South Davis Water District

2025 Water Conservation Plan

Prepared by: Jake Ferguson, General Manager
Adopted: December 2025
Next Update: December 2030

Executive Summary

South Davis Water District provides culinary and secondary water to 10,590 residents. In 2024, the District used 192.7 gallons per capita per day (52.4 gpcd culinary, 149.9 gpcd secondary)—already better than the 200 GPCD target set for the Weber River Basin by 2030. But lower per capita use hasn't solved the aquifer problem. In fact, reducing outdoor irrigation is making things worse.

The Bountiful sub-aquifer has declined an average of 25.5 feet from 2000 to 2024, with U.S. Geological Survey monitoring wells showing decline rates between 1.3 and 1.9 feet annually [4][5][6][7]. Current annual recharge of approximately 18,300 acre-feet represents a 30% reduction from the USGS historical baseline of 26,000 acre-feet [1][2]. Perhaps most concerning, water quality testing reveals all four District production wells exceed EPA secondary standards for chloride, indicating saltwater intrusion from Great Salt Lake could threaten the regional water supply serving 110,100 residents across six municipalities [15].

This plan provides conservation goals balancing regulatory compliance with aquifer sustainability, estimates supply-demand projections through 2070, evaluates infrastructure priorities, and examines potential managed aquifer recharge strategies. The South Davis Water District recognizes that conservation through reduction alone is insufficient when it eliminates artificial recharge that has historically sustained water tables. Success requires maintaining aquifer levels through efficiency improvements, infrastructure investment, and potential future recharge programs.

---

1. System Profile and Water Use Analysis

Service Area and Regional Context

The District maintains 3,280 metered culinary connections and 2,063 unmetered secondary connections within a service area that has grown 18.4% since 2016 [21]. Population projections suggest continued growth at approximately 1.2% annually, reaching 11,300 residents by 2030 and potentially 17,624 by 2070 [18]. This growth trajectory creates compounding pressure on the aquifer that is already stressed by climate variability and historical over-appropriation, which has been acknowledged by the State Engineer in recent proceedings [8].

Six municipalities collectively withdraw approximately 9,500 acre-feet annually for municipal purposes from the shared Bountiful sub-aquifer, with industrial users adding another 2,000 to 4,000 acre-feet [10][11]. The 1995 Bountiful Sub-Area Groundwater Management Plan limits total diversions to 25,000 acre-feet annually on a five-year moving average [9]. However, this management plan limit derives from USGS baseline recharge estimates representing historical conditions during 1947-1985, not current recharge now estimated at 18,300 acre-feet [1][2][9]. The management plan limit therefore exceeds current recharge by approximately 6,700 acre-feet, placing even conservative extraction rates into aquifer mining potentiality.

Water Supply Sources

District-owned groundwater wells provide primary culinary supply, with maximum theoretical capacity of 1,997.2 acre-feet annually based on 30% operational efficiency [21]. Actual 2024 production totaled 391.6 acre-feet from District wells, representing roughly 20% of theoretical capacity. Weber Basin Water Conservancy District supplemented local production through 360 acre-feet of culinary water and 1,457.6 acre-feet of secondary water during 2024[12][14]. Additional sources for secondary use included the North Canyon Creek (192.6 AF), and local springs producing (72.8 AF), bringing total 2024 supply to approximately 2,475 acre-feet for both culinary and secondary use [21].

The historical relationship between imported water and aquifer sustainability is essential. During the 1960-1985 period, approximately 20,000 acre-feet entered annually through Weber Basin infrastructure, with roughly 3,700 acre-feet infiltrating to groundwater from irrigation applications according to USGS-validated 40% infiltration rates [1][2]. This artificial recharge stabilized water tables during periods of substantial population growth. Current regional secondary water deliveries of 13,149 acre-feet generate an estimated 5,259 acre-feet of annual recharge, representing 28.7% of total current aquifer replenishment [1][12][13].

