ATTACHMENT 1

SWEETWATER AUTHORITY
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February 6, 2026

Subject: REQUEST FOR PROPOSALS FOR DEVELOPMENT OF THE WELL REHABILITATION AND MAINTENANCE PROGRAM

To Whom It May Concern:

Sweetwater Authority (Authority) is seeking proposals from professional engineering firms with specialized expertise in hydrogeology and well rehabilitation – particularly in well condition assessment, operational performance evaluation, rehabilitation methods, and maintenance planning – to develop a Well Rehabilitation and Maintenance Program for the Authority's groundwater production wells.

The Authority produces groundwater from the Coastal Plain of the San Diego Groundwater Basin, including brackish water treated at the Richard A. Reynolds Desalination Facility (Desal Plant) and fresh water from the National City Wells, using thirteen wells supported by the required treatment systems and conveyance infrastructure (Exhibit 1. Groundwater Well Information). With some wells operating for over 70 years, a structured rehabilitation program is essential to maintain reliable production, extend equipment life, minimize emergency repairs, and ensure continued compliance with regulatory water quality standards.

The Authority encourages participation by local, small, and/or disadvantaged businesses. Persons or entities submitting a proposal in response to this Request for Proposals (RFPs) are referred to herein as “Consultant”, “Proposer”, or “Responder”.

A. BACKGROUND INFORMATION

The Authority is a publicly-owned water agency that was formed in 1977 as a Joint Powers Agency between the City of National City and South Bay Water.

Service population: approximately 200,000 residents in National City, western Chula Vista, and the unincorporated areas of Bonita and Lincoln Acres.

System overview: approximately 395 miles of water mains, 24 pump stations, 2 surface reservoirs, 20 storage tanks, and 13 groundwater wells.

Groundwater operations:

- 10 brackish production wells (San Diego Formation) convey raw water to the Richard A. Reynolds Desalination Facility.
- 3 fresh groundwater wells in National City pump directly into the distribution system.

- Both draw water from the San Diego Formation (SDF), the principal aquifer located in the Coastal Plain of the San Diego Groundwater Basin. The SDF is estimated to yield between 1 and 2 million acre-feet (ac-ft) of water, with approximately 960,000 ac-ft of groundwater stored within the portion of the basin underlying the Authority's service area.

The Authority's mission is *"to provide its current and future customers with a safe and reliable water supply through the use of the best available technology, sound management practices, public participation and a balanced approach to human and environmental needs"*.

More information on the Authority can be found at *www.sweetwater.org*.

B. PROJECT OBJECTIVE

The primary objective is to develop a comprehensive Well Rehabilitation and Maintenance Program by evaluating the current condition and operational performance of the Authority's wells. This evaluation will identify maintenance needs, rehabilitation priorities, and operational deficiencies that could affect long-term reliability. Based on these findings, the Consultant will develop preventive maintenance procedures, inspection schedules, and standardized documentation tools. The final program will provide clear recommendations and cost-planning guidance tailored to the Authority's operational needs.

C. SCOPE OF SERVICES

Project Schedule

The Consultant shall prepare a detailed project schedule identifying all major tasks, milestones, meetings, and deliverable dates. The Authority anticipates that final program deliverables will be presented by the end of August 2026, including all the information specified under Task 4. Any schedule delays shall be closely communicated with and approved by the Authority throughout the study.

Task 1: Data Collection, Review, and Project Coordination

The Consultant shall initiate the project by coordinating with the Authority to establish communication protocols, confirm project expectations, and collect all available well information. This task includes:

1. Conducting a kickoff meeting to review scope, schedule, and data needs.
2. Collecting and reviewing existing documentation, including:
    - Well construction logs

- Historical pumping and performance data
- Water quality test results
- Maintenance and rehabilitation records
- Electrical/mechanical information

3. Meeting with Authority staff to understand operational history and known issues.
4. Providing ongoing project management, including schedule tracking, quality oversight, and regular project coordination.
5. Holding progress meetings at key milestones to report preliminary findings and confirm direction.

Task 2: Field Assessments and Condition Evaluation

The Consultant shall conduct field visits to each well to observe existing conditions and evaluate well performance. The work will be documented and incorporated into the program. Activities include:

1. Visual inspection of wellheads, pumps, motors, electrical equipment, and appurtenances.
2. Evaluation of site accessibility, safety conditions, and related infrastructure.
3. Observation of operational characteristics, including available pump performance indicators.
4. Review of historical performance data (e.g., specific capacity, drawdown trends).
5. Identification of potential deterioration, fouling, corrosion, or structural deficiencies.
6. Recommendations for additional testing where beneficial.

Narrative findings will be prepared for each well summarizing observed conditions, issues, and preliminary needs.

Task 3: Rehabilitation Planning, Maintenance Strategy, and Program Development

Based on field observations and data review, the Consultant shall prepare rehabilitation recommendations and develop the maintenance program. This task includes:

1. Well-by-well rehabilitation recommendations and prioritization.
2. Preventive maintenance schedules and inspection procedures.
3. Identification of equipment upgrades or replacements.
4. Development of standardized tools including:
    - Inspection checklists

- Maintenance logs and templates
- Standard operating procedures (SOPs)

5. Preparation of cost estimates for rehabilitation tasks.
6. Development of short-term (1–3 years) and long-term (5–10 years) budget projections.
7. Conducting a draft review meeting to present preliminary findings and receive feedback.

This task will produce the structure and guidance that form the core of the final Maintenance Program.

Task 4: Final Program Preparation and Deliverables

The Consultant shall compile all findings, comments, and recommendations into a clear, comprehensive Well Rehabilitation and Maintenance Program. This task includes:

1. Preparation of the Draft Program for Authority review.
2. Incorporation of comments and revisions.
3. Conducting a final presentation to Authority staff.
4. Delivery of the Final Program, including:
    - Executive summary
    - Basin-wide findings and evaluations
    - Well-by-well rehabilitation plans
    - Maintenance schedules and SOPs
    - Budget planning tools
    - All supporting data tables, figures, and templates
5. Submission of deliverables in:
    - PDF format
    - Fully editable electronic files (Word, Excel, GIS files as applicable)

D. PROPOSAL REQUIREMENTS

Prospective firms must have the necessary technical and professional qualifications, skills and facilities to perform the required work, and must have a demonstrated satisfactory record of performance. In their proposals, firms having such experience should list projects that demonstrate explicitly the consultant's ability to complete such a project.

Proposals must be clear, concise, and no more than 25 pages (excluding cover letter and appendices) in the following order and shall include:

1. *Introductory Letter (Cover Letter):* Describe firm's basic understanding of the Authority's request for the preparation of a well rehabilitation and maintenance program, and provide a statement regarding the qualifications of the firm.

2. *Identification of Responder:*
   a. Provide legal name and address of company.
   b. Provide legal form of company (partnership, corporation, joint venture, etc.).
   c. Identify any parent companies.
   d. Provide addresses of office(s) and number of employees.
   e. Provide name, title, address, telephone number, and email of a person to contact concerning the proposal.

3. *Financial Relationships Disclosure(s):*
   a. Identify all existing and past financial relationships between Consultant's firm and current members of the Authority's Board and staff and entities for which said members are employed or have an interest, both past and present. Include any potential subconsultants. If there are none, clearly state this.
   b. For a list of the Authority's Governing Board members, see the following link: *http://www.sweetwater.org/35/Governing-Board*.

4. *Consultant's Organization and Key Personnel:* Describe proposed Consultant's organization, and years of experience and competence of key personnel. Provide an organizational chart showing the relationship and titles of key personnel. For each of the key personnel, identify their main work location.
   a. Resumes or documentation must be provided in separate appendices, and do not count toward the 25-page limit. A short biography of the project manager and key personnel that includes relevant information is preferable over full resumes.

5. *Required Qualifications and Experience:* The following are the minimum required qualifications for proposers. Interested parties should not submit a proposal if they do not meet these required qualifications:
   a. The Consultant's primary business or the primary business of a department within the Consultant's firm shall include direct experience on the subject for at least five (5) years.
   b. The Consultant shall provide a single Project Manager as the primary point of contact with the Authority. This Project Manager must have at least ten (10)

years (total, with current firm or other employers) of experience in hydrogeology consulting or well rehabilitation and project management.

c. Provide a list of past and ongoing qualifying projects for which the Consultant's services were or are similar to those described in this RFP. Limit the list to no more than five (5) projects from the past ten (10) years, which the Consultant feels are most relevant to the RFP. For each project, include the following:
   - A brief description of the project, date initiated, date completed (if applicable).
   - Name of owner and owner's project manager with contact information (e-mail and/or phone).

d. Present the experience of any subconsultants in the same manner. If no subconsultants are anticipated to support on-call scope items, please state so.

6. *Approach to complete tasks identified in the Scope of Services:* Provide a narrative that describes your firm's approach to completing the requested general tasks in the Scope of Services. A general strategy, or one that describes a representative task(s), would suffice and should include the initial task order request, task order proposal(s), award, work flow, response times, and assumptions leading to the desired product(s).

7. *Exceptions to the RFP:* The proposer shall certify that it takes no exceptions to this RFP, including but not limited to the Authority's Professional Services Agreement (Agreement), as attached in Exhibit C. If the respondent does take exception(s) to any portion of the RFP or Agreement, the specific portion of the RFP or Agreement to which exception(s) is taken shall be identified and proposed alternative language shall be provided and explained in the proposal. Please note that significant exceptions may result in disqualification from consideration.

8. *Amendments to the RFP:* Proposal documents must acknowledge receipt of any amendments issued before March 9, 2026. Amendments will be available on PlanetBids, as well as the Authority's Bid Opportunities and Results webpage.

9. *Proposal Authorization:* The proposal shall be signed by an individual having legal authority to bind the firm to the terms of the Agreement and shall contain a statement confirming that the submittal will remain valid for a period of ninety (90) days.

E. BILLING RATES AND COSTS

Proposers shall provide costs in a separate Portable Document Format (PDF) file, titled "Billing Rates and Costs". The PDF cost file must include the following:

1. Billing rates per hour for every staff position to work on the proposed project, including subconsultants.

2. A total not-to-exceed fee, broken down by scope of services tasks and subtasks, per Section C, with estimated labor hours by staff classification, applicable hourly billing rates, and all subconsultant costs clearly identified.

3. Anticipated direct expenses, including but not limited to travel, equipment, printing, and regulatory fees, shall be itemized and state whether they are billed at cost or with mark-up.

4. Costs for optional or contingency tasks, if any, shall be presented separately.

F. PROPOSAL SUBMITTAL

Consultants must provide one (1) electronic copy of the proposal document, and one (1) electronic copy of the proposed costs in separate PDF files The proposal file and cost file shall be uploaded to PlanetBids at the link below:

https://vendors.planetbids.com/portal/69501/bo/bo-detail/138049

Proposals in response to this RFP are due to PlanetBids no later than 3:00 p.m. on Friday, March 13th, 2026.

Proposals submitted after this deadline will not be accepted. Incomplete proposals shall be deemed non-responsive and will be removed from consideration.

G. CONSULTANT SELECTION PROCESS

The Authority will evaluate all proposals using the criteria outlined in this section, along with background information and references. Firms that fail to meet the required qualifications or submit an incomplete proposal will be deemed non-responsive and excluded from further consideration. If two or more firms are deemed equally qualified, costs may be considered as a secondary factor.

The Authority may elect to create a short list of firms for interviews. Following interviews, firms may be re-evaluated and ranked based on the combined proposal/interview process, or solely on interview performance. The Authority reserves the right to eliminate the interview step entirely or cancel the RFP process if deemed necessary.

Final selection will be based on overall qualifications and cost effectiveness, with the Authority reserving the sole right to determine the firm(s) most advantageous to its needs. All selections are subject to Board approval. Firms that submit proposals will be notified of the results.

The evaluation criteria that will be used by the Authority are as follows:

Category	Maximum Points
Completeness of proposal in addressing requested information	20
Qualifications and experience of the Consultant’s personnel assigned	25
Firm’s experience relevant to the type of project being considered, including past performance on Authority projects	30
Approach to complete tasks identified in the Scope of Services Section	25
Total	100

H. AGREEMENT EXECUTION

The selected Consultant will be expected to execute the Authority's standard Agreement for Professional Services (Agreement). A template copy of the Agreement is provided as Exhibit C. Any exceptions to the Agreement must be clearly identified in the proposal for consideration. If Proposers do not submit Exceptions to the Agreement, it will be assumed that the Proposer agrees fully with the Agreement.

All services will be performed in accordance with:

- The hourly rates submitted with the proposal,
- Approved costs provided by the Contractor for each task, and
- The terms of the Agreement.

The Agreement with selected Consultant will be in effect for the duration of the task, as proposed by the consultant and agreed by the Authority. Additional time may be granted on a mutually agreed to basis.

The Authority's Engineering and Operations Department will serve as the administrative lead on the proposed contract. The Authority’s Engineering Manager of Water Resources and Environmental will serve as the project manager.

I. INVOICING

Frequency: Consultants shall submit invoices monthly, covering only the work performed during that billing month.

Deadline: Each invoice must be submitted no later than the 15th calendar day of the following month.

Documentation: Invoices must include appropriate backup such as monthly progress reports, subconsultant invoicing, expense receipts, and any other records necessary to substantiate charges.

Delivery: Invoices must be sent electronically to *eng-invoices@sweetwater.org*.

J. DISCLAIMER

This RFP does not commit the Authority to enter into an agreement for services, to pay any costs incurred in the preparation of proposals, or to procure or contract for services or supplies. The Authority reserves the right to accept or reject any or all proposals received as a result of this request, to negotiate with any qualified source, or to cancel in part or in its entirety this RFP, if it is in the best interest of the Authority to do so. The Authority shall not be obligated to contract any or all of the requested services to the retained Consultant. Further, even upon execution of the Agreement, the selected consultant will not be guaranteed any work under the Agreement until a Notice to Proceed letter is issued by the Authority.

If you have any questions regarding this RFP or the described scope of services, please contact Kyehee (Kay) Kim, Engineering Manager of Water Resources and Environmental, at kkim@sweetwater.org, or at 619-409-6751.

Sincerely,

SWEETWATER AUTHORITY

Xochitl Aranda, P.E.
Director of Engineering and Operations

enclosures: Exhibit A – Groundwater Well Information
Exhibit B – 2023 Water Resources Master Plan
Exhibit C – Professional Services Agreement (Template)

EXHIBIT A

SWEETWATER AUTHORITY

GROUNDWATER WELL INFORMATION

EXHIBIT 1. SWEETWATER AUTHORITY_GROUND WATER WELL INFORMATION

Wells	Year of Construction	Status	Approx. Well Depth (ft)	Screen Length (ft)	Pump Type	Pump Capacity (Rated)	Pump Capacity (Current)	HP
National City Wells								
NC Well #2	1957	Backup	807	53	Turbine	600	430	40
NC Well #3	1983	Active	810	100	Turbine	700	450	75
NC Well #4	2003	Active	690	250	Turbine	750	700	75
Reynolds Desal Wells (San Diego Formation Wells)								
SDF #1	1998	Active	710	142	Turbine	900	930	100
SDF #2	1998	Demolished						
SDF #3	1998	Active	760	205	Turbine	800	750	50
SDF #4	1998	Active	606	134	Turbine	800	730	100
SDF #5	1998	Active	460	81	Turbine	500	470	50
SDF #6	2004	Active	790	440	Turbine	1200	1100	100
SDF #7	2016	Active	900	540	Turbine	1500	1400	200
SDF #8	2016	Active	920	355	Turbine	1,500	1,500	200
SDF #9	2016	Active	1010	610	Turbine	1500	1500	200
SDF #10	2016	Active	860	550	Turbine	900	760	200
SDF#11	2016	Active	950	610	Turbine	1500	1500	200

EXHIBIT B

SWEETWATER AUTHORITY

2023 WATER RESOURCES MASTER PLAN

Sweetwater Authority
2023 Water Resources Master Plan

FINAL Report
20178-004
September 5, 2024

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List of Acronyms and Abbreviations

Acronym	Definition
AACE	Association of the Advancement of Cost Engineering
AF	Acre-Feet
AFY	Acre-Feet per Year
AMI	Advanced Meter Infrastructure
AMR	Automated Meter Reading
Authority	Sweetwater Authority
AWTP	Advanced Water Treatment Plant
BMP	Best Management Practices
BOY	Beginning of Year
CCR	California Code of Regulations
CCRO	Closed Circuit Reverse Osmosis
CEQA	California Environmental Quality Act
City	City of San Diego
CPSD	Coastal Plain of San Diego
CRA	Colorado River Aqueduct
CSP	Carryover Storage Program
CTR	California Toxics Rule
CWC	California Water Commission
CY	Calendar Year
DDW	Department of Drinking Water
Delta	Sacramento-San Joaquin Rivers Delta
DPH	Department of Public Health
DPR	Direct Potable Reuse
DRP	Drought Response Plan
DWR	Department of Water Resources
ESP	Emergency Storage Program
FRRO	Flow Reversal Reverse Osmosis
FY	Fiscal Year
GPCD	Gallon Per Capita Per Day
GPM	Gallon Per Minute

GRRP	Groundwater Replenishment Reuse Project
GSP	Groundwater Sustainability Plan
HCF	Hundred Cubic Feet
HDPE	High Density Polyethylene
HOA	Homeowners Association
HRRO	High Recovery Reverse Osmosis
HRT	Hydraulic Retention Time
IID	Imperial Irrigation District
IPR	Indirect Potable Reuse
IRP	Integrated Resource Planning
LRFP	Long-Range Financing Plan
LRV	Log Removal Value
MCL	Maximum Contaminant Level
MG	Million Gallon
MGD	Million Gallon per Day
MIB	2-Methylisoborneol
MTBE	Methyl tertiary butyl ether
Metropolitan	Metropolitan Water District
NC	National City
NCW	National City Wells
NDF	NO DES Flushing
NDMA	N-Nitrosodimethylamine
NEPA	National Environmental Protection Agency
NL	Notification Limit
PFAS	Polyfluoroalkyl substances
PSAWR	Permanent Special Agricultural Water Rate
PVC	Poly Vinyl Chloride
RO	Reverse Osmosis
RTS	Readiness-to-Serve
RWCWRF	Ralph W. Chapman Wastewater Reclamation Facility
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SCADA	Supervisory Control and Data Acquisition
SDCWA	San Diego County Water Authority
SDF	San Diego Formation
SGMA	Sustainable Groundwater Management Act
SWP	State Water Project
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
URDS	Urban Runoff Distribution System

USGS	United States Geological Service
UV	Ultraviolet
UWMP	Urban Water Management Plan
WDSMP	Water Distribution System Master Plan
WRF	Water Reclamation Facility
WRMP	Water Resources Master Plan
WSCP	Water Shortage Contingency Plan
WTP	Water Treatment Plant

Executive Summary

Sweetwater Authority (Authority) is better positioned to mitigate future supply challenges than many other water suppliers in Southern California due to its diverse portfolio 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. In response to these challenges, the Authority has conducted a comprehensive update to its Water Resources Master Plan (WRMP), which serves as a foundational document for projecting the Authority's future water supply reliability and evaluating the efficacy of potential water supply project alternatives. The WRMP update directly aligns with the Authority's mission to provide current and future customers with a safe and reliable water supply and is motivated by the desire to explore all avenues to minimize costs to its rate payers.

This WRMP incorporates findings from the 2020 Water Supply Feasibility Study, the 2020 Urban Water Management Plan (UWMP), and recent trends in water supply reliability that are relevant to the Authority's service area and customers. The WRMP addresses three primary planning objectives including:

- 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.

Key findings of the WRMP update are summarized below including:

- Updated population and demand projections;
- Analysis of reliability of the existing water supply system, including the estimated need and cost of imported water supplies;
- Cost and yield comparison of potential water supply alternatives; and
- Categorization and recommendation of water supply alternatives.

Updated Population and Demand Projections

Given the WRMP goal of delivering a high-quality, reliable water supply at the least cost to customers, it is important to consider demand projections that adequately balance the need for water against the risk of overinvesting in future water supply infrastructure. In recognition of these motivations, the WRMP reexamined both the population and gallons per capita per day (GPCD) assumptions used to project total water demand in the 2020 UWMP.

Updated population projections used in the WRMP were developed by Authority staff based on datasets from the California Department of Finance, local land use agencies, and the US Census. The staff projections more precisely reflect the Authority's service area (e.g., National City and the South Bay Irrigation District boundaries) and recent population trends than the San Diego Association of Governments (SANDAG) projections used in the 2020 UWMP. Updated population projections and historical population are presented in Figure ES-1 below.

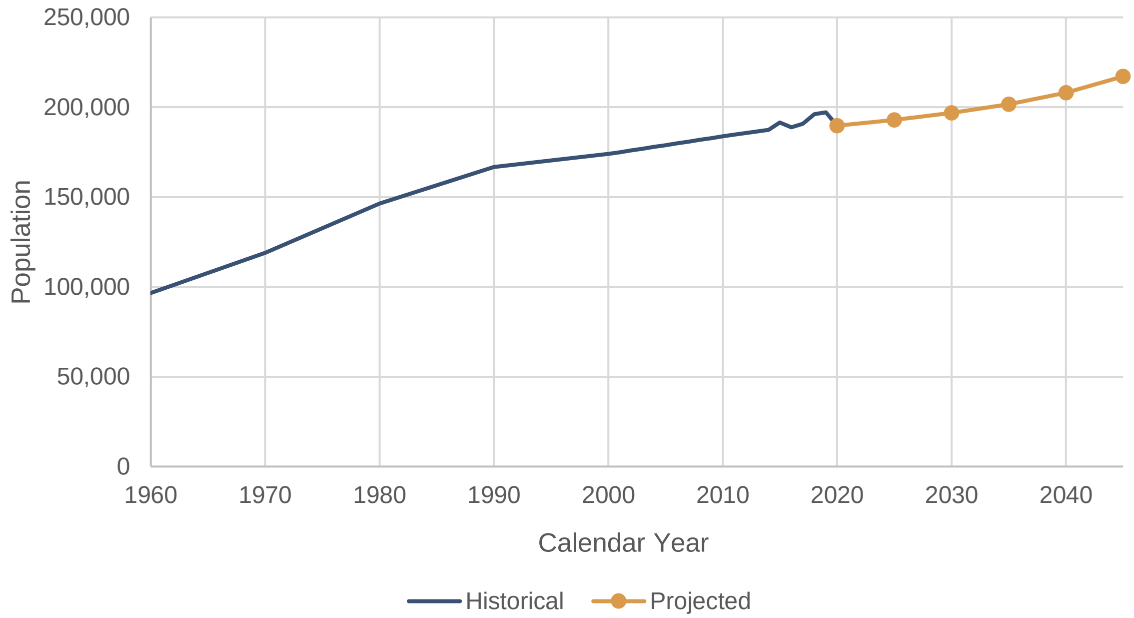

Figure ES-1. Historical and Projected Population

The WRMP also performed an analysis on recent trends in GPCD within the Authority's service area. Recent trends over the last 20 years indicate that a return to 90 GPCD (the assumed water use rate in the 2020 UWMP) is unlikely to occur. In response to this, the WRMP assumed a future per capita use of 82 GPCD, which roughly corresponds to the average usage rates between 2015 to 2019. The updated demand projection considering the revised population projections and new per capita use assumption is plotted in Figure ES-2 below.

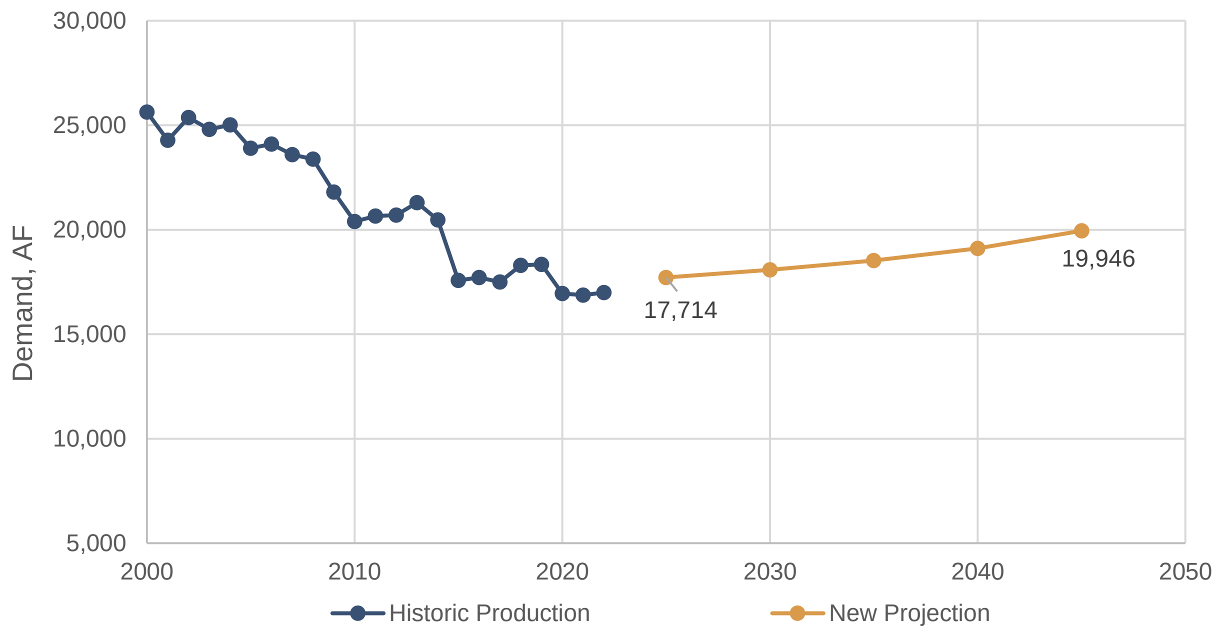

Figure ES-2. Historical and Projected Water Demand

Reliability Analysis of the Existing Water Supply System

The WRMP conducted a supply assessment to estimate the availability and use of the Authority's existing water supply sources including the National City Wells, production from the Reynolds Desalination Facility, use of local surface water from Loveland and Sweetwater Reservoirs and imported water purchases from the San Diego County Water Authority (SDCWA). The assessment was conducted using projected water demands between 2025 and 2045 under the following hydrologic scenarios:

- Average (i.e., "normal") hydrologic conditions between 2010 to 2020;
- Single dry year conditions based on 2015 hydrology;
- 5-consecutive dry year conditions based on 2012 to 2016 hydrology (the lowest 5-year moving average of the total local runoff from both reservoirs); and
- 10-consecutive dry year conditions based on 1955 and 1964 hydrology (the driest 10-year period on record).

The analysis considered following key assumptions associated with water supply system conditions:

- Local surface water availability consistent with the hydrologic scenarios identified above.
- National City Wells production based on average 2010-2020 production (1,900-acre feet per year (AFY)).
- 8,300 AFY of Reynolds Desalination Facility production based on maximum production since the 2017 expansion, increased to 8,800 AFY by 2030.

- Imported water purchased to fill gaps not met by existing local sources.

By 2045, if there is no further development of local water supply sources, average annual imported water purchases were modelled to range between 4,246 AFY and 7,843 AFY and maximum annual imported water purchases could exceed 9,000 AFY under extremely dry hydrologic conditions. Table ES-1 summarizes the modeled annual average imported water purchases from the analysis.

Table ES-1. Estimated Need of Imported Water Under Modeled Hydrologic Scenarios

	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 Year [(a)]	4,976	4,844	5,442	6,712	7,690
10-Consecutive Dry Year [(b)]	4,151	4,308	4,866	5,593	6,447

[(a)] Reports average annual modeled imported water purchase.
[(b)] Ibid.

The future cost of imported water was estimated in the WRMP considering escalation of fixed and variable costs from SDCWA and the Metropolitan Water District of Southern California (Metropolitan) based on information obtained from recent Metropolitan Biennial Budgets, the SDCWA CY 2021 Cost of Service Study, and the Authority's recent purchase history between FY 2011/12 through FY 2022/23. The WRMP analysis concluded that the cost of imported treated water is projected to at least double (increases between 100 and 160%) by 2045. Given the modeled imported water purchases summarized above, the annual cost of imported water could range between $24 million and $54 million depending on hydrologic condition.

Cost and Yield Comparison of Water Supply Alternatives

Seven local water supply alternatives were conceptualized and evaluated in the WRMP including:

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

The seven water supply alternatives were compared to each other based on their cost and expected yield. For cost, only capital cost of the alternatives was considered, as there are several outstanding factors that influence annual costs (e.g., O&M, cost agreements for new water purchases) that must be confirmed prior to estimating a cost per acre-foot for some of the alternatives. For example, the Recycled Water

Purchase from Otay Water District and IPR Groundwater Injection to the CPSD Basin alternatives' annual costs are dependent on the cost to purchase recycled water from Otay Water District and the IPR Surface Water Augmentation to Sweetwater Reservoir is dependent on the cost to purchase wastewater from the City of San Diego.

Table ES-2. Summary of Water Supply Alternative Costs and Estimated Yields

Water Supply Alternative	Estimated Capital Cost	Estimated Yield (AFY)
Sweetwater Reservoir Aeration/Destratification System	$2.3 million	1,790
Otay River Brackish Groundwater Desalination	$55.5 million	4,480
Recycled Water Purchase from Otay Water District	$23.4 million	155
IPR Groundwater Injection to CPSD Basin (including conveyance from E St to new AWTP and L St to new AWTP)	$61.4 million	1,490-2,260
IPR Surface Water Augmentation to Sweetwater Reservoir	$288 million	6,450
Yield Optimization at Reynolds Desalination Facility	N/A [(a)]	1,400-2,100
Potable Water Sales Agreement to Otay Water District	$45.8 million	N/A [(b)]

[(a)] Costs associated with the specific treatment technologies in consideration for further optimizing the Reynolds Desalination Facility were not developed as part of the WRMP as they are being developed under a separate optimization study.

[(b)] A potable water sales agreement with Otay Water District does not have an estimated yield since it would not increase water supply. However, the alternative meets the intent of the WRMP by developing a new revenue source that would offset other Authority operating costs.

Water Supply Alternatives Categorization and Recommendations

The WRMP carefully considered the yields, costs, and notable considerations and constraints associated with each of the seven potential water supply alternatives. Each alternative was classified into three distinct categories: ***implement, advance,*** or ***study***. Alternatives recommended for ***implementation*** are advised to proceed to the design and construction phase, primarily due to their favorable yield-to-cost ratios and minimal constraints. For alternatives grouped in the ***advance*** category, it is suggested that the Authority coordinate with other agencies required to move the alternative forward. These alternatives are contingent on securing partnerships with other agencies, to enhance alternative feasibility via securing supply and/or cost-sharing agreements. Alternatives assigned to the ***study*** category warrant a thorough feasibility analysis to better understand potential constraints and determine their viability for further advancement. A summary of the key considerations associated with each water supply alternative as well as their categorization is presented in Table ES-3 below.

Table ES-3. Summary of Water Supply Alternative Categorization and Recommendation

Implement	
Alternative	**Key Considerations**
Sweetwater Reservoir Aeration/ Destratification System	• It is recommended that the Authority monitor the aeration/destratification system's performance and the associated water quality improvements in Sweetwater Reservoir to better quantify the expected yield improvements from the aeration/destratification system. Actual yield benefits will depend on quagga mussel population control and system operations. Design of the project is complete and environmental permitting is in progress.
Advance	
Alternative	**Key Considerations**
Recycled Water Purchase from Otay Water District	• Otay Water District's recycled water availability is variable since max day and peak demands would generally occur during summer months. Otay Water District's recycled water demands are also projected to increase over time, which decreases availability for the Authority. • It is recommended that the Authority continue to coordinate with Otay Water District to confirm the cost and availability of the recycled water supply. • It is recommended that the Authority conduct a feasibility study to analyse the alternative in more detail to identify other potential recycled water users (e.g., HOA's, commercial, and industrial properties) along the suggested alignment, as the WRMP only considered large outdoor users. A joint Recycled Water Market Study is currently being prepared in cooperation with Otay Water District. • It is recommended that the Authority coordinate with identified users to determine their interest in utilizing recycled water.
IPR Groundwater Injection to CPSD Basin	• The WRMP considered IPR groundwater injection using the same source of supply as the recycled water purchase from Otay Water District, therefore the same considerations also hold for this alternative. • It is recommended that the Authority determine internally how much of the recycled water supply to allocate to the identified recycled water users versus to the potential AWTP.

Table ES-3 (continued). Summary of Water Supply Alternative Categorization and Recommendation

Advance (continued)	
Alternative	**Key Considerations**
IPR Surface Water Augmentation to Sweetwater Reservoir	• It is recommended that the Authority confirm the availability of wastewater supply and the cost to purchase it from the City of San Diego. • It is recommended that the Authority coordinate with other local agencies to determine their interest in partnership for the alternative, cost sharing and the distribution of yield among the partner agencies.
Potable Water Sales Agreement with Otay Water District	• It is recommended that the Authority coordinate with Otay Water District to confirm continued interest in pursuing this partnership and to confirm whether the periods in which they are interested in purchasing potable water from the Authority align with the availability analysis. • This alternative does not yield addition supply; however, it increases revenue for Authority customers.
Study	
Alternative	**Key Considerations**
Otay River Brackish Groundwater Desalination	• Groundwater availability, specifically the sustainable yield of CPSD Basin must be confirmed. • CPSD groundwater basin may be subject to SGMA in the future if it is determined to be a high- or medium-priority basin. • Increased pumping could accelerate the rate of seawater intrusion in the basin, so more monitoring and modelling in coordination with the USGS is recommended. • It is recommended that the Authority further study brine disposal alternatives, potentially in coordination with the City of San Diego and/or SDCWA.
Yield Optimization at Reynolds Desalination Facility	• Additional evaluations are required to determine feasibility with the existing equipment at the Reynolds Desalination Facility. Results of the ongoing optimization study should be incorporated to amend the findings of this WRMP. • It is recommended that the Authority coordinate with the Regional Water Quality Control Board to determine the regulatory work required for an amendment to their brine permit.

1. Introduction

In response to the uncertainties of future water supplies and demands, Sweetwater Authority (the Authority) has undertaken a broad water resources master planning effort. This initiative is designed to navigate the complexities of water resource management while also proactively addressing the evolving needs of the communities it serves. The goal of this plan is to deliver high quality, reliable water supply at the least cost to customers.

The motivation behind this strategic undertaking is driven by a collective desire to 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 keen focus on key objectives, the Authority aims to assess the existing system's reliability under extended drought scenarios, evaluate new or expanded local supply alternatives, and ultimately identify cost-effective, reliable initiatives for future detailed 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.

1.1 Background and Motivation

The Authority is a publicly owned water agency (comprising a joint powers authority of the City of National City and the South Bay Irrigation District), which serves customers in National City, Bonita, and the western and central portions of Chula Vista, California. The Authority's mission is to provide its current and future customers with a safe, reliable, and affordable water supply through the use of the best available technology, sound management practices, public participation, and a balanced approach to human and environmental needs. In the 2022-2023 fiscal year, the Authority provided water service to approximately 189,371 people through 33,424 service connections in an approximately 41-square-mile service area (Figure 2-1).

The Authority accomplished its first Water Resources Master Plan (WRMP) in 2003 and updated it in 2008; and has supplemented that initial planning effort with Urban Water Management Plans (UWMPs) in 2010, 2015, and 2020; and a 2020 Water Supply Feasibility Study.

Per the 2020 Urban Water Management Plan (UWMP), the Authority is not expected to experience water supply shortages given their existing supply portfolio, demand projections through 2045, and a hypothetical 5-consecutive dry year scenario – however this does not mean that the Authority does not face significant future water supply challenges, including:

- Increasing costs of imported water;
- Reliability risks to imported supplies serving the Authority, including the State Water Project (SWP) and the Colorado River Aqueduct (CRA); and

- Compounding impacts of climate change and increased frequency/severity of droughts.

At the same time, the Authority has several opportunities for expanding the reliability of its local supply system. This WRMP seeks to update the Authority's understanding of its future water supply needs and evaluate potential local alternatives that are responsive to the long-range challenges it faces.

1.2 Key Planning Tasks Addressed by the WRMP

Through this planning effort, the Authority has examined the reliability of its existing supply portfolio over a 25-year planning period including consideration of a hypothetical 10-consecutive dry year scenario in addition to the 5-consecutive dry year scenario included in the UWMP. The Authority has also examined the potential performance and opportunities of several potential local supply alternatives. The alternatives presented, evaluated, and compared in this report currently only developed to the planning level; additional evaluations are needed to confirm sizing and siting decisions, layouts, and associated environmental and economic impacts.

