20 YEAR PLAN

TO SECURE NEW WATER SUPPLIES FOR WASHINGTON COUNTY, UTAH

JULY 2023

WASHINGTON COUNTY WATER CONSERVANCY DISTRICT

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EXECUTIVE SUMMARY

This 20-Year Plan to Secure Water Supplies for Washington County identifies enough new water to meet the projected demands of Washington County's growing population through 2042 with a combination of initiatives:

- **Water Conservation** is expected to generate about 11,400 acre feet per year (AFY) of additional supply, primarily through the district's lawn replacement program plus a variety of other measures, including reducing system loss, improving existing water conservation rate structures, and installing Advanced Metering Infrastructure (AMI) meters. Details are found in Section III.
- The **Regional Reuse System** will produce about 24,200 AFY of additional supply, through the construction of new treatment facilities, pipelines, and storage reservoirs to capture reuse water and put it to use for agricultural and irrigation purposes, freeing up water for drinking. See Section IV for details.
- Potable **Water Development Projects** will add about 4,800 AFY of additional water. These projects include the new Toquer Reservoir, expansion of the Sullivan/Cottom Wells, Cove Reservoir in Kane County, redevelopment of the Ence Wells, and a well in Diamond Valley. Section V provides additional information.
- **Municipal Groundwater Optimization** may add another 3,000 AFY to the water supply if it is determined that the area's groundwater rights may reliably generate more supply than current working estimates. The municipalities have about 6,624 AFY in water rights that are not utilized due to uncertainty about the reliability of the groundwater sources. Hydrologic studies may conclude that some of that water is reliably available. Section VI gives more detail.
- **Agricultural Conversion** may generate 3,215 AFY of available water as land historically used for farming or ranching converts into land for municipal development. Section VII discusses agricultural conversion.

As shown in Section VIII, implementing these combined measures will meet the demands of a growing population.

However, the plan requires the cooperative efforts of all Regional Water Supply partners as well as commitment to an aggressive schedule of project development.

SECTION I

INTRODUCTION

The analysis, recommendations, and conclusions of the Washington County Water Conservancy District's (district) recently completed 2022 Regional Water Master Plan (master plan) anticipated that the Lake Powell Pipeline (LPP) would be in operation by the year 2035. While LPP remains a critical component for meeting Washington County's long-term water supply needs, a number of recent hydrological, environmental, and political issues impacting the Colorado River Basin have introduced uncertainty regarding the timing and yield of that project. These issues have made it necessary to re-evaluate potential alternatives for providing the future water supply for approximately 72,000 units at various stages of development within the Regional Water Supply Agreement (RWSA) service area. These potential alternatives include enhancing the implementation of additional conservation measures, changing the way the district and its RWSA partners utilize agricultural and reuse water, and re-evaluating the yield of local groundwater supplies.

Based on the growth projections developed by the Kem C. Gardner Policy Institute (KCG), it will take approximately 20 years to realize 72,000 units of planned development. This plan focuses on identifying new water supplies to meet demands through the next 20 years. To simplify the analysis, water demand has been evaluated in terms of total demand with no specific distinction between potable water supplies and non-potable supplies. Proposed projects involving agricultural conversion and reuse will provide flexibility to use water for both potable and secondary demands.

A note of caution

The district's ability to execute this plan, and to successfully obtain the new water supplies discussed herein, is contingent upon all RWSA partners working together. Without a unified approach and a holistic view of water supplies needed to serve the county as a whole, the new supply yields presented in this plan may not be achievable. This plan is a high-level review of potential future water supply alternatives. Additional detailed analysis will be required to refine the estimates discussed herein.

SECTION II

EXISTING WATER SUPPLIES

The master plan focused primarily on the evaluation of existing and future potable water supplies and facilities needed to meet projected demands, assuming that portions of future potable water demands will be offset by secondary irrigation or reuse water. Based on the best assumptions at the time of the master plan, it would take until about the year 2040 to develop large, regional conveyance and storage facilities to put a significant amount of water from agricultural conversion or reuse to use in secondary systems. In other words, agricultural conversion and reuse water were not assumed to be able to directly meet potable water demands but would come into the picture in the future to offset potable water demands.