Water Use Patterns and Conservation Achievements

Comprehensive data for 2021-2024 reveals both successes and ongoing challenges. Culinary consumption averaged 619.2 acre-feet annually across this period, serving an average population of 10,627 residents for a per capita rate of 52.0 GPCD [21]. This stability, despite weather extremes and population fluctuations, suggests culinary demand that is at the lowest practical level of water consumption that cannot realistically be reduced further without compromising essential household functions and quality of life. Secondary water use shows a far greater volatility, ranging from 942.5 acre-feet during drought year 2022 to 1,723.0 acre-feet during a more moderate 2024, reflecting both climatic influences and customer behavioral responses to conservation messaging [21].

Table 1: Water Use Summary 2021-2024

Year	Population	Culinary (AF)	Culinary GPCD	Secondary (AF)	Secondary GPCD	Average GPCD
2021	10,670	622.2	52.1	1,295.4	112.3	161.6

Year	Population	Culinary (AF)	Culinary GPCD	Secondary (AF)	Secondary GPCD	Average GPCD
2022	10,682	617.6	51.6	942.5	82.6	131.7
2023	10,565	615.5	52.0	1,451.4	126.3	174.5
2024	10,590	621.6	52.4	1,723.0	149.9	192.7
Average	**10,627**	**619.2**	**52.0**	**1,353.1**	**117.8**	**165.1**

Source: District operational data [21]

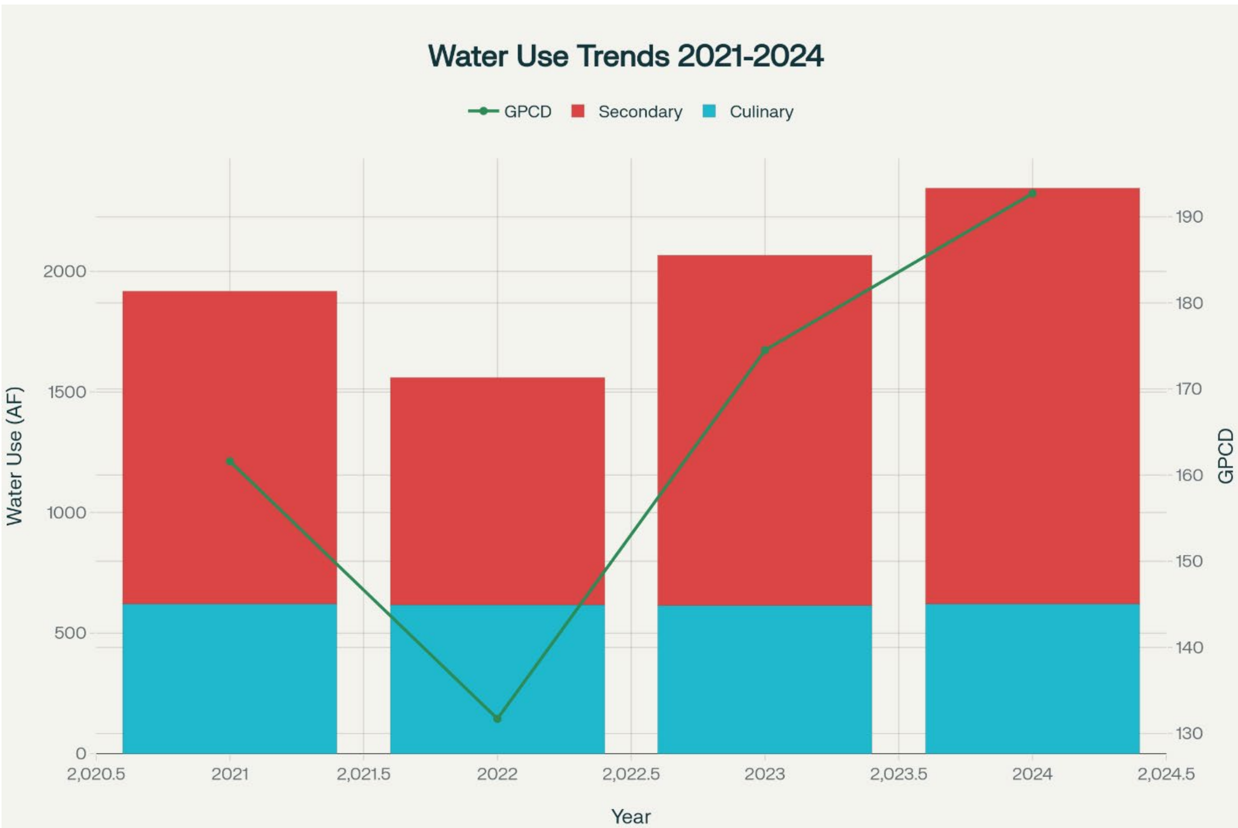

Figure 1: District water use showing culinary and secondary consumption with per capita trends, 2021-2024