Specific tasks completed for this WRMP included the following:

1. Reviewed existing and projected population and sources of supply under normal conditions, single dry year, and 5-consecutive dry year scenarios to verify need for new sources of supply and management measures to meet existing and projected demands.
2. Determined projected water demands and supplies for 10-consecutive dry years, in 5-year increments from 2025 to 2045.
3. Reviewed existing Demand Management Measures and provided recommendations for additional measures not identified in the 2020 Urban Water Management Plan and the 2020 Water Shortage Contingency Plan (WSCP).
4. Reviewed groundwater management measures and their impact on potential alternative water supplies evaluated.
5. Evaluated expected yield from local water supply alternatives and provided recommendations for implementation or non-implementation of the different alternatives evaluated, with respect to potential issues with water quality, environmental restrictions, and existing and potential new regulatory requirements.
6. Prepared a cost comparison to produce water from the alternatives evaluated versus the cost to produce water from existing local and imported water supplies.

1.3 WRMP Report Organization

This 2023 Water Resources Master Plan has been prepared to document the following elements:

- Overview of Existing Supply System
- Hydrologic Planning Scenarios Considered
- Existing and Projected Demands
- Reliability of Existing Supply System

- Local Water Supply Alternatives Analysis and Comparison
- WRMP Conclusions

2. Overview of Existing Supply System

The Authority's supply system serves the Cities of Chula Vista and National City, and the unincorporated community of Bonita for domestic, irrigation, and industrial use. The Authority's water service area is shown in Figure 2-1.

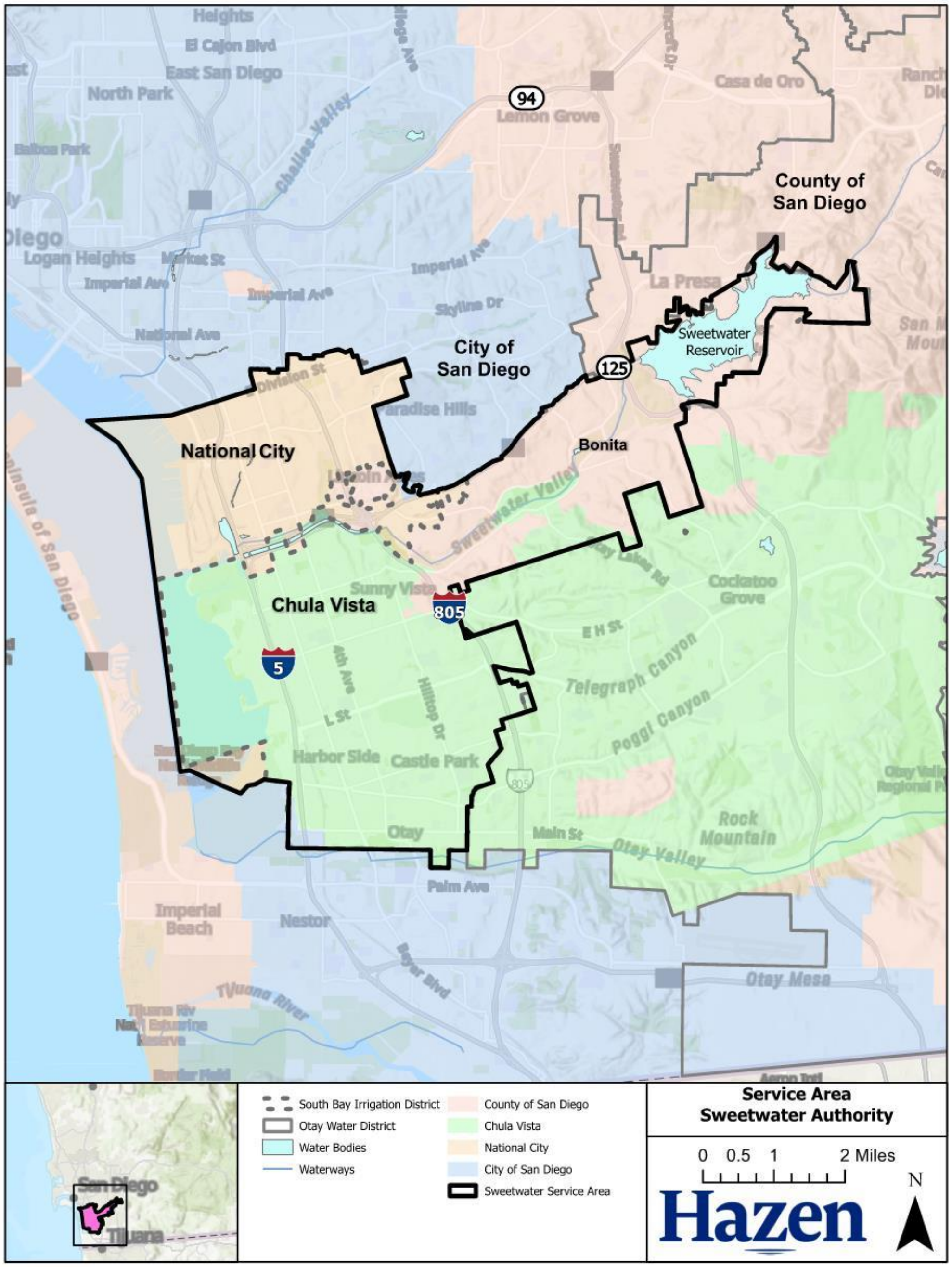

Figure 2-1. Sweetwater Authority Service Area

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) who is supplied from 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 Desalination Facility (Reynolds Desalination Facility).
- Senior water rights (pre-1914) to the Sweetwater River which feeds two reservoirs (Sweetwater and Loveland) and treated at the Robert A. Perdue Water Treatment Plant (WTP).

The Authority's supply sources and facilities are depicted in Figure 2-2 on the following page.

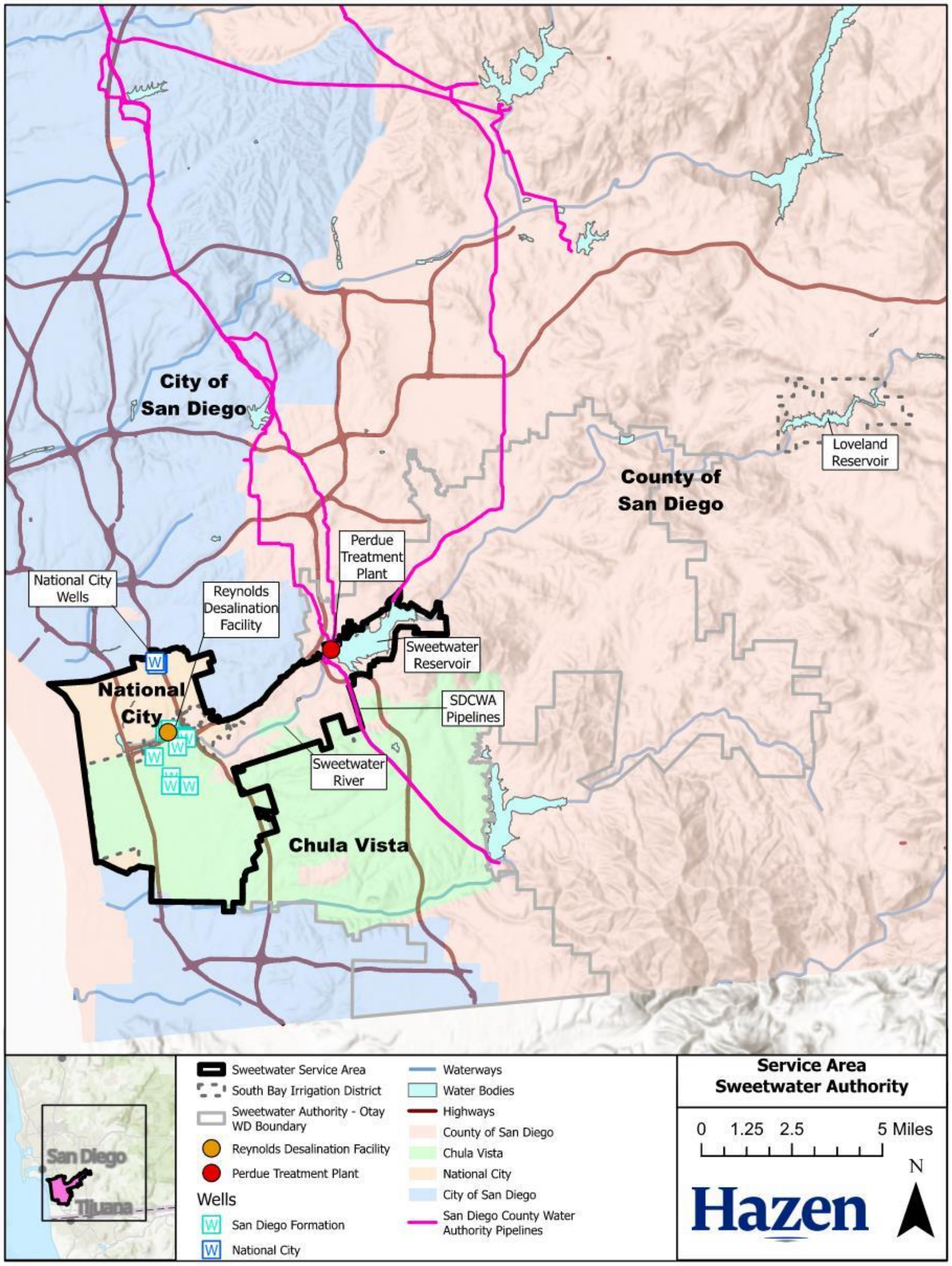

Figure 2-2. Authority Facilities Map

Because of variability in local surface hydrology (which impacts production from Sweetwater and Loveland Reservoirs) the Authority also operates three fresh groundwater wells in National City and 11 brackish groundwater wells at various locations in western Chula Vista. Raw water provided from the three National City Wells meets all state and federal drinking water standards and therefore only requires disinfection prior to distribution. However, raw water from the 11 brackish groundwater wells is treated at the Reynolds Desalination Facility located in Chula Vista, which has a capacity of 8,800 AFY as of the Phase II expansion completed in 2017.

The Authority also has the option to purchase imported raw or treated water from SDCWA. Both raw and treated water can be delivered to the Perdue WTP or bypass Perdue WTP to be directed to Sweetwater Reservoir. Similar to local surface water supplies, the availability of imported supplies can also significantly fluctuate on an interannual basis. Because of this, groundwater production from the National City Wells and supplies from the Reynolds Desalination Facility are the Authority's most reliable sources. Since the Phase II expansion of the Reynolds Desalination Facility in 2017, the Authority has supplied approximately 80 to 85 percent of its demand from local sources. The historic mix of supplies used by the Authority is shown in Figure 2-3.

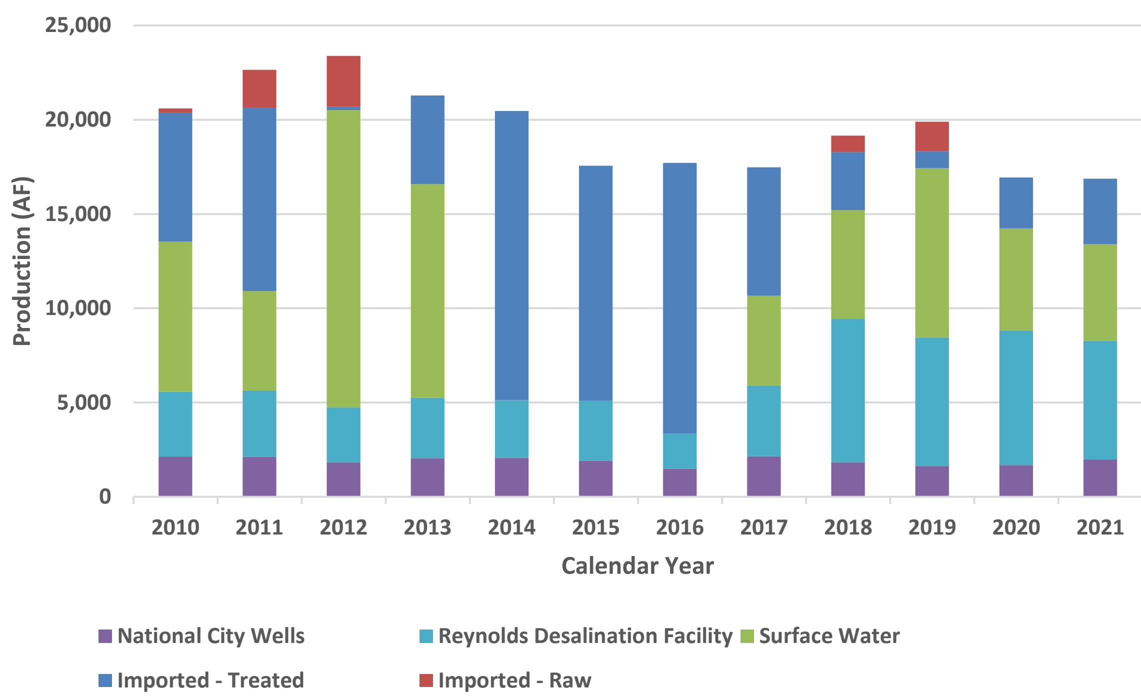

Figure 2-3. Historical Production since 2010

2.1 Local Surface Water

Sweetwater Reservoir, located near Spring Valley, CA, was constructed in 1888 and has an approximate capacity of 28,079 AF. 1,700 AF of the reservoir's capacity is reserved for emergency storage, which would meet the average demand for about one month in the Authority's service area. The remainder of the reservoir's usable storage is used to meet the Authority's demands. Water from Sweetwater Reservoir is treated at the adjacent Perdue WTP, which has a 30-MGD production capacity.

Loveland Reservoir, located near Alpine, CA, was constructed later in 1945 and has an approximate capacity of 25,387 AF. Similar to Sweetwater Reservoir, the Authority sets aside 6,375 AF for emergency storage in Loveland Reservoir, which would meet the average demand for about three months in the Authority's service area. This volume also approximates the transfer losses that occur in the Sweetwater River between the two reservoirs (about 30% of the water released). Water from Loveland Reservoir is released from Loveland Dam and flows downstream through the Sweetwater River channel into Sweetwater Reservoir, where it can then be treated at the Perdue WTP.

Sweetwater and Loveland Reservoirs have a total combined capacity of 53,466 AF. During wet years, when both are at or near full capacity, the reservoirs can provide up to two years' worth of supply to the Authority's customers. Figure 2-4 includes historical storage volumes for both Sweetwater and Loveland Reservoirs. Section 3 provides more information on historical hydrologic data, which includes precipitation, runoff, and evaporation for both Sweetwater and Loveland Reservoirs.

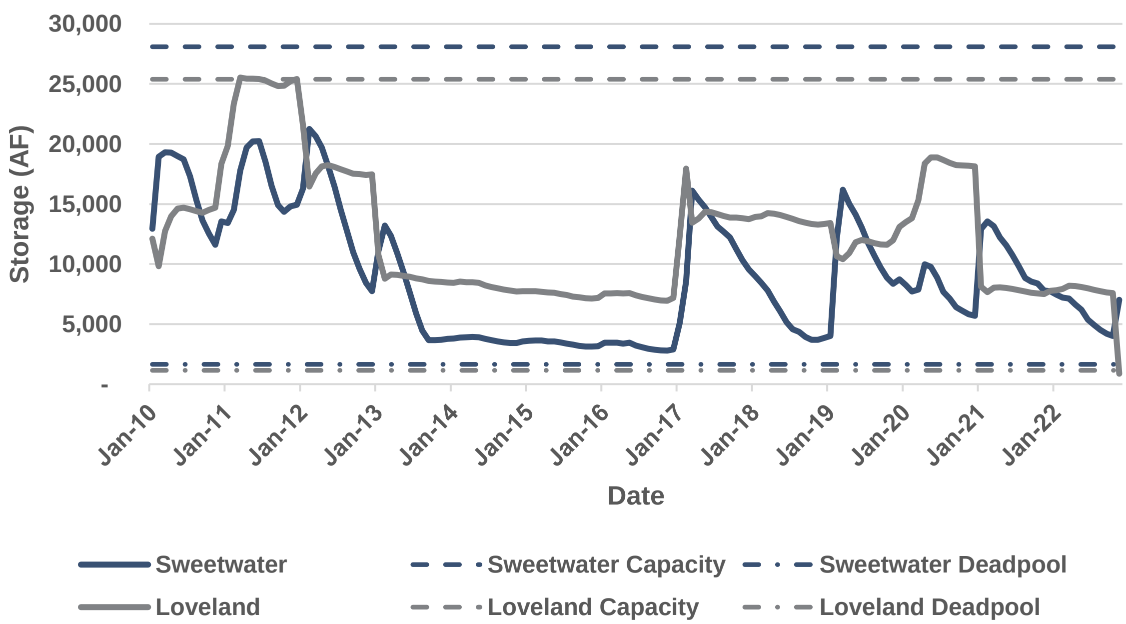

Figure 2-4: Sweetwater and Loveland Reservoirs Historical Storage Volumes

2.1.1 Surface Water Operations

Production of local surface water is typically balanced with the Authority's other local sources in order to minimize the purchase of imported water. Operation and production of local surface water is constrained by hydrology, environmental restrictions, and water quality.

On average, total local surface water production is generally around 5,000 AFY which allows for a balanced operation of the Authority's water supply system. During dry years, production of local surface water is prioritized in order to minimize evaporative losses and maximize beneficial use of available inflow and prior storage. Under wet hydrologic conditions, the Authority attempts to increase surface water production to lower the reservoir levels by the wintertime in order to capture as much local surface water as possible while simultaneously avoiding spills.

Environmental restrictions associated with Arroyo Toad (a federally listed endangered species) habitat can affect the operation of the surface water system, in particular transfers from Loveland Reservoir to Sweetwater Reservoir. Several areas in the Sweetwater River watershed have been designated as critical habitat for the Arroyo Toad, which can limit the release of water from Loveland to Sweetwater Reservoir during the spring and summer. In addition to environmental release restrictions, the Authority attempts to limit transfers during hot summer months to minimize transmission losses that occur through the unlined river channel.

Evaporation and transfer losses between Loveland and Sweetwater reservoirs can be significant; the Authority has taken steps to optimize operation of the existing surface water system to minimize these losses. Figure 2-5 and Figure 2-6 show an analysis of historical evaporation at Sweetwater and Loveland reservoir, which illustrates that evaporation tends to be larger when the reservoirs are fuller. To prevent these losses, the Authority generally prioritizes production of its local surface water.

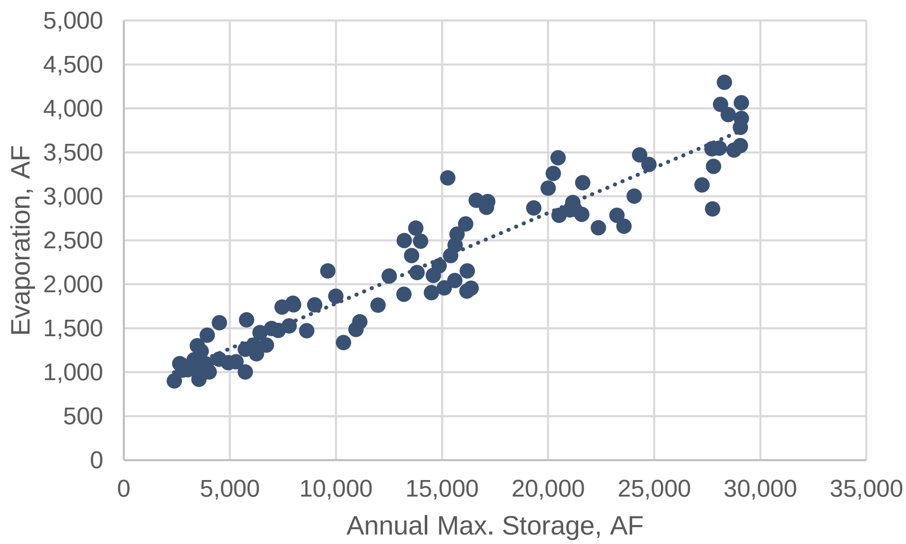

Figure 2-5. Sweetwater Reservoir Evaporation vs. Storage Elevation

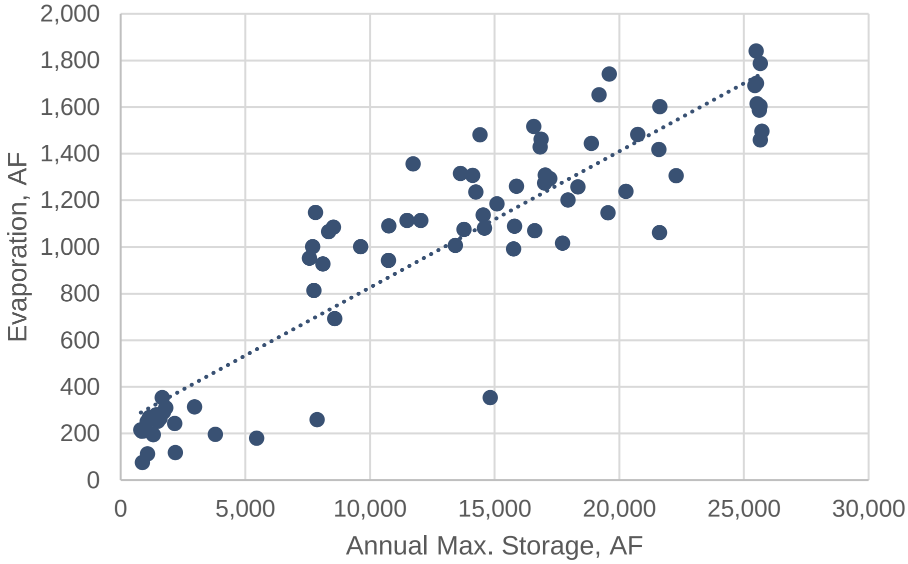

Figure 2-6. Loveland Reservoir Evaporation vs. Storage Elevation

Though the Authority limits transfers from Loveland Reservoir to Sweetwater Reservoir during certain times of the year to limit transmission losses that occur through the unlined river channel, typical transfer losses are about 30% of the amount of water released. Table 2-1 provides the maximum and average amount of water loss during transfers as well as the number of occasions in which water was lost out of the 145 transfers that have occurred since March 1945 to date.

Table 2-11. Loveland Reservoir Historical Transfer Loss

Maximum Transfer Loss, AF	4,520.0
Average Transfer Loss, AF	666.3
Occasions of Loss	122

Every 1,000 AF of water lost is equivalent to over $1 million in cost for the Authority. As such, the Authority is extremely mindful of when they conduct transfers and has expressed interest in ways to mitigate these losses as well as ways to more efficiently utilize its surface water supply to prevent evaporative losses.

2.1.2 Surface Water Treatment

Surface water treatment is conducted at the 30 MGD Perdue WTP. In addition to treating local surface water, the plant can also treat imported water supplies received from the SDCWA's raw water conveyance system. Water sent to Perdue WTP is treated through a five-step process that includes coagulation, flocculation, sedimentation, filtration, and disinfection. Chlorine dioxide is used as the primary disinfectant while chloramines are the residual disinfectant to meet disinfection by-product rules. Following treatment, the water is sent to the plant's 10 MG clear well, which serves as the point of delivery for the Authority's distribution system. The following section discusses intermittent water quality events that are challenging to manage at Perdue WTP, which can result in reduced surface water production.

2.1.3 Surface Water Quality

Surface water quality, in particular low-quality stormwater runoff and taste and odor issues have historically been a challenge at Sweetwater Reservoir. Water quality conditions have often resulted in conditions that constrain production from Perdue WTP. This section provides an overview of the main surface water quality challenges the Authority faces in its surface water system.

Land use and associated stormwater flows from the watershed especially influences water quality captured in Sweetwater Reservoir. The Authority diverts low quality runoff around the reservoir through the Urban Runoff Diversion System (URDS), which was constructed in two phases in 1991 and 1999. The system is composed of a series of ponds and conveyance structures which capture first flush storm flows, low flow runoff, or hazardous spills in the watershed, preventing water with high salt and/or contaminant loads from entering the reservoir. Water diverted through the URDS bypasses the reservoir and is discharged to Sweetwater River, where it joins the underground alluvium. Water with acceptable quality conditions is sent to the reservoir, which is then sent to the Perdue WTP for treatment and distribution. URDS bypasses tend to be short-duration and are not viewed as significantly reducing water supply availability of Sweetwater Reservoir.

Aside from intermittent stormwater issues, the Authority faces more chronic, longer-duration water quality events within Sweetwater Reservoir that prevent the local surface supply within the reservoir to be maximized. As depicted in Figure 2-7, there are numerous occasions within the past five years where the Authority had to purchase imported raw water to be treated at the Perdue WTP to meet demands when there was available supply (above the minimum storage requirement of 3,350 AF) within Sweetwater Reservoir.

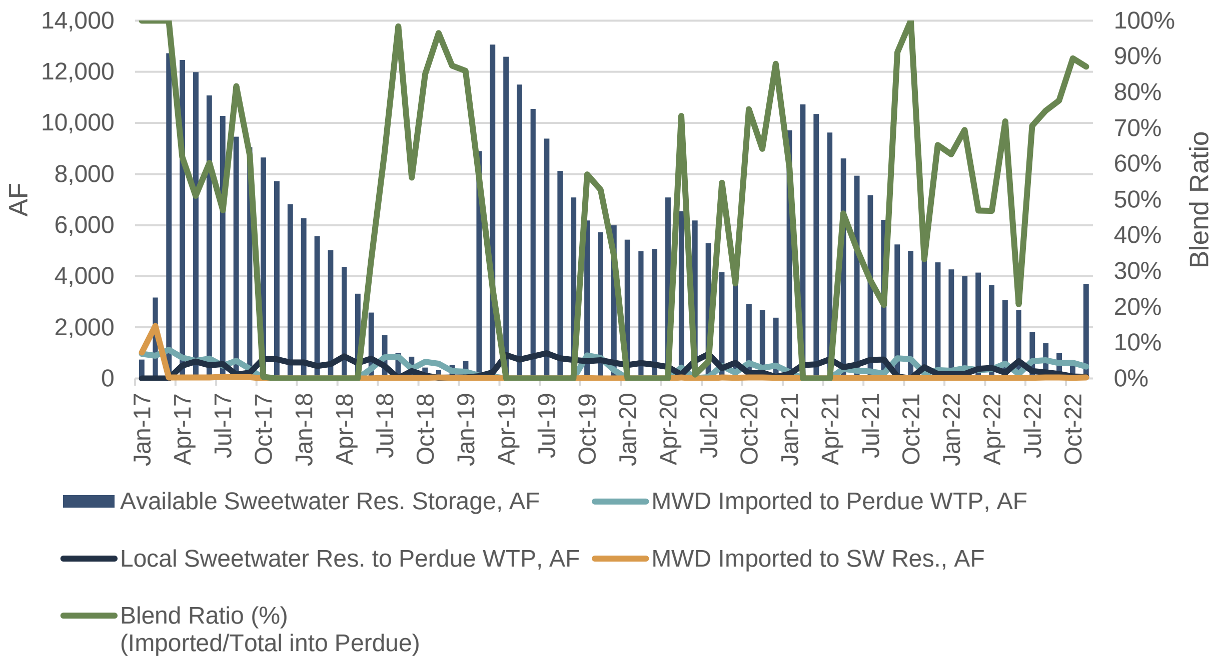

Figure 2-7. Historical Water Supply Availability and Purchases

The predominant drivers for purchasing imported water when local surface supply is available include taste and odor issues attributed to seasonal algal blooms, discoloration from high manganese concentrations, and low dissolved oxygen within the reservoir (Table 2-2).

Table 2-22. Water Quality Challenges at Sweetwater Reservoir

Challenge	Description	Consequence
Algal Productivity	Algal productivity can vary as a function of nutrient concentrations, water temperatures, and other factors.	• The occurrence of algal blooms can produce Taste and Odor compounds (MIB & geosmin) that are difficult to treat, and which may generate customer complaints and lead to reduced levels of consumer confidence in the Authority's product
Manganese	Past use of potassium permanganate (KMnO4) at the plant as an oxidizing agent has contributed to problematically higher levels of manganese in the reservoir.	• High manganese levels can cause discolored water, resulting in possible staining of porcelain water fixtures and customer complaints.
Dissolved Oxygen	Depletion of dissolved oxygen (anoxia), as it can occur in the deeper waters of a reservoir, allows nutrients and other oxidized compounds sequestered in the sediment to reenter the water column.	• The Regional Water Quality Control Board currently lists Sweetwater Reservoir as an impaired water body under Section 303(d) of the Clean Water Act due to low dissolved oxygen. • Low dissolved oxygen concentrations fuel a cycle of algal productivity and other water quality challenges that impair treatability of the local surface water supply in Sweetwater Reservoir.

2.2 Groundwater

The Authority owns three freshwater wells in the National City wellfield (two of which are operated at a given time) and 11 brackish groundwater wells, both of which draw water from the Pliocene San Diego Formation (SDF) aquifer, the principal aquifer located in the CPSD groundwater basin (Figure 2-8). The Authority's total groundwater pumping capacities are summarized in Table 2-3 on the following page. The SDF extends from Mission Valley Basin in the north to the U.S./Mexico border in the South. It is also bounded by the La Nacion and Rose Canyon Fault Zones in the east and the San Diego Bay in the West.

Sustainable yield of the SDF is undetermined, but a regional groundwater model study prepared by Timothy J. Durbin, Inc. has estimated total groundwater storage within the basin to range between 1 and 2 million AF, with approximately 960,000 AF of groundwater being in storage within the area bounded by the Authority service area, the La Nacion Fault, and the Pacific Ocean (Durbin, 2019 and AECOM, 2020). The estimated pumping capacity of the SDF is about 11,000 AFY, which is split between the Authority and the City of San Diego (AECOM, 2020). The Authority's initial share is about 8,300 AFY and the City of San Diego's is about 2,700 AFY. In the near future, it is anticipated that the City of San Diego will be prioritizing supply through their Pure Water program, which can make their share of the SDF's capacity available for the Authority's use. This planning assumption is further discussed in Section 6. In addition to the SDF, the CPSD groundwater basin includes three narrow riverine alluvial aquifers along the coastal drainages of the Sweetwater, Otay, and Tijuana Rivers. However, the Authority extracts groundwater from the principal SDF aquifer.

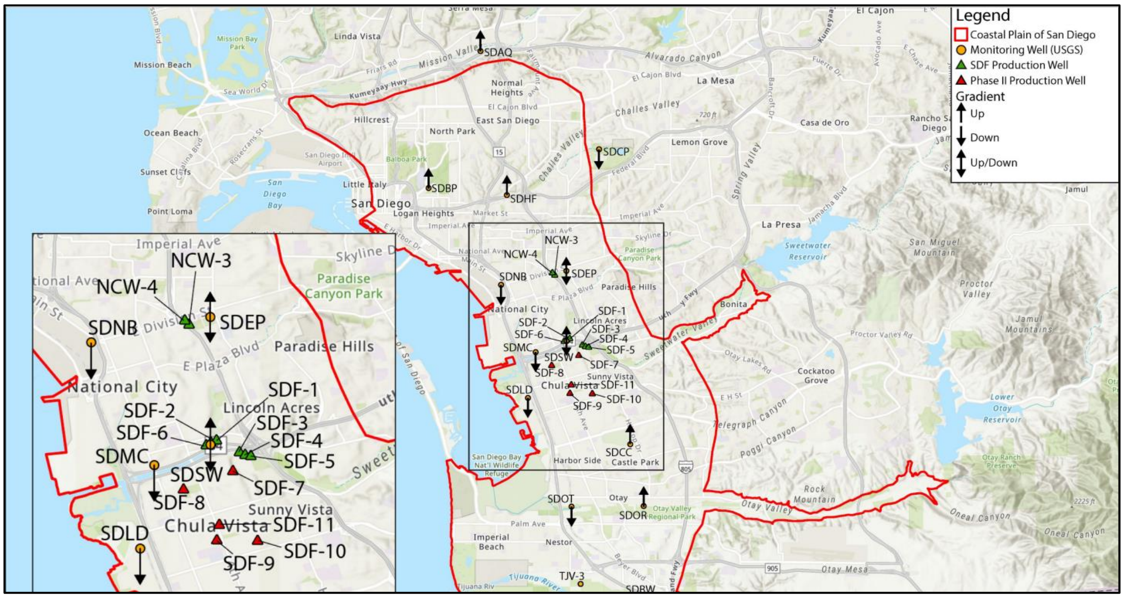

Figure 2-8: Sweetwater Authority Groundwater Wells Within the CPSD Basin (AECOM, 2020)

Table 2-3. Sweetwater Authority Groundwater Wells Design Capacity

Well	Design Capacity (AFY)
NC Wells #3 and #4 (rounded to nearest 50 AFY)	~2,350
SDF Wells #1-#11	8,800
Total	**~11,150**

The CPSD groundwater basin encompasses approximately 86 square miles and includes various physical, hydrologic, and geologic features. The SDF aquifer is more than 1,000 feet thick and contains an upper coarse non-marine section and lower fine-grained marine section. Due to the low relief, groundwater occurs at shallow depths in the Pleistocene sediment overlying the SDF. Additionally, low permeability Tertiary sedimentary formations form the basin bottom. Figure 2-9 shows a generalized diagram of the major physical and geologic features of the CPSD, looking southeast. The SDF east of the La Nacion fault is relatively thin, lies above the most regional groundwater table, and has not been shown to be a productive aquifer. West of the fault, the SDF and overlying Pleistocene sediment appear to thicken below the San Diego Bay. The major rivers, Sweetwater River and Otay River, cut their channels downward below the San Diego Bay.

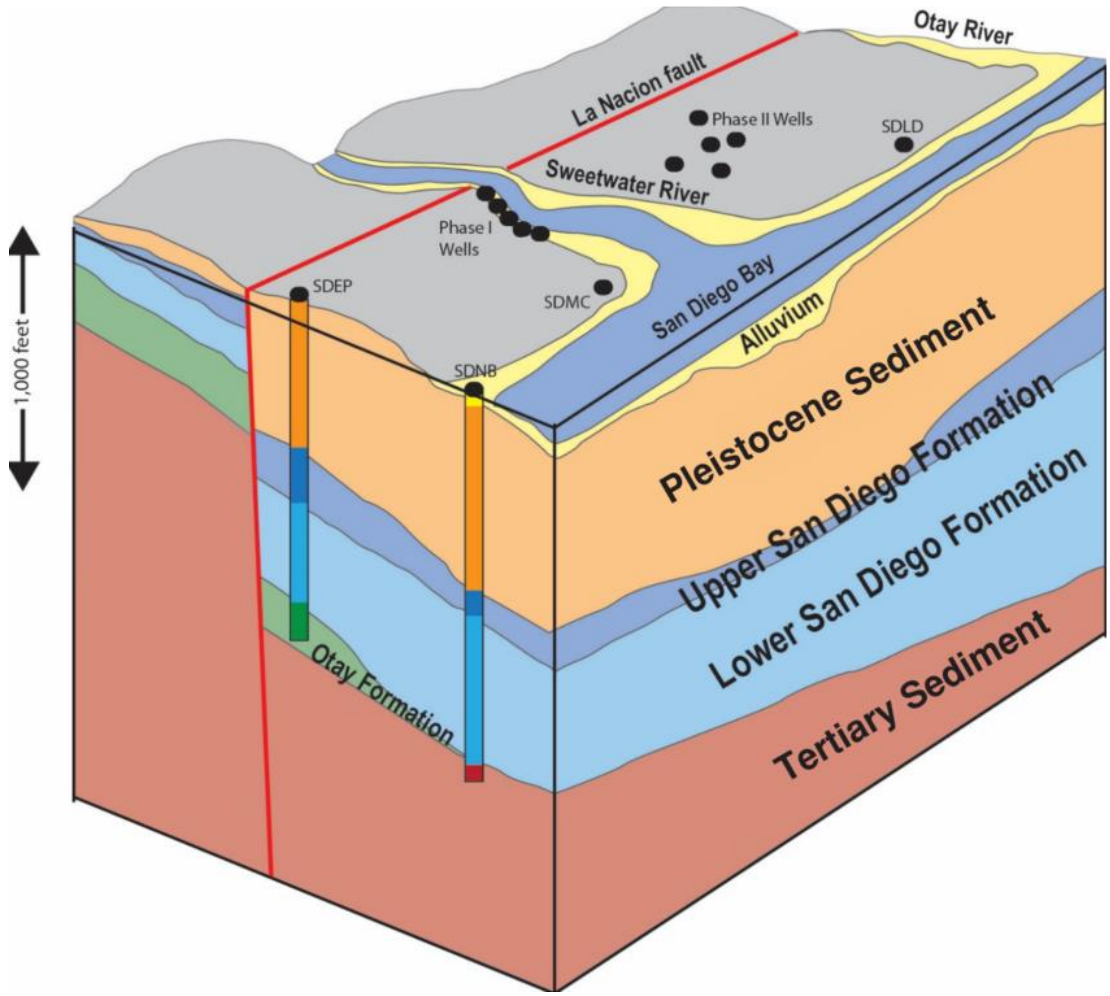

Figure 2-9. CPSD Geological Model - Block Diagram (AECOM, 2020)

2.2.1 National City Wells Groundwater

The National City wellfield includes three wells, Well #2, Well #3, and Well #4 (Table 2-4). Wells #3 and #4 operate daily, while Well #2 primarily acts as a standby. Together, these wells produced an average of 1,900 AFY between 2010 and 2020. No treatment is required for the water produced by these wells because of the high quality of the water, which averages about 600 mg/L Total Dissolved Solids (TDS). As a result, the water is only disinfected with chloramines once it is produced, and then delivered to the Authority's customers.