Under these assumptions, current and future potable water demands needed to be met by existing and new water supplies that could be developed with a water quality conducive to use in potable water systems. The master plan documents the assumed reliable yield of existing water supplies and new local water supplies, concluding that the reliable yield of existing water supplies would be exhausted by the end of 2023 (with a minor deficit of about 200 acre feet). For the purposes of this evaluation, it has been assumed that by the end of 2023, the reliable yield of existing water supplies (as defined in the master plan) will be fully utilized. In essence, a new source of water supply above the reliable yield of existing water supplies will need to be secured to meet future demands.

SECTION III

WATER CONSERVATION

State and local leaders recognize that ongoing water conservation is essential to meeting the water needs of Washington County's growing population.

The district has adopted the aggressive water conservation goal established by the State of Utah in a 2019 study.[1] In short, this goal strives to reduce average per capita water use an additional 23% by the year 2070. As part of the district's water conservation plan,[2] specific measures were developed to meet these water conservation goals. These measures produced an anticipated conservation schedule that was applied to the calculated source sizing standard for existing users of 0.78 acre feet per year (AFY) per Equivalent Residential Connection (ERC) (based on water use data from 2018 – 2020). Applying the long-term water conservation goal to this value yields a target source sizing standard of 0.59 AFY per ERC (this number includes both indoor and outdoor water use, regardless of whether the water comes from the potable or secondary irrigation system).

As documented in the master plan and 2022 Regional Impact Fee Facilities Plan and Impact Fee Analysis (IFFP/IFA), the level of service per ERC applied to all new development starting in 2023 is 0.59 AFY. For existing users, it is anticipated that average water use will see a gradual decline into the future as a result of conservation measures. This anticipated conservation schedule for existing users (those constructed before the end of 2022) is shown in Table 1. Based on this anticipated schedule, it is estimated that, by the year 2042, conservation from existing users will free up 11,400 AFY of existing water supply.

It is important to reiterate that this projection of future conservation is not certain but is achievable. It illustrates that water conservation has the potential to make a significant impact on local water supplies. The district and its municipal partners should continue to work together to promote, facilitate, and enforce water conservation efforts in Washington County. The majority of water saved through conservation over the next 20 years is anticipated to come from the district's new lawn rebate program with the remaining water savings achieved through the following additional measures:

- Reduction in System Water Loss
- Improvements to Existing Water Conservation Rate Structures
- AMI Meter Installation
- Weather Based Irrigation Controller Rebates
- CII Building Retrofits/Water Audits
- Policy Compliance
- Education and Training
- Residential Leak Devices/Flow Sensors

[1] *"Utah's Regional M&I Water Conservation Goals." Prepared for the Utah Department of Natural Resources by Hansen, Allen & Luce and Bowen Collins & Associates. November 2019.*

[2] *"Water Conservation Plan." Washington County Water Conservancy District. Updated October 2021.*

TABLE 1

ESTIMATED WATER CONSERVATION SCHEDULE AND RECOVERY OF EXISTING SUPPLY

YEAR	ESTIMATED LEVEL OF SERVICE (AFY/ERC)	EXISTING ERCs	SOURCE SIZING REQUIREMENT (AFY)	EXISTING SUPPLY RECOVERY (AFY)
2022	0.772	83,308	64,311	0
2023	0.760	83,308	63,301	1,011
2024	0.748	83,308	62,347	1,964
2025	0.730	83,308	60,805	3,506
2026	0.720	83,308	59,944	4,367
2027	0.710	83,308	59,115	5,196
2028	0.700	83,308	58,326	5,985
2029	0.691	83,308	57,556	6,755
2030	0.674	83,308	56,177	8,134
2031	0.669	83,308	55,724	8,588
2032	0.664	83,308	55,309	9,002
2033	0.659	83,308	54,926	9,385
2034	0.655	83,308	54,561	9,750
2035	0.643	83,308	53,553	10,758
2036	0.642	83,308	53,457	10,854
2037	0.640	83,308	53,349	10,962
2038	0.639	83,308	53,244	11,067
2039	0.638	83,308	53,150	11,161
2040	0.637	83,308	53,059	11,252
2041	0.636	83,308	52,970	11,341
2042	0.635	83,308	52,890	11,421

SECTION IV

REUSE WATER

The district and its RWSA partners are working to develop a regional reuse water system. The system will include new treatment facilities, conveyance infrastructure, and storage reservoirs to optimize the utilization of reuse water in Washington County. The system will allow for reuse to be used in secondary irrigation systems as well as augment potable water supplies through agricultural exchange and indirect potable reuse (IPR). The district is pursuing financial support for the system from the State of Utah as well as the U.S. Bureau of Reclamation's WaterSMART Large Scale Water Recycling Program.