The period from 2000 to 2025 witnessed regional secondary water consumption declining 28% from approximately 18,200 acre-feet to 13,149 acre-feet [13]. This conservation period coincided with accelerated aquifer decline as seen through USGS monitoring. State Engineer Blake Bingham acknowledged in April 2023 that "large-scale irrigation that was being brought in from the Weber River is no longer infiltrating into the groundwater," validating concerns that conservation eliminating artificial recharge is counterproductive without corrective measures being implemented [8].

Overview of Current Rate Structure

South Davis Water District's rate structure is designed to meet the operational and infrastructure needs of the District while promoting equitable cost distribution across culinary and secondary water services. The District currently operates under a 2025 rate structure that includes tiered culinary water pricing and acreage-based irrigation fees. The rate structure reflects the District's commitment to financial sustainability while maintaining affordability for residents.

Culinary Water Rates

The District employs a five-tier increasing block rate structure for culinary water, billed bi-monthly with six bills issued per year. This structure is designed to encourage conservation by charging progressively higher rates for increased consumption.

Base Rate (Tier 1): $51.00 for up to 10,000 gallons bi-monthly

Tier 2 (11,000-20,000 gallons): $1.50 per 1,000 gallons

Tier 3 (21,000-30,000 gallons): $2.50 per 1,000 gallons

Tier 4 (31,000-40,000 gallons): $3.50 per 1,000 gallons

Tier 5 (41,000+ gallons): $4.50 per 1,000 gallons

This tiered structure creates a pricing signal that escalates costs for higher consumption levels incentivizes water conservation behaviors among customers. The base rate covers essential household water needs, while the progressively higher tiers target less essential high-volume uses.

Secondary (Irrigation) Water Rates

Secondary water for irrigation purposes operates under a dual-component fee structure based on connection and acreage.

Irrigation Connection Fee: $135 per connection annually

Irrigation Per Acre Fee: $330 per acre annually

Total Cost Per Acre: $465 (combining connection fee and per-acre charge)

This structure generates current annual irrigation revenue of $551,415 from 2,063 connections serving 827 acres within the service area.

Rate Structure Performance and Analysis

Current Revenue Generation

Under the 2025 rate structure, the District's projected revenues include:

Culinary Water Revenue: $1,140,000 annually

Irrigation Water Revenue: $551,415 annually

Total Current Revenue: $2,207,600 annually

---

2. Conservation Goals and Supply-Demand Projections

Target Setting

The Weber River Basin conservation target of 200 GPCD by 2030 establishes the regional framework [22]. The District has set different conservation targets for different time periods. This recognizes that as infrastructure upgrades are completed and customers become more educated, water savings will increase over time.

Table 2: Conservation Targets

Category	Current (2024)	2030 Target	2060 Target
Culinary GPCD	52.0	50.0	48.0
Secondary GPCD	117.8	110.0	105.0
Total District	192.7	160.0	153.0

Targets assume continued efficiency improvements and infrastructure modernization [21]

Culinary targets progress conservatively given that culinary levels are approaching lowest possible use levels with infrastructure upgrades needed to reduce loss from distribution leakage. Secondary targets are more aggressive but assume implementation strategies maintaining aquifer benefit through efficiency improvements rather than elimination of outdoor watering.

Achieving the culinary use targets will require advanced metering infrastructure that would enable quicker leak detection and customer engagement through real-time water use monitoring rather than the District's current bi-monthly manual meter reading system [21].

Long-Term Projections

Population growth drives baseline demand increases despite per capita reductions. The service area's 10,590 residents could reach 17,624 by 2070, representing 66% growth [18]. Capacity projections accounting for aquifer decline rates suggest a growing imbalance approaching crisis by mid-century without intervention.