Table 2-4. National City Wellfield Capacities

Well	Pumping Capacity (GPM)	Pumping Capacity (AFY)
Well #2	600	968
Well #3	700	1,129
Well #4	750	1,210
Total Typical Operations*	**1,450**	**2,339**
Total Maximum Operations	**2,050**	**3,307**

* Well #2 is not typically operated and primarily acts as a standby well.
Typical operations total capacity does not include Well #2.

The primary water quality risk to groundwater quality in the SDF is contamination with Methyl Tertiary Butyl Ether (MTBE), an oxygenate added to gasoline to reduce emissions of carbon monoxide and other pollutants. When evaporated or spilled, it contaminates groundwater aquifers, lakes, and other various bodies of water. The Regional Water Quality Control Board's GeoTracker database shows cases of leaking underground storage tanks at Shell and former EZ Serve stations in National City. However, the Authority has been monitoring the National City wellfield monthly for MTBE contamination since being notified by the San Diego County Health Department. To date, no monitoring has indicated any significant contamination. Aside from MTBE, per- and polyfluoroalkyl substances (PFAS) contamination is a potential area of concern given the recent national primary drinking water Maximum Contaminant Levels (MCLs) proposed by the US Environmental Protection Agency (EPA), notification levels established by the California Department of Drinking Water (DDW), and general prevalence of PFAS in groundwater resources across the state and country. Currently the Authority is not aware of any PFAS contamination in its groundwater supply. Other concerns that could result from pumping from the SDF (in particular seawater intrusion) are further discussed in Section 2.2.3.

2.2.2 Brackish Groundwater Desalination

Brackish groundwater from the SDF is treated at the Reynolds Desalination Facility, which has a 10 MGD treatment capacity. The Reynolds Desalination Facility uses reverse osmosis to treat brackish groundwater from the SDF. The treatment process decreases the TDS from the 1,600 – 2,500 mg/L range to 100 mg/L. The treated water is then blended with bypass SDF well water with a target TDS level of 400-500 mg/L.

Phase I of the Desalination Facility (completed in January 2000) was designed to produce approximately 3.5 MGD (3,600 AFY) of treated water. Source water for Phase I included water from six SDF wells and four Sweetwater River alluvial wells; however, the alluvial wells are no longer in use[1]. In 2017, Phase II of the Desalination Facility was completed, which added five more SDF wells (bringing the total to 11 SDF wells) and adding another 5,200 AFY in capacity. As a result, the Desalination Facility's capacity was increased to 8,800 AFY. The Facility has produced an average of 7,000 AFY for the last five years.

[1] Use of the Sweetwater River alluvial wells has ceased due to vegetative distress in the Sweetwater River riparian area and the finding that the Sweetwater River alluvium has been found to be under the influence of surface water. The California Department of Public Health has not approved reverse osmosis membranes for surface water treatment.

The historical production of the Authority's National City Wells and Reynolds Desalination Facility from the aquifer is reflected below in Figure 2-10.

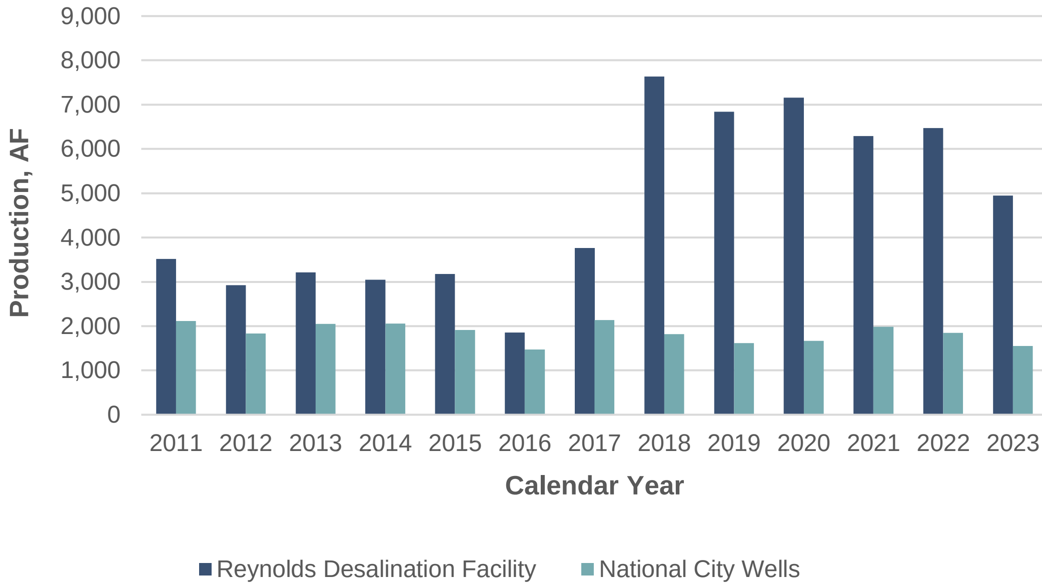

Figure 2-10. Historical Authority Groundwater Production by Source

2.2.3 Summary of Recent Groundwater Management Measures

Careful management of the Authority's groundwater supplies is important for supply reliability. The Authority closely monitors and studies trends in supply availability, water quality, and potential regulatory impacts to its groundwater sources. Recently in 2020, the Authority and the City of San Diego prepared a Preliminary Groundwater Sustainability Plan (GSP) for the CPSD Groundwater Basin, which details corrective and management measures to minimize adverse effects to the basin's sustainability. However, the sustainable yield in the basin remains undefined by the U.S. Geological Survey (USGS). Multiple competing groundwater models exist, each presenting different perspectives on this critical parameter. The Authority recognizes the need to stay aware of these variations and the evolving dialogue surrounding sustainable yield. Hence, ongoing monitoring and collaboration with the USGS are essential for refining the understanding of sustainable yield within the basin.

In addition, the SDF currently does not carry a high-priority basin designation, sparing the Authority from immediate concerns related to Sustainable Groundwater Management Act (SGMA) regulations and constraints. However, the Authority acknowledges the potential for the SDF's priority status to change in the future and recognizes that this could alter the use of the groundwater basin.

While seawater intrusion stands as a potential risk in the SDF, the ambiguity introduced by competing models makes the quantification of this threat difficult. The Authority remains proactive in addressing this concern by maintaining a continuous dialogue and coordination with the USGS as well as collaboration on periodic monitoring efforts.

Currently, neither sustainable yield nor seawater intrusion, coupled with SGMA-related regulations, constrains SWA's groundwater production from the SDF, and this status quo is not anticipated to change in the near future. Nevertheless, the prevailing uncertainty introduces an element of potential risk, underscoring the necessity for ongoing monitoring and the possibility of further study. This becomes particularly important when contemplating new supply alternatives that may involve increased groundwater extraction or the introduction of groundwater injection into the SDF.

The subsections below further summarize key findings from the Preliminary GSP associated with Water Quantity and Quality.

2.2.3.1 Water Quantity

Current pumping operations are sustainable according to various models discussed in the Preliminary GSP. While most groundwater extraction from the SDF aquifer is from the Authority's municipal water supply wells, golf course irrigation pumping by the National City Golf Course and the San Diego Country Club also pull relatively small volumes from the aquifer for irrigation use. Average annual pumping from the SDF is summarized below in Table 2-5.

Table 2-5. SDF Average Annual Pumping

Facility	Description	Average Production
National City Well Field	NCW-3 and NCW-4 (2010-2021)	1,900 AFY
Reynolds Desalination Facility	Phase I Wells SDF 1-6 and Phase II Wells SDF 7-11 (2018-2021)	7,000 AFY
Golf Courses	Irrigation Wells (estimated amount)	~400 AFY
Total	**~9,300 AFY**	

Table from Preliminary Groundwater Sustainability Plan for Coastal Plain of San Diego, dated May 2020.

Recent groundwater modeling (Durbin, 2019) suggests that basin storage has increased by up to about 8,000 AFY between 1950 and 2019 as shown in Table 2-6. Positive storage increases in the Durbin study were mostly attributed to urban recharge, inclusive of the deep percolation of precipitation, irrigation water, and conveyance losses within urban areas.

Table 2-6. Durbin Model Groundwater Budgets for Pre-Development and Current Conditions

Pre-Development		Current	
Budget Component	**Rate (AFY)**	**Budget Component**	**Rate (AFY)**
Inflows		**Inflows**	
Natural recharge	105,000	Natural recharge	105,000
Urban recharge	0	Urban recharge	26,000
Total	105,000	Total	131,000
Outflows		**Outflows**	
Discharge to streams	61,000	Discharge to streams	60,000
Discharge to ocean	12,000	Discharge to ocean	13,000
Phreatophytes	32,000	Phreatophytes	32,000
Pumping	0	Pumping	18,000
Total	105,000	Total	123,000
Storage Change	0	**Storage Change**	8,000

Table from Preliminary Groundwater Sustainability Plan for Coastal Plain of San Diego, dated May 2020.

The 2020 Update of the Groundwater Model Study prepared by INTERA adjusted the regional model to focus on the SDF hydrogeology and pumping. The model indicates that storage in both the upper and lower sections of the SDF are projected to decrease between 5,000 and 10,000 AF, after 50 years of pumping. However, the Pleistocene aquifer storage is predicted to increase at about twice this amount. The modeling suggests storage increases in the shallow Pleistocene aquifer may offset SDF storage losses, although interaction between shallow and deep aquifers due to pumping may be slow due to the confined or semi-confined system (Figure 2-11).

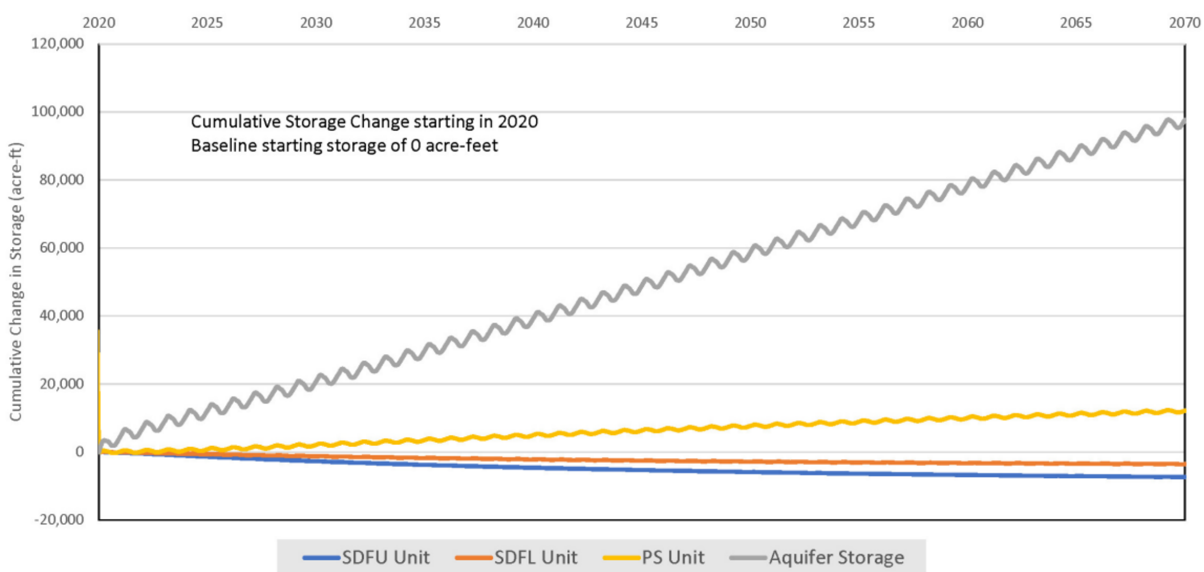

Figure 2-11. INTERA CPSD Cumulative Storage Change Predictive Model (AECOM, 2020)

This further exemplifies that the CPSD appears sustainable at 2018-2019 pumping rates for the next 50 years, since projected storage loss in the SDF aquifer is small compared to overall basin storage and as such, is unlikely to produce undesirable results.

However, future water supply impacts could arise if seawater intrusion is the actual primary source of storage increases in the Pleistocene aquifer and salinity becomes more pervasive in the system. Accordingly, it is important for the Authority and other users of the basin to continue to monitor seawater intrusion to prevent any adverse effects on this valuable supply source.

2.2.3.2 Water Quality

Ongoing water quality monitoring and management are essential for long-term aquifer sustainability. Although there are no indications that seawater intrusion is currently significant, several groundwater modeling studies have indicated that seawater intrusion is the primary future risk for the basin's long-term sustainability. The 2020 GSP cites model simulations (Boyle, 1999) of seawater intrusion to the basin. The Boyle modeling suggested that pumping rates up to 4,000 AFY would result in some seawater intrusion, but the effects would be limited to areas near San Diego Bay. After 100 years of pumping at 8,000 AFY at an average velocity of 40 ft/yr, the Boyle modeling suggests that more widespread seawater intrusion may occur. Furthermore, the Boyle modeling indicated that the seawater front could advance more quickly in more permeable layers and potentially move further inland. More recent modeling within the SDF aquifer related to pumping at the National City well field (Danskin et al., 2014) arrived at similar conclusions regarding the potential slow advance of increased salinity over approximately the next 60 years, as shown in Figure 2-12. [2]

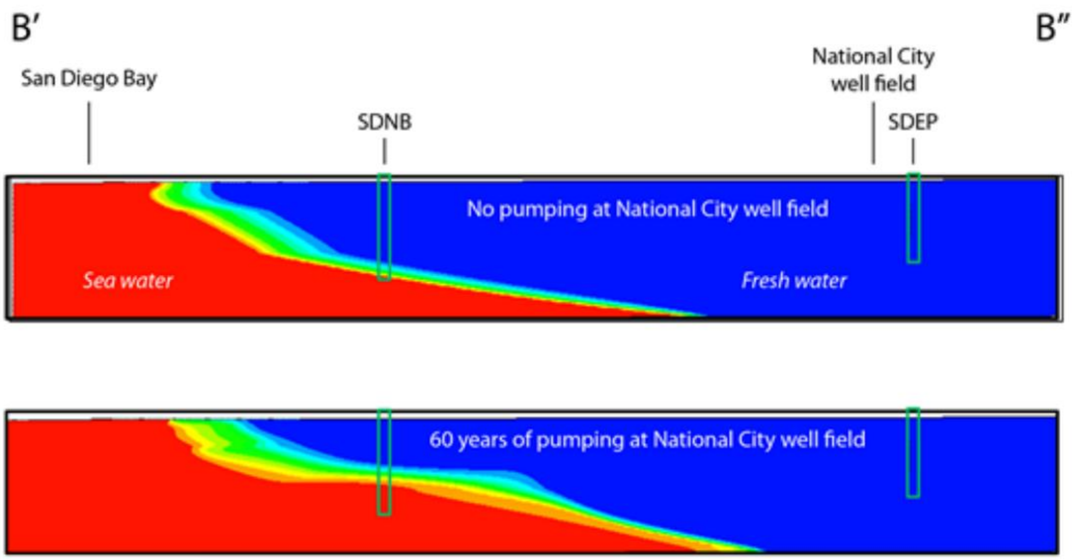

Figure 2-12. Danskin Model Simulating Freshwater/Seawater Interface (AECOM, 2020)

[2] It is important to note that these modeling results appear to be solely for seawater intrusion that would occur as a result of reduced heads from pumping. Sea level rise will increase the salt gradient, which has the potential to make the seawater front advance faster and/or further than modeled.

The Boyle study (Boyle Engineering, 1999) also indicated as little as 2% seawater would increase the SDF's average concentration of TDS and chloride from about 1,746 to 2,411 ppm and 736 to 1,108ppm, respectively. Despite the predictive modeling summarized above, monitoring of active seawater intrusion does not appear to be impacting any of the SDF production wells; recent water quality test results are not showing significant TDS increases at the well sites. Of the 11 USGS monitoring wells, sampling conducted between 2017 and 2019 at the San Diego Sweetwater (SDSW) wells actually showed decreasing TDS in the upper SDF pumping zone 540-560 feet below grade surface and that the lower SDF was stable.

The Authority and the City of San Diego have identified water quality thresholds and monitoring programs for TDS and chloride in the Main SDF aquifer and the National City Well Field. As mentioned, the National City Wells draw fresh water with a TDS of approximately 550 ppm, so only disinfection prior to municipal use is required. The Main SDF encompasses the whole of the upper and lower SDF aquifer system, where the Authority pumps brackish water from its 11 Reynolds Desalination Wells. Accordingly, the water drawn has a TDS of approximately 1,900-2,000 ppm and a chloride concentration of approximately 900 ppm, which meets the threshold the Authority has set for the Desal Facility. The water quality thresholds for TDS and chloride and corresponding sample data for the Reynolds Desalination Facility are reflected in Figure 2-13 below. While individual production wells producing from the SDF may nominally exceed the 2,600-ppm threshold, the average combined source water had a TDS of 1,900 ppm in 2019 which the Management Objective of 2,600 ppm TDS.

While current risks associated with salinity appear to be manageable, it is important to consider management actions that proactively minimize the impact of seawater intrusion on the basin's sustainability. To this end, the Preliminary GSP identifies various management actions to address seawater intrusion, which are summarized in Table 2-7 on the following page.

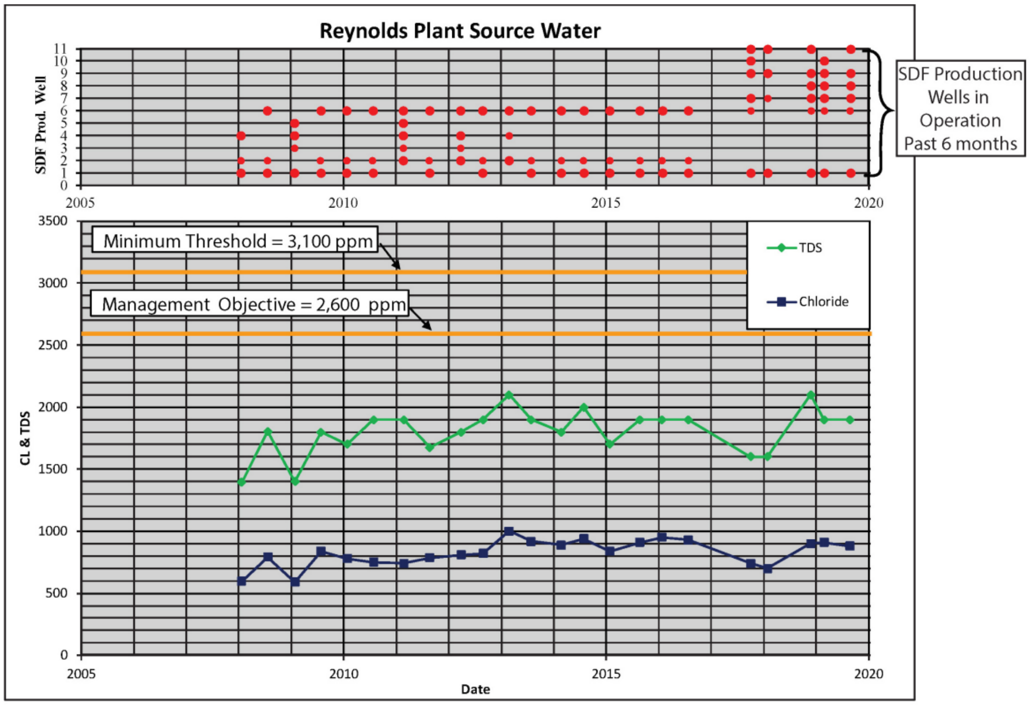

Figure 2-13. Proposed Minimum Threshold Approach Based on Reynolds Desalination Facility Source Water TDS and SDF Pumping Over Time (AECOM, 2020)

Table 2-7. Potential Management Actions for Seawater Intrusion

Management Action	Description
Adjust spatial distribution of pumping from existing wells	Adaptively manage pumping by varying the spatial distribution from existing wells to maintain blended TDS below 2,600 ppm measured at the Desal Facility.
Extend the well field southward	New SDF wells extended southerly would help distribute and lessen drawdowns in the existing SDF pumping zone, which would reduce the seawater intrusion gradient. Feasibility investigations would be required.
Modify the discharge permit	If the discharge permit could be raised, the limit at the production wells could also be increased potentially as high as 5,000 ppm TDS. Additional research and analysis would be needed to help decide if a permit modification might be achievable and, if so, what types of analysis and monitoring would be needed to support the 2022 permit application.
Reduce umping	If specific management actions or combinations of management actions prove too expensive, ineffective, or otherwise infeasible, reduced pumping may be required. Economic evaluations would be required to help decide whether to reduce pumping.
Other	Other management actions capable of maintaining basin sustainability over the next 50 years may be identified with periodic expert reviews.

Table from Preliminary Groundwater Sustainability Plan for Coastal Plain of San Diego, dated May 2020.

Additional extractions from the SDF may be possible but will need to demonstrate sustainability on a case-by-case basis. The Preliminary GSP suggests there may be opportunities for increased utilization of the basin by expanding the geographic scope of pumping beyond the current well fields, however additional study would be required to understand the impacts from specific projects. When considering future pumping projects, it is crucial to avoid the overdevelopment of basin extractions, excessive overlap of zones of influence, or other adverse operations that could negatively impact the basin's sustainability.

The typical operations and design capacity of the entities drawing from the SDF is provided in Table 2-8. The SDF's usable capacity is approximately 11,000 AFY, which could support intermittent increases in pumping as long as it is not sustained over extended periods of time, which may be used as a source of drought supply and to cover the increasing costs in importing water. Furthermore, the construction of new SDF wells that extend in the southern direction could also increase the Authority's capacity and would help distribute and lessen drawdowns in the existing SDF pumping zone, thus reducing the seawater intrusion gradient. A future potential indirect potable reuse (IPR) alternative could also be implemented by the Authority to further expand their system's capacity and be used to balance out seawater intrusion by pushing against the salt gradient. However, feasibility investigations would be required to determine any other potential adverse impacts on the basin's sustainability. These alternatives will be discussed further in Section 6.

Table 2-8. SDF Design Pumping Capacity and Typical Operations

Facility	Maximum Capacity (AF)*	Typical Operations (AF)*
Sweetwater Authority	11,750[1]	8,900[2]
Golf Courses	-	400
Total SDF	**11,000**	**9,300**

*Maximum pumping capacity and typical operations from Preliminary Groundwater Sustainability Plan for Coastal Plain of San Diego, dated May 2020.
[1.] Includes capacity of Wells #3 and #4 of National City Wellfield and all 11 Desal Wells.
[2.] The Authority has historically drawn approximately 8,900 AFY from the SDF since the completion of the Phase II Reynolds Desalination Facility Expansion.

2.3 Imported Water

The Authority imports both raw and treated water from SDCWA, which is either purchased from or wheeled by Metropolitan. Metropolitan's imported water sources available to the Authority include the SWP and the CRA. Water from the SWP originates from the Sacramento-San Joaquin Rivers Delta (Delta) in Northern California and is delivered to Metropolitan from the California Department of Water Resources (DWR), which is then sent to SDCWA and finally, to the Authority. This supply is usually high in organics and bromide. Raw water from the CRA is delivered to Metropolitan and SDCWA via the Colorado River from U.S. Bureau of Reclamation. This supply is generally high in TDS. All imported raw water is treated at Perdue WTP. SDCWA's Pipeline 3 delivers all raw water from the SDCWA's aqueducts, which receives it from Metropolitan's 44-mile Inland Feeder pipeline. Treated water from the SDCWA's aqueducts is first treated at either Metropolitan's Robert A. Skinner Filtration Plant, located in Riverside County, or the SDCWA's Twin Oaks Plant before being sent to the Authority via Pipeline 4E.

There are multiple water supply reliability risks associated with the imported sources. The primary concern is the availability and reliability of imported supplies. Both the SWP and CRA supplies are vulnerable to drought. During the most recent drought, allocations to the SWP fluctuated between 0-15% between 2021 and 2022 and resulted in statewide calls to reduce water use. Similarly, storage in Lake Powell and Lake Meade, two of the most important reservoirs in the Colorado River system, approached historic lows during the same time period. Long-term water supply modeling of the SWP and CRA systems performed by DWR and the Bureau of Reclamation suggest that climate change and increasing demands will result in more frequent and more severe water shortages. Future regulation and management actions on both systems, such as the Bay Delta Water Quality Control Plan and on-going negotiations of operation of the Colorado River Basin have the potential to further exacerbate shortages from climate change and drought.

The Authority also contends with interruptions of imported water deliveries stemming from conveyance infrastructure operations and maintenance. SDCWA typically performs their Second Aqueduct (treated water) maintenance during a 10-day period in the winter. While SDCWA usually notifies its member agencies of these planned shutdowns in advance, the Authority may also be subject to any unplanned interruptions of both raw and treated water supplies from SDCWA and Metropolitan. Acute seismic events could cause major outages of both statewide (e.g., key SWP facilities, such as Banks Pumping Plant) and local (e.g., Metropolitan and/or SDCWA) water transmission facilities. Several major pipelines within Metropolitan and SDCWA’s supply systems cross over earthquake faults. A major earthquake event could cause breaks in these pipelines, resulting in delivery interruptions for extended time periods.

Lastly, water quality concerns, such as quagga mussels and perchlorate, pose additional risks to imported supplies. Quagga mussel infestation presents a risk, due to their ability to multiply quickly and attach themselves to water intake structures and clog them. Quagga mussels also disrupt natural food chains and release toxins that affect other aquatic organisms. As a preventative measure, the Authority pre-chlorinates its imported water with chlorine dioxide before allowing it to enter Sweetwater Reservoir.

Despite these challenges, the 2020 UWMPs for both Metropolitan and SDCWA indicate that future water supply shortages to their member agencies are not currently expected, as both Metropolitan and SDCWA are actively pursuing regional water supply reliability projects to mitigate these risks. SDCWA transfers from the Imperial Irrigation District (IID) along the Colorado River Aqueduct mitigate shortage risk, while the local Emergency and Carryover Storage Project and Carlsbad Desalination Plant increase local supplies in the event of a MWD system outage. However, regional water supply investments do come at a financial cost, some of which will be passed down to member agencies and retailers, including the Authority[3].The future cost of imported water to the Authority, including a scenario where representative regional projects are implemented, is further discussed in Section 5.5.

2.4 Current Cost of Supplies

The current (2023) cost breakdown of each water supply source that the Authority draws from is shown in Table 2-9. All water supply costs are provided in the Water Rate Study for Sweetwater Authority prepared by NBS, dated Septemberote that future costs are further explored in Sections 5 and 6. As previously mentioned, water from Loveland Reservoir is not directly connected to the Perdue WTP, so it

[3] While Metropolitan currently provides grants to support the development of local projects there is no guarantee that they will continue.

is first sent to Sweetwater Reservoir via the Sweetwater River. Thus, the first listed cost includes the cost of maintaining local surface water, operations and maintenance, and raw water pumping in both reservoirs. This cost also reflects the cost of maintaining the URDS. Treated fresh groundwater from the National City Wells is the lowest-cost supply source the Authority has due to the high quality of water produced, costing only about $338 per AF. Treated brackish groundwater at the Desalination Facility costs approximately$561 per AF to produce. The most expensive options for water supply are imported supplies. In 2023, the SDCWA volumetric rate was $1,338 for imported supplies. However actual charges for imported water also incorporate fixed charges from both SDCWA and Metropolitan (see Section 5.5 for additional discussion on the application of fixed charges).[4] The cost of producing water from local supplies is comparably less expensive than that or purchasing imported water supplies, thereby reinforcing the need to further expand existing local supply sources or investigate options to develop new local supply sources.

Table 2-9. Approximate Water Supply Costs by Source

Water Source [a, b]	Average Cost per AF
Treated Sweetwater Reservoir Water at Perdue WTP*	$506
Groundwater from the National City Wells*	$338
Treated Brackish Groundwater at Reynolds Desal Facility*	$561
SDCWA Purchased Imported Water	$1,338

All supply costs are from the Water Rate Study for Sweetwater Authority prepared by NBS, dated September 2023.
Current SDCWA rates can be found at

3. Hydrologic Planning Scenarios Considered in the WRMP

The Authority's local surface water supplies display significant interannual variability, which directly impact availability. Given the variability in local hydrology, four scenarios were developed to guide planning for the WRMP, including "normal" (i.e., average hydrology) conditions, a hypothetical single dry year, a hypothetical 5-consecutive dry year sequence, and a hypothetical 10-consecutive dry year sequence.

3.1 Historical Context

The normal conditions, single dry year, 5-consecutive dry year, and 10-consecutive dry year scenarios were informed based on historical observations detailed in the following figures. Figure 3-1 and Figure 3-2 show the historical precipitation data at Sweetwater Reservoir and Loveland Reservoir, as well as their 5-year and 10-year rolling averages. Figure 3-3 and Figure 3-4 provide the historical annual evaporation data for Sweetwater Reservoir and Loveland Reservoir.

[4] SDCWA fixed costs included a transportation rate, a customer service charge, an emergency storage charge, a supply reliability charge, and an infrastructure access charge. Metropolitan fixed charges passed down to the Authority included a capacity charge and a readiness to serve charge.

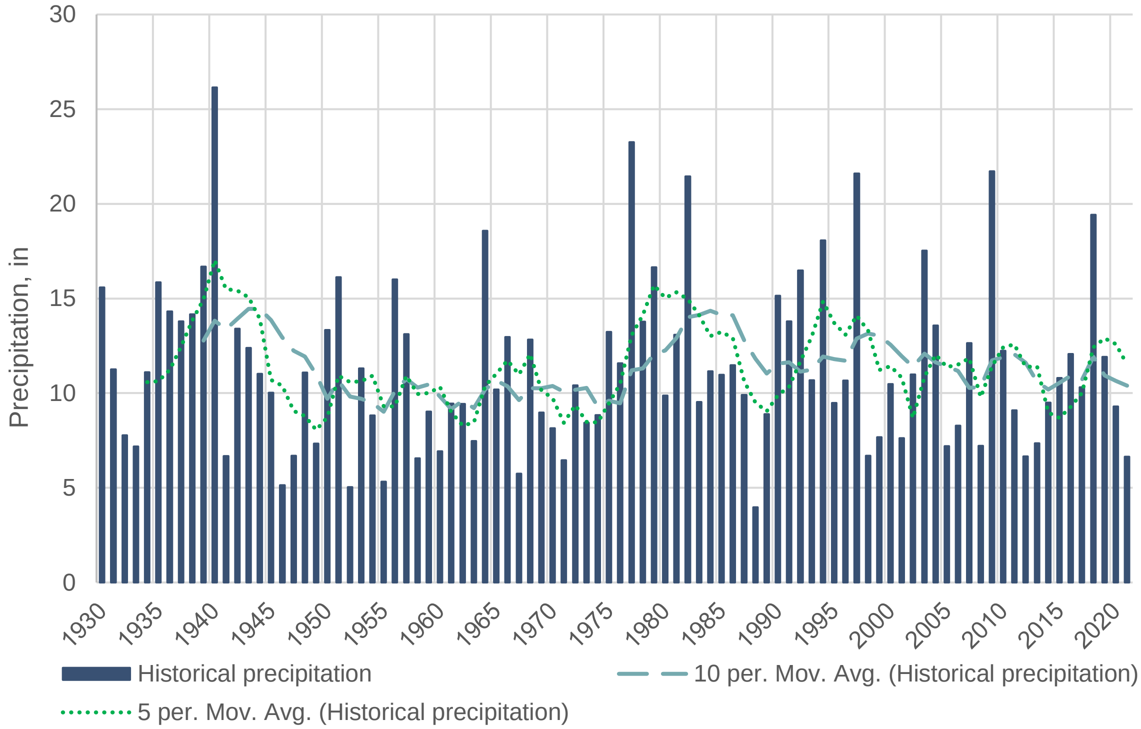

Figure 3-1. Historical Precipitation Data at Sweetwater Reservoir

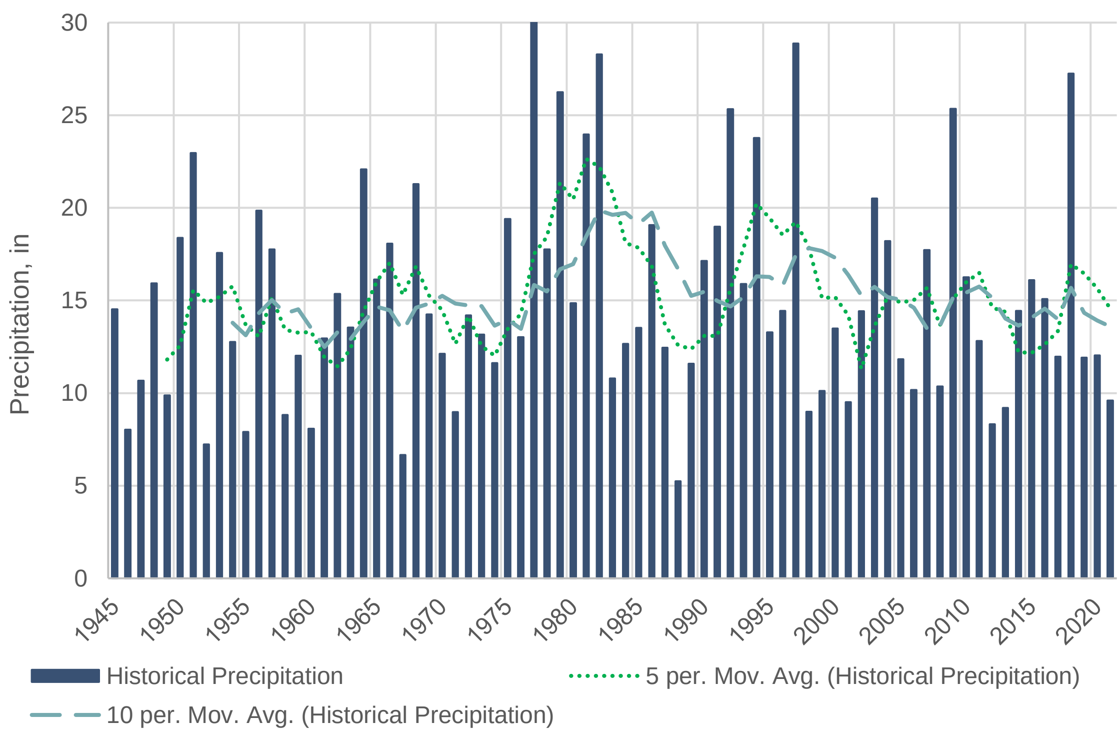

Figure 3-2. Historical Precipitation Data at Loveland Reservoir

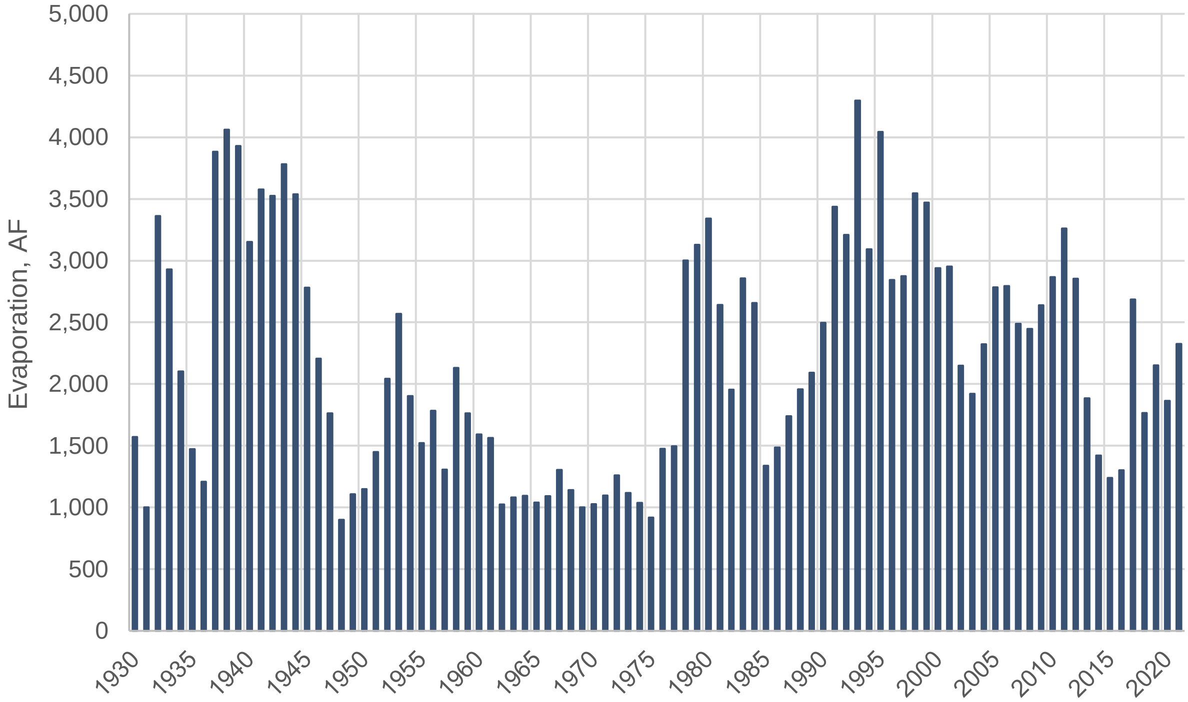

Figure 3-3. Historical Evaporation Data at Sweetwater Reservoir

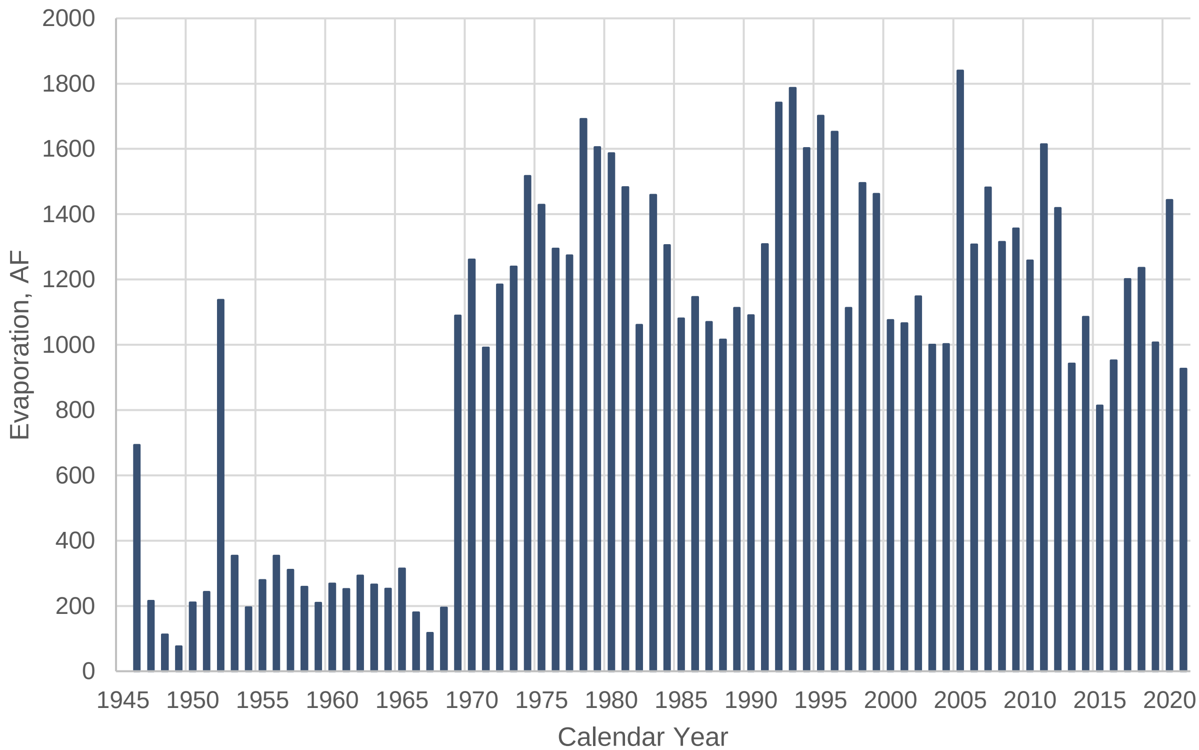

Figure 3-4. Historical Evaporation Data at Loveland Reservoir

3.2 Normal Conditions

As part of the 2020 UWMP and the 2020 WDSMP, an analysis of historical water supply and demands defined “normal” conditions to be average hydrology between 2010 to 2020. This 10-year period was selected by the 2020 UWMP and the 2020 WDSMP because it covers a wide range of hydrological conditions including a mix of wet and dry years including the 2012-2016 drought. However, climate change is expected to result in more frequent, more intense drought events in the future (California Fourth Climate Change Assessment Statewide Report, 2018). These trends necessitate explicit consideration of dry year scenarios to inform the assessment of future water supply reliability. In addition to considering historical normal conditions, the WRMP also considered several dry year scenarios which are further defined below.