The St. George Regional Water Reclamation Facility currently treats about 12.5 million gallons per day (MGD) of wastewater from St. George, Washington, Santa Clara, and Ivins cities. Ash Creek Special Service District (ACSSD) treats about 2.7 MGD of wastewater flow from Hurricane, La Verkin and Toquerville cities. Combined, about 17,000 acre feet of wastewater is treated within the RWSA partner cities annually. Of this amount, only about 2,400 AFY is currently reused, with the remainder being discharged to the Virgin River or land applied at the ACSSD farm. In addition to the 2,400 acre feet used annually by St. George, another 2,000 AFY of reuse water is committed to the Shivwits Band of Paiutes.

Subtracting current reuse demands and other obligations, there are about 12,600 acre feet of wastewater currently available in the regional reuse system and this value will continue to increase as the community grows. A number of large capital projects will be required to use this available supply of water. The reuse water could. The reuse water could be used in one or more of the following ways:

- Supply for local secondary irrigation systems.
- Supply for local canal companies in exchange for river water.
- Augmentation of drinking water supply through indirect potable reuse in Sand Hollow and Quail Creek reservoirs. This would include additional treatment beyond what is required for type 1 reuse to optimize the water for potable purposes by removing nitrates, phosphorus, and other contaminants from the reuse water.

A number of large-scale projects are needed to treat, convey, store, and deliver reuse water to the county. Based on the preliminary schedule of these proposed regional reuse projects, Table 2 displays the anticipated amount of estimated annual yield of reuse added to the system. The annual yield of reuse water was calculated using the Virgin River Daily Simulation Model (VRDSM) which accounts for the indoor municipal water deliveries and storage capacity available from existing and future reservoirs. Several factors impact the future availability of reuse water shown in Table 2:

- The projected reuse yields are based on meeting high population growth projections, which are used for long-term water supply planning purposes. If the population grows at a slower rate, then both water demands and the projected reuse of supply to meet those demands will be less.
- The reuse modeling incorporates planned conservation in the overall water demands but does not simulate a change in the ratio between indoor and outdoor demand. As conservation is expected to affect mostly outdoor demand, it is likely that the ratio of indoor demand to outdoor demand will increase slightly over time, which will slightly increase projected reuse yields. This change in indoor/outdoor percentages is a subject of ongoing evaluations.

[1] *First block of reuse water is anticipated with the completion of Dry Wash or Graveyard reservoirs.*

[2] *Large increase in 2030 is expected with the completion of major transmission infrastructure to the east side of the county/advanced water treatment plant for IPR.*

TABLE 2

PROJECTED RELIABLE YIELD OF REUSE WATER SUPPLY

YEAR	PROJECTED TOTAL ADDITIONAL REUSE SUPPLY (AF/Y)
2022	0
2023	0
2024	0
2025	0
2026	1,450[1]
2027	1,450
2028	1,450
2029	1,450
2030	15,888[2]
2031	16,093
2032	16,285
2033	16,514
2034	16,889
2035	17,047
2036	17,302
2037	17,568
2038	17,902
2039	18,093
2040	18,182
2041	22,207
2042	24,218

SECTION V

PLANNED WATER SUPPLY DEVELOPMENT

The master plan identifies new projects intended to produce, treat, store, and deliver water to the district's municipal partners. Some of these projects are already in design or under construction. Of the projects presented in the master plan, the following planned local projects listed in Table 3 are expected to increase the water available in the district supply portfolio over the next 20 years (not including LPP).

In addition to these local water supply projects, the master plan includes several new production, treatment, storage, and conveyance projects. Some of these future projects are partially contingent upon future water supply made available by LPP and may need to be revisited in the district's future planning efforts.

The district is pursuing other water supply development projects such as Beaver Dam Wash and the Hurricane Fault Deep Wells. Due to the high level of uncertainty surrounding these projects and their respective yield, they have not been counted as a new supply in this evaluation.