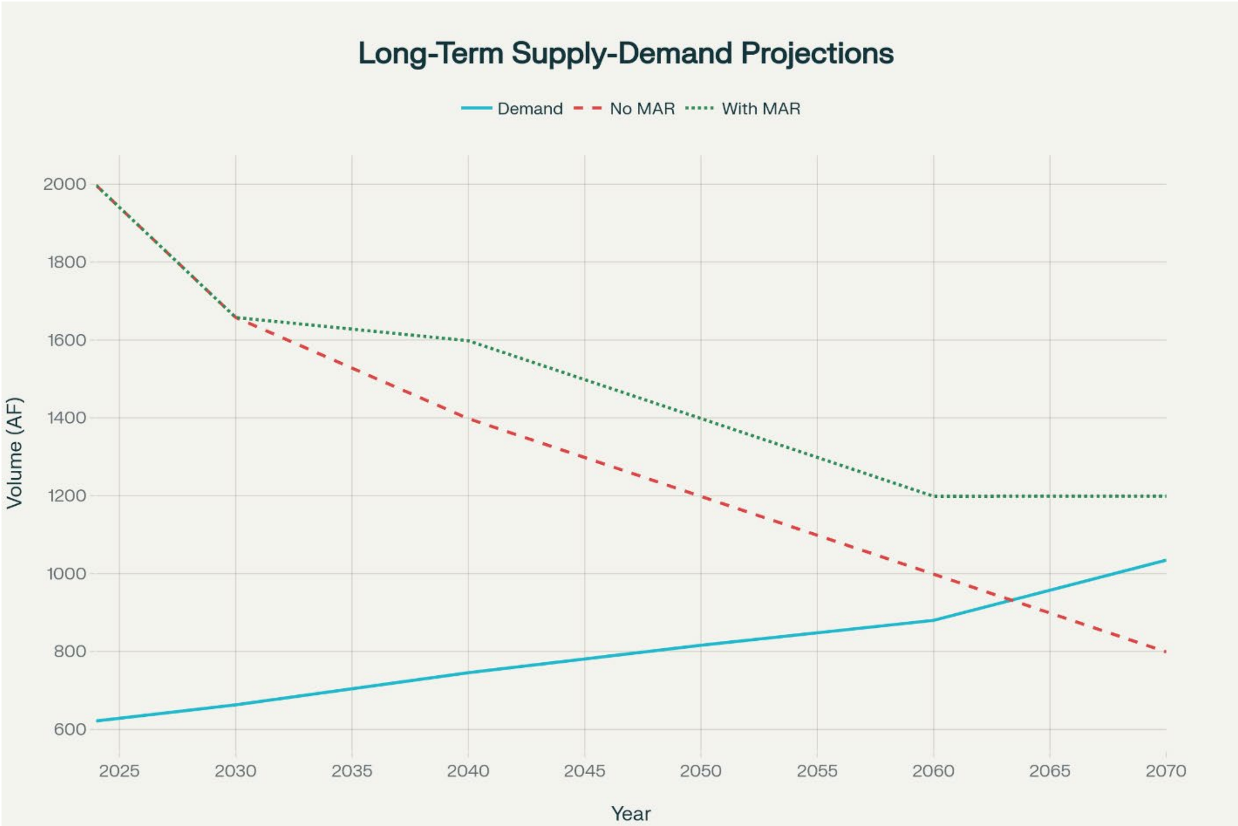

Figure 2: Projected supply-demand balance through 2070 showing capacity decline scenarios

Projections:

Through 2030, projected culinary demand of 663.2 acre-feet remains well below estimated capacity of 1,657.7 acre-feet. However, by 2060 the balance tips decisively negative when projected demand of 880.0 acre-feet consumes nearly 90% of estimated 998.6-acre-foot capacity. By 2070, demand of 1,034.5 acre-feet exceeds capacity of 798.9 acre-feet by 235.6 acre-feet without additional supply development or demand management [18][21].

---

3. Aquifer Decline and Water Quality Threats

USGS Monitoring Documentation

Four U.S. Geological Survey monitoring wells provide continuous federal documentation of regional aquifer decline through the National Water Information System [4][5][6][7]. These wells recorded average decline of 25.5 feet from 2000 to 2024, with current rates averaging 1.0 feet annually during normal years and 1.9 feet during drought periods.