3.3 Single Dry Year

As part of the 2020 UWMP, a single dry year water supply and demand assessment was undertaken to understand the Authority's water reliability if experiences a single dry year condition. The single dry year scenario was performed based on the year with lowest runoff (2015) in the last 30 years. This WRMP will make the same assumptions as the 2020 UWMP.

3.4 5-Consecutive Dry Years

A 5-consecutive dry year scenario was considered for the WRMP based on the lowest 5-year moving average of the total runoff to Sweetwater and Loveland Reservoirs.

Table 3-1 documents local runoff entering Sweetwater and Loveland Reservoirs over the last 15 years, which includes one of the most historically severe statewide droughts in California. The 5-year moving average of the total local runoff from both reservoirs is the lowest for 2012 to 2016. Therefore, this WRMP uses the hydrological data from 2012 to 2016 . Note that this selected period slightly differs from the 5-consecutive dry year sequence used in the 2020 UWMP, which selected 2013-2017.

Table 3-1. Local Runoff Records for Sweetwater Reservoir and Loveland Reservoir, 2006 to 2021

Starting Year	End Year	Sweetwater Reservoir Local Runoff		Loveland Reservoir Local Runoff		Total Local Runoff	
		Annual* (AF)	5-yr Moving Avg. (AF)	Annual* (AF)	5-yr Moving Avg. (AF)	Annual* (AF)	5-yr Moving Avg. (AF)
2006	2010	1,318	3,200	3,874	5,850	5,192	9,050
2007	2011	1,465	4,226	1,382	8,385	2,848	12,611
2008	2012	4,402	4,549	5,456	8,758	9,858	13,307
2009	2013	1,515	4,058	2,473	7,862	3,989	11,920
2010	2014	7,299	3,901	16,064	7,441	23,363	11,342
2011	2015	6,448	2,531	16,549	4,276	22,997	6,806
2012	2016	3,079	1,396	3,249	1,158	6,328	2,554

2013	2017	1,948	1,555	976	3,879	2,923	5,434
2014	2018	733	1,323	368	3,850	1,101	5,173
2015	2019	445	2,030	238	6,359	683	8,389
2016	2020	777	2,747	958	7,614	1,735	10,361
2017	2021	3,871	2,834	16,857	7,887	20,728	10,721
2018	2022	787	--	830	--	1,616	--
2019	2023	4,269	--	12,911	--	17,181	--
2020	2024	4,030	--	6,514	--	10,544	--
2021	2025	1,214	--	2,324	--	3,538	--
Minimum		**445**	**1,323**	**238**	**1,158**	**683**	**2,554**
Corresponding Year		**2015**	**2014-2018**	**2015**	**2012-2016**	**2015**	**2012-2016**

* This is the annual local runoff for the starting year.

3.5 10-Consecutive Dry Years

A hypothetical 10-consecutive dry year sequence was developed for this WRMP to allow the Authority to evaluate overall supply reliability under an extraordinarily dry scenario. This scenario is more extreme than state UWMP planning requirements and can serve as a proxy for future, dry conditions under climate change. Figure 3-5 and Figure 3-6 display the historical local runoff data for Sweetwater Reservoir and Loveland Reservoir, respectively, as well as their 5-year and 10-year moving averages. The figures demonstrate that the reservoirs experienced an extensive dry period from the 1950s through the 1970s. More specifically, 1955 to 1964 was the driest 10-year period on record with the lowest runoff on average entering both reservoirs since their construction. Between 1955 and 1964, the average local runoff entering Sweetwater and Loveland Reservoirs was only 932 AF and 1,646 AF, respectively. Based on this analysis, the historical hydrologic data from 1955 to 1964 was used for the hypothetical 10-consecutive dry year sequence for this WRMP.

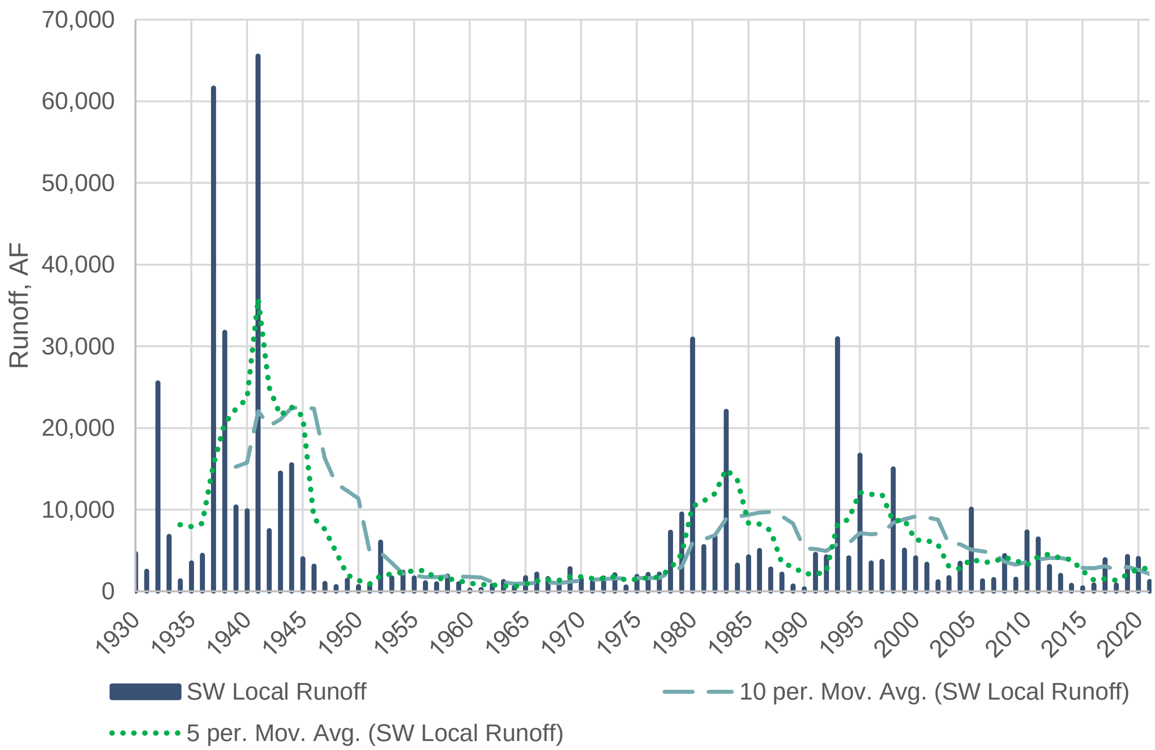

Figure 3-5. Historical Local Runoff for Sweetwater Reservoir

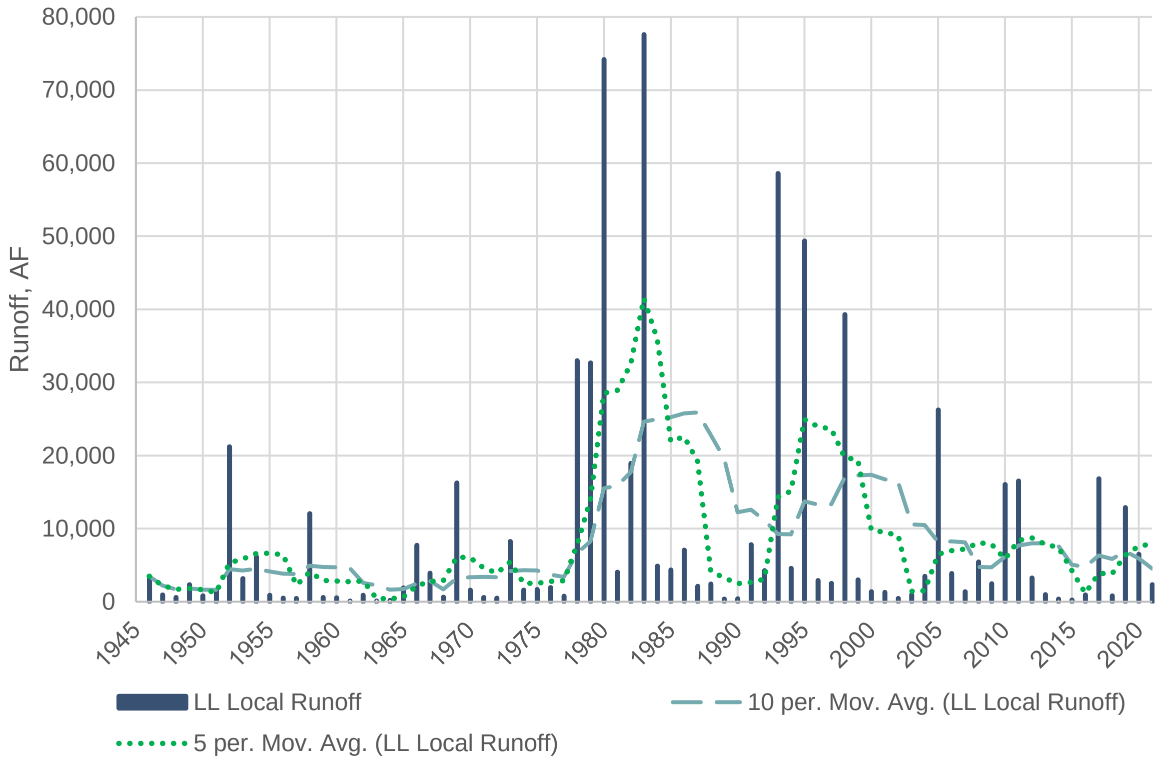

Figure 3-6. Historical Local Runoff for Loveland Reservoir

4. Projected Demands

The following sections provide an overview of the Authority's historical and projected demands under both normal and dry hydrologic conditions. Demands were updated for this WRMP to reflect updated population projections from the 2020 UWMP and develop the basis of the reliability assessment documented in Section 5.

4.1 Summary of Projected Population

As part of the 2020 UWMP and 2020 WDSMP, an analysis of the population and land use in the Authority's service area was performed to derive projected water demands. Population and housing growth data for the Authority's service area was obtained from the San Diego Association of Governments (SANDAG) 2050 Regional Growth Forecast (Series 14) for the years 2020 through 2045. The Series 14 projections forecasted that the service area population would increase by approximately 16 percent from 2020 to 2045, which corresponds to an average annual growth rate of 0.6 percent per year. Since the 2020 UWMP, recent demographic observations within the Authority's service area indicate that SANDAG projections may be slightly overestimated. In addition, SANDAG population projections are based on geographic subdivisions (i.e. city limits) that do not directly correspond with the Authority's service area boundary (namely, the South Bay Irrigation District), which further contributes to imprecisions in population and demand projections. Given these factors, the WRMP uses population projections that have been maintained by Authority staff, which more precisely reflect service area boundaries and recent population trends.

Staff projections were prepared using population data obtained from the California Department of Finance, local land use agencies, and the US Census. Observed and projected population was geo-processed for the Authority's service area specific to boundaries reflecting both National City and the South Bay Irrigation District.

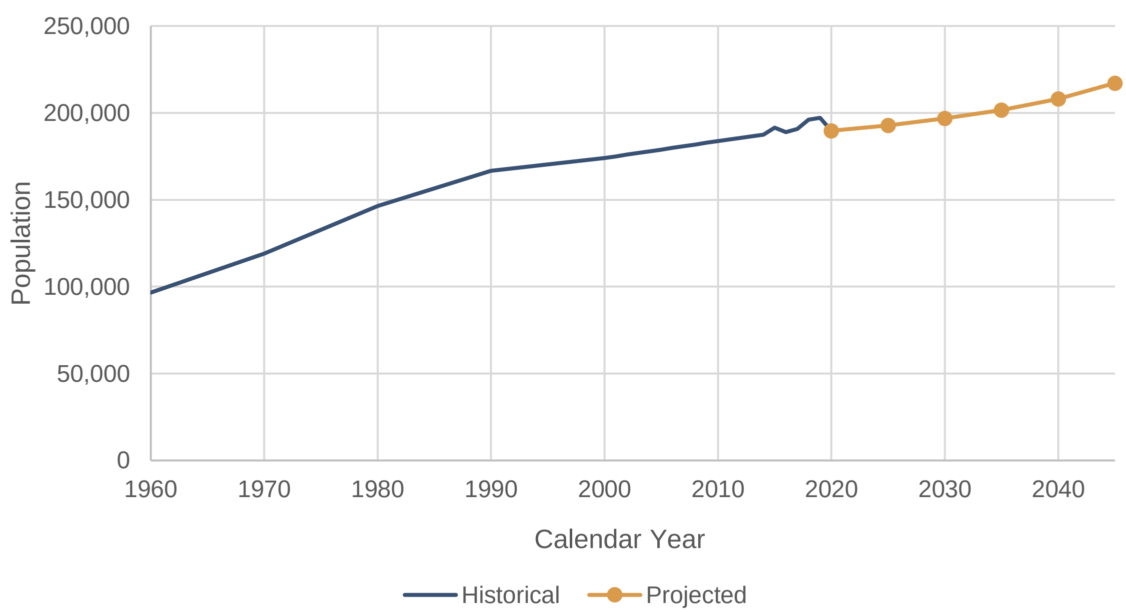

Figure 4-1. Historic and Projected Population

4.2 Summary of Historical and Projected Demands

The 2020 WDSMP and UWMP projected demands based on expected per capita use multiplied by projected population. Expected per capita demands in the 2020 WDSMP and UWMP were estimated using the average demand within the Authority's system from 2010 to 2020, which included a mix of wet and dry years and relatively recent trends in water use reductions following drought and continued water conservation habits. The WRMP re-examined estimated per capita demand including years 2021 and 2022.

Figure 4-2 provides the Authority's historical production and per capita unit demand data from 1920 to 2022. The data prior to 1975 are shown as dashed lines to indicate that the data is approximate because the service area prior to 1975 differs from the present one. As shown, the water demand demonstrates an overall declining trend since 2000 (subsequent figures will focus on this recent period). The data illustrates a sharp drop in demand from 2014 to 2015 due to severe drought conditions, after which demand has not fully rebounded. The lack of rebound may demonstrate more "permanent" behavioral changes in water use stemming from the water conservation effort taken during the 2012-2016 drought such as replacing turf with xeriscape, for example.

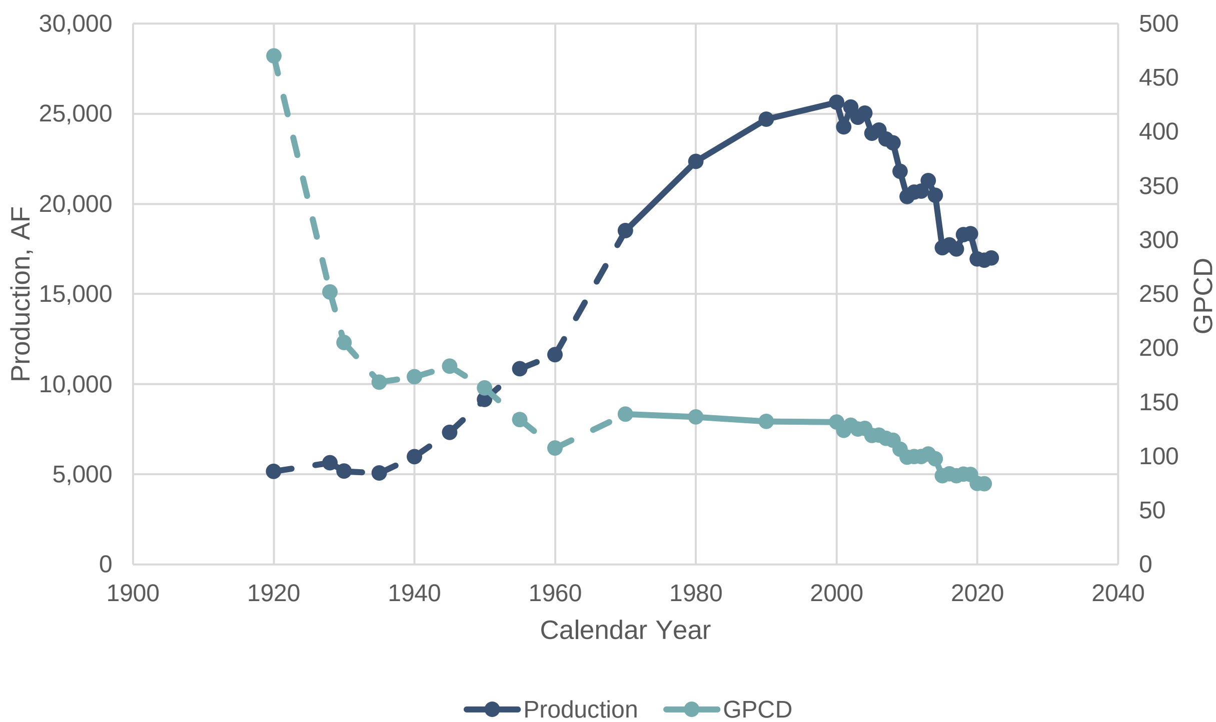

Figure 4-2. Historical Production and GPCD

4.2.1 Updated Demands under Normal Conditions

The 2020 UWMP and the WDSMP considered 90 gallons per capita per day (GPCD) as a baseline for long-term water use planning, because it was deemed to be a conservative estimate for water use and supply reliability planning. Recent trends in service area water use indicate a return to 90 GPCD is unlikely and could result in over-projection of long-term demand, potentially running the risk of overinvestment in new water supply projects. In response to this, the WRMP sought to reconsider the assumed future per capita use to better balance the need for water with the risk of overinvestment in new supplies. The WRMP considered a more recent time period (roughly corresponding to the average demand from 2015 to 2019) for establishing a baseline per capita use of 82 GPCD. Figure 4-3, compares the last 20 years of historical per capita use with the projected 90 GPCD used in the 2020 UWMP and the updated 82 GPCD applied in the WRMP.

The new projection updated in this WRMP considering the revised population projections and new per capita use assumption is plotted in Figure 4-4 compared with historic production and the demand projection estimated in the 2020 UWMP. A tabular summary of the updated projections is presented in Table 4-1.

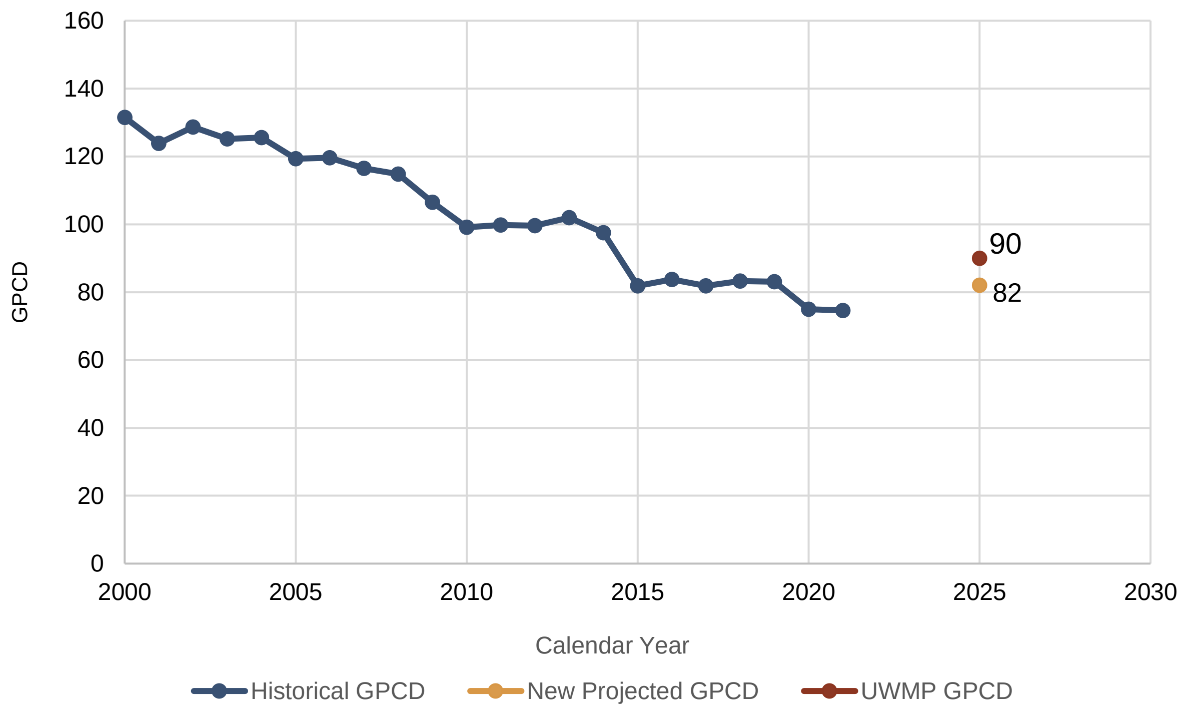

Figure 4-3. Historic and Projected Per Capita Demand

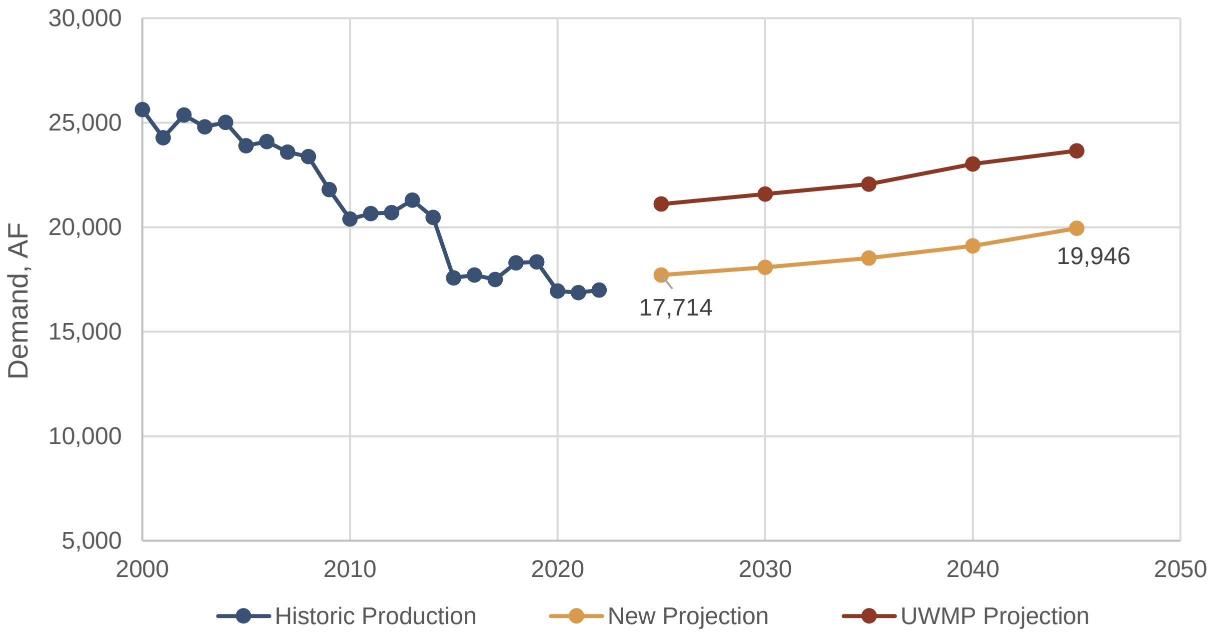

Figure 4-4. Historic and Projected Demand Under Normal Conditions

Table 4-1. Demand Projections Under Normal Conditions

	2025	2030	2035	2040	2045
Total Demand, AF	17,714	18,083	18,524	19,104	19,946

4.2.1.1 Water Efficiency Standards for Indoor Residential Use

Recent legislation (SB 1157) sets a new water use standard of 42 GPCD for residential indoor use by 2030. 2030 projected indoor residential use was estimated by proportionally scaling the total projected 2030 demand (18,083 AFY) by the following percentages:

- Historical residential demand relative to total demand; and
- Historical wintertime low (January/February) demand relative to annual totals.

When divided by the expected 2030 population, indoor residential use is implied to be 44 GPCD, 2 GPCD higher than the 42 GPCD standard. This implied wintertime residential demand provides an approximation of indoor residential use, but it is understood to be conservatively high since outdoor use is never completely eliminated during the winter months. It is also noteworthy that annual GPCD in the high 70s since 2020 suggests that it is likely that the Authority may already be meeting the 42 GPCD standard. Nevertheless, as 2030 approaches, the Authority's water efficiency team may continue to monitor indoor residential GPCD including:

- Conducting a more detailed monitoring or analysis of indoor/outdoor use, for example an aerial imagery / GIS-based assessment of outdoor residential use.
- Consider accelerating planned conservation programs as necessary (see Section 0).

4.2.2 Single Dry Year Demand

To assess water service reliability during drought events, the 2020 UWMP prepared single dry year demand projections by increasing normal year demand by 7 percent.[5] The WRMP demand during a single dry year scenario was estimated using the same methodology applied in the 2020 UWMP using the updated demands defined in the prior section. Table 4-2 and Figure 4-5 provide the updated demand projections under the single dry year conditions in 5-year increments to 2045.

Table 4-2. Demand Projection Under Single Dry Year Conditions

	2025	2030	2035	2040	2045
Total Demand, AF	18,954	19,349	19,821	20,441	21,343

[5] Increased demands in a single dry year a study performed by SDCWA supporting evaluation of unconstrained demand for their 2020 UWMP. The increase reflects short-term elevated demand stemming from customer responses to hot, dry conditions prior to implementation of drought response actions.

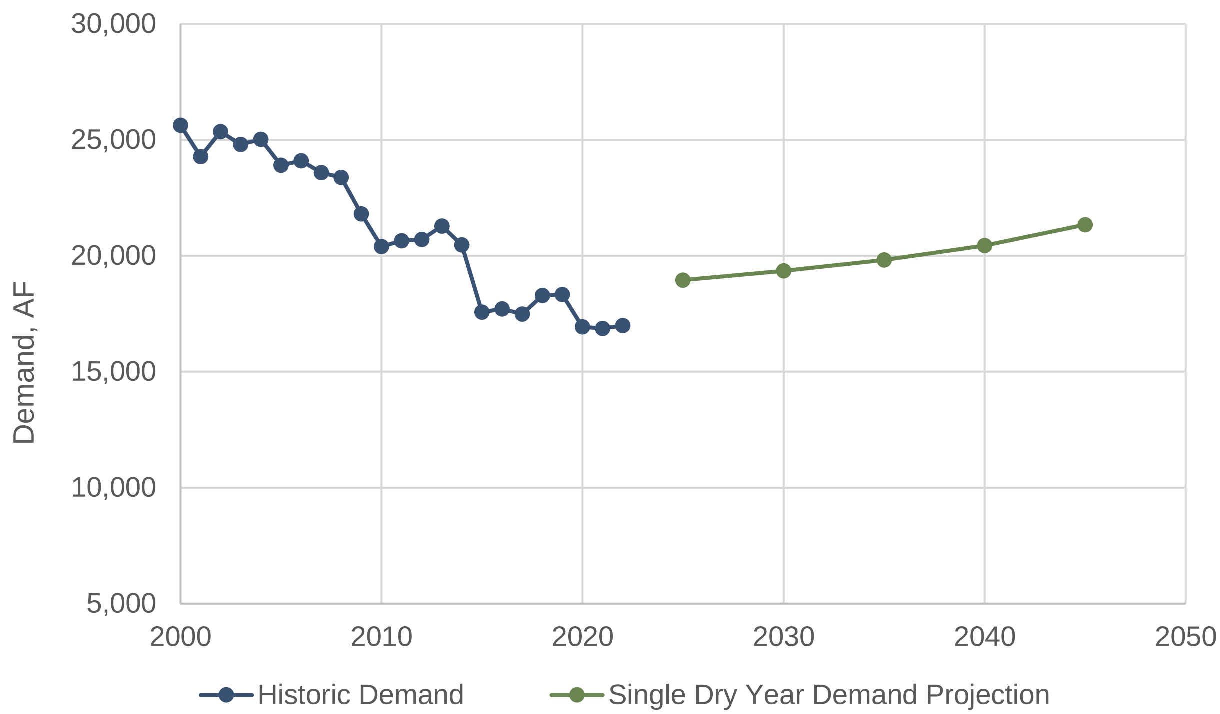

Figure 4-5. Historic and Single Dry Year Demand Projections

4.2.3 5-Consecutive Dry Year Demand

The Authority's 2020 UWMP demands were also projected for a 5-consecutive dry year scenario in order to comply with supply reliability assessments required under California UWMP guidelines. The 2020 UWMP considered dry-year factors developed in SDCWA's UWMP that estimated that unconstrained demand would increase to 107 percent of normal in the first year, 108 percent of normal in the second and third years, and 109 percent of normal in the fourth and fifth years of a multiple dry-year period. Unconstrained dry-year demand is defined in California UWMP guidelines to reflect increased demands under hot/dry conditions and not consider implementation of short-term water savings measures under an agency's WSCP.[6]

Rather than consider unconstrained demand, which is typically conservatively high during drought events, the WRMP assumes activation of the WSCP[7] starting in the third dry year. Table 4-3 shows the updated percent change from normal 82 GPCD and implied volumetric demand projection calculated in this WRMP in 5-year increment for 2025 to 2045. The implied volumetric demand is the product of the projected population of a given year and the corresponding adjusted GPCD for that year. Similar to the single-dry-year scenario, this scenario projects a slight increase in demand through the second year,

[6] Under UWMP guidelines, WSCP response actions are explicitly accounted for in an agency's drought risk assessment to address projected supply shortages compared to unconstrained demand.

[7] The Authority's WSCP is further discussed in Section 4.3.

consistent with customer responses to hot/dry conditions (See Section 4.2.2); however, this is followed by decrease in the following years as the WSCP is implemented.

Table 4-3. Demand Projection Under 5-Consecutive Dry Year Conditions, AF

	% change from Normal GPCD	2025	2030	2035	2040	2045
1st dry year	7%	18,954	19,349	19,821	20,441	21,343
2nd dry year	8%	19,211	19,625	20,131	20,814	21,724
3rd dry year	0%	17,862	18,260	18,756	19,441	20,283
4th dry year	-10%	16,142	16,513	16,985	17,648	18,407
5th dry year	-10%	16,209	16,592	17,089	17,800	18,558

4.2.4 10-Consecutive Dry Year Demand

The WRMP also considers a 10-consecutive-dry year demand scenario that follows a similar approach to the 5-consecutive-dry year scenario. The same percent adjustment to the normal GPCD is applied for the first four dry years followed by progressively more stringent implementation of shortage response actions, up to Level 3 of the Authority's WSCP.

Table 4-4 provides the percent adjustment from normal GPCD and the implied demand projection for the 10-consectutive dry year scenarios in 5-year increments from 2025 to 2045. Starting in the eighth year, the estimated GPCD is estimated to decrease 25% from the normal GPCD, which corresponds with implementing Level 3 of the WSCP targeting 30% reduction offset by presumed incomplete compliance in the service area. This estimate amounts to a new historic low for per capita demand of 61.5 GPCD.

Table 4-4. Demand Projection Under 10-Consecutive Dry Year Conditions, AF

	% change from Normal GPCD	2025	2030	2035	2040	2045
1st dry year	7%	18,954	19,349	19,821	20,441	21,343
2nd dry year	8%	19,211	19,625	20,131	20,814	21,724
3rd dry year	0%	17,862	18,260	18,756	19,441	20,283
4th dry year	-10%	16,142	16,513	16,985	17,648	18,407
5th dry year	-15%	15,308	15,670	16,140	16,811	17,527
6th dry year	-15%	15,371	15,745	16,238	16,954	17,671
7th dry year	-20%	14,537	14,912	15,418	16,092	16,766
8th dry year	-20%	14,608	15,005	15,553	16,227	16,901
9th dry year	-25%	13,761	14,154	14,707	15,339	15,971
10th dry year	-25%	13,827	14,241	14,833	15,465	16,097

4.3 Demand Management

The Authority's conservation and demand management programs are currently managed by the Authority's Public Affairs group. The Authority possesses several documents that are regularly updated and define the Authority's demand management programs, including the UWMP, WSCP, and Drought

Response Plan (DRP). The following sections provide a brief overview of the demand management measures defined within these documents, identification of future demand management programs that are planned for implementation, and potential demand management measures/programs that may be considered.

4.3.1 Existing Demand Management Measures for Droughts and Acute Water Shortages

The Authority originally adopted a DRP in 2008 (adopted by Resolution 08-19) and was subsequently updated on an ad-hoc basis to address new regulations from the State Water Resources Control Board (SWRCB), executive orders from the Governor's office, and other state directives. In 2021 (Resolution 21-13), the DRP was amended for consistency with new revisions to the California Urban Water Management Planning Act (CWC § 10610) which identified more specific requirements for urban water suppliers' WSCPs. The Authority's current DRP is directly referenced and is consistent with the latest WSCP, which was most recently updated within the 2020 UWMP.