TABLE 3

SUMMARY OF PROPOSED LOCAL WATER SUPPLY PROJECTS THROUGH 2042

PROJECT NAME	ESTIMATED RELIABLE YIELD[1] (AFY)	ESTIMATED COMPLETION YEAR
Sullivan Wells/ Cottam Wells Expansion	1,405	2024
Ash Creek Pipeline/ Toquer Reservoir[2]	1,748	2026
Cove Reservoir	546	2033
Diamond Valley Well	388	2040
Total	**4,087**	

[1] Values shown represent the 50th percentile yield scenario. See Chapter 4 of the master plan for detailed description of this source yield scenario.

[2] Updated hydrologic evaluations of the Ash Creek/Toquer Reservoir system determined a slightly higher yield of the project than the assumptions used in the master plan.

Additional sources that the district intends to further evaluate are the Ence and Santa Clara wells. Previously, the Ence Wells were the primary source of water for the Kayenta Water Users (KWU) system. A new connection to St. George's Gunlock pipeline now provides water to KWU, and the wells are not currently in use. Although the water produced from the wells meets state drinking water requirements, customers have reported issues with taste and odor. Due to these issues, the master plan concluded that the Ence Wells would be better suited in a secondary irrigation application. However, potential options for the Ence Wells may include:

- Use the wells as a secondary irrigation supply.
- Use the wells as a potable water supply. Blending with another source of water may help improve taste and odor issues through dilution.
- Treat the well water to remove taste and odor issues and use as a potable water supply.
- Drill new wells in an effort to target groundwater zones with higher water quality characteristics.

However ultimately used, the Ence Wells can add to the overall water portfolio of the county. It is assumed that the wells will add 700 AFY[1] of supply.

The Santa Clara Wells are currently used as a supplemental water source for the irrigation companies in Santa Clara, Ivins, and St. George during low yield years on the Santa Clara River. The wells are relatively high in total dissolved solids (TDS, 1,000 – 1,300 mg/L), so they would not be suitable for potable water applications without treatment. The supplemental designation of the water rights may limit the use of the wells for anything other than supplementing the Santa Clara system, but additional research is needed. Additional uses of these wells and corresponding water rights will continue to be evaluated.

[1] *Value represents the total Ence Wells water right evaluated at the 50th percentile yield.*

SECTION VI

MUNICIPAL GROUNDWATER OPTIMIZATION

During the development of the master plan, Bowen Collins & Associates worked closely with each partner municipality to determine the estimated reliable yield of local municipal water supplies, most of which are groundwater sources. This effort is documented in Appendix C of the master plan. The reliable yield of municipal supplies was estimated to be less than the total paper water rights associated with those supplies due to seasonal variations in source availability. Table 4 provides a summary of the total developed potable water rights held by each city along with the reliable yield assumed in the master plan.

As shown in Table 4, over 6,000 acre-feet of water rights were assumed not to be reliable in the master plan evaluation (i.e., this amount of water was not assumed to be available year in and year out). However, with additional studies of local groundwater supplies, it may be possible to determine that some or all of this water is in fact reliably available from year to year or could be reliable with additional investment in infrastructure.

TABLE 4
ASSUMED BASELINE RELIABLE YIELD OF MUNICIPAL SUPPLIES IN MASTER PLAN

CITY	DEVELOPED POTABLE WATER RIGHTS (AFY)	ESTIMATED RELIABLE YIELD, 50TH PERCENTILE (AFY)
St. George[1]	20,910.61	16,456
Ivins	1,006.56	995
Santa Clara	2,740.98	2,566
Washington	3,807.90	3,694
Hurricane	5,308.93	3,478
La Verkin	714.45	693
Toquerville	557.33	541
Total	35,046.76	28,423
Amount Assumed Unreliable		**6,624**

[1]Excludes St. George's mountain springs. The reliable yield of the springs is based on historical data and it is not recommended that the yield estimates for the mountain springs be revisited/increased.

The district is planning to commission such studies on local aquifers to help refine these estimates on reliable yield. This plan assumes that such studies could conclude that an additional 3,000 AFY of reliable yield is available in municipal groundwater supplies. Note that this 3,000 acre feet would be considered the additional supply under the 50th percentile yield scenario (see Chapter 4 of the master plan for additional discussion). It is likely that the groundwater studies will identify additional infrastructure needed to increase system reliability.