Table 3: USGS Monitoring Wells 2010-2025

Well ID	Location	2010 Level (ft)	2025 Level (ft)	Total Decline (ft)	Annual Rate (ft/yr)
405449111533701	Central	4,263.70	4,245.80	17.9	1.19
405412111525701	Eastern	4,279.89	4,255.73	24.2	1.61
405135111531501	Northern	4,379.08	4,371.20	7.9	0.53
405353111544201	Southern	4,231.30	4,221.40	9.9	0.66

Source: USGS National Water Information System [4][5][6][7]

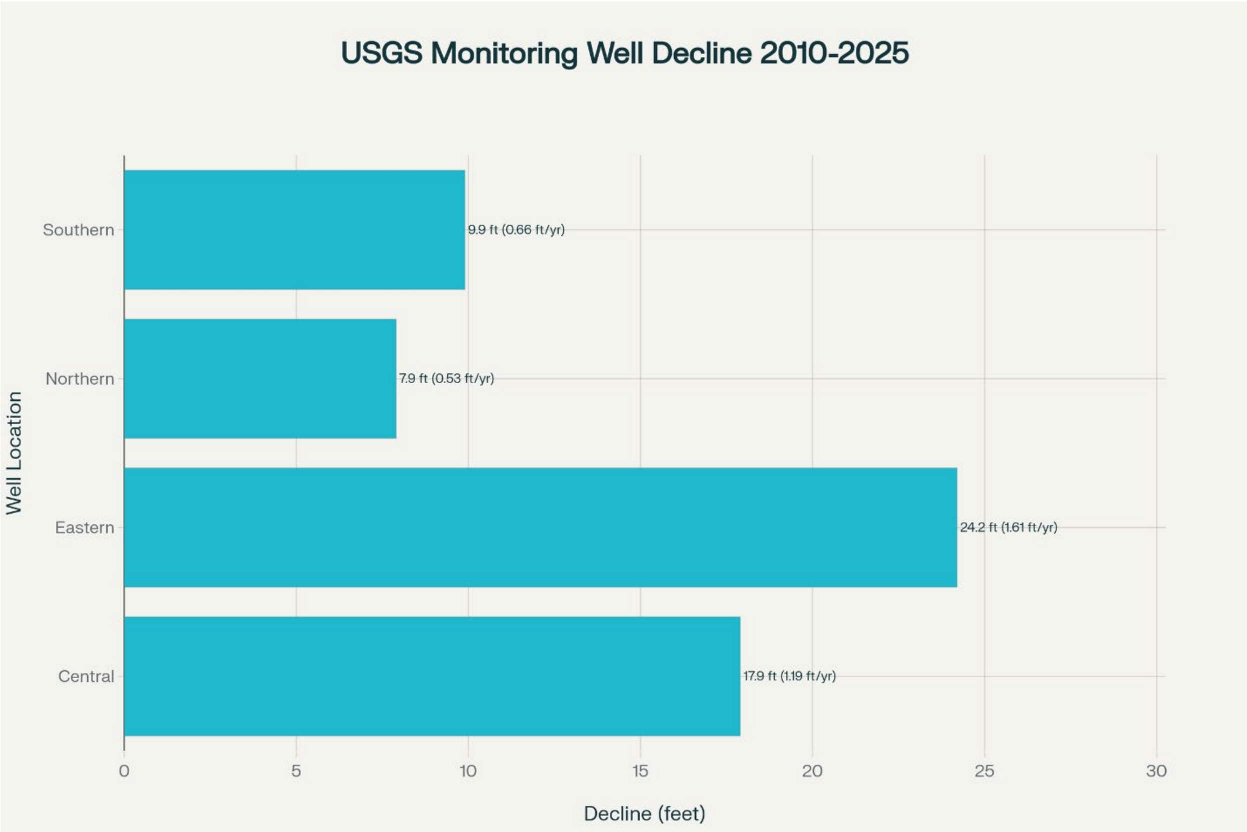

Figure 3: Shows water levels at four USGS Monitoring Wells over 15-year period

The eastern sector's 1.61 feet annual decline rate reflects concentrated municipal pumping. Even the northern well in favorable hydrogeological settings shows ongoing decline rather than sustainable equilibrium. Deputy State Engineer Blake Bingham confirmed at the April 24, 2023 public meeting that the Bountiful sub-aquifer is "clearly over-appropriated" with "deteriorating groundwater conditions" showing "noticeable downward trend across all USGS monitoring wells" [8].