The WSCP and DRP define the Authority's plan for operating during a drought or other acute water shortage condition. The WSCP and DRP defined specific, short-term demand management measures that are intended to be implemented during these conditions. Consistent with revisions to CWC § 10610, the Authority has identified six standard water shortage stages, commensurate target water use reductions, and specific response actions to be implemented by the Authority and the public (see on the following page). In addition to the actions defined in, the WSCP and DRP provide the option to implement customer water use allocations, drought rates, and/or a drought surcharge during water shortage Levels 2-6.

During certain water shortage events, such as the most recent (2020-2022) drought, executive orders have been issued by the California Governor that mandate target reductions in water use and/or identify mandatory implementation of WSCP stages. In complying with these requirements, the Authority closely examines trends in customer water use when determining the implementation of measures that affect water consumption. The Authority has consistently had one of the lowest total per capita usage rates in San Diego County, which can make state-mandated, percentage-based reductions in water use difficult to achieve without affecting non-discretionary use from customers. In recognition of this, during the most recent drought, the Authority complied with state-mandated requests for implementing Level 2 shortage restrictions by asking customers to *voluntarily* adopt the Level 2 response measures.

Table 4-5. Summary of Water Shortage Stages and Response Measures

Stage	Target Reduction in Use	Summary of Requested Response Actions
Level 1: Drought Watch	10%	• Water should be used reasonably and productively at all times. • Customers are to repair major water leaks immediately and minor leaks within 24 hours of discovery. • Customers are encouraged to restrict hose washing of paved areas. • Customers are encouraged to use an automatic shut-off nozzle when using a hand-held hose for irrigation, vehicle, or structure washing. • Restrict runoff from landscape irrigation.
Level 2: Drought Alert	20%	• Customers are to restrict irrigation to no more than 2 days per week, which may include limitations to specific days of the week as determined by the Governing Board. • Customers are encouraged to limit lawn watering and irrigation sprinklers to no more than 10 minutes per watering station per day. • Customers are encouraged to stop filling or re- filling pools, ornamental lakes and/or ponds, except to the extent needed to sustain aquatic life. • Restrict water use for decorative water features. • Customers are prohibited from irrigating ornamental turf on public street medians with potable water. • Customers are prohibited from irrigating with potable water landscapes outside newly constructed homes and buildings in a manner inconsistent with regulations or other requirements established by the California Building Standards Commission and the Department of Housing and Community Development.
Level 3: Drought Alert	30%	• Customers are to restrict irrigation to no more than 2 days per week, which may include limitations to specific days of the week as determined by the Governing Board. • Customers are encouraged to limit lawn watering and irrigation sprinklers to no more than 10 minutes per watering station per day. • Restaurants may only serve water upon request. • Lodging establishments must offer opt out of linen service.
Level 4: Drought Critical	40%	• Prohibit use of potable water for washing hard surfaces. • Prohibit vehicle washing except at facilities using recycled or recirculating water. • Customers shall only operate landscape sprinklers between the hours of 6 p.m. and 9 a.m. • Customers are to restrict residential and commercial landscape irrigation to no more than 1 day per week. • Customers are to limit irrigation using sprinklers to no more than 10 minutes per watering station per day.
Level 5: Drought Emergency	50%	• Prohibit all landscape irrigation.
Level 6: Drought Emergency	>50%	

Summary table provided by 2020 Water Shortage Contingency Plan.

4.3.2 Existing Long-Term Demand Management Measures

The Authority first implemented a formal water conservation program in 1990, with the specific objectives of:

- Eliminating wasteful practices in water use.
- Developing information for both current and potential water conservation practices.
- Implementation of conservation practices in a timely, continuous manner.
- Using public information and education activities to spread knowledge of efficient water use techniques and devices.

Existing long-term demand management programs are formally documented in the Authority's UWMP. The Authority maintains active participation in countywide and regional demand management programs implemented by SDCWA and Metropolitan, which includes cost sharing efforts associated with the implementation of conservation and demand management measures.

Table 4-6 on the following page lists a summary of the specific conservation and demand management measures currently enacted by the Authority. Discussions with Authority conservation staff indicate that recent drought events may have promoted increased uptake of certain conservation measures identified in

Table 4-6 and/or resulted in long-term behavioural changes in water use. Despite these apparent trends, Authority conservation staff expressed challenges while implementing certain demand management programs. Enforcement-based programs have been constrained by budgetary resource limitations, generally precluding resources required to implement the fines and/or enforce regulations mentioned in the WSCP and DRP. In addition, existing billing data sets do not allow the Authority to differentiate between indoor and outdoor water usage within the service area, since most facilities and households only have one meter. The Authority has made plans for additional demand management measures as described in the following section.

Table 4-6. Summary of Conservation and Demand Management Programs

Conservation / Demand Management Program Category	Specific Programs Offered by the Authority
Public Education and Outreach	• Participation in Wholesale Agency Assistance Program with Metropolitan and SDCWA. • Promotion and distribution of literature and brochures, newsletters/outreach materials, personal letters/emails, seminars, staff speaking events, communications committees, model conservation exhibits, news relations, and advertising. • Participation in school education programs.
System Loss Prevention Programs	• Commissioning of annual water audits of the distribution system. • Implementation of a Supervisory Control and Data Acquisition (SCADA) system and associated flow/pressure monitoring for leak detection. • Routine preventative maintenance, facility inspection, and meter replacement. • Monitoring and enforcement of water theft.
Residential Programs	• Free residential water survey programs. • High efficiency washing machine rebate program. • Residential toilet replacement program. • Single-source grey water retrofit rebates. • Carwash rebates. • Smart leak detector rebates. • "Fix-a-leak" campaign and associated rebates.
Large Landscape Conservation Programs and Incentives	• Rebates for landscape transformation. • Free landscape irrigation audits. • Rebates for weather-based and soil moisture sensor irrigation controllers. • Rebates for rotating irrigation nozzles. • Rebates for installation of rainwater cisterns.
Commercial, Industrial, and Institutional Conservation Programs	• Incentives for participation in water savings performance programs. • Grant funding for implementation of water efficiency projects.
Metering	• Maintenance of metering of all service locations and requirement for metering associated with new service connections.
Tabular information summarized from the Authority's 2020 Water Shortage Contingency Plan.	

4.3.3 Planned and Suggested Future Demand Management Measures

The Authority is currently developing and extending several demand management measures. State/federal grants and other funding sources to fund demand management programs have been pursued with varying success in recent years to help advance implementation the Authority's planned conservation programs.

One of the most significant future conservation measures the Authority is currently pursuing is a comprehensive Automated Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) program. AMI/AMR is expected to help the Authority to better differentiate between indoor and outdoor water usage data, ease the implementation of a monthly billing cycle, provide customers with real-time monitoring of their own water usage, enhance leak detection, and allow for Authority staff to more efficiently identify high-water users and extend assistance with existing conservation/efficiency programs. Under a separate study, the Authority is evaluating the cost and feasibility of implementing AMI.

The Authority is also considering applying for and using awarded grant funds to provide upfront funding for their customers to implement a variety of conservation improvements. Certain locations within the Authority's of the service area have higher per-capita use and may benefit from more targeted offerings of programs associated with turf replacement, water efficient landscape design, and smart irrigation controller implementation. Additionally, in historically disadvantaged communities (where lack of discretionary income may preclude customers from investing in efficiency), offering direct install programs and leak detection services/fixes would provide for water savings that may not be implementable by customers currently unable to afford these improvements.

The Authority has also received approval from the SWRCB Division of Drinking Water to implement a no discharge flushing system using a NO-DES Flushing (NDF) truck. The NDF truck will recirculate water through all pipelines 12 inches and smaller within the Authority's distribution system, minimizing water waste. The system also contains onboard water quality monitoring instrumentation and eliminate the need of better management practices (BMPs) to remove biofilms and sedimentation to improve water quality.

In addition to the activities discussed above, the Authority may consider conducting additional conservation/demand management strategic planning exercises, in particular:

- Explicit identification of long-term targets/goals for overall water savings in addition to required indoor residential water use efficiency standards identified in SB 1157.
- Explicit identification of goals (e.g., percent uptake, time for implementation) for conservation/demand management program implementation.
- Tracking, retrospective analysis, and performance evaluation of specific demand management programs and ordinances.

5. Reliability of Existing Supply System

The following section examines the reliability of the Authority's existing supply system. A supply assessment was performed to estimate the availability of each supply for the hydrological scenarios developed in Section 3. An annual water balance model was built to evaluate whether the Authority's anticipated demand could be met by the available local supply for each scenario. In each scenario the estimated need for imported water is calculated to close any demand gap after utilizing local supplies. This section also summaries the expected future cost of imported water as well as other risks associated with the existing system such as water quality, environmental factors, and other regulatory requirements.

5.1 Annual Water Balance Model for Evaluating Local Surface Water Supply

An annual water balance model was developed for the local surface water supply system to aid in assessing water supply availability during the 5- and 10-consecutive dry year scenarios. Figure 5-1 shows the water balance model schematic and the key assumptions made.

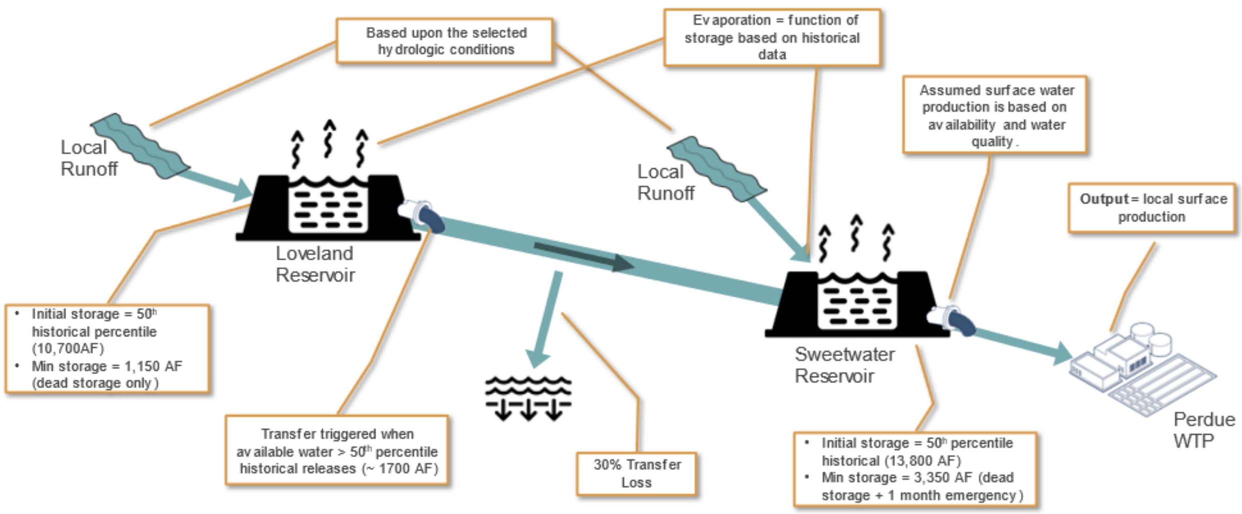

Figure 5-1. Model Schematic and Key Assumptions

The following explains the assumptions made in the annual water balance model built around Loveland Reservoir and Sweetwater Reservoir:

- Under dry year conditions, the model maximizes local surface water production respecting current water quality constraints on production (further detailed below) and reservoir dead storage. Year-to-year reservoir carryover storage targets have been relaxed based on the *2020 Water Supply Feasibility Study*.
- Due to water quality issues in Sweetwater Reservoir, the Authority must currently blend imported raw water from SDCWA to improve the surface water quality. The blend ratio of import water depends on the reservoir storage, and Table 5-1 shows the model assumption of percentage of imported water sent to the Perdue WTP. Section 6.1.3 further details an analysis of historical blending ratios and guiding this assumption.

Table 5-11. Blend Ratios to Perdue WTP Model Assumptions

Available Supply at Sweetwater Reservoir (AF)	Perdue WTP Blend Ratio (% Imported Water)
0 – 2,000	80%
2,000 – 4,000	60%
4,000 – 6,000	25%
6,000 – 10,000	25%
10,000+	0%

- Initial reservoir storage is the 50th percentile of historical maximum month storage.
- Loveland Reservoir releases to Sweetwater Reservoir are triggered when the available storage (available water minus dead storage) is greater than the Loveland Reservoir's 50th percentile historical release.
- 30% losses are levied on transfers from Loveland to Sweetwater Reservoir via the Sweetwater River channel.
- The *2020 Water Supply Feasibility Study* made recommendations to continue to target one-month of reserve in Sweetwater Reservoir but reduce the target from three months to none in Loveland Reservoir. The water balance model implements these recommendations in the following manner:
    - Emergency storage in Loveland Reservoir is assumed to be available when the sum of beginning of year (BOY) storage and the local runoff is lower than the 50th percentile storage.
    - Otherwise, the minimum Loveland Reservoir storage is constrained at 7,725 AF (dead storage plus 3 months of reserve).
- Minimum Sweetwater Reservoir storage is constrained at 3,350 AF (dead storage plus one-month of reserve).
- Evaporative loss assumptions are estimated based on the following:
    - A linear regression analysis was performed using the max month storage and annual evaporation to generate a formula to estimate evaporation based on reservoir storage. The upper 85^{th} percentile confidence interval of the linear regression was used to account for higher temperatures during dry-year period.
    - When BOY storage for Loveland Reservoir is at dead storage level and if estimated evaporation is higher than the incoming runoff, the model will force evaporation equal to runoff to avoid depleting the reservoir to below dead storage.
    - When BOY storage for Sweetwater Reservoir is at the storage level of dead storage plus emergency, and if estimated evaporation is higher the incoming runoff, the model will force evaporation equal to runoff to avoid depleting the reservoir to below dead storage.

- The 2020 UWMPs for Metropolitan and SDCWA do not indicate expected shortages in the ability to serve water to their retail customers. Therefore, supply deficits from local supply sources are assumed to be filled using imported water purchases.

5.2 Water Balance Under Normal Hydrologic Conditions

The Authority's existing system local supply projections under normal hydrologic conditions were developed using the same assumptions as the 2020 UWMP's water service reliability and drought risk assessment which assumed:

- Average production data from the Perdue WTP between 2010 and 2020, which yields approximately 5,000 AF of local surface water production annually.
- Average pumping data from 2010 to 2020, yielding approximately 1,900 AF of production from the National City well field annually.
- Initial production from the Reynolds Desalination well field consistent with maximum annual production since the 2017 facility expansion (8,300 AFY) increasing to 8,800 AFY by 2030, assuming that the Authority will further maximize production of the SDF Wells now that the City of San Diego is anticipated to transition away from production from the SDF in favor of the Pure Water program.

Table 5-2 shows the modelled imported water purchases the Authority would need to meet the projected demands from Section 4, assuming only the existing water supply system. Figure 5-2 shows water production for each water source during normal hydrologic conditions from 2025 to 2045.

Table 5-22. Imported Water Estimates During Normal Conditions, AF

	2025	2030	2035	2040	2045
Imported Water, AF	2,514	2,383	2,824	3,404	4,246

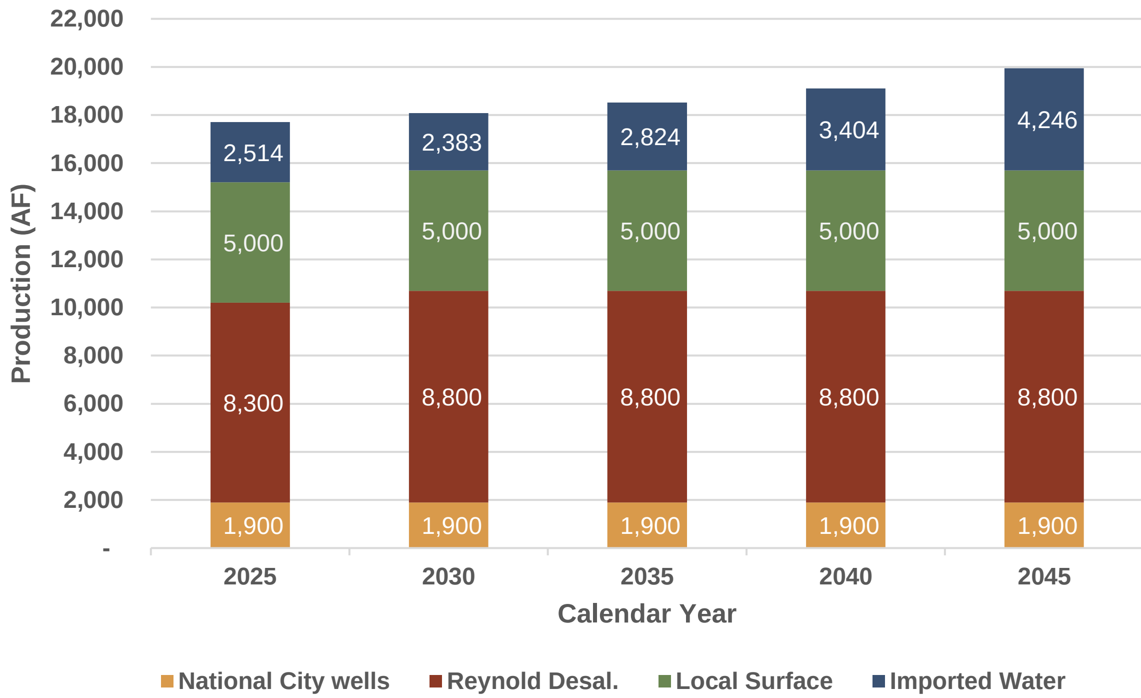

Figure 5-2. Water Production by Sources Under Normal Conditions, 2025-2045

5.3 Water Balance Under Dry Hydrologic Conditions

A water balance model was conducted for a single dry year, a 5-consecutive dry year, and 10-consecutive dry year scenarios. Since the potable groundwater and desalinated brackish groundwater are less dependent on weather conditions, they were assumed to remain constant (1,900 AFY from National City Wells, 8,300 AFY from Reynold Desalination Facility increasing to 8,800 AFY by 2030) in all the dry year scenarios. Conversely, the Authority's local surface water supply is highly dependent on local hydrologic conditions and was treated with distinct assumptions for each dry year scenario. The following sections provide additional detail on assumptions and results for each dry year scenario.

5.3.1 Single Dry Year

The single dry year scenario assumes that 56% of the normal 5,000 AFY of local surface water supply would be available for use, which is consistent with the assumption made in the 2020 UWMP as well as the production data from the Perdue WTP for a single dry year. This equates to 2,800 AF of local surface water supply annually. Table 5-3 shows the amount of imported water the Authority would have to purchase in order to meet their service area's demand. Figure 5-3 shows water production for each water source during single dry year conditions from 2025 to 2045.

Table 5-33. Imported Water Estimates During Single Dry Year Scenario, AF

	2025	2030	2035	2040	2045
Imported Water, AF	5,954	5,849	6,321	6,941	7,843

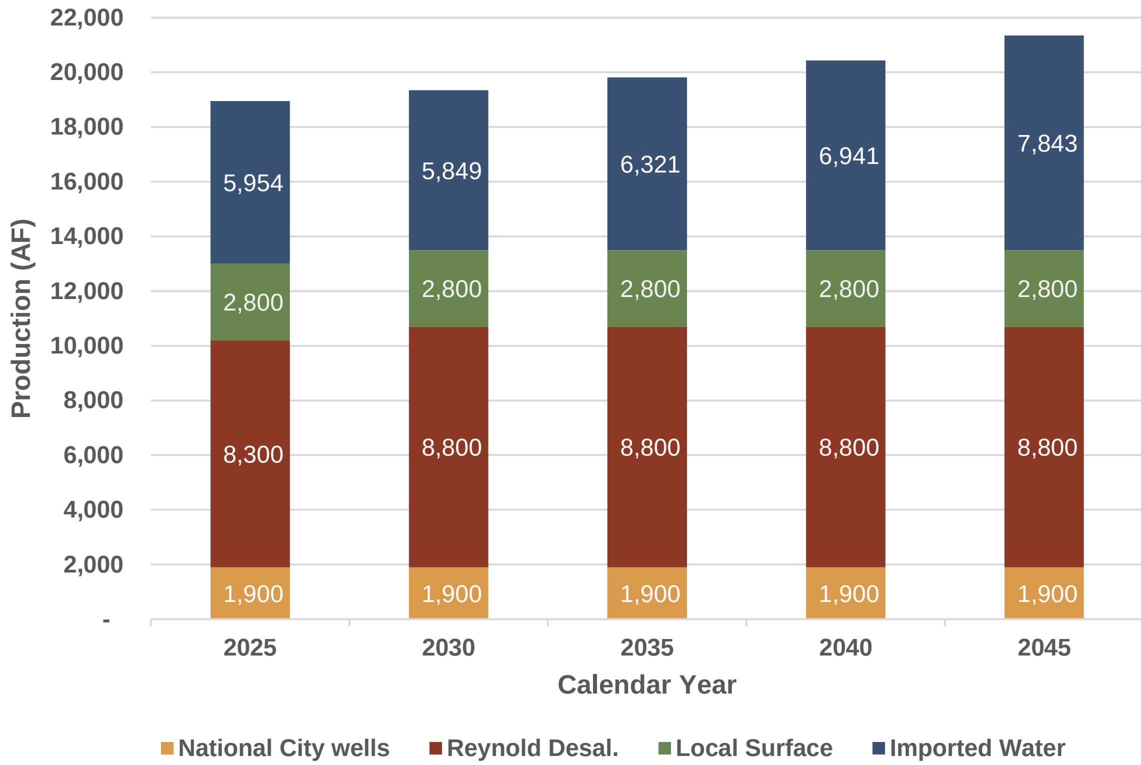

Figure 5-3. Water Production by Sources Under Single Dry Year Conditions, 2025-2045

5.3.2 5-Consecutive Dry Year Supply

The water balance model was used to estimate the surface water availability during a 5-consective dry year scenario for 2025 to 2040 in 5-year increments. The 2012 to 2016 hydrologic conditions were selected to simulate the local surface water availability during dry years, consistent with assumptions made in the 2020 UWMP. Demands in this scenario are consistent with the demands defined in Table 4-3 including implementation of the Authority's WSCP.

Table 5-4 summarizes the model results of the local surface water availability during the 5-consecutive dry year scenarios. The results indicate that the local surface could be depleted by the third year given the assumed hydrologic conditions. The results are consistent with the actual surface water production during the 2012-2016 drought, as production declined to zero starting in the third year (hydrologic years 2014 to 2016).

Table 5-4. Modeled Local Surface Water Production During 5-Consecutive Dry Year Scenarios, AF

Starting Year	2025	2030	2035	2040	2045
1st dry year	8,754	8,649	9,121	9,741	10,643
2nd dry year	8,721	8,815	8,392	5,876	5,270
3rd dry year	0	0	0	179	143
4th dry year	0	0	0	0	0
5th dry year	0	0	0	0	0

Table 5-4 shows that the first dry year of the 2030 sequence is slightly higher than the first dry year of the 2025 sequence. This behavior reflects the planned expansion of the Reynolds Desalination Facility in 2030 which offsets both imported and local surface water. Starting in 2035, the demand growth by population outpaces the additional desalinated water production, which results in an increase of local surface water production in the first dry year.

As discussed in Section 2.3, when local supplies are unable to fully meeting demand imported water is purchased from SDCWA to close the demand gap. Table 5-5 provides the modelled needs of imported water during the 5-consective dry year scenarios. The table shows the need of imported water increases by approximately four times in the second dry year of the 2040 and 2045 sequence when compared to the 2035 sequence. This is because the increase in demand drives the increase of local surface water production resulting in lower reservoir storage. When the reservoir storage is lower, it requires more imported water to blend with local water to remain within the blend ratios assumed in the analysis.[8]

Figure 5-4 shows an example of the production for each water source during a 5-consecutive dry year sequence using 2045 as the starting year.

Table 5-5. Imported Water Estimates During 5-Consecutive Dry Year Scenarios, AF

Starting Year	2025	2030	2035	2040	2045
1st dry year	0	0	0	0	0
2nd dry year	290	111	1,039	4,238	5,755
3rd dry year	7,662	7,560	8,056	8,562	9,441
4th dry year	5,942	5,813	6,285	6,948	7,707
5th dry year	6,009	5,892	6,389	7,100	7,858

[8] This is consistent with the decrease in local surface water production on the second dry year of the 2040 sequence and the 2045 sequence as shown in Table 5-4. Due to the reduction in surface water production on the second dry year, the reservoir carries over some storage for the third dry year.

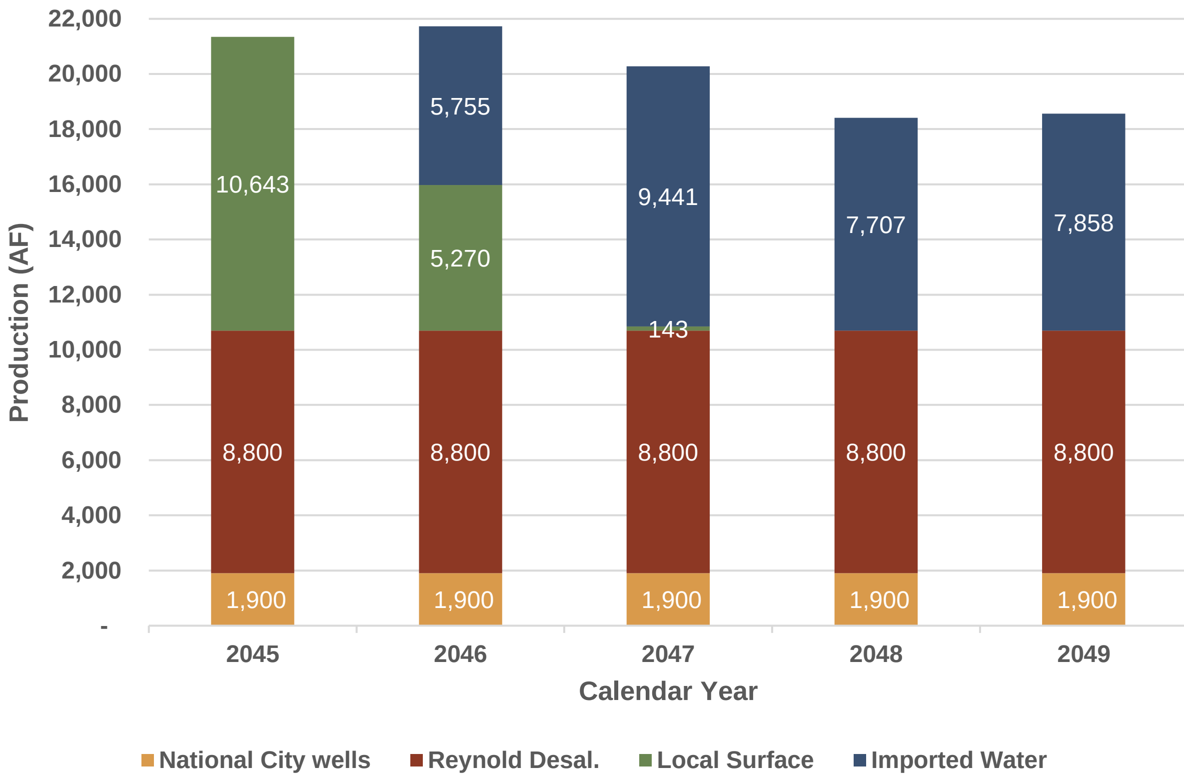

Figure 5-4. Water Supply Portfolio During a 5-Consecutive Dry Year Sequence, 2045

5.3.3 10-Consecutive Dry Year Supply

The 10-consecutive dry year scenario used 1955-1964 historical hydrology (see Section 3.5) as the inputs to the annual water balance model. Demands in this scenario are consistent with the demands defined in Table 4-4 including implementation of the Authority's WSCP.

Table 5-6 provides the water balance results for the local surface production estimates during the 10-consecutive dry year scenarios for each forecasted year. Consistent with the 5-consecuyive dry year scenario, the 10-consecutive dry year sequence assumes that imported water from SDCWA is purchased to close any demand gap that could not be met by their local supplies. provides the estimated needs of imported water for each forecasted year.

Similar to the 5-consectiove dry sequence, the first dry year of the 2030 sequence shows a slightly higher increase in local surface water production than the first dry year of the 2025 sequence. This behaviour reflects the planned expansion of the Reynolds Desalination Facility in 2030 which offsets both imported and local surface water. The additional desalinated water production is slowly outpaced by the demand growth. Figure 5-5 shows an example of the production for each water source during a 10-consecutive dry year sequence using 2045 as the starting year.

Table 5-6. Modeled Local Surface Water Production During 10-Consecutive Dry Year Scenarios, AF

Starting Year	2025	2030	2035	2040	2045
1st dry year	8,754	8,649	9,121	9,741	10,643
2nd dry year	3,952	4,022	3,705	3,287	1,430
3rd dry year	100	104	85	60	248
4th dry year	1,306	1,312	1,285	1,249	1,519
5th dry year	3,614	3,619	3,592	3,555	3,828
6th dry year	0	0	0	0	0
7th dry year	0	0	0	0	0
8th dry year	0	0	0	0	0
9th dry year	0	0	0	0	0
10th dry year	0	0	0	0	0

Table 5-7. Imported Water Estimates During 10-Consecutive Dry Year Scenarios, AF

Starting Year	2025	2030	2035	2040	2045
1st dry year	0	0	0	0	0
2nd dry year	5,059	4,903	5,726	6,827	9,594
3rd dry year	7,562	7,456	7,971	8,681	9,336
4th dry year	4,636	4,501	5,000	5,700	6,188
5th dry year	1,494	1,351	1,848	2,556	2,999
6th dry year	4,671	5,045	5,538	6,254	6,971
7th dry year	3,837	4,212	4,718	5,392	6,066
8th dry year	3,908	4,305	4,853	5,527	6,201
9th dry year	3,061	3,454	4,007	4,639	5,271
10th dry year	3,127	3,541	4,133	4,765	5,397

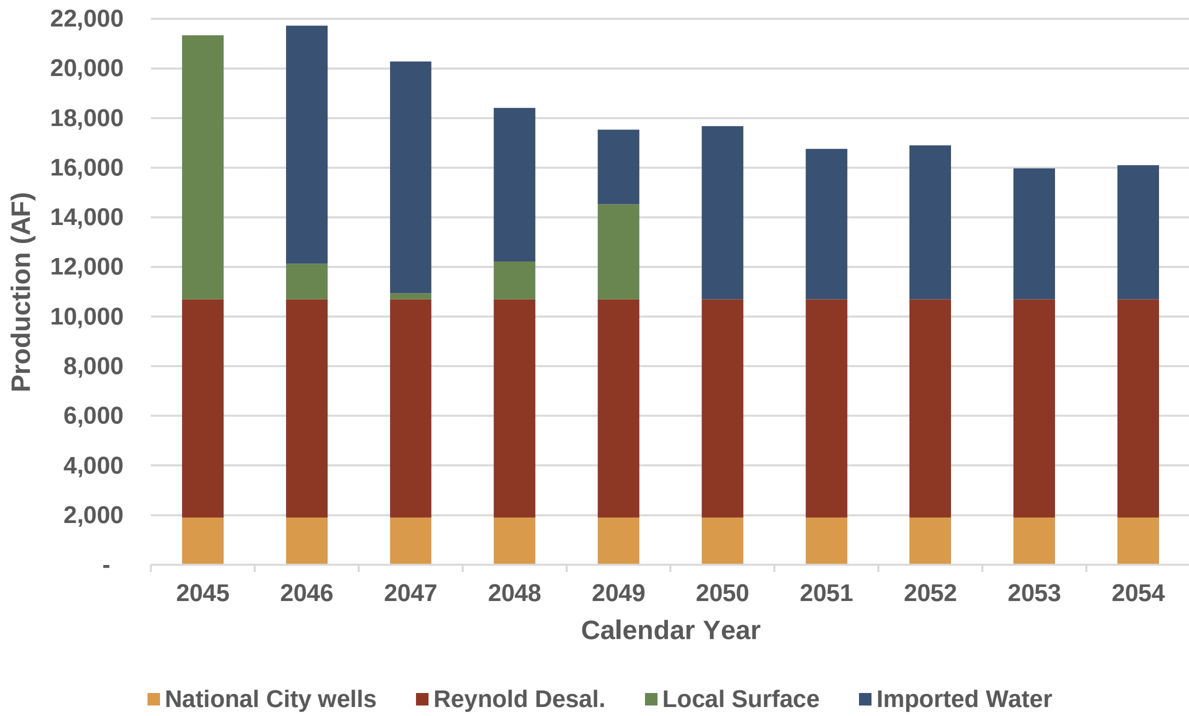

Figure 5-5. Water Supply Portfolio During a 10-Consecutive Dry Year Sequence, 2045

5.4 Summary of Estimated Need of Imported Water with Existing Water Sources

Sections 5.2 and 5.3 presented the modelling results using local supplies under a variety of hydrologic scenarios and the estimated corresponding need for imported water purchases. By 2045, if there is no further development of local water supply sources, average annual imported water purchases are modelled to range between 4,246 AFY and 7,843 AFY and the maximum annual imported water purchases could exceed 9,000 AFY under extremely dry hydrologic conditions (see Table 5-8).

Table 5-8. Estimated Need of Imported Water Under Modeled Hydrologic Scenarios

	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-Consecutative Dry Year [(a)]	4,976	4,844	5,442	6,712	7,690
10-Consecutive Dry Year [(b)]	4,151	4,308	4,866	5,593	6,447

[(a)] Reports average annual modeled imported water purchase.

[(b)] Ibid.

5.5 Expected Future Cost of Imported Water

Imported water costs were estimated through 2050 in order to understand the main cost drivers in the existing system and to be used as a point of comparison for possible cost efficiency of potential new local water supply alternatives further explored in Section 6. Imported water cost projections were based on the five cost components for water supply included in the Authority invoices from SDCWA:

1. Untreated SDCWA Rate (variable volumetric rate);
2. Treated SDCWA Rate (variable volumetric rate);
3. Transportation Rate for SDCWA Supplies (variable volumetric rate);
4. SDCWA Fixed Charges (based on the Authority's 3- and 5-year rolling average water use); and
5. Metropolitan Fixed Charges (based on the Authority's 5- and 10-year rolling average water use).

While the variable rates apply to every acre-foot of water, the total fixed Metropolitan and SDCWA charges decrease if the Authority purchases less water.

Potential future Metropolitan project investment costs are incorporated into both the variable and fixed rates using a methodology consistent with the way Metropolitan allocates costs, as discussed in the following sections. Table 5-9 outlines the projects assumed for this analysis, and the associated supply volume and cost estimated by Metropolitan. Note that future regional water supply investments from Metropolitan and SDCWA are uncertain; the regional projects identified for the WRMP were selected based on their prior inclusion in similar publicly available financial planning studies including Metropolitan's Biennial Budget for Fiscal Years 2019/20. The Authority should continue to monitor the planning and implementation of regional projects and their impact on the cost of imported water.

Table 5-9. Planned Metropolitan Projects

Project	Year Online	Supply (AF)	Storage (AF)	Cost
Regional Recycled Water Program	2035	168,000	N/A	▪ $3.4 billion capital (distributed over 30 years) ▪ $129 million O&M ▪ $242 million per year
Delta Conveyance	2035	900,000	N/A	▪ 60% of $17 billion capital ▪ $340 million per year
New Reservoir	2035	N/A	400,000	▪ $3.9 billion capital ▪ $130 million per year

Metropolitan's Biennial Budget for Fiscal Years 2019/20 shows that 51% of the Delta Conveyance planning costs were allocated to the System Access Rate (variable cost) and 49% were allocated to the fixed Readiness-to-Serve Charge. The total cost for the Delta Conveyance, the Regional Recycled Water Program, and a new reservoir are equally partitioned between the Metropolitan System Access Rate (variable cost) and the Readiness-to-Serve (RTS) Charge (fixed cost). The Authority will see direct impacts of the increase in the Readiness-to-Serve charge, since that is passed from Metropolitan directly to end users. Changes to the System Access Rate would be buffered with the SDCWA rate, which incorporates IID transfers, desalination, and canal lining supplies.

5.5.1 Variable Cost of Untreated SDCWA Supplies

SDCWA purchases untreated water supplies from Metropolitan. Metropolitan charges a common Tier 1 rate (for member agency supplies that remain within the Metropolitan allocation) and a Tier 2 rate (assigned to agency needs over the annual Metropolitan allocation.)

The Authority must estimate Metropolitan charges through 2050 for planning purposes. Metropolitan's Biennial Budget for Fiscal Years 2020/21 and 2021/22 presents the estimated water sales volumes, rates, and charges from 2020 to 2030. This analysis relies on Scenario D of the Metropolitan 2020 Integrated Resources Plan Refined Analysis to approximate net demands and Metropolitan charges for imported supplies from 2031 to 2050. IRP Scenario D assumes a gradual recovery in Metropolitan member agency demands from the 2020 low point. By applying forecasted Metropolitan revenue across a larger (recovered) volume of sales, Scenario D avoids an over-prediction of Metropolitan variable costs. Assumptions made for variable costs for untreated Metropolitan supplies are shown in Table 5-10.