SECTION VII

AGRICULTURAL CONVERSION

Agricultural conversion typically occurs when land historically used for farming or ranching is converted into land for development. Certain challenges accompany the conversion of agricultural water to municipal and institutional (M&I) use, such as overall water quality and cuts to water rights due to increased depletion. Another challenge is estimating when and where agricultural water will become available to meet M&I needs. As a result, it is difficult to accurately estimate how agricultural conversion will ultimately play into the future M&I water supply of the county.

In the master plan, agricultural conversion was assumed to primarily function as a source of secondary irrigation supply. While this may still be the case for a large amount of the agricultural water impacted by increased salinity downstream of the La Verkin Hot Springs, some agricultural water comes from sources with high water quality that could be treated and used for potable water supply. Whether agricultural conversion is used for potable water or secondary irrigation, it will directly meet or offset future potable water demands.

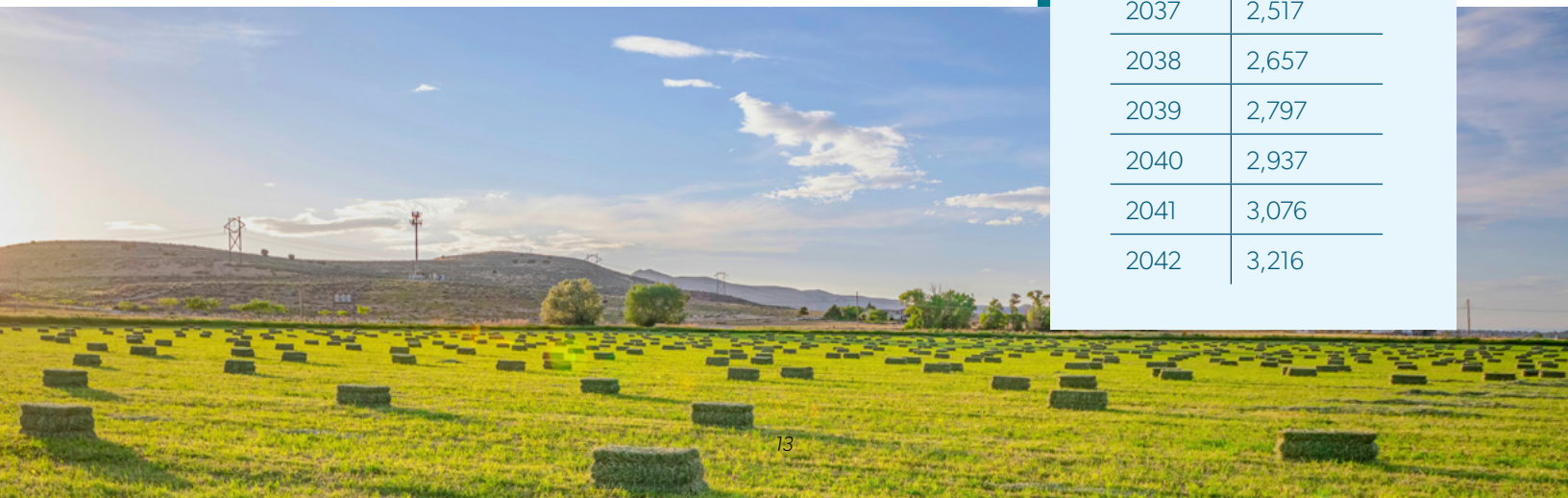
In a recent report,[1] the Utah Division of Water Resources (UDWRe) provided estimates for future agricultural conversion to M&I in Washington County. These projections are summarized in Table 5 and have been used as the proposed agricultural conversion schedule for this analysis. It should be noted that the values shown in Table 5 would be in addition to agricultural water obtained through exchange with type 1 reuse water. It is also assumed that the values in Table 5 include agricultural water already owned by the municipalities that is not currently in use that will be put to use as secondary irrigation systems are expanded.