Saltwater Intrusion Emergency

Water quality testing reveals an immediate crisis requiring urgent attention. Great Salt Lake elevation of approximately 4,191.5 feet exceeds the regional groundwater table elevation of 4,177 feet by 14.5 feet, creating negative hydraulic gradient where saline water intrudes into the aquifer rather than freshwater discharging to the lake [16][17].

Table 4: District Water Quality Testing Results (February 2025)

Parameter	Val Vista	Val Verda	Bona Vista	North Canyon
Respective Years Tested	2024 / 2025	2024 / 2025	2024 / 2025	2024 / 2025
Chloride (mg/L)	281 / 271	516 / 511	520 / 487	385 / 287
TDS (mg/L)	840 / 884	1390 / 1380	1270 / 1250	1020 / 924
Sodium (mg/L)	62 / 65	134 / 144	164 / 167	114 / 81
Bromide (mg/L)	0.10 / ND	0.15 / 0.10	0.10 / 0.02	0.08 / 0.02

Source: NELAP-certified laboratory testing [15]

All four production wells exceed EPA secondary standards for chloride, with concentrations ranging from 271 to 520 mg/L against the 250 mg/L standard. The spatial pattern of increasing concentrations for wells closer to the Great Salt Lake shows that the lake could be the source. Bromide detection provides a chemical fingerprint uniquely identifying Great Salt Lake influence, as this compound occurs naturally in the lake at elevated concentrations but rarely appears in freshwater aquifers [15].

This potential saltwater intrusion threatens water quality for the entire 110,100 residents served by the Bountiful sub-aquifer across six municipal systems. The threat extends beyond aesthetic concerns to potentially irreversible contamination if aggressive intervention does not reverse the negative hydraulic gradient [11][16].

---

4. Infrastructure and Technology Implementation

System Modernization Priorities

The District's 76 miles of distribution infrastructure includes many segments installed during early 20th century development. The infrastructure replacement program prioritizes aging distribution lines based on assessment of flow requirements, material composition, and leak history [21]. The minimum replacement rate of 1,000 linear feet annually represents realistic commitment given budgetary constraints while concentrating efforts on highest-risk segments.

Culinary water loss analysis reveals an average of 98 acre-feet annually, during 2020-2025, disappearing through meter inaccuracy, pipeline leakage, and hydrant flushing. Infrastructure improvements and advanced culinary metering would reduce this amount of loss.

Advanced Metering Infrastructure

The AMI deployment for culinary connections represents transformative investment in customer engagement and operational efficiency. The District desires to invest in AMI for culinary connections, however, an investment in this technology reduces the amount of money that could be invested in ageing infrastructure that right now takes priority.

Table 5: Estimated Culinary AMI Deployment Estimate

Period	Meters	Capital Cost	Result
2028-2030	3,280	$2.65M	Complete culinary coverage

Costs represent preliminary estimates subject to bid results and market conditions [21]

The technology platform provides hourly interval data enabling automated leak detection algorithms identifying continuous flow characteristic of toilet leaks or service line breaks. Web portals and mobile applications give customers real-time consumption data, comparing current use against historical patterns and enabling behavioral modifications. The transition from bi-monthly to monthly billing would vastly improve consumption feedback [21].

Secondary Water Metering Considerations

Utah Code § 73-10-34 mandates secondary water metering by January 1, 2030, supported by $250 million in ARPA funding statewide [20]. The District's secondary water use generates an estimated 541.2 acre-feet annually of aquifer recharge, representing 2.9% of total current estimated recharge in the Bountiful sub-aquifer region [1][12][13]. The District continues evaluating compliance strategies balancing regulatory requirements against aquifer sustainability concerns and financial constraints.

---

5. Managed Aquifer Recharge Feasibility Assessment

Strategic Rationale

Managed aquifer recharge at North Canyon Reservoir represents a potential future strategy addressing three challenges: compensating for lost irrigation recharge as conservation reduces outdoor application, addressing aquifer mining where current recharge falls 30% below USGS baseline, and reversing negative hydraulic gradient driving Great Salt Lake intrusion [1][2][16][17].