Table 5-10. Variable Metropolitan Costs

Rates & Charges	2020 – 2030 Assumption (Source)	2031 – 2050 Assumption
Tier 1 Supply Rate ($/AF)	Biennial Budget	Increased based on annual inflation rate of 3%, plus an additional Metropolitan rate increase of 3%
Tier 2 Supply Rate ($/AF)	Biennial Budget	Increased based on annual inflation rate of 3%, plus an additional Metropolitan rate increase of 3%
System Access Rate ($/AF)	Biennial Budget	Increased based on annual inflation rate of 3% New projects incorporated as: $Baseline\ System\ Access\ Rate + \frac{0.5\ \times Total\ New\ Project\ Cost}{Total\ Demand\ on\ MWD}$
Water Stewardship Rate ($/AF)	Biennial Budget	Increased based on annual inflation rate of 3%
System Power Rate ($/AF)	Biennial Budget	Increased based on annual inflation rate of 3%

SDCWA published their water rates in the CY 2021 and CY 2023 Cost of Service studies. Although the SDCWA 2021 Long Range Financing Plan (LRFP) estimates rates through 2032, actual rates may increase beyond the high scenario provided in the LRFP if Metropolitan invests in additional project. This analysis forecasts the SDCWA rates separately based on the supply rate used to recover their cost of water. Components of the SDCWA supply rate include:

- Total purchases (desalination supplies, Imperial Irrigation District (IID) transfer, volume from canal lining projects, Metropolitan purchases);

- Negative Permanent Special Agricultural Water Rate (PSAWR) purchases (these are sent to agricultural users at cost of purchase from Metropolitan);

5.5.2 Supply Revenue Requirement

- Supply reliability credit (negative supply reliability charge used to reduce the rate, but added to the fixed cost); and
- Cash and Reserves (multiplied by negative 1 to reduce the total rate);

The supply rate is the sum of these components (Table 5-11) multiplied by an assumed 3% rate increase in addition to inflation. From 2023 to 2024, a total percent of 9.5% is multiplied to all SDCWA variable and fixed costs to account for rate increases and inflation. After 2024, the total percent of 6% is used as a multiplier to represent a 3% rate increase and inflation.

Table 5-11. Variable SDCWA Costs

Rates & Charges	Assumption (Source)
Full cost of purchase of Metropolitan water at the delivery point	Minus PSAWR volume multiplied by Metropolitan tier 1 untreated rate
Supply and acquisition costs related to the Poseidon water purchase agreement associated with the Carlsbad Desalination Project	Desal volume = 42,000 AFY SDCWA CY 2021 Cost of Service Study shows $106.74 million for 42,000 AF (increased 3% annually for inflation)
Payments to IID for transfer of conserved water	IID = 205,000 AFY SDCWA CY 2021 Cost of Service Study shows $250.32 million (increased 3% annually for inflation)
Costs associated with obtaining conserved water from the Coachella and All-American Canal Lining Projects	Canal deliveries = 77,700 AFY SDCWA CY 2021 Cost of Service Study shows $42.72 million (increased 3% annually for inflation)
Supply revenue requirement	$17.10 million in 2021, SDCWA anticipates a 3% increase in revenue each year (SDCWA CY 2021 Cost of Service Study)
Supply reliability credit (equal to negative supply reliability charge)	Considered avoided Metropolitan cost: 25% of the difference between reliable water cost (the total cost of SDCWA desalination plus the IID transfer) and equivalent Metropolitan cost (the volume of water produced by the desalination plant and the IID transfer multiplied by the Metropolitan tier 1 untreated water rate)
Cash and reserves	$79.82 million in 2021, $28.23 million in 2023 (varies based on CY Cost of Service Study) Assumed to increases by 3% from 28.23 to be conservative

SDCWA projected demands are based on the Long-Range water demand forecast (SCDWA, 2021). The net demands on SDCWA are obtained by subtracting the PSAWR program sales, 35,000 AFY, from the total demand numbers.

5.5.3 Treated SDCWA Supplies

The SDCWA treatment rate is a volumetric charge designed to recover the cost of treating water. The Melded Municipal and Industrial (M&I) Treatment Rate includes the costs of purchasing treated water from Metropolitan, the operating and capital costs associated with SDCWA's agreement with Helix Water District's Levy Water Treatment Plant, operating costs associated with the Olivenhain Treatment Plant, and the operating and capital costs associated with the Twin Oaks Valley Treatment Plant.

The SDCWA CY 2021 Cost of Service study reports $295/AF in 2021, this is increased 3% annually for inflation.

5.5.4 Transportation Charges for SDCWA Supplies

The Transportation rate is a volumetric charge set to recover capital, operating, and maintenance costs of SDCWA's water delivery facilities including all facilities used to physically transport the water to member agencies; SDCWA reports $164/AF in 2021.[9]

5.5.5 SDCWA Fixed Charges

The Authority provided their water purchase history from FY 2011/12 through FY 2022/23 These reports are summarized in Table 5-12 and were used to determine the fixed charges from SDCWA, which include:

- Customer service charge (based on the 3-year rolling average of agency demands);
- Emergency storage charge (based on the 3-year rolling average of agency demands);
- Supply reliability charge (based on the 5-year rolling average of agency demands and the supply reliability credit as shown in Table 5-11 ((Desal cost + IID Transfer cost) – offset Metropolitan Tier 1 cost) x 0.25; and
- Infrastructure access charge

Because these charges are based on the historical rolling average of member agency demands, they are not as fixed as their name implies. The purchase history indicates that the Authority incurs about 4.6% of the total infrastructure access charge, 2% of the customer service charge, 2% of the emergency storage charge, and 2% of the supply reliability charge. SDCWA is pursuing changes to the fixed charges, and the 2% portion may eventually be based on a rolling 5-year peak demand instead of a rolling average. SDCWA and member agencies are discussing changes to the fixed cost allocation. The commodity based fixed charges depend on the distribution of demands from other member agencies.

[9] The most recent rate forecasts from Metropolitan are from 2021, therefore rate projections in the WRMP start in 2021 in order to maintain consistency.

Table 5-12. Fixed SDCWA Costs

Rates & Charges	Assumption
Customer Service Charge	Commodity-based fixed charge set to recover costs that are necessary to support the functions of SDCWA, develop policies, and implement system-wide programs. Currently the Authority shows $0.03/HCF. Values from SDCWA are used in this analysis: $25.6 million in 2021 multiplied by 2% and divided by the total Authority demand to get for $/AF.
Emergency Storage Charge	Commodity-based fixed charge set to recover costs associated with the Emergency Storage Program (ESP) and Carryover Storage Program (CSP). Currently the Authority shows $0.08/HCF. SDCWA shows $60 million in 2021, which is multiplied by 2% and divided by the total Authority demand in this study.
Supply Reliability Charge	Commodity-based fixed charge established to recover a portion of the Carlsbad Desalination Plant and the IID transfer water costs. Set equal to the difference between the supply cost of reliable local sources and a like amount of water purchased at the Metropolitan Tier 1 rate multiplied by 25% and apportioned according to a five-year rolling average of water purchases. Authority-specific value is calculated by multiplying the total SDCWA supply reliability charge by 2% (to reflect the Authority-specific use of SDCWA supplies) and dividing by total Authority demands.
Infrastructure Access Charge	SDCWA estimates $47.3 million in 2022, the Authority is 4.6% of SDCWA demands so this study assumes 4.6% of this cost.

The commodity based fixed charges depend on the distribution of demands from other member agencies.

5.5.6 Metropolitan Fixed Charges

The Authority water purchase history also reports Metropolitan fixed costs (Table 5-13). Metropolitan fixed costs are applied to the Authority based on their accounting for 0.8% percent of net demands on Metropolitan.

Table 5-13. Fixed Metropolitan Costs

Rates & Charges	Assumption
Capacity Charge	Metropolitan bills each member agency a monthly amount equal to the capacity used on the peak demand day multiplied by the capacity charge rate and divided by 12. The Metropolitan biennial budget for FY 2020-21 and FY 2021-22 provides this rate out to 2030, and this study assumed a constant $16,000/cubic foot per second after 2030.
Readiness to Serve Charge	The readiness-to-serve charge funds projects to meet reliability and water quality needs. Metropolitan passes these costs to its member agencies based on the member agency's share of the 10-year rolling average firm water deliveries. The Metropolitan biennial budget from FY 2020-21 and FY 2021-22 provided the charges out to 2030, and in this study, it was considered constant at $179 million after 2030. 50% of new project cost is added to the baseline charge: 179 million plus half the new project cost

As noted during the discussion of variable rates, a portion of the costs for new Metropolitan projects is allocated to the readiness-to-serve charge. The Authority will see the direct impact of this rate increase.

5.5.7 Projected Imported Water Costs to the Authority

Figure 5-6 shows the treated SDCWA water rates assuming no new Metropolitan projects, and Figure 5-7 shows the treated water rates assuming Metropolitan invests in the new projects. The graphs show that most of the cost increase to the Authority is in the Metropolitan pass-through Readiness to Serve Charge. The cost of imported treated water is projected to increase between 100 and 160% by 2045. Given the modeled imported water purchases summarized in Section 5.4, the annual cost of imported water could range between $24 million and $54 million depending on hydrologic condition.

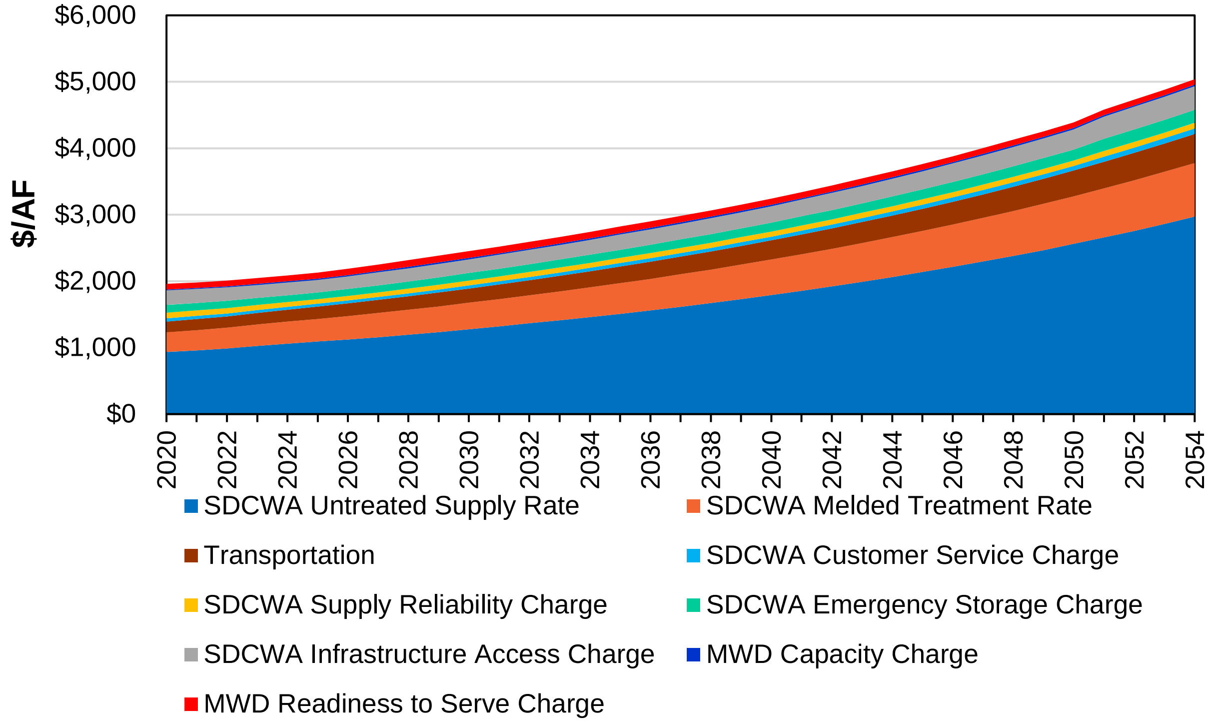

Figure 5-6. SDCWA Treated Water Costs with no new Metropolitan Projects

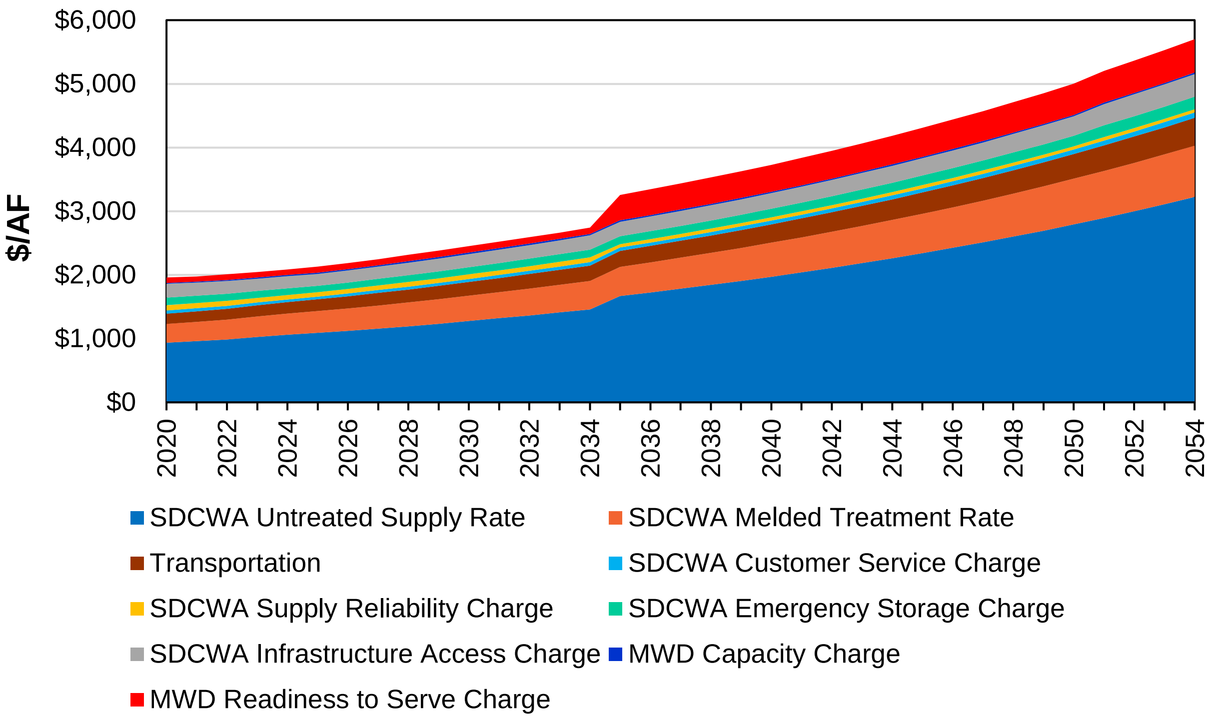

Figure 5-7. SDCWA Treated Water Cost with new Metropolitan Projects

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.

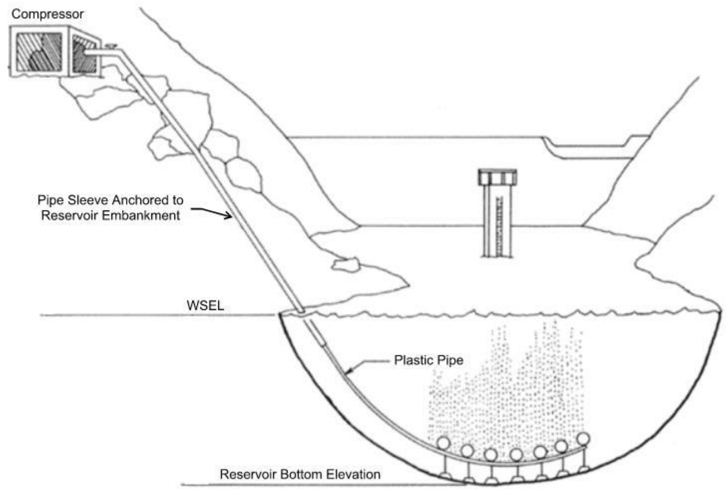

Figure 6-1. Typical Diffused Aeration System with Linear Diffusion (WQS)

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.

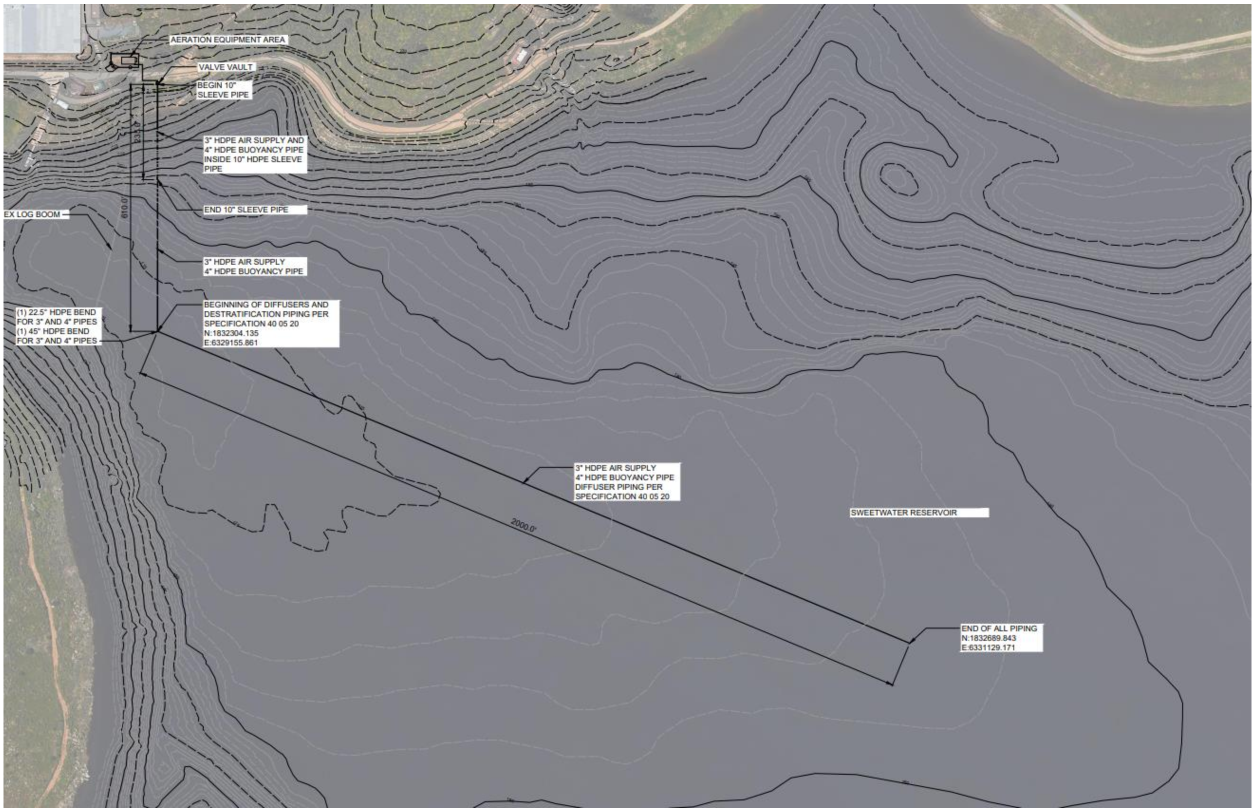

Figure 6-2. Sweetwater Reservoir Aeration/Destratification System Layout (Hazen and Sawyer, 2023)

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.

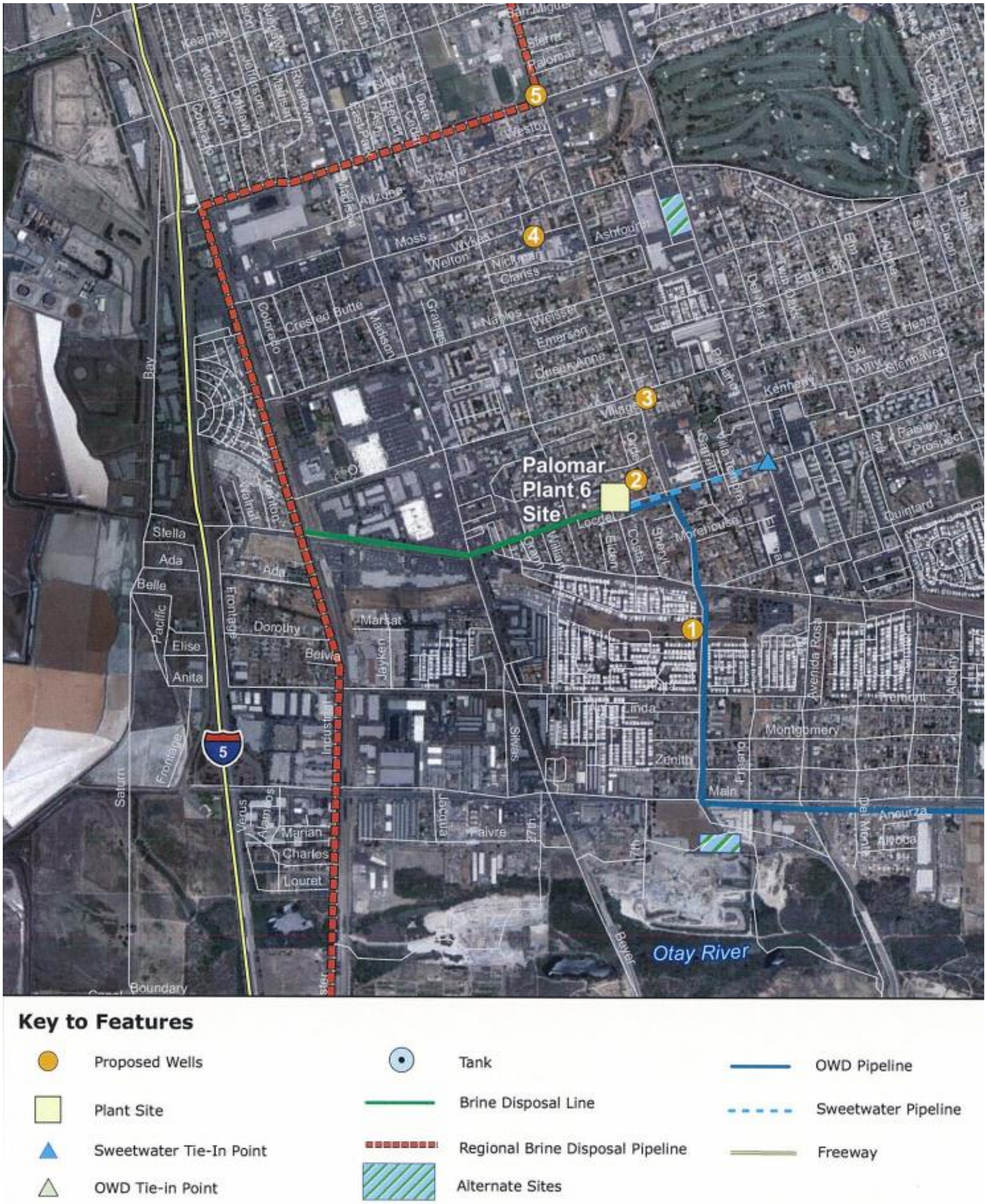

Figure 6-3. Otay River Desalination Supply Alternative Infrastructure (2009 Otay Basin Brackish Groundwater Desalination Feasibility Study)

The conceptual layout in Figure 6-3 is as identified in the 2009 Otay Basin Brackish Groundwater Desalination Feasibility Study when the alternative was considered to be a collaboration between the Authority and Otay Water District. As such, it includes conveyance facilities to Otay Water District after treatment at the new desalination plant. Under direction of the Authority, this alternative is no longer considered a collaborative alternative, so these distribution facilities will not be required.

Table 6-4. Major Infrastructure of Otay River Desalination Alternative

Infrastructure Component	Description
Brackish Groundwater Wells	The Authority's staff has expressed a preference for constructing the wells along 4th Avenue in Chula Vista, where the San Diego Formation is the thickest and yields the highest production. Wells are to be located approximately 2,000 feet apart starting a minimum of 1,000 feet north of the Otay River and extending north to L Street. A typical well is anticipated to produce 700 to 800 gpm of brackish groundwater. Construction of a minimum of five wells would provide approximately 4.8 MGD of raw water flow to the new treatment plant.
Conveyance from Groundwater Wells to Desalination Plant	Approximately 10,000 feet of PVC pipe in 8- and 16-inch diameters will transfer the water produced from the wells to the new treatment plant. It is assumed each well will be equipped with a pump with head and capacity to deliver water to the new treatment plant.
Desalination Plant	The new groundwater desalination facility will include a reverse osmosis system, iron and manganese treatment system, product water degassifier system, product water transfer pumps and other ancillary equipment. This equates to about a 300' by 300' minimum site footprint. The assumed site is a private parcel near Palomar High School as depicted in Figure 6-3.
Brine Disposal Conveyance Facilities	A reverse osmosis Concentrate Stream (Brine Stream) produced at the desalination plant also must also be disposed of. The brine flow is estimated to be approximately 0.8 MGD for a 4 MGD treatment facility. It is assumed that a regional brine disposal line would be available and located in Industrial Boulevard west of the desalination plant location. The brine line from the facility would have to be extended to the regional brine line, requiring approximately 6,800 feet and would be 6-inch PVC pipe sized for 0.8 MGD of brine production. A pump would likely be needed to pump to the regional brine line. Alternative options for brine disposal, including discharge to the San Diego Bay, are discussed in Section 6.2.5.2.

6.2.3 Yield Analysis

Following treatment at the new desalination plant, this alternative is projected to produce approximately 4,480 AF/year (4 MGD) of potable water for the Authority. Similar to the Authority's Reynolds Desalination Facility, the facility has the potential to be expanded in the future to produce more water.

However, this is contingent on environmental factors such as the sustainable yield of the basin, as discussed in Section 6.2.5, and other potentially adverse effects to the basin's water quality.

6.2.4 Cost Assessment

Costs for the water supply alternative are summarized in Table 6-5 below. Capital and operations and maintenance (O&M) costs were derived from the cost estimates prepared for the 2009 feasibility study and escalated to 2023 dollars.

Table 6-5. Otay River Desalination Cost Summary

Attribute	Cost
Capital Cost	$55.5 million
Annual O&M	$2.7 million/year

The capital cost estimate assumes that the regional brine disposal line would be available. It assumes the Authority is responsible for 15% of the estimated capital cost of the regional brine line from the assumed point of connection to the South Bay Ocean Outfall and also includes a buy-in cost to the alternative. The capital cost estimate also includes the cost of the local brine disposal line needed to connect the new desalination facility to the regional brine disposal line.

6.2.5 Other Evaluation Factors and Constraints

6.2.5.1 Water Quality and Environmental Factors

Further groundwater extraction may be possible for subsequent expansion of supply, based upon the results of the United States Geological Survey (USGS) of the SDF aquifer. Currently, the USGS has not yet defined a sustainable yield for the CPSD groundwater basin and subsequently the SDF aquifer as the basin is considered a low priority basin. In the future, if the basin has overdraft issues that impact its sustainability, the DWR could require the development of a groundwater sustainability plan. This would require more regulatory work from the agencies drawing from the basin. Furthermore, increased pumping from the groundwater basin will have other adverse impacts on the basin's water quality, including potentially increasing the rate of seawater intrusion and land subsidence. If the water quality of the basin decreases, the amount of potable water recovered would decrease, increasing the cost of recovery, which could affect the project's feasibility.

6.2.5.2 Contractual Constraints

The regional brine line alternative, as identified in the 2008 San Diego Regional Concentrate Conveyance System Feasibility Study by SDCWA and CDM, has been assumed to be complete by the time this alternative comes online. If this regional brine line is completed, the Authority would likely require a contract with SDCWA for buy-in to the South Bay Ocean Outfall, capital and annual cost sharing and other potential conditions. However, since 2008, there has been no update to this study, suggesting the Authority may have to investigate alternative options for brine disposal.

If this regional brine line is not constructed prior to advancing this alternative to design, the Authority could construct a brine line that only serves the new desalination facility or investigate the feasibility and regional interest of constructing a regional brine line alternative with other interested agencies in the South Bay area. The 2009 Otay Basin Brackish Groundwater Desalination Feasibility Study states that given the assumed location of the new desalination facility, a brine line to serve the new desalination facility only would add approximately 5.5 miles of 8-inch pipeline and a 125 horsepower (HP) lift station to the alternative. The cost of this is approximately $16 million. If this were assumed in its entirety by the Authority, the alternative would likely not be viable due to cost. The study also states that given the assumed location of the new desalination facility, the regional brine line from the new desalination facility to the South Bay Outfall would consist of approximately 5.5 miles of 32-inch pipeline and a 30 HP lift station. The cost of this portion of the regional brine line is approximately $53 million. Another potential alternative could include connecting to the regional brine line alternative between the City of San Diego and other East County water utilities, but this would also require a large amount of piping to connect to the line and contractual requirements. Alternatively, when the Authority confirms whether the assumed parcel is still available for the new desalination facility, it is recommended the Authority search for a parcel closer to the South Bay Outfall to reduce the amount of piping required for the brine line, thereby reducing capital costs associated with it.

6.3 Recycled Water Purchase from Otay Water District

6.3.1 Alternative Description

This water supply alternative includes the purchase of recycled water from City of San Diego’s South Bay Water Reclamation Plant (with which Otay Water District has an agreement to purchase recycled water) to supply water to non-potable and/or large outdoor users in the Authority’s service area, thus reducing potable water demands. The Authority is currently preparing a joint Recycled Water Market Study with the Otay Water District that may help further develop this alternative and its associated constraints.

To maximize a new recycled water system from Otay Water District to the Authority, potential recycled water users within the Authority’s service area were identified. Five potential users include the Chula Vista Golf Course, Bonita Golf Course, National City Golf Course and San Diego Country Club. These sites were identified as they all include large outdoor landscapes that could be irrigated with recycled water. Historical annual average potable water demands for these potential users were provided by the Authority and are reflected in Table 6-6 below as estimated recycled water demands.

Table 6-6. Potential Recycled Water User Demands

Potential User	Recycled Water Demand (AFY)
Chula Vista Golf Course	24.9
National City Golf Course	2.36
San Diego Country Club	228
JR South Bay Golf Inc	4.86
Bonita Golf Course	2.92
Total	**263**

It is suggested that the Authority conduct a feasibility study to analyse its users further to identify other potential recycled water users, such as HOAs, commercial, and industrial properties, along the suggested alignment, as this analysis only considered large outdoor users.

6.3.2 Conceptual Design

The new sales agreement would require new conveyance facilities to deliver recycled water from two of Otay Water District's connection points to the identified potential users in the Authority's service area. As the points of connection from Otay's recycled water system are at higher elevations than the potential users in the Authority's service area, no pump station is expected to be required. The major infrastructure components for this alternative are summarized in Table 6-7. A conceptual alignment is also depicted in Figure 6-10.

Table 6-7. Major Infrastructure of Recycled Water Sales Agreement Alternative

Infrastructure Component	Description
Otay Origination Point – Terra Nova Dr	Conveyance for the potential recycled water users in the northeastern portion of the Authority's service area would need to originate from Otay's recycled water main located in Terra Nova Dr.
Pipeline Sizing and Alignments – Terra Nova Dr	The new pipeline from Otay's connection point in Terra Nova Dr would be 8-inch diameter and the conceptual alignment is depicted in Figure 6-4 below. The pipeline alignment would go through from Terra Nova Dr up to Randy Ln and Bonita Rd following the Authority and City of Chula Vista's right-of-way to reach JR South Bay Golf Center. From there, Chula Vista Golf Course and Bonita Golf Course are up to the right following Bonita Rd to Sweetwater Rd. Following Bonita Rd to the left and up to 2nd Ave is the National City Golf Course. The total length of pipe is approximately 41,000 feet.
Otay Origination Point – Telegraph Ave	Conveyance for the potential recycled water users in the southwestern portion of the Authority's service area would need to originate from Otay's recycled water main located in Telegraph Canyon Rd.
Pipeline Sizing and Alignments – Telegraph Ave	The new pipeline from Otay's connection point in Telegraph Canyon Rd. would be 8-inch diameter and the conceptual alignment is depicted in Figure 6-4 below. The pipeline would follow Telegraph Canyon Rd to E L St where it would reach the San Diego Country Club. The total length of pipe is approximately 11,200 ft.

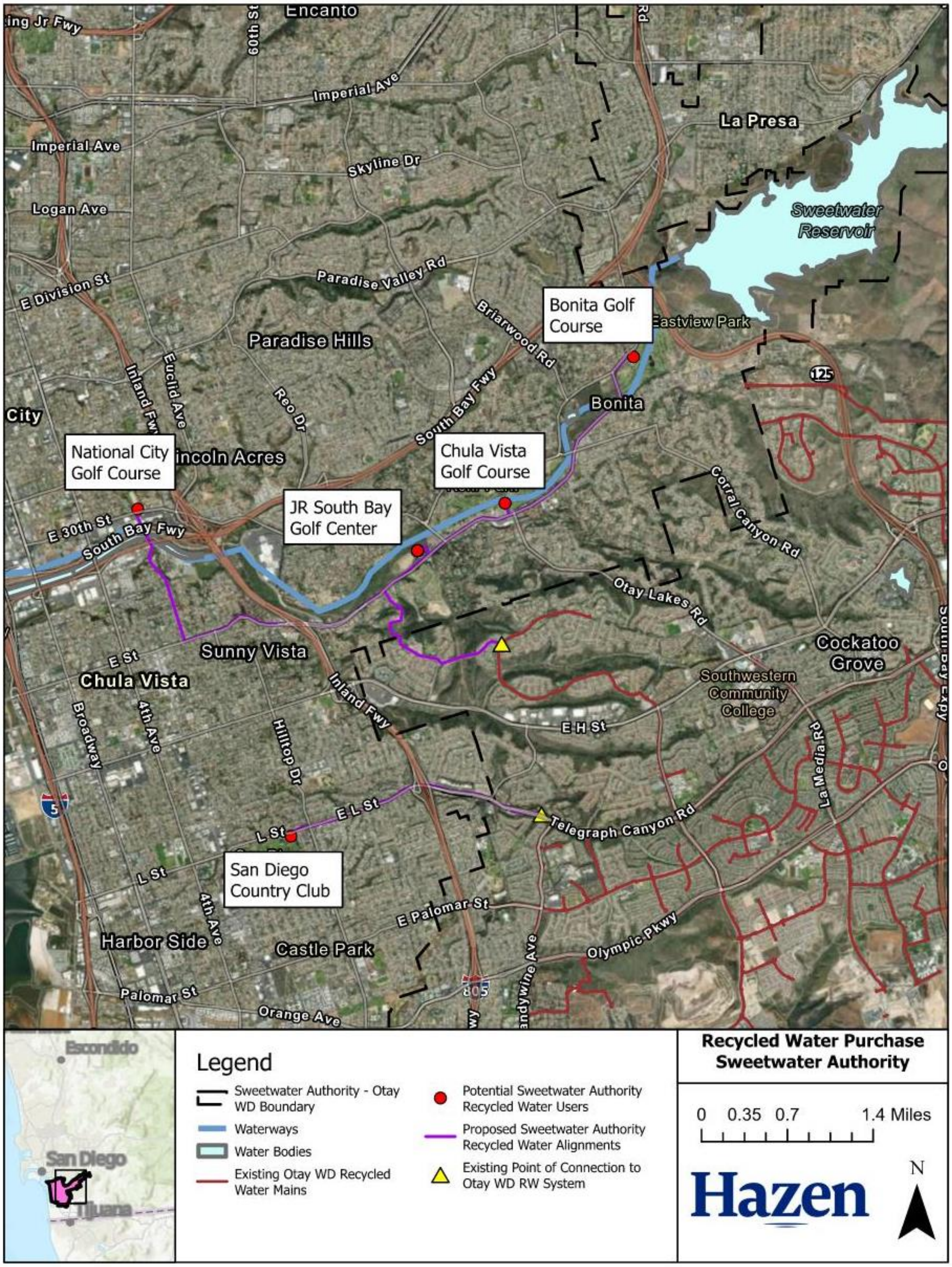

Figure 6-4. Recycled Water Purchase Conceptual Alignment

6.3.3 Yield Analysis

Sales are assumed to occur year-round to supplement supply for users with large landscapes when supply is available from Otay Water District's recycled water system. Otay's total recycled water system capacity is approximately 7,840 acre-feet per year and is assumed to be constantly available throughout the year. Any excess recycled water supply not used by Otay's recycled water customers was assumed to be available for the Authority. Currently, Otay only has excess supply for the Authority to purchase during low and average demand periods as peak and max day demands surpass their system's supply. The months during which Otay cannot satisfy the Authority's potential recycled water demand are July through September because recycled water is entirely needed for Otay's customers. This alternative is estimated to reduce imported water purchases by 157 acre-feet per year, assuming the Authority's identified potential recycled water customers in Table 6-6 only purchase recycled water from Otay from October through June and that historical potable water demands are representative of recycled water demands.