[1] *"Water Resources Plan." Utah Division of Water Resources. December 2021.*

TABLE 5

ESTIMATED FUTURE AGRICULTURAL CONVERSION TO M&I

YEAR	AGRICULTURAL CONVERSION TO M&I[1] (AFY)
2023	559
2024	699
2025	839
2026	979
2027	1,119
2028	1,259
2029	1,398
2030	1,538
2031	1,678
2032	1,818
2033	1,958
2034	2,098
2035	2,237
2036	2,377
2037	2,517
2038	2,657
2039	2,797
2040	2,937
2041	3,076
2042	3,216



SECTION VIII

SUPPLY & DEMAND COMPARISON

Having identified potential new water supplies in the county, Table 6 compares the projected growth of new ERCs with potential future water supplies. Demand projections are based on the 2018 KCG high growth scenario.[1] Assuming the proposed measures and new supply development occur as planned, adequate water supply will be available to meet the demand for approximately 72,000 new ERCs over the next 20 years. However, securing this new supply will require a large investment of time and resources, as well as cooperation and coordination between the district and its RWSA partners. Many projects, especially those pertaining to reuse water, need to begin the planning and design phases in the immediate future in order to achieve the timeframes presented in this evaluation.

While the 20-year plan is achievable, there is still uncertainty regarding the assumed yield of future water supplies. Water supply planning is and will continue to be dynamic. The district and its partner municipalities should continue to innovate and identify ways to extend its current water supplies and develop new water supplies in the future.

[1] *KCG's 2018 population growth scenario was used in this analysis consistent with the district's 2023 Regional Water Master Plan. The most recent KCG growth scenario will be analyzed in the pending update to the district's Master Plan.*

TABLE 6

PROPOSED 20-YEAR SOURCE DEVELOPMENT PLAN (AFY)

YEAR	EXCESS EXISTING SUPPLY (BASED ON RELIABLE YIELD DEFINED IN THE MASTER PLAN)	PROJECTED CONSERVATION FROM EXISTING USERS (RECOVERY OF EXISTING SUPPLY)	NEW REUSE	NEW POTABLE WATER PROJECTS	ENCE WELLS REDEVELOPMENT	MUNICIPAL GROUNDWATER OPTIMIZATION	AGRICULTURAL CONVERSION TO M&I	TOTAL NEW SUPPLY	PROJECTED GROWTH (ERCs)	REQUIRED ADDITIONAL SOURCE CAPACITY BASED ON PROJECTED GROWTH	SURPLUS/DEFICIT
2023	256	1,011	0	0	0		559	1,826[1]	3,435	2,027	(201)[2]
2024	0	1,964	0	1,405	0	0	699	4,068	6,754	3,985	83
2025	0	3,506	0	1,405	700	0	839	6,450	9,978	5,887	563
2026	0	4,367	1,450	2,279	700	0	979	9,775	13,197	7,786	1,989
2027	0	5,196	1,450	3,153	700	3,000	1,119	14,618	16,400	9,676	4,942
2028	0	5,985	1,450	3,153	700	3,000	1,259	15,547	19,741	11,647	3,899
2029	0	6,755	1,450	3,153	700	3,000	1,398	16,457	23,148	13,657	2,800
2030	0	8,134	14,707	3,153	700	3,000	1,538	31,233	26,657	15,728	15,505
2031	0	8,588	14,972	3,153	700	3,000	1,678	32,091	30,235	17,839	14,252
2032	0	9,002	15,239	3,153	700	3,000	1,818	32,911	33,984	20,051	12,860
2033	0	9,385	15,495	3,699	700	3,000	1,958	34,237	37,838	22,325	11,913
2034	0	9,750	15,793	3,699	700	3,000	2,098	35,040	41,739	24,626	10,414
2035	0	10,758	16,027	3,699	700	3,000	2,237	36,421	45,605	26,907	9,514
2036	0	10,854	16,300	3,699	700	3,000	2,377	36,931	49,497	29,203	7,728
2037	0	10,962	16,571	3,699	700	3,000	2,517	37,449	53,319	31,458	5,991
2038	0	11,067	16,816	3,699	700	3,000	2,657	37,939	57,125	33,704	4,236
2039	0	11,161	17,116	3,699	700	3,000	2,797	38,473	60,942	35,956	2,517
2040	0	11,252	17,362	4,087	700	3,000	2,937	39,337	64,778	38,219	1,118
2041	0	11,341	23,687	4,087	700	3,000	3,076	45,891	68,608	40,479	5,413
2042	0	11,421	24,716	4,087	700	3,000	3,216	47,141	72,452	42,747	4,394

[1] *Value includes existing excess supply capacity that will be used through the year 2023.*

[2] *Temporary, short-term supply deficits can be covered by groundwater storage reserves in the Sand Hollow area.*