The District has initiated feasibility studies examining North Canyon Reservoir's suitability for MAR operations. The site formerly operated as a commercial gravel pit, creating excavated basin with mixed gravel-sand-silt subsurface materials. USGS basin-fill aquifer studies show infiltration rates ranging from 0.5 to 2.0 feet per day through similar geological materials, suggesting potential recharge rates between 200 and 600 acre-feet annually depending on configuration and operational protocols [2][3][23].

Table 6: Preliminary MAR Feasibility Parameters

Parameter	Value	Source/Notes
Site Location	North Canyon Reservoir	Existing irrigation facility
Geology	Mixed gravel-sand-silt	Former gravel pit excavation
Estimated Infiltration Rate	0.5-2.0 ft/day	USGS basin-fill studies [2][3]

Parameter	Value	Source/Notes
Potential Annual Recharge	200-600 AF	Depends on configuration
Source Water	Weber Basin imports/North Canyon Creek	Winter season availability
Preliminary Capital Estimate	$1.5-2.0M	Feasibility phase currently

All parameters subject to detailed engineering studies and hydrogeological testing [21][23]

Feasibility Study Approach

The District follows U.S. Bureau of Reclamation MAR framework emphasizing pilot-scale validation before major capital commitments [23]. The feasibility approach proceeds through defined stages over the next 5-10 years:

Phase 1: Desktop Studies and Preliminary Design
This phase begins with hydrogeological modeling using existing USGS data. Engineers will design the basin modifications we'd need. We'll work with the State Engineer on regulatory requirements and coordinate with other municipalities through the Groundwater Management Committee

Phase 2: Pilot Testing and Monitoring
Small-scale recharge operations testing infiltration rates, installation of observation wells measuring groundwater response, water quality sampling tracking interaction between recharged and native water, and adaptive refining of operational protocols based on empirical results.

Phase 3: Implementation Decision
Comprehensive cost-benefit analysis incorporating pilot results, regional financing negotiations addressing benefit distribution, regulatory permit applications if proceeding, and Board authorization for capital investment if justified by technical and financial analysis.

This staged approach limits near-term commitments while maintaining strategic option value. The District makes no commitment to full MAR implementation within the current five-year planning cycle, recognizing that feasibility studies may identify technical constraints, excessive costs, or alternative strategies proving more effective.

Regional Benefit and Governance Challenges

Hydrogeological modeling suggests recharged water would migrate according to natural flow patterns, with Woods Cross capturing estimated 63% of benefit through wells positioned downgradient, the District itself capturing 21%, and remaining municipalities receiving 16% through regional connectivity [2][3]. This asymmetric distribution creates equity questions requiring regional cost-sharing arrangements through the a multi-party Groundwater Management Committee [8][9][11].

---

6. Regulatory Requirements and Public Engagement

Utah Code § 73-10-32 mandates five-year update cycles with public hearings providing 14-day advance notice [19]. The District's engagement strategy extends beyond minimum requirements through aquifer health reports synthesizing monitoring data into accessible reports explaining current conditions, trends, and projections. Aquifer health in this area is of the utmost importance for the public.

The Bountiful sub-aquifer region shows us that effective water management requires understanding hydrogeological complexity rather than applying simplistic conservation measures, such as the secondary metering mandate. Stringent regulatory requirements reducing consumption would eliminate the artificial recharge that currently provides 28.7% of aquifer replenishment, accelerate water table decline, worsen the negative hydraulic gradient driving saltwater intrusion, and potentially cause irreversible contamination.

Comprehensive monitoring of aquifer levels and Great Salt Lake infiltration enables the District to pursue sustainable conservation by maintaining aquifer benefit rather than simple reduction targets potentially proving counterproductive. This approach recognizes that conservation success measured through per capita metrics can mask underlying aquifer decline, requiring strategies that balance efficiency improvements, infrastructure investment, and potential recharge enhancement.

---

7. Conclusion and Path Forward

The challenges confronting South Davis Water District demand responses transcending conventional conservation approaches. The District's 2024 performance of 192.7 GPCD demonstrates conservation success measured through per capita metrics. However, underlying aquifer decline of 25.5 feet from 2000 to 2024, recharge reduction to 18,300 acre-feet (30% below USGS baseline), and potential saltwater intrusion affecting production wells showing the limitations of reduction-focused strategies [1][2][4][5][6][7][15].