Table 6-8. Potential Recycled Water Purchase Yield

Scenario	(AFY)
Sweetwater Recycled Water Demand – Annual	263
Sweetwater Recycled Water Demand – July – September (Otay recycled water unavailable)	106
Sweetwater Recycled Water Demand – October – June (Otay recycled water available)	157
Imported Water Purchase Offset	**157**

6.3.4 Cost Assessment

The cost estimate for this alternative consists of the capital cost for the pipeline based upon the conceptual alignment identified in Figure 6-4. No annual operations and maintenance costs are anticipated for this alternative as it would only consist of a pipeline, which may require some periodic maintenance but no annual work. Conceptual-level capital cost estimates in 2023 dollars are summarized in Table 6-9. The estimate serves for alternatives analysis and is considered to be an AACE Class 5 level. Class 5 has a typical accuracy range of -50% on the low side and +100% on the high side. A 40% 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 6-9. Recycled Water Purchase Agreement Cost Summary

Attribute	Cost
Capital Cost	$23.4 million
Annual O&M	$28,000

The additional cost of the recycled water purchased from Otay would be at a rate to be negotiated between Otay and the Authority. This rate would be offset by the resale rate; therefore, it is not considered as a net contributor to the cost for this alternative.

6.3.5 Other Evaluation Factors and Constraints

6.3.5.1 Contractual Requirements

This alternative would require an agreement with Otay Water District, and availability of recycled water flows is subject to Otay's use. One of the primary challenges is that recycled water demands reflect seasonality, as max day and peak demands generally occur during summer months. It is likely that the potential recycled water users in the Authority's service area will also have similar demand patterns as those in Otay. However, since Otay only has capacity to sell excess recycled water during average and low demand periods (October – June), this may pose a challenge for the Authority to meet demands of its potential recycled water users.

6.4 IPR Groundwater Recharge to CPSD Basin

6.4.1 Alternative Description

The alternative would consist of treating recycled water purchased from Otay Water District at a new advanced water treatment plant (AWTP) in Chula Vista to be used for groundwater recharge to the CPSD basin. It assumes that this alternative would build off of the recycled water purchase alternative from Section 6.3, thus the recycled water availability for IPR would account for the Authority's potential recycled water users and the conveyance facilities from Otay Water District's recycled water system to the Authority's service area would already be constructed. Treated effluent from the new AWTP would be used to recharge the CPSD groundwater basin, which could provide dual benefits in that it would (a) increase ability to withdraw more groundwater and (b) potentially function as a barrier for seawater intrusion.

Availability of recycled water to treat would depend on a variety of factors. First, the Authority would only be able to purchase recycled water from Otay during the latter's low and average demand periods. Max day and peak demands generally occur during the months of July through September for Otay, whereas the most recycled water flow would be available during January through March. Additionally, as mentioned in Section 6.3, approximately 149 acre-feet of recycled water will be used for the potential recycled water users identified, with the potential for more recycled water being required for future recycled water users identified surrounding the assumed pipeline alignment. These factors have been considered when determining an efficient capacity of the new IPR facility.

6.4.2 Conceptual Design

Based on the availability of Otay recycled water and considering new recycled water demands of the five new Sweetwater customers referenced in Section 6.3, this alternative assumes an AWTP treatment capacity of 2.7 MGD for the treatment of Title 22 effluent from the City of San Diego's South Bay Water Reclamation Plant via Otay's recycled water system. This treatment capacity was chosen to balance the ability to take advantage of recycled water when available and minimize unused capacity when recycled water availability is low. The AWTP would be located in Chula Vista within the vicinity of the new groundwater injection wells. A potential location for the AWTP will be identified in the future if the Authority chooses to pursue this alternative. Treated effluent from the new AWTP would be sent to new groundwater injection wells located on the vicinity of the Broadway corridor between C Street and H Street in Chula Vista to recharge the CPSD groundwater basin. A conceptual alignment building off the Authority's recycled water system alignment identified in Section 6.3.2 (see Figure 6-5).

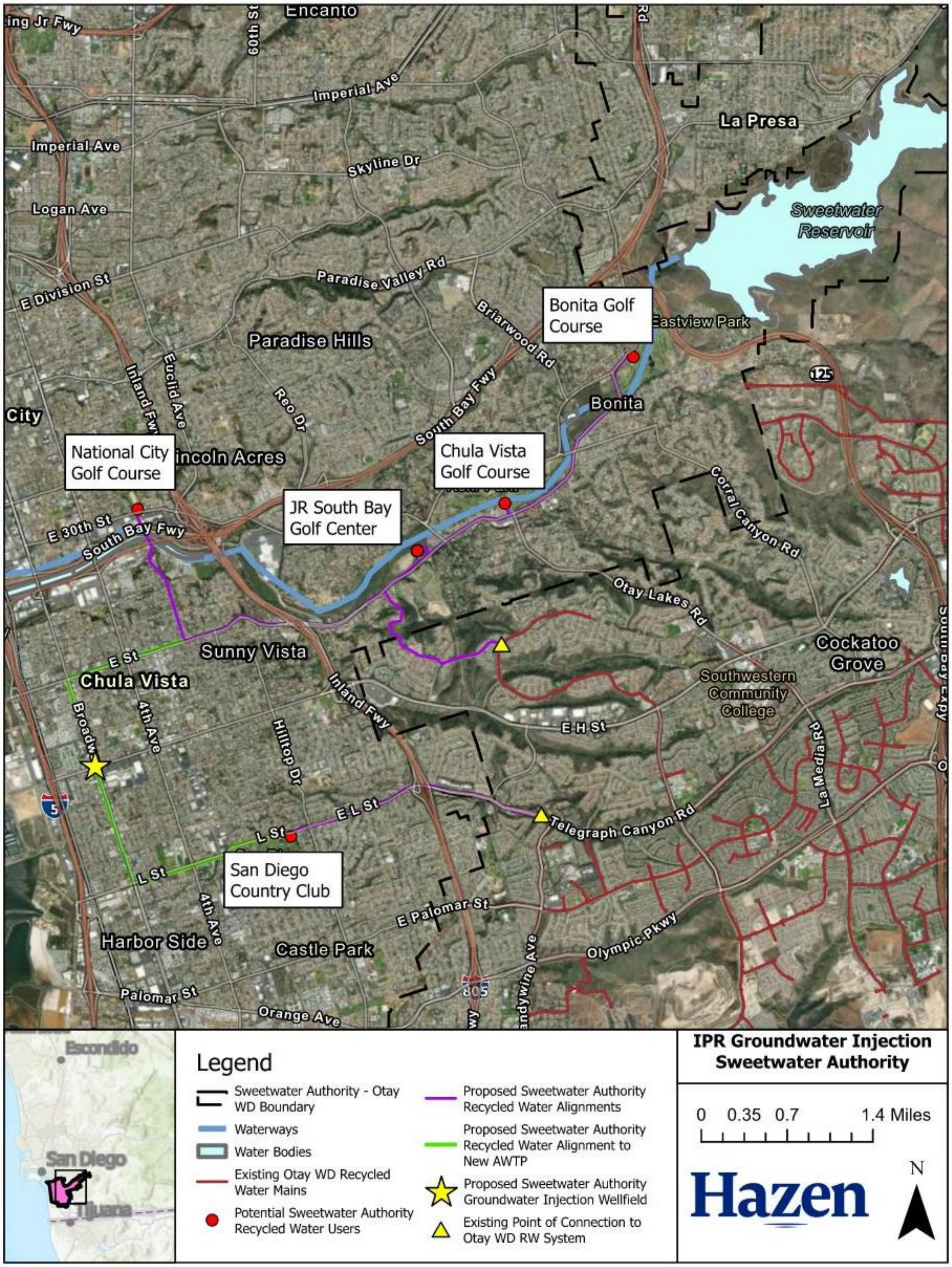

Figure 6-5. IPR Groundwater Recharge Conceptual Alignment

The major infrastructure required for this alternative are summarized in Table 6-10.

Table 6-10. Major Infrastructure of IPR Groundwater Recharge Alternative

Infrastructure Component	Description
Recycled Water Conveyance to Advanced Water Treatment Plant	To move recycled water from the Authority's new recycled water system to the new AWTP site, the alternative would include an additional segment of recycled water pipeline to the system, approximately 22,000 feet long total if originating at E St and 2nd Ave by the National City Golf Course and L St and Hilltop Dr by the San Diego Country Club.
Advanced Water Treatment Plant	Divert 2.7 MGD of flow from the Authority's new recycled water system to be treated at a new AWTP which will be located in Chula Vista. The treatment train would consist of membrane filtration, reverse osmosis, and UV disinfection processes, capable of meeting the State of California Department of Drinking Water (DDW) Groundwater Replenishment standards for indirect potable reuse, prior to injection to the CPSD basin. Land acquisition for the AWTP was not included in the cost estimate.
Residuals Disposal	Reverse osmosis concentrate generated during the treatment processes could potentially be discharged via existing sewer to San Diego Metro Sewer System (Metro System). However, disposal to the Metro System may be complicated by negative impacts to the City of San Diego's Pure Water program downstream.
Product Water Conveyance to Groundwater Injection	To move water from the AWTP to the groundwater injection wells at the new well site located on the Broadway corridor between C St and H St. Assuming the new AWTP would be located on Broadway, along the green alignment in Figure 6-5, the new advanced water pipeline could be up to 12,000 feet long.
Groundwater Injection Wells	3 new groundwater injection wells would be installed on the Broadway corridor between C St and H St. Once the groundwater is injected, it would percolate to the groundwater table where a set retention time by DDW is expected to provide log reduction value to aid with pathogen removal and treat the groundwater to drinking water standards.
Waste Volume and Disposal	Waste flows and centrate flows from the reverse osmosis concentrate would total approximately 0.2 MGD and be disposed to the Metro System. Negotiations with Metro and potentially City of Chula Vista would be required.

6.4.3 Yield Analysis

Availability of recycled water to treat would depend on a variety of factors, including Otay's recycled water demands and the Authority's potential recycled water user demands, which vary on a monthly basis. Otay's recycled water demand is also projected to increase through 2055, thus reducing the amount of recycled water available for the Authority to use for the IPR alternative. The capacity of the plant is sized to be 3,000 AFY (2.7 MGD) to balance the ability to treat high recycled water availability and unused capacity during low recycled water availability. Table 6-11 below shows the average recycled water availability for the IPR alternative and estimated production of the AWTP through 2055. Production values assume a 90 percent recovery of the influent flow based upon recovery rates of similar facilities within Southern California and reflect the treatment and injection of recycled water.

Table 6-11. AWTP Sizing and Utilization

	2025	2030	2035	2040	2045	2050	2055
Recycled Water Availability for IPR (AFY)	3,480	3,270	3,060	2,850	2,640	2,420	2,420
AWTP Capacity (AFY)	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Production (AFY)	2,260	2,140	1,950	1,800	1,650	1,490	1,490

As Otay's recycled water demands increase over time, less excess supply will be available for the Authority to utilize for IPR. Based upon these projections, it is estimated that this alternative may reduce imported water purchases by approximately 1,490 to 2,260 AF/year depending on when the alternative is implemented and assuming a one-to-one recovery ratio for injected water.

6.4.4 Cost Assessment

Conceptual-level capital cost estimates in 2023 dollars are summarized in Table 6-12. The estimate serves for alternatives analysis and is considered to be an AACE Class 5 level. Class 5 has a typical accuracy range of -50% on the low side and +100% on the high side. A 40% 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. The annual operations and maintenance cost estimate for this alternative is scaled from comparable AWTP design in Southern California utilizing the same treatment train. This cost does not reflect the annual cost of producing the water as that is also dependent on the cost to purchase recycled water from Otay Water District. Capital and annual operating costs also do not include withdrawal and distribution of groundwater following treatment.

Table 6-12. IPR Groundwater Recharge Cost Summary

Attribute	Cost
Capital Cost	$61.4 million
Annual O&M	$6.8 million/year

6.4.5 Factors and Constraints

6.4.5.1 Regulatory Constraints

As this alternative involved injecting drinking water into groundwater for aquifer storage and recovery, regulatory requirements that apply include recycled water regulations, water quality objectives established by the Regional Water Quality Control Board (RWQCB) San Diego Basin Plan requirements, and federal regulations. Applicable regulations for recycled water include but are not limited to CCR Title 22, pathogen control, chemical control, nitrogen compounds, total organic carbon, response retention time, and monitoring wells. The Basin Plan applies the State of California Maximum Contaminant Level drinking water standards, which includes a variety of constituents, such as TDS, nitrate, total nitrogen, and total phosphorous.

Hydraulic modelling or tracer studies could be required before the basin can receive potable reuse water. A tracer test must be performed during the first six months after augmentation begins to verify the conditions in the groundwater basin are as expected. As is applicable to all IPR alternatives unless waived by DDW, an independent advisory panel is required to ensure the alternative meets the DDW Groundwater Replenishment Reuse Project (GRRP) Requirements for Subsurface Application (DPH-14-003E), which could add time and cost to the regulatory process. Other applicable regulations by DDW and RWQCB would be investigated further if the Authority chooses to pursue this alternative.

6.4.5.2 Contractual Requirements

Similar to the Recycled Water Purchase alternative, this alternative is limited by the amount of recycled water the Authority is able to purchase from Otay at a given time. As this alternative assumes that the recycled water purchase alternative will already be in place, the Authority would most likely require an amendment to their contract with Otay regarding how much recycled water they may purchase.

Additionally, as mentioned earlier, a potential location for the AWTP has not yet been identified. Given the size requirements of an AWTP, it may be challenging to identify an available location that could accommodate all the necessary equipment and facilities. Furthermore, once this location is identified, the Authority may face potential challenges during the land acquisition process.

6.5 IPR Surface Water Augmentation to Sweetwater Reservoir

6.5.1 Alternative Description

In 2015, an opportunity for an IPR alternative within the South Bay region was identified by the Otay Water District. The Authority hosted a workshop in 2020 with potential partner agencies within the region (Otay Water District and the County of San Diego) to discuss the potential of pursuing a South Bay IPR alternative. The alternative would consist of a new AWTP at the Otay Water District’s Ralph W. Chapman Wastewater Reclamation Facility (RWCWRF) to treat Title 22 effluent to IPR quality that is suitable for discharge to a water body and the conveyance facilities to deliver the treated water to Sweetwater Reservoir. The reservoir would provide at least 60 days of detention time and an environmental buffer as required by California IPR regulations. Following that, should the Authority identify interested partner agencies, the treated water would be distributed to the Authority’s service areas and to partner agencies.

Title 22 effluent from the County of San Diego’s Spring Valley Interceptor Sewer would be a possible source of supply for the IPR alternative.

Table 6-13 provides a list of agencies that provide wastewater collection services in and around the Authority’s service area, as well as their estimated wastewater flows, that are available at the Spring Valley Interceptor.

Table 6-13. Wastewater Collection Agencies Near Authority Service Area

Agency	Raw Wastewater Flow (MGD)
La Mesa and Lemon Grove	2
County of San Diego	4.4
Otay Water District	1.5
Chula Vista	6
Total	**13.9**

The 2020 Water Supply Feasibility Study estimated that 8 MGD could be diverted from the Spring Valley Interceptor for the South Bay IPR alternative. However, availability of this wastewater flow is subject to the negotiation with City of San Diego, as all the South Bay wastewater service providers are members of the Metropolitan Joint Powers Authority and deliver their flows to the City's Metro System through the Spring Valley Interceptor. The rest of this section assumes that this wastewater supply could be made available for a new South Bay IPR alternative.

6.5.2 Conceptual Design

The 2020 Water Supply Feasibility Study presented a conceptual layout of an IPR alternative supplied by the Spring Valley Interceptor Sewer, as depicted in Figure 6-6. The South Bay IPR alternative would consist of a new Water Reclamation Facility (WRF) to treat wastewater flows diverted from the Spring Valley Interceptor, a new AWTP at the RWCWRF, and other conveyance components. The effluent from the AWTP would be conveyed to the nearest point of the Sweetwater Reservoir URDS for delivery to Sweetwater Reservoir.

Figure 6-6. IPR Surface Water Augmentation to Sweetwater Reservoir Conceptual Alignment (Gillingham Water, 2020)

The major infrastructure required for this alternative are summarized in

Table 6-14.

Table 6-14. Major Infrastructure of IPR Surface Water Augmentation Alternative

Infrastructure Component	Description
Wastewater Reclamation Facility	Divert 8.0 MGD of flow from the Spring Valley Interceptor in the vicinity of the Spring Valley Swap Meet property to be treated at a new WRF in the same vicinity.
Recycled Water Conveyance	Build a new pump station and pipeline to convey recycled water from the WRF to the site of an AWTP.
Residuals Disposal	Reverse osmosis concentrate and waste solids generated during the treatment processes could potentially be discharged via existing sewer to Metro System. However, disposal to Metro may be complicated by negative impacts to the City of San Diego's Pure Water program downstream. There may need to be solids handling facilities at the new WRF, but this will require further review.
Advanced Water Treatment Plant	A new AWTP could be sited adjacent to the Chapman WRF upstream of Sweetwater Reservoir. The new AWTP would consist of membrane filtration, reverse osmosis, and UV disinfection processes, capable of meeting the DDW Surface Water Augmentation standards for indirect potable reuse, prior to discharge to Sweetwater Reservoir.
Product Water Conveyance to Sweetwater Reservoir/Dechlorination	To move water from the AWTP to Sweetwater Reservoir, the alternative would include an advanced water product pipeline, approximately 3,500 feet long if originating at the Ralph W Chapman WRF, a dechlorination facility, and an inlet facility to the Sweetwater Reservoir. Dechlorination would be required to remove chlorine added at the completion of the AWT process in order to protect the river and/or reservoir environment(s). The location of the dechlorination facility located at the pipe outlet, prior to the reservoir inlet, may require the acquisition of right of way, as well as provide electrical and physical access to the site. Alternatively, it might be possible to deliver dechlorinated product water directly to the Sweetwater River in the vicinity of the Chapman plant, for conveyance to Sweetwater Reservoir.
Waste Volume and Disposal	Waste flows, the combination of concentrate flows from the WRF and RO concentrate from the AWT, would total approximately 2.25 MGD and be disposed to the Metro System. Negotiations would be required.
Treated Water Distribution	New conveyance facilities would be required to deliver treated water from the Authority's Perdue Water Treatment Plant to partner agencies.

6.5.3 Yield Analysis

Following the final stage of treatment at the new AWTP, this alternative is anticipated to produce 5.75 MGD or 6,445 AFY of product water for delivery to Sweetwater Reservoir. As the assumed wastewater availability is not subjected to seasonal or temporal changes, production is anticipated to be relatively constant throughout the duration of the year. However, as this product water is being used for surface water augmentation, it would be subject to typical evaporative losses observed in Sweetwater Reservoir. Furthermore, because the reservoir is conical in shape, more evaporative losses could occur when the elevation of the reservoir is raised, and more surface area of water is exposed to the sun.

6.5.4 Cost Assessment

Costs for the alternative are summarized in Table 6-15 below. Capital and O&M costs were derived from recent cost estimates for the East County Advanced Water Purification collaborative alternative between Padre Dam Municipal Water District, Helix Water District, the County of San Diego, and the City of El Cajon, because this alternative also includes conveyance, wastewater treatment, advanced water treatment, and new solids handling facilities. Costs were scaled to the anticipated size of the alternative and escalated to 2023 dollars.

Table 6-15. IPR Surface Water Augmentation Cost Summary

Attribute	Cost
Capital Cost	$288 million
Annual O&M	$19 million/year

This water supply option has the potential to benefit other utility agencies, thus potentially lending itself to a cost share opportunity. Local utility interest and sizing options would need to be confirmed.

6.5.5 Other Evaluation Factors and Constraints

6.5.5.1 Regulatory Constraints

As this supply alternative plans to augment a surface water reservoir that is a source of domestic drinking water supply using recycled water, it will be subject to the California Toxics Rule (CTR), which imposes stricter limits for select constituents. For example, N-Nitrosodimethylamine (NDMA) has a limit 0.69 ng/L in recycled water, as compared to a Notification Level (NL) of 10 ng/L in other water drinking water supplies. The stricter limits of the CTR can make regulatory compliance more challenging and could potentially require the AWTP design to achieve higher chemical removal than is typical for IPR alternatives in California.

As mentioned, the hydraulic retention time (HRT) for recycled water in the reservoir must be at least 60 days for surface water augmentation. If the HRT is less than 60 days, then the alternative would be characterized as direct potable reuse (DPR) instead of IPR. The dilution requirement for IPR via surface water augmentation is 10:1, meaning that 10% of the water leaving the reservoir outlet can be from the purified water added to the reservoir in the past 24 hours. If the dilution is less than 10:1, it qualifies as DPR instead of IPR. Depending on the extent to which the Authority meets and exceeds these HRT and dilution requirements will dictate the log removal requirements for pathogens.

Like the IPR groundwater injection alternative (Section 6.4), hydraulic modelling or tracer studies would be required before the reservoir can receive potable reuse water. A tracer test must be performed during the first six months after augmentation begins to verify the conditions in the reservoir are as expected. Unless waived by DDW, this alternative would also require an independent advisory panel to ensure it meets the hydraulic requirements of the Surface Water Augmentation Regulation (SBDDW-16-02), which may add time and cost to the regulatory process. Other applicable regulations will be investigated further if the Authority chooses to pursue this alternative.

6.5.5.2 Contractual Requirements

In September 2020, the Authority hosted a workshop group comprised of staff from the Authority, Otay Water District, and the County of San Diego to discuss the feasibility of this South Bay IPR alternative and interest from each agency in implementing next steps required for this regional alternative. While the workshop identified potential opportunities for mutually advantageous partnership, it also identified many potential constraints to alternative feasibility, such as cost and availability of wastewater supply, regulatory requirements, and capital cost. Prior to proceeding with further investigations for this alternative, it is advised that the Authority continue discussions with potential partner agencies to ascertain their level of interest in pursuing this alternative. Furthermore, the development of this alternative assumes that the Authority could acquire wastewater flow from the City of San Diego’s Metro System, which may be challenging as San Diego continues to develop its Pure Water project. Negotiations with the City of San Diego for waste and residuals disposal would also be required. Finally, property acquisition of the Spring Valley Swap Meet site for the new Water Reclamation Facility may also present a challenge while pursuing this alternative.

6.5.5.3 Water Quality Impacts

The operations of Sweetwater Reservoir may impact how much purified water can be augmented to the reservoir. It is recommended the Authority further examine impacts of the aeration system on the operation of Sweetwater Reservoir to evaluate the possible extent of surface water augmentation. Additionally, it is necessary to consider the impact of the reservoir’s water quality after augmentation to determine its impact on the performance of the Perdue WTP and resulting drinking water quality, especially corrosion control. Purified water from a reverse osmosis based AWTP, as is identified for this alternative, blended with surface water at blends as high as 50% have been shown to improve surface water treatment plant performance, which could result in further cost savings.

6.6 Yield Optimization at Reynolds Desalination Facility

6.6.1 Alternative Description

The Authority’s existing Reynolds Desalination Facility consists of a total of six trains operating at 80% recovery. The original plant had three trains that produced a total of 4 MGD of permeate with 20 pressure vessels in the first stage and 10 pressure vessels in the second stage, and an interstage booster pump. The plant expansion added three more trains that produce a total of 5 MGD of permeate with 24 pressure vessels in the first stage and 12 pressure vessels in the second stage, and an energy recovery device between the two stages. A 1 MGD bypass brings the system to a total production of 10 MGD.

A potential way to improve the yield of the Reynolds Desalination Facility is increasing the recovery of the plant. This can be done in a number of ways, including retrofitting the existing two stages of reverse osmosis (RO) through Flow Reversal Reverse Osmosis (FRRO), adding a third RO stage (High Recovery Reverse Osmosis (HRRO)) or Closed-Circuit Reverse Osmosis (CCRO). FRRO (Figure 6-7) would be custom-retrofitted for the existing RO skids and would periodically switch the flow direction of the RO concentrate to prevent scaling. CCRO (Figure 6-8) would be added as a new stage of RO and would recirculate the concentrate until a desired recovery level is reached. It is a semi-batch process where permeate is constantly produced and the brine produced is recirculated until the desired recovery setpoint is achieved. With a HRRO system, the concentrate from the primary RO stage would be sent to a single-stage HRRO system. It would use stand-alone RO skids with separate feed pumps rather than adding an additional stage to the existing RO skids and is anticipated to scale far more rapidly than the existing RO. The Authority is currently conducting a separate Reynolds Desalination Facility optimization study beyond this WRMP. Additional conceptual design concepts will be further incorporated to the WRMP following completion of the optimization study.

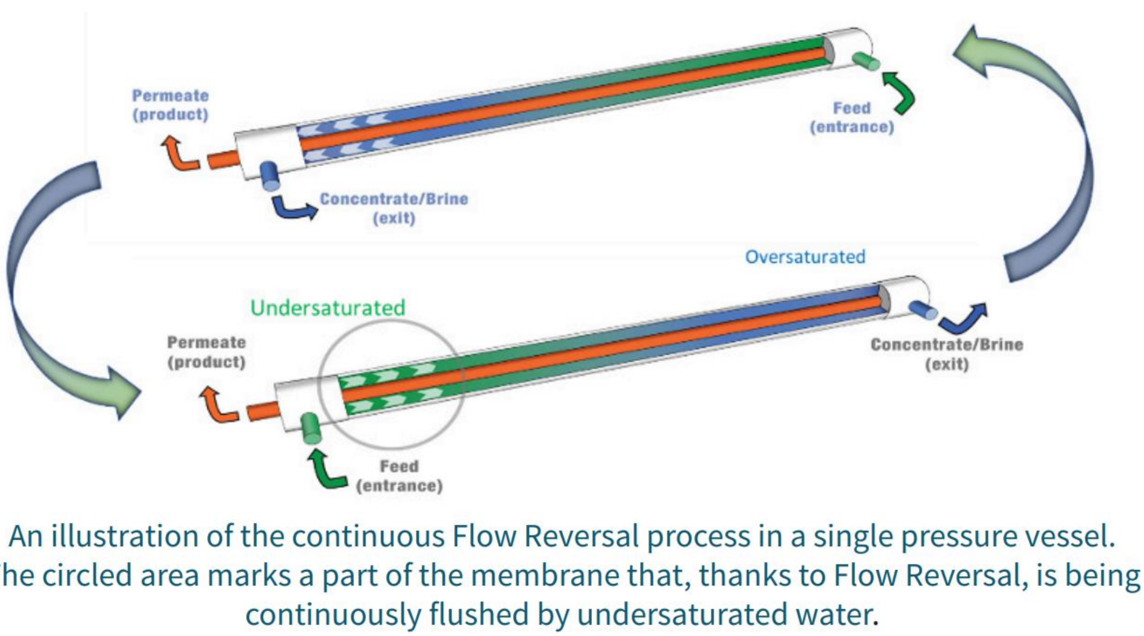

Figure 6-7. Example Flow-Reversal Reverse Osmosis (ROTEC)

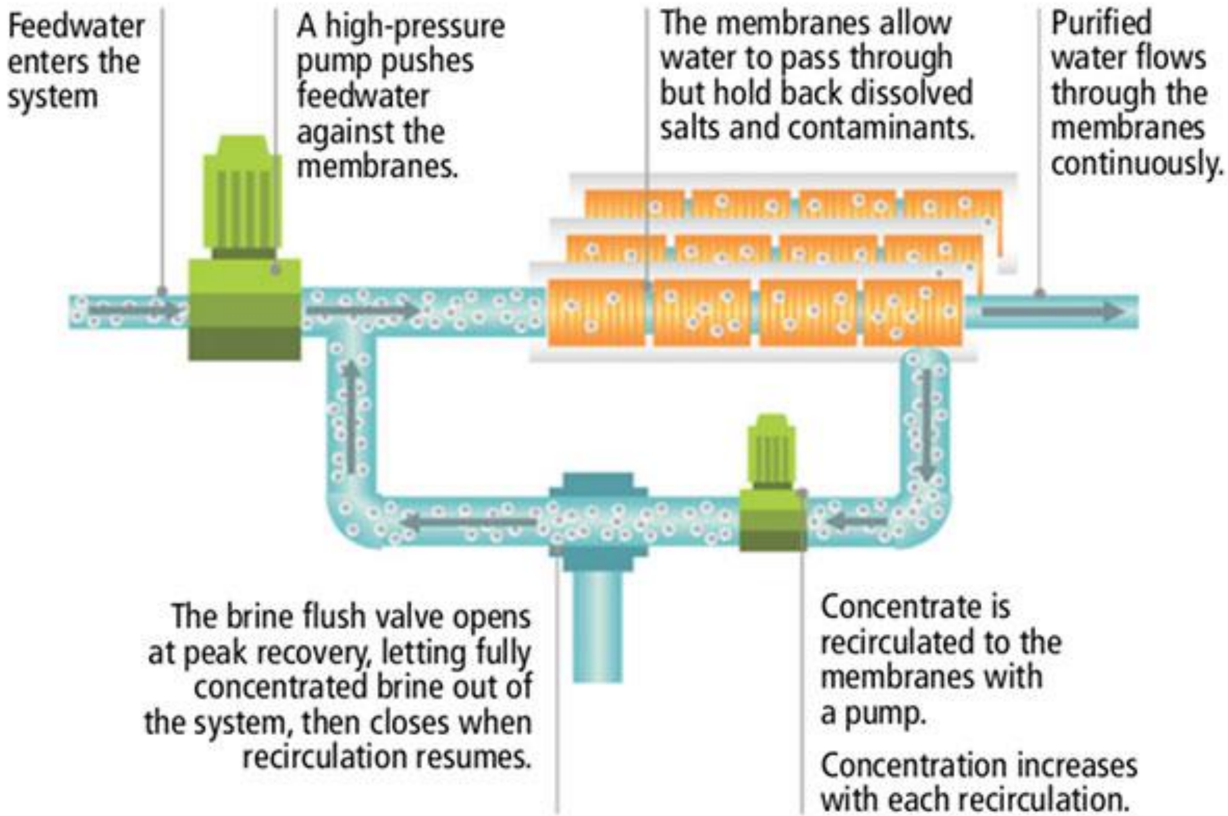

Figure 6-8. Example Closed-Circuit Reverse Osmosis (Desalitech)

6.6.2 Alternative Components

The components for this alternative have been sized assuming the plant operates at its full 10 MGD production capacity and 12.5 MGD of feed flow. The primary RO skid has a design recovery of 80% and typically operates at that setpoint based on historical operational data. As such, after primary RO treatment, 2.5 MGD of brine remains. The FRRO retrofitting option would be sized for 12.5 MGD of feed flow, while the HRRO and CCRO would be sized for 2.5 MGD of feed flow. System selection and design for CCRO and FRRO is typically performed by individual vendors, using their own proprietary software. Additionally, while FRRO would require retrofitting the existing RO skids through the addition of actuated valves, CCRO and HRRO would require an additional stage of equipment and associated space. Upon evaluating plans of the existing RO facility, it appears there is likely not enough space to accommodate another stage of equipment for CCRO and HRRO. It is recommended that the Authority and its consulting partners evaluate where the new equipment would be placed as well as the suitability of the existing system for FRRO retrofit.

6.6.3 Yield Analysis

This alternative may increase the Reynolds Desalination Facility’s overall system recovery to between 90 to 95 percent, reducing imported water purchases by 1,400 to 2,100 AF/year, respectively. As desalination is not weather dependent, the yield is expected to stay consistent. However, groundwater quality and other operational factors may cause the expected yield value to fluctuate from time to time.

6.6.4 Cost Assessment

Costs for FRRO, HRRO, and CCRO were not developed as part of the WRMP as they are being developed under the separate optimization study.

6.6.5 Other Evaluation Factors and Constraints

6.6.5.1 Evaluation Factors

It should be noted that the three options presented for yield optimization are not mature technologies and that there are not many full-scale operating plants which utilize them. However, HRRO is more mature in comparison to CCRO and FRRO, with a local example in Southern California including application at the Water Replenishment District Leo J. Vander Lans Water Treatment Facility expansion. It is recommended that the Authority implement a pilot study first to better understand the water quality and quantity impacts of the technology that the Authority is considering.

Operations and maintenance costs of the Reynolds Desalination Facility would be anticipated to increase as well due to the increase in power consumption for any of the three technologies. In addition, CCRO and HRRO would require additional chemical consumption for pH control and to mitigate scaling in the equipment. The addition of chemicals would require more storage, which would also contribute to a higher capital cost and larger footprint requirement.

As mentioned, it is recommended that the Authority consider the footprint requirement of each technology and evaluate locations in or by the existing RO facility for the new equipment. Structural investigations and hydraulic evaluation would be required to determine if the addition of a second floor to the existing RO facility would be feasible. In the case of FRRO, the addition of valves to the existing treatment train may present challenges for operations and maintenance and require training.

6.6.5.2 Regulatory Constraints

For HRRO and CCRO, which essentially add another stage of treatment, each technology would be the last stage of treatment in the train. As such, it will likely produce permeate of lower quality than the existing RO stage. It is recommended that the Authority conducts a desktop analysis followed by a potential pilot study to better quantify the expected permeate water quality, especially TDS, to ensure no water quality requirements are exceeded.

As all three desalination yield optimization alternatives would increase the volume of permeate, the Authority would be sending a lower flow of concentrate to the brine discharge line. However, because the flow of concentrate is lower, the brine would have a higher concentration of all constituents, particularly TDS. As such, the Authority would require an amendment to their brine discharge permit because the existing permit limits both the load and concentration of TDS that is discharged. Additionally, with the more concentrated brine, the Authority may need to take measures to ensure the brine does not precipitate in the brine disposal line.

6.7 Potable Water Sales Agreement with Otay Water District

6.7.1 Alternative Description

The Authority has previously discussed the potential of a water sales agreement with Otay Water District, which would involve the sale and delivery of finished water from the Perdue Water Treatment Plant to Otay Water District. This alternative does not increase water supply for the Authority as it is a sale of existing supplies. However, the alternative meets the intent of the WRMP by developing a new revenue source that would offset other Authority operating costs. Potential future sales are assumed to be limited to times when local supply availability is greater than the Authority's local demands and additionally limited to the 10-day period when Otay Water District is unable to purchase imported water from the SDCWA due to the biannual Second San Diego Aqueduct (Second Aqueduct) maintenance or any other emergency shutdowns in which Otay Water District does not have access to imported potable water.

Availability for sales is dependent on the water quality of the Authority's local surface water supply. As discussed above, the Authority is pursuing full implementation of an aeration system which would improve the water quality and treatability of the supply in Sweetwater Reservoir (see Section 6.1). Given the current treatment capacity of the Perdue WTP and the assumed improvements from the Sweetwater Reservoir aeration/destratification system, the availability of excess local supply of potable water for Otay Water District is depicted below in Figure 6-9. This amount available assumes that the Authority's demands are met through local supply as much as possible and that 3,350 AF is reserved as per the minimum storage requirement. Additionally, it assumes that if the Authority requires any imported water purchases to meet its own demands, then no excess local supply is available for Otay Water District.

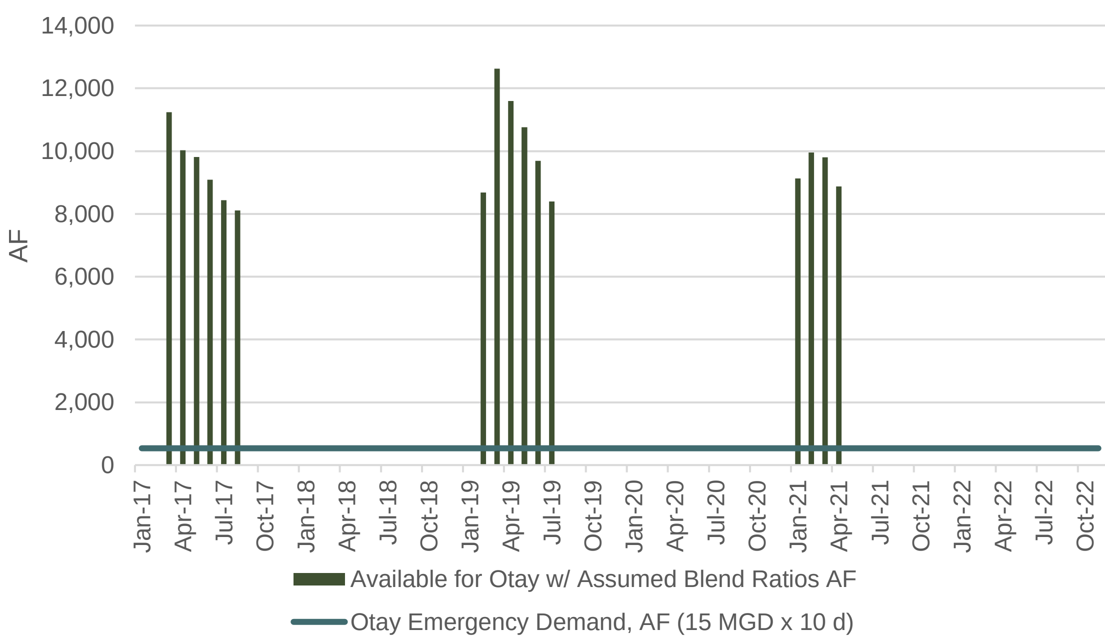

Figure 6-9. Local Surface Water Supply Availability for Otay Water District

The analysis demonstrates that excess potable water is generally available during February – April following a transfer from Loveland Reservoir. SDCWA typically performs their Second Aqueduct maintenance during a 10-day period in winter and Otay Water District would require 15 MGD for 10 days, which equates to approximately 535 AF of water. While there is typically no excess local supply available during December, the Authority may potentially supply Otay Water District with potable water during other emergency shutdowns.

