of each agency. For the assumed siting (Figure 6-3), this alternative would potentially also include the need for a new San Diego Regional Concentrate System (a brine disposal line alternative connected to the South Bay Ocean Outfall) and brine conveyance from the new desalination facility to the regional brine line. If the new desalination plant were to be sited closer to the San Diego Bay coastline, a direct discharge like the Reynolds Desalination Plant may be feasible. This alternative proposes approximately 4.8 MGD of brackish groundwater supply for delivery to the treatment plant, resulting in 4 MGD of product water. The alternative could also be expanded in a second phase, similar to the Reynolds Desalination Facility, if groundwater supply is available. As a general guide, the Reynolds Desalination Facility was used as a basis for developing the conceptual design of this alternative.

6.2.2 Conceptual Design

The new treatment plant and its process components were developed in the 2009 Otay Basin Brackish Groundwater Desalination Feasibility Study based on the Authority's current operations of the Reynolds Desalination Plant and expected groundwater quality of Otay River. The treatment plant, its facilities and required site area, are sized to produce 4 MGD of product water from the 4.8 MGD of brackish water supplied by the groundwater wells. Brine disposal has been sized for the remaining 0.8 MGD. The treatment plant and conveyance facilities have been assumed to be located within the City of Chula Vista south of J Street and north of the Otay River. The wells are assumed to be located along the 4th Street corridor between J Street and Main Street in Chula Vista. For the purposes of this WRMP, the treatment capacities and locations are assumed to remain the same. A map of the assumed facilities is depicted in Figure 6-3, and a description of the alternative's infrastructure components is provided in Table 6-4.