This plan establishes an integrated approach combining consumption reduction through Advanced Metering Infrastructure, infrastructure replacements eliminating wasteful losses while preserving beneficial infiltration, and feasibility assessment of managed aquifer recharge strategies. Success over the 45-year planning horizon requires balancing competing values between per capita targets and aquifer sustainability, and coordinating with regional partners who all share the Bountiful sub-aquifer resource.

The District makes realistic commitments while maintaining strategic flexibility for longer-term responses. AMI deployment for culinary connections proceeds as feasible. Infrastructure replacement continues at a sustainable pace addressing highest-priority segments. MAR feasibility studies advance through staged approach limiting financial exposure while being able to opt-out should technical analysis show infeasibility.

The path forward requires uncomfortable realities about conservation seeing that aggressive secondary water reduction will accelerate aquifer decline. The District's approach recognizes these complexities, pursuing sustainable conservation. The 10,590 current residents and projected 17,624 residents by 2070 depend on decisions made today creating viable water futures for subsequent generations.

References

[1] Thomas, H.E. and Nelson, W.B. 1948. *Ground-Water Recharge in the East Shore Area, Utah Part I: Bountiful District, Davis County*. U.S. Geological Survey Water-Supply Paper 1029.

[2] Clark, D.W. 1991. *Ground-water Resources and Simulated Effects of Withdrawals in the Bountiful Area, Utah*. U.S. Geological Survey Water-Resources Investigations Report 91-4020.

[3] Gardner, P.M., and Heilweil, V.M. 2014. *A Multiple-Method Approach to Understanding Ground-Water Flow in a Complex Basin-Fill Aquifer System*. U.S. Geological Survey Scientific Investigations Report 2014-5213.

[4] U.S. Geological Survey. 2010-2025. Well 405449111533701 Water Level Data. National Water Information System.

[5] U.S. Geological Survey. 2010-2025. Well 405412111525701 Water Level Data. National Water Information System.

[6] U.S. Geological Survey. 2010-2025. Well 405135111531501 Water Level Data. National Water Information System.

[7] U.S. Geological Survey. 2010-2025. Well 405353111544201 Water Level Data. National Water Information System.

[8] Utah Division of Water Rights. 2023. *Bountiful Sub-area Water Rights Policy Update Meeting Transcript*. April 24, 2023 Public Meeting Proceedings.

[9] Utah Division of Water Rights. 1995-1999. *Bountiful Sub-Area of the East Shore Area Ground-Water Management Plan Update*.

[10] Utah Division of Water Rights. 2025. *Municipal & Industrial Water-Use Data Downloads*. Current Database Access.

[11] Utah Division of Water Rights. 2024. *Water System Summary Database*.

[12] Weber Basin Water Conservancy District. 2024. *Summary of Operations 2024*.

[13] Weber Basin Water Conservancy District. 2025. *Regional Secondary Water Delivery and Groundwater Monitoring Database 2000-2024*.

[14] Weber Basin Water Conservancy District. 2025. *Municipal Contract Water Delivery Analysis 2000-2024*.

[15] South Davis Water District. 2024-2025. *Saltwater Intrusion Testing Results*. Laboratory analysis by NELAP-certified facilities: Weber Basin WQL 2024, Chemtech-Ford Labs 2025.

[16] INOWAS. 2019. *Simple Saltwater Intrusion Equations (Ghyben-Herzberg Principal Applications)*.

[17] Woods Cross City. 2025. *Static Water Level Data* - Well at 4,287 ft elevation with 110 ft static water level.

[18] Utah Department of Health. 2024. *Population Projections to 2070*. Office of Vital Records and Statistics.

[19] Utah Code § 73-10-32. *Utah Water Conservation Act - Planning Requirements*.

[20] Utah Code § 73-10-34. *Secondary Water Metering Mandate*.

[21] South Davis Water District. 2020-2025. *Operational Data and Records*.

[22] Utah Division of Water Resources. 2021. *State Water Plan & Regional Conservation Goals* (Weber River Basin GPCD targets).

[23] U.S. Bureau of Reclamation. 2020. *Managed Aquifer Recharge: Framework and Feasibility Guidelines*.