For both existing conditions and with the assumed improvements from the aeration system, the Authority would be unable to supply Otay Water District with treated local supplies when reservoir levels are low and treated imported water from SDCWA is unavailable. This is because local surface water supply quality would be unacceptable without imported water blending as depicted in Table 6-2.

6.7.2 Conceptual Design

As proposed in the 2020 Water Supply Feasibility Study, the new sales agreement would require new conveyance facilities to deliver finished water from the Authority's Perdue WTP to Otay Water District's service area, as is identified in the 2020 Water Supply Feasibility Study. As the Otay service area is at a higher elevation than the Authority's service area, a new pump station and pipeline would be required. The major infrastructure for this alternative is sized for 15 MGD and are summarized in Table 6-16. A conceptual alignment is also depicted in Figure 6-10.

Table 6-16. Major Infrastructure of Potable Water Sales Agreement Alternative

Infrastructure Component	Description
Pump Station / Delivery Gradient	Provision of the desired capacity requires the conveyance originate in the Authority Gravity (275) zone, terminate in the Otay 624 zone in the vicinity of suitably sized 24-inch and larger pipelines. This leads to the need for a new pump station with a total dynamic head of approximately 400 ft. Installed horsepower would be 1,300 HP for 15 MGD. Property would need to be acquired for the new pump station.
Authority Origination Point	Conveyance would need to originate from the Authority's 36-inch transmission line in Bonita Road, or the 42-inch transmission line in Sweetwater Road.
Pipeline Sizing and Alignments	The new pipeline from the Authority's service area to Otay's service area would be 30-inch for 15 MGD and the conceptual alignment is depicted in Figure 6-10 below. The pipeline alignment could be in Corral Canyon Road, starting from the Authority's 36-inch transmission pipeline in Bonita Road at Frisbee Street, west on Central Avenue to Corral Canyon Road, and to the existing 30-inch Otay 624 zone transmission pipeline in East "H" Street. The total length of the alignment is approximately 16,500 feet.

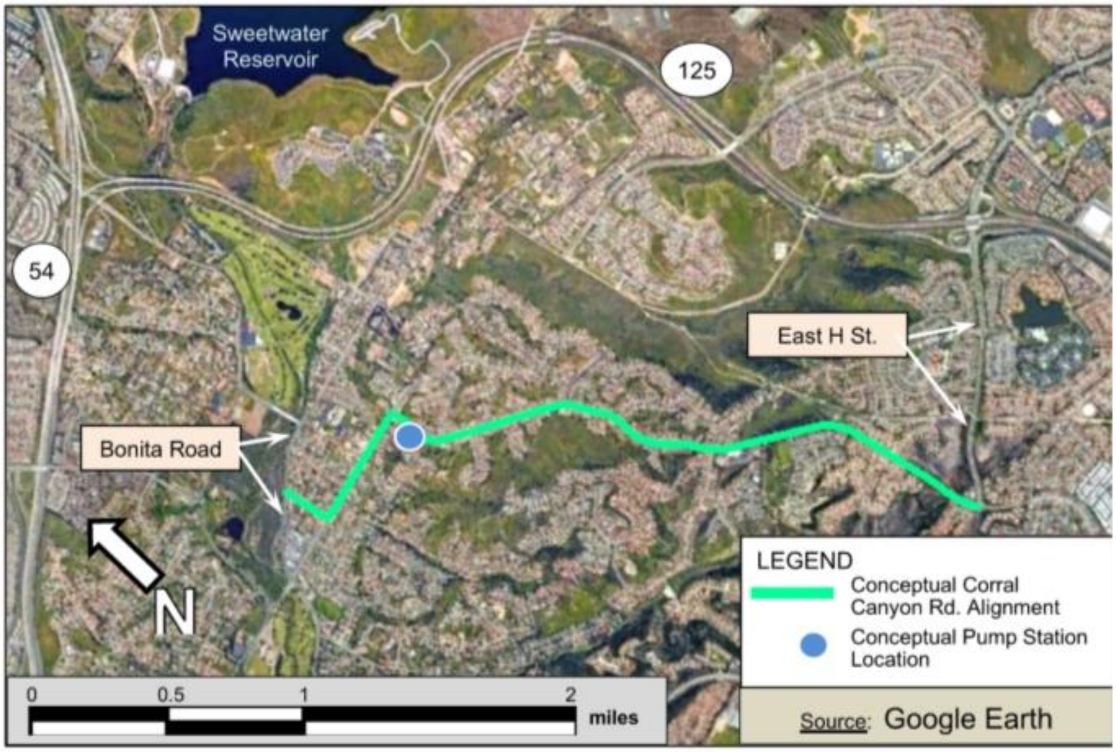

Figure 6-10. Authority to Otay Potable Water Sales Agreement Conceptual Alignment (Gillingham Water, 2020)

6.7.3 Yield Analysis

This alternative is not anticipated to have any yield impacts to the Authority's system as sales would only occur when local supply is greater than the Authority's demands. This alternative potentially provides Otay Water District with a backup water supply option and the Authority with an additional source of revenue, but it does not provide the Authority with increased supply nor offset the need for imported water.

Additionally, a higher demand base would benefit the Authority's reservoirs by allowing storage levels to be drawn down faster, reducing evaporation losses. Higher demands would also improve operations at the Perdue WTP by reducing the need to turn the plant off or to operate it inefficiently at low rates of flow.

6.7.4 Cost Assessment

Conceptual-level capital cost estimates for the alternative are summarized in

Table 6-17. The estimate serves for alternative analysis and budget authorization and is considered to be an AACE Class 5 level. Class 5 has a typical accuracy range of -50% on the low side and +100% on the high side. The costs shown include a 40% design contingency based on the current status of the design documents, the nature of the alternative and the estimate classification and is provided in 2023 dollars.

Table 6-17. Potable Water Sales Agreement Cost Summary

Attribute	Cost
Capital Cost	$45.8 million
Annual O&M	$78,000/year

6.7.5 Other Evaluation Factors and Constraints

6.7.5.1 Contractual Requirements

Otay has advised the Authority that it will require time to evaluate its options further and to determine whether this investment would be cost-effective. Implementation of this potable water sales agreement with the Authority would require a capital investment of approximately $30 million from Otay to fund the necessary infrastructure components. Furthermore, it would likely require property acquisition for Otay as the alternative would require a pump station to pump the water from the Authority's system to Otay's.

6.8 Alternatives Comparison

The seven alternatives conceptualized were compared to each other based on their cost, expected yield, and feasibility. For cost, only capital costs of the alternatives were considered, as there are several outstanding factors that influence annual costs (e.g., O&M, cost agreements for new water purchases) that must be confirmed prior to estimating a cost per acre-foot for some of the alternatives. For example, the Recycled Water Purchase from Otay Water District and IPR Groundwater Injection to the CPSD Basin alternatives' annual costs are dependent on the cost to purchase recycled water from Otay Water District and the IPR Surface Water Augmentation to Sweetwater Reservoir is dependent on the cost to purchase wastewater from the City of San Diego.

The cost and estimated yield of each alternative are summarized in Table 6-18, considering alternative yields under typical hydrological conditions. Recall that without any new planned water supply system improvements, the 2045 projected need for imported water is expected to range between 4,246 AFY and 7,843 AFY on average (potentially exceeding 9,000 AFY under the driest conditions within a single, extended drought event), which translates to an annual cost ranging between $24M and $54M (see Section 5.5.7).

Table 6-18. Water Supply Yielding Alternatives Comparison Summary

Alternative	Estimated Capital Cost	Estimated Yield (AFY)
Sweetwater Reservoir Aeration/Destratification System	$2.3 million[1]	1,790
Otay River Brackish Groundwater Desalination	$55.5 million[2]	4,480
Recycled Water Purchase from Otay Water District	$23.4 million[2]	155
IPR Groundwater Injection to CPSD Basin (including conveyance from E St to new AWTP and L St to new AWTP)	$61.4 million[2]	1,490-2,260
IPR Surface Water Augmentation to Sweetwater Reservoir	$288 million[2]	6,450

1. Class 2 Cost Estimate with accuracy of -15 to +20 percent.
2. Class 5 Cost Estimate with accuracy of -50 to +100 percent.

7. WRMP Conclusions

Without implementing any new water supply alternatives, the Authority's need for imported water purchases is expected to range between 4,246 AFY and 7,843 AFY on average and has the potential to exceed 9,000 AFY under the driest conditions. These volumes translate to annual costs between $24M and $54M given the projected future cost of imported water. Under this WRMP, the Authority has explored several new local water supply alternatives that have the potential to significantly reduce future imported water purchases. This section conducts a holistic review of the key considerations of the seven water supply alternatives and makes recommendations for next steps.

After carefully assessing the notable considerations and constraints associated with each of the seven potential alternatives considered in Section 6, they have been classified into three distinct categories: ***implement, advance,*** or ***study***. Alternatives recommended for ***implementation*** are advised to proceed to the design and construction phase, primarily due to their favorable yield-to-cost ratios and minimal constraints. Presently, the only alternative recommended for immediate implementation is the Sweetwater Reservoir Aeration/Destratification System Improvements project. The Sweetwater Reservoir Aeration/Destratification System project is currently within the final phase of design and is anticipated to proceed to the construction phase soon after.

For alternatives grouped in the ***advance*** category, it is suggested that the Authority coordinate with other agencies required to move the alternative forward. These alternatives are contingent on securing partnerships with other agencies, to enhance alternative feasibility via securing supply and/or cost-sharing agreements. Alternatives within this category include the recycled water purchase from Otay Water District, the IPR groundwater injection to the CPSD Basin, and the IPR surface water augmentation to Sweetwater Reservoir.

Alternatives assigned to the ***study*** category warrant a thorough feasibility analysis to better understand potential constraints and determine their viability for further advancement. Alternatives within this category include the Otay River brackish groundwater desalination alternative and yield optimization at the Reynolds Desalination Facility.

Regardless of categorization, all the alternative alternatives would require California Environmental Quality Act (CEQA) and potentially National Environmental Protection Agency (NEPA) coordination depending on its funding sources and grants. Additional partnerships with other regulatory agencies will also be required based on environmental permitting needs for each alternative. The alternative categorizations, notable considerations and constraints, and recommended actions for each alternative are summarized in Table 7-1 on the following page.

Table 7-1. Water Supply Alternatives Recommendations

Implement	
Alternative	**Key Considerations**
Sweetwater Reservoir Aeration/Destratification System	• Actual yield benefits will depend on quagga mussel population control, hydrologic conditions, and the observed water quality improvements from the aeration system. • It is recommended that the Authority monitors the aeration system's performance and the associated water quality improvements in Sweetwater Reservoir to better quantify the expected yield improvements from the aeration system.
Advance	
Alternative	**Key Considerations**
Recycled Water Purchase from Otay Water District	• Otay recycled water availability is variable and decreases over time, since max day and peak demands would generally occur during summer months for both the Authority and Otay. Otay's recycled water demands are also projected to increase over time. • It is recommended that the Authority coordinate with Otay Water District to confirm the cost and availability of the recycled water supply. • It is recommended that the Authority conduct a feasibility study to analyse its users more granularly to identify other potential recycled waters, such as HOA's, commercial, and industrial properties, along the suggested alignment, as this analysis only considered large outdoor users. • It is recommended that the Authority coordinate with these users to determine their interest in utilizing recycled water.
IPR Groundwater Injection to CPSD Basin (including conveyance from E St to new AWTP and L St to new AWTP)	• Otay recycled water availability is variable and decreases over time, since max day and peak demands would generally occur during summer months for both the Authority and Otay. Otay's recycled water demands are also projected to increase over time. It is recommended that the Authority coordinate with Otay Water District to confirm the cost and availability of the recycled water supply. • It is recommended that the Authority determine internally how much of the recycled water supply to allocate to the identified users versus to the new AWTP.

Table 7-1 (continued). Water Supply Alternatives Recommendations

Advance (continued)	
Alterative	**Key Considerations**
IPR Surface Water Augmentation to Sweetwater Reservoir	• It is recommended that the Authority confirm the availability of wastewater supply and the cost to purchase it with the City of San Diego. • It is recommended that the Authority coordinate with the identified agencies (Table 6-13) to determine their interest in partnership for the alternative, cost sharing and the distribution of yield among the partner agencies.
Potable Water Sales Agreement with Otay Water District	• Excess local surface water supply is primarily available for sale following a transfer from Loveland Reservoir to Sweetwater Reservoir. • It is recommended that the Authority coordinate with Otay Water District to confirm whether the periods in which they are interested in purchasing potable water from the Authority align with the availability analysis and whether they are still interested in pursuing this partnership.
Study	
Alternative	**Key Considerations**
Otay River Brackish Groundwater Desalination	• Groundwater availability, specifically the sustainable yield of CPSD Basin must be confirmed. • CPSD groundwater basin may be subject to SGMA in the future if it is determined to be a high- or medium-priority basin. • Increased pumping could accelerate the rate of seawater intrusion in the basin, so more monitoring and modelling in coordination with the USGS is recommended. • It is recommended that the Authority further study brine disposal alternatives and potentially coordinate with the City of San Diego and/or SDCWA.
Yield Optimization at Reynolds Desalination Facility	• Additional evaluations are required to determine feasibility with the existing equipment at the Reynolds Desalination Facility. Results of the ongoing optimization study should be incorporated to amend the findings of this WRMP. • It is recommended that the Authority coordinate with the Regional Water Quality Control Board to determine the regulatory work required for an amendment to their brine permit.

The detailed recommendations for each alternative, as summarized in Table 7-1, provide a roadmap for the Authority to navigate the implementation, advancement, or study of these initiatives. Outside of considering new supply alternatives, the Authority should continue its dedication and investments in water conservation/demand management strategic planning exercises, in particular:

- Explicit identification of goals (e.g., percent uptake, time for implementation) for conservation/demand management program implementation;
- Monitoring of overall water savings, in particular those required for indoor residential water use efficiency standards identified in SB 1157;
- Continued consideration of AMI implementation; [10] and
- Tracking, retrospective analysis, and performance evaluation of specific demand management programs and ordinances.

This strategic approach ensures a thorough understanding of alternative nuances and facilitates informed decision-making in the pursuit of sustainable and effective water management solutions.

[10] AMI is noted as a future consideration and not one of the supply-yielding project concepts evaluated in this WRMP.

8. References

California Governor's Office of Planning and Research, Scripps Institution of Oceanography, California Energy Commission, California Natural Resources Agency, California Public Utilities Commission. 2018. California's Fourth Climate Change Assessment Statewide Summary Report.

Hazen and Sawyer. 2022. Sweetwater Reservoir Aeration/Destratification System Preliminary Design Technical Memorandum.

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San Diego County Water Authority (SDCWA). 2021. Water Demand Model and Forecast Update 2020 Appendices. Prepared by Hazen and Sawyer.

San Diego County Water Authority (SDCWA). 2021. Adopted Long-range Financing Plan 2021.

San Diego County Water Authority (SDCWA) and CDM Smith. 2008. San Diego Regional Concentrate Conveyance System Feasibility Study.

Sweetwater Authority (SWA). 2008. 2008 Water Resource Master Plan. Prepared by Malcolm Prime, Inc.

Sweetwater Authority (SWA). 2008. Resolution 08-19 Drought Response Plan.

Sweetwater Authority (SWA). 2020. 2020 Urban Water Management Plan (UWMP). Prepared by HDR, Inc.

Sweetwater Authority (SWA). 2020. Water Supply Feasibility Study 2020. Prepared by Gillingham Water Planning and Engineering, Inc.

Sweetwater Authority (SWA). 2021. Water Distribution System Master Plan (WDSMP). Prepared by HDR, Inc.

Sweetwater Authority (SWA). 2021. Resolution 21-13 Drought Response Plan dated June 9, 2021.

Sweetwater Authority (SWA). 2023. Water Rate Study – Sweetwater Authority dated September 2023. Prepared by NBS.

Sweetwater Authority (SWA) and City of San Diego Public Utilities. 2020. Preliminary Groundwater Sustainability Plan – Coastal Plain of San Diego. Prepared by AECOM.

Sweetwater Authority (SWA) and Otay Water District. 2009. Otay Basin Brackish Groundwater Desalination Feasibility Study. Prepared by MWH Americas, Inc. and RBF Consultants.

EXHIBIT C

SWEETWATER AUTHORITY

AGREEMENT FOR PROFESSIONAL SERVICES

TEMPLATE

AGREEMENT FOR SERVICES
BETWEEN SWEETWATER AUTHORITY
AND
[CONSULTANT NAME]

This Agreement is made and entered into this _____ day of _________________, 20 26 , by and between SWEETWATER AUTHORITY (hereinafter referred to as the "Authority"), a joint powers agency operating under the Irrigation District Law, Water Code § 20500 et seq., and **[CONSULTANT NAME]** (hereinafter referred to as "Consultant").

RECITALS

A. The Authority is a public agency of the State of California and is in need of professional services for the following: **DEVELOPMENT OF THE WELL REHABILITATION AND MAINTENANCE PROGRAM** (hereinafter referred to as "the Project").

B. Consultant is duly licensed and has the necessary qualifications to provide such services.

C. The parties desire by this Agreement to establish the terms for the Authority to retain Consultant to provide the services described herein.

AGREEMENT

NOW, THEREFORE, IT IS AGREED AS FOLLOWS:

1. Services

1.1 Consultant shall provide the Authority with the services described in the Scope of Services attached hereto as Exhibit "A" and by this reference incorporated herein ("Services"). Consultant warrants that it will perform the Services as set forth herein in a competent, professional, and satisfactory manner.

1.2 At any time during the term of this Agreement, the Authority may request changes in the Scope of Services, and any such change shall be processed by the Authority in the following manner: a letter outlining the changes shall be forwarded to the Authority by Consultant with a statement of estimated changes in fee or time schedule. An amendment to the Agreement shall be prepared by the Authority and executed by both parties before performance of such services or the Authority will not be required to pay for the changes in the scope of work. Such amendment shall not render ineffective or invalidate unaffected portions of this Agreement.

2. Compensation

2.1 Subject to paragraph 2.2 below, the Authority shall pay for such Services in accordance with the Schedule of Charges set forth in Exhibit "B" and by this reference incorporated herein.

2.2 Unless otherwise provided herein, Consultant will perform services on a time and material basis. In no event shall the total amount paid for services rendered by Consultant pursuant to Exhibit "A" exceed the sum of **[AMOUNT]**. Periodic payments shall be made within thirty (30) days of receipt of an undisputed statement for services rendered. Payments to Consultant for work performed will be made on a monthly billing basis.

2.3 Payment shall not constitute acceptance of any work completed by Consultant.

3. Time of Performance

3.1 The Consultant shall perform its services hereunder in a prompt and timely manner, in accordance with the Activity Schedule shown in Exhibit "C", and shall commence performance upon receipt of the written Notice to Proceed from the Authority. Consultant shall confer as requested with Authority representatives to review progress of work elements, adherence to work schedule, coordination of work, scheduling of review and resolution of problems which may develop.

3.2 Neither the Authority nor Consultant shall be considered in default of this Agreement for delays in performance caused by circumstances beyond the reasonable control of the non-performing party. For purposes of this Agreement, such circumstances include, but are not limited to, abnormal weather conditions, floods, earthquakes, fire, epidemics, war, riots, and other civil disturbances; strikes, lockouts, work slowdowns, and other labor disturbances, sabotage, or judicial restraint.

3.3 Should such circumstances occur, the non-performing party shall, within a reasonable time of being prevented from performing, give written notice to the other party describing the circumstances preventing continued performance and the efforts being made to resume performance of this Agreement.

4. California Labor Code Requirements

4.1 Consultant is aware of the requirements of California Labor Code Sections 1720 et seq and 1770 et seq., which require the payment of prevailing wage rates and the performance of other requirements on certain "public works" and "maintenance" projects. If the services are being performed as part of an applicable "public works" or "maintenance" project, as defined by the Prevailing Wage Laws, and if the total compensation is $1,000 or more, Consultant agrees to fully comply with such Prevailing Wage Laws, if applicable. Consultant shall defend, indemnify and hold the Authority, its elected officials, officers, employees and agents free and harmless from any claims, liabilities, costs, penalties or interest arising out of any failure or alleged failure to comply with the Prevailing Wage Laws. It shall be mandatory upon Consultant and all subconsultants to comply with all California Labor Code provisions, which include but are not limited to prevailing wages, employment of apprentices, hours of labor and debarment of contractors and subcontractors.

4.2 If the services are being performed as part of an applicable "public works" or "maintenance" project, in addition to the foregoing, then pursuant to Labor Code sections 1725.5 and 1771.1, Consultant and all subconsultants must be registered with the Department of Industrial Relations ("DIR"). Consultant shall maintain registration for the duration of the Project and require the same of any subconsultants. This Project may also be subject to compliance monitoring and enforcement by the DIR. It shall be Consultant's sole responsibility to comply with all applicable registration and labor compliance requirements, including the submission of payroll records directly to the DIR.

5. Standard of Care

5.1 Consultant's services will be performed in accordance with generally accepted professional practices and principles and in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions.

6. Insurance

6.1 Minimum Insurance Requirements: Consultant shall procure and maintain for the duration of the contract and for a minimum of twenty-four (24) months following the date of the Project completion and acceptance by the Authority, insurance against claims for injuries or death to persons or damages to property which may arise from or in connection with the performance of the work hereunder and the results of that work by the Consultant, his agents, representatives, employees or sub-contractors.

6.2 Coverage: Coverage shall be at least as broad as the following:

6.2.1 Commercial General Liability (CGL): Insurance Services Office (ISO) Commercial General Liability Coverage (Occurrence Form CG 00 01) including products and completed operations, property damage, bodily injury, personal and advertising injury with limit of at least two million dollars ($2,000,000) per occurrence or the full per occurrence limits of the policies available, whichever is greater. If a general aggregate limit applies, either the general aggregate limit shall apply separately to this project/location (coverage as broad as the ISO CG 25 03, or ISO CG 25 04 endorsement provided to the Authority) or the general aggregate limit shall be at least twice the required occurrence limit or four million dollars ($4,000,000).

(a) **Required Provisions:** The General Liability policy must contain, or be endorsed to contain, the following provisions:

(i) **Additional Insured Status:** Authority, its directors, officers, employees, and authorized volunteers are to be given insured status (at least as broad as ISO Form CG 20 10 10 01), with respect to liability arising out of work or operations performed by or on behalf of the Consultant including materials, parts, or equipment furnished in connection with such work or operations.

(ii) **Primary Coverage:** For any claims related to this project, the Consultant's insurance coverage shall be primary at least as broad as ISO CG 20 01 04 13 as respects to the Authority, its directors, officers, employees and authorized volunteers. Any insurance or self-insurance maintained by the Authority its directors, officers, employees and authorized volunteers shall be excess of the Consultant's insurance and shall not contribute with it.

6.2.2 Automobile Liability: Insurance Services Office (ISO) Business Auto Coverage (Form CA 00 01), covering Symbol 1 (any auto) or if Consultant has no owned autos, Symbol 8 (hired) and 9 (non-owned) with limit of one million dollars ($1,000,000) for bodily injury and property damage each accident.

6.2.3 Workers' Compensation Insurance: As required by the State of California, with Statutory Limits, and Employer's Liability Insurance with limit of no less than $1,000,000 per accident for bodily injury or disease. By his/her signature hereunder, Consultant certifies that he/she is aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and he/she will comply with such provisions before commencing the performance of the work of this agreement.

(a) **Waiver of Subrogation:** The Workers' Compensation Policy shall be endorsed with a waiver of subrogation in the favor of the Authority for all work performed by Consultant, its employees, agents and sub-consultants. The Insurer(s) agree to waive all rights of subrogation against the Authority, its elected or appointed officers, officials, agents, authorized volunteers and employees for losses paid under the terms of the policy which arise from work performed by the Consultant; but this provision applies regardless of whether or not the Authority has received a Waiver of Subrogation from the insurer.

6.2.4 Professional Liability Insurance (Also known as Errors & Omission): appropriate to the Consultant profession, with limits no less than $1,000,000 per occurrence or claim, and $2,000,000 policy aggregate.

(a) **If Claims Made Policies:**

(i) The Retroactive Date must be shown and must be before the date of the contract or the beginning of contract work.

(ii) Insurance must be maintained and evidence of insurance must be provided **for at least five (5) years after completion of the contract of work.**

(iii) If coverage is canceled or non-renewed, and not **replaced with another claims-made policy form with a Retroactive Date** prior to the contract effective date, the Consultant must purchase "extended reporting" coverage for a minimum of **five (5)** years after completion of contract work.

6.2.5 *Reserved.*

6.3 Other Required Provisions:

6.3.1 If the Consultant maintains broader coverage and/or higher limits than the minimums shown above, the Authority requires and shall be entitled to the broader coverage and/or higher limits maintained by the Consultant. Any available insurance proceeds in excess of the specified minimum limits of insurance and coverage shall be available to the Authority.

6.3.2 Policy limits shall not be less than the minimum limits described above. The limits of insurance required by this Agreement may be satisfied by a combination of primary, and umbrella or excess insurance. Each umbrella or excess policy shall follow the same provisions as the primary policy.

6.3.3 Any failure to comply with reporting or other provisions of the policies including breaches of warranties shall not affect coverage provided to the Authority its Board and each member of the Board, its officers, employees, agents, and the Authority's designated volunteers.

6.3.4 Consultant's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

6.3.5 Each insurance policy required above shall provide that coverage shall not be canceled, except with notice to the Authority.

6.4 Deductibles and Self-Insured Retentions: Insurance deductibles or self-insured retentions must be declared to and approved by the Authority. The Authority may require the Consultant to provide proof of ability to pay losses and related investigations, claim administration, and defense expenses within the retention.

6.4.1 At the election of the Authority, Consultant shall either 1) reduce or eliminate such deductibles or self-insured retentions, or 2) procure a bond which guarantees payment of losses and related investigations, claims administration, and defense costs and expenses.

6.4.2 Policies containing any self-insured retention (SIR) provision shall provide or be endorsed to provide, that the self-insured retention may be satisfied by either the named insured or Authority.

6.5 <u>Acceptability of Insurers</u>: Any insurance carrier providing insurance coverage required by the Contract Documents shall be admitted to and authorized to do business in the State of California and maintain an agent for process within the state, unless waived, in writing, by the Authority Risk Manager. Carrier(s) shall have an A.M. Best rating of not less than an A: VII or better, or as otherwise approved by the Authority Risk Manager.

6.6 <u>Verification of Coverage</u>: Consultant shall furnish the Authority with certificates (Acord Form 25 or equivalent) and amendatory endorsements, declarations page(s) listing all policy endorsements or copies of the applicable policy language effecting coverage required by this Agreement. Blanket endorsements are accepted with language that states "as required by contract". All certificates and endorsements are to be received and approved by the Authority before work commences.

6.6.1 Such evidence shall include the following:

(a) Additional insured endorsements with primary & non-contributory wording for each policy providing General Liability coverage

(b) Workers' Compensation waiver of subrogation

6.6.2 All of the insurance shall be provided on policy forms and through companies satisfactory to the Authority. However, failure to obtain the required documents prior to the work beginning shall not waive the Consultant's obligation to provide them. The Authority reserves the right to obtain complete, certified copies of all required insurance policies, at any time.

6.7 <u>Continuation of Coverage</u>: Consultant shall, upon demand of the Authority deliver evidence of coverage showing continuation of coverage for not less than 24 months for all policies, and not less than (5) years for claims made policies, following the termination or completion of this Agreement. Consultant further waives all rights of subrogation under this agreement. When any of the required coverages expire during the term of this agreement, Consultant shall deliver the renewal certificate(s) including the general liability additional insured endorsement and evidence of waiver of rights of subrogation against the Authority to the Authority at least ten (10) days prior to the expiration date. Failure to continually satisfy the Insurance requirements is a material breach of contract.

6.8 <u>Sub-Consultants</u>: In the event that Consultant employs other consultants (sub-consultants) as part of the work covered by this agreement, it shall be Consultant's responsibility to require, verify and confirm that each sub-consultant meets the minimum insurance requirements specified above. Consultant shall, upon demand of the Authority, deliver to the Authority copies such policy or policies of insurance and the receipts for payment of premiums thereon.

6.9 The Authority reserves the right to modify these insurance requirements, including limits, based on the nature of the risk, prior experience, insurer, coverage or other circumstances.

7. Indemnification

7.1 To the fullest extent permitted by law, Consultant shall defend (with counsel of the Authority's choosing), indemnify and hold the Authority, its officials, officers, employees, volunteers, and agents free and harmless from any and all claims, demands, causes of action, costs, expenses, liability, loss, damage or injury of any kind, in law or equity, to property or persons, including wrongful death, in any manner arising out of, pertaining to, or incident to any acts, errors or omissions, or willful misconduct of Consultant, its officials, officers, employees, subcontractors, consultants or agents in connection with the performance of Consultant's Services, the Project or this Agreement, including without limitation the payment of all damages, expert witness fees and attorneys' fees and other related costs and expenses. Consultant's obligation to indemnify shall not be restricted to insurance proceeds, if any, received by Consultant, the Authority, its officials, officers, employees, agents, or volunteers.

7.2 To the extent required by Civil Code section 2782.8, which is fully incorporated herein, Consultant's obligations under the above indemnity shall be limited to claims that arise out of, pertain to, or relate to the negligence, recklessness, or willful misconduct of Consultant, but shall not otherwise be reduced. If Consultant's obligations to defend, indemnify, and/or hold harmless arise out of Consultant's performance as a "design professional" (as that term is defined under Civil Code section 2782.8), then upon Consultant obtaining a final adjudication that liability under a claim is caused by the comparative active negligence or willful misconduct of the Authority, Consultant's obligations shall be reduced in proportion to the established comparative liability of the Authority and shall not exceed Consultant's proportionate percentage of fault.

8. Termination or Abandonment

8.1 The Authority has the right to terminate or abandon any portion or all of the work under this Agreement by giving ten (10) calendar days written notice to Consultant. In such event, the Authority shall be immediately given title and possession to all original field notes, drawings and specifications, written reports, and other documents produced or developed for that portion of the work completed, and/or being abandoned. The Authority shall pay Consultant the reasonable value of services rendered for any portion of the work completed prior to termination. If said termination occurs prior to completion of any task for the Project for which a payment request has not been received, the charge for services performed during such task shall be the reasonable value of such services, based on an amount mutually agreed to by the Authority and Consultant of the portion of such task completed but not paid prior to said termination. The Authority shall not be liable for any costs other than the charges or portions thereof, which are specified herein. Consultant shall not be entitled to payment for unperformed services, and shall not be entitled to damages or compensation for termination of work.

8.2 Consultant may terminate its obligation to provide further services under this Agreement upon thirty (30) calendar days' written notice to the Authority only in the event of substantial failure by Authority to perform in accordance with the terms of this Agreement through no fault of Consultant.

9. Compliance with All Laws

9.1 Consultant shall comply with all applicable laws, ordinances, codes, and regulations of the federal, state, and local government.

9.2 Consultant will use its best professional efforts to interpret all applicable federal, state and local laws, rules and regulations with respect to access, including those of the Americans with Disabilities Act ("ADA"). All documents (including but not limited to plans, specifications, and other technical documents, if applicable) prepared by Consultant pursuant to this Agreement shall be compliant with all applicable requirements of the ADA.

9.3 Consultant shall assist the Authority in obtaining and maintaining all permits required by federal, state, and local regulatory agencies.

9.4 Consultant is responsible for all costs of clean up and/or removal of hazardous and toxic substances spilled as a result of its services or operations performed under this Agreement.

10. Organization

Consultant shall assign **[PM NAME]** as the Project Manager. The Project Manager shall not be removed from the Project or reassigned without the prior written consent of the Authority.

11. Maintenance of Records

Books, documents, papers, accounting records, and other evidence pertaining to costs incurred shall be maintained by Consultant and made available at all reasonable times during the Agreement period and for four (4) years from the date of final payment under the Agreement for inspection by the Authority.

12. Job Site Responsibility

If the services covered by this Agreement involve a construction phase of the Project, the Authority agrees that in accordance with generally accepted construction practices, the construction contractor will be required to assume sole and complete responsibility for job site conditions during the course of construction of the Project, including safety of all persons and property, and that this requirement shall be made to apply continuously and not be limited to normal working hours. Consultant shall not have control over or charge of, and shall not be responsible for, construction means, methods, techniques, sequences, or procedures, as these are solely the responsibility of the construction contractor.

13. Assignment and Subconsultants

Consultant shall not assign, sublet, or transfer this Agreement or any rights under or interest in this Agreement without the written consent of the Authority, which may be withheld for any reason. Nothing contained herein shall prevent Consultant from employing independent associates, and subconsultants as Consultant may deem appropriate to assist in the performance of services hereunder.

14. Conflicts of Interest

Identify all existing and past financial relationships (including consulting agreements) between **[CONSULTANT NAME]** and members of the Authority's Governing Board, and entities for which said members are employed, or have an interest, both past and present.

15. General Provisions

15.1 Independent Consultant. Consultant is retained as an independent consultant and is not an employee of Authority. No employee or agent of Consultant shall become an employee of the Authority. The work to be performed shall be in accordance with the work described in Exhibit "A," subject to such directions and amendments from the Authority as herein provided.

15.2 Notice. All notices permitted or required under this Contract shall be given at the following address, or at such other address as the parties may provide in writing for this purpose:

Authority:	Consultant:
SWEETWATER AUTHORITY	**[COMPANY]**
505 Garrett Ave	[ADDRESS]
Chula Vista, CA 91910	
Attn: **[NAME]**	Attn: **[CONTACT]**
[POSITION]	[POSITION]

The parties may designate, in writing, other individuals to whom notice is to be given. Notices shall be deemed to be received upon personal delivery to the addresses above; if sent by overnight delivery, upon delivery as shown by delivery service records; if sent by facsimile, upon receipt as confirmed by the sending facsimile equipment; if by United States Postal Service, five days after deposit in the mail.

15.3 Severability. The unenforceability, invalidity or illegality of any provision(s) of this Agreement shall not render other provisions of this Agreement unenforceable, invalid or illegal.

15.4 Integration. This Agreement represents the entire understanding of the Authority and the Consultant as to those matters contained herein, and supersedes and cancels any prior oral or written understanding, promises, or representations with respect to those matters covered hereunder. This Agreement may not be modified or altered except in writing, signed by both parties hereto. This is an integrated Agreement.

15.5 Survival. All rights and obligations hereunder that by their nature are to continue after any expiration or termination of this Agreement, including, but not limited to, the indemnification obligations, shall survive any such expiration or termination.

15.6 Time is of the Essence. Time shall be of the essence as to all dates and times of performance contained in this Agreement.

15.7 Third Party Rights. Nothing in this Agreement shall be construed to give any rights or benefits to anyone other than the Authority and Consultant.

15.8 Disputes. If any disputes should arise between the Parties concerning the work to be done under this Agreement, the payments to be made, or the manner of accomplishment of the work, Consultant shall nevertheless proceed to perform the work as directed by the Authority pending settlement of the dispute.

15.9 Laws, Venue, and Attorneys' Fees. This Agreement shall be interpreted in accordance with the laws of the State of California. If any action is brought to interpret or enforce any term of this Agreement, the action shall be brought in a state or federal court situated in the County of San Diego, State of California. In the event of any such litigation between the parties, the prevailing party shall be entitled to recover all reasonable costs incurred, including reasonable attorney's fees, as determined by the court.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first written above.

SWEETWATER AUTHORITY		**[CONSULTANT NAME]**	
By:	______________________	By:	______________________ (Authorized Representative of Consultant)
Name:	Carlos Quintero, P.E.	Name:	[NAME]
Title:	General Manager	Title:	[TITLE]
Dated:	______________________	Dated:	______________________

Approved as to form: (only required when contract template is modified)

____
Paula C. P. de Sousa
Legal Counsel
SWEETWATER AUTHORITY

AGREEMENT FOR SERVICES
BETWEEN SWEETWATER AUTHORITY
AND
[CONSULTANT NAME]

EXHIBIT "A"
SCOPE OF WORK

[INSERT PROPOSED SCOPE OF WORK]

AGREEMENT FOR SERVICES
BETWEEN SWEETWATER AUTHORITY
AND
[CONSULTANT NAME]

EXHIBIT "B"
SCHEDULE OF CHARGES

AGREEMENT FOR SERVICES
BETWEEN SWEETWATER AUTHORITY
AND
[CONSULTANT NAME]

EXHIBIT "C"
ACTIVITY SCHEDULE