CITY OF GEORGETOWN

INTEGRATED WATER RESOURCES PLAN

EXECUTIVE SUMMARY

MAY 2023

Photo Courtesy of City of Georgetown

CDM Smith

Purpose of the Integrated Water Resources Plan

The City of Georgetown, Texas (City) faces unprecedented water demand growth coupled with a finite surface water contract volume from the Brazos River Authority (BRA) and limited yield of local Edwards aquifer groundwater. The population is rapidly expanding in Central Texas, increasing competition for BRA surface water and groundwater supplies. The City initiated the integrated water resources plan (IWRP) to identify new water supply options and ensure long-term reliability under uncertain hydrology and demand growth. The three principal objectives of the Georgetown IWRP are the following:

1. Construct and calibrate a systems model that forecasts water supply at a monthly time step.
2. Identify and evaluate potential water supply alternatives that the City can implement.
3. Evaluate the volume needed from, and timing for, each supply alternative out to 2070.

The integrated systems approach will help answer critical questions for the City, including the ideal mix of supply alternatives to yield reliability at the most reasonable cost. The IWRP was completed concurrently with other City planning efforts to maintain consistency with water and wastewater master plans. While the master plans look at each system in detail, the IWRP looks at the interrelationships of the system as a whole to identify multipurpose and multibenefit projects (**Figure 1**).

The IWRP will help the City identify the availability of future water supplies, the appropriate supply volume to purchase, and the future dates on which to bring the supplies on line.

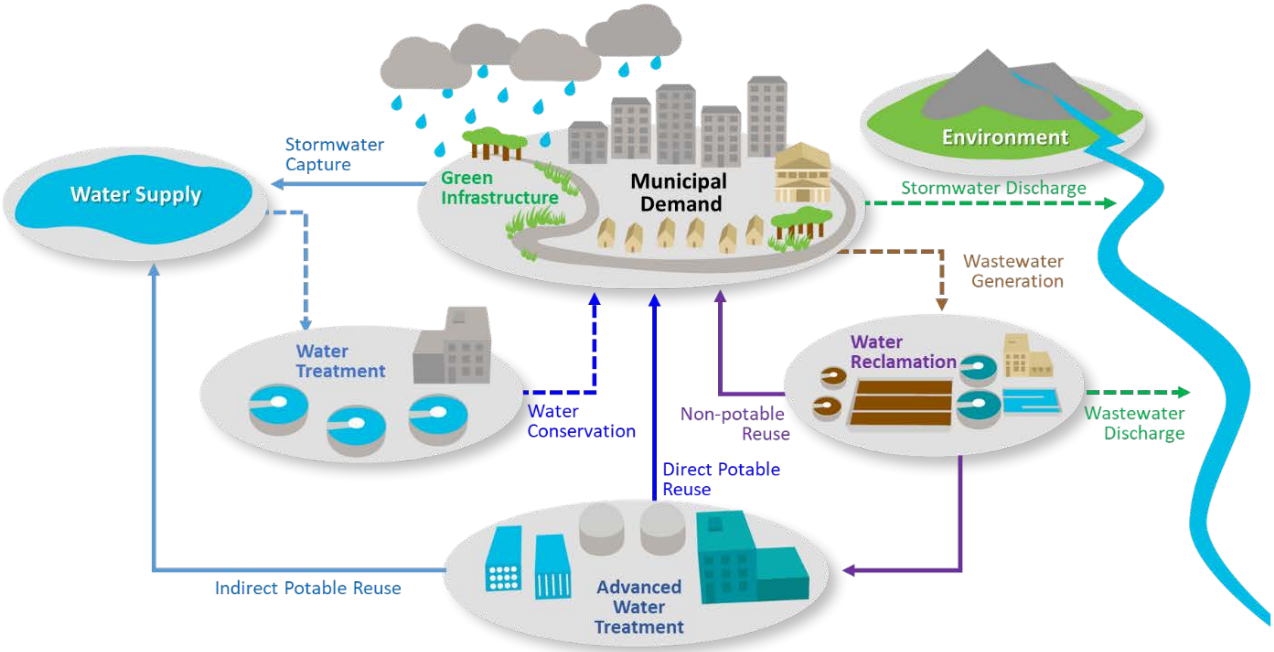

Figure 1. An Integrated (or One Water) Approach Considers the Full System

Existing Supplies and Projected Supply Gap

The City has historically met approximately 70 percent of its water demand through a 45,707 acre-foot per year (AFY) contract with BRA. The BRA is the local sponsor of the water supply storage for the U.S. Army Corps of Engineers in Belton, Stillhouse Hollow, Granger, and Georgetown Lakes. BRA operates the Williamson County Regional Raw Water Line to supplement the water in Lake Georgetown, where the City makes withdrawals, with water from Lake Stillhouse Hollow.

Surface water supplies from Lake Georgetown are treated at the City's Lake Water Treatment Plant (WTP), which will soon have a capacity of 37.4 million gallons per day (MGD), as well as through a contract with the City of Round Rock to receive up to 3 MGD of treated water. The City of Georgetown plans to bring the South Lake WTP online in 2025 at a capacity of 44 MGD. At that time, the contract with the City of Round Rock will end, and the BRA water they were supplying will instead be directed to the Lake or South Lake WTPs for treatment.

The City also uses groundwater from the Edwards aquifer to meet demands. The City maintains a production capacity of 12 MGD in the Edwards aquifer; however, during times of drought this capacity may be reduced to 6 MGD.

Currently, the City has access to water from Lake Travis and the Lower Colorado River Authority via the City of Round Rock and the City of Leander. The contract with the City of Round Rock is constant at 4 MGD for 10 years. Within the IWRP, it was assumed the contract would continue at 1 MGD beyond 2032. The seasonal 3 MGD contract with the City of Leander will retire in 2030.

Significant future growth in water demand is expected as the population increases. A baseline water demand forecast consistent with other City planning efforts was used in the IWRP analysis, along with a forecast 10 percent lower to account of the impacts of additional conservation efforts.

Comparing the future demand to existing supplies (**Figure 2**), supply gaps are projected to begin as early as 2031 and grow to 99,000 AFY under the baseline conditions by 2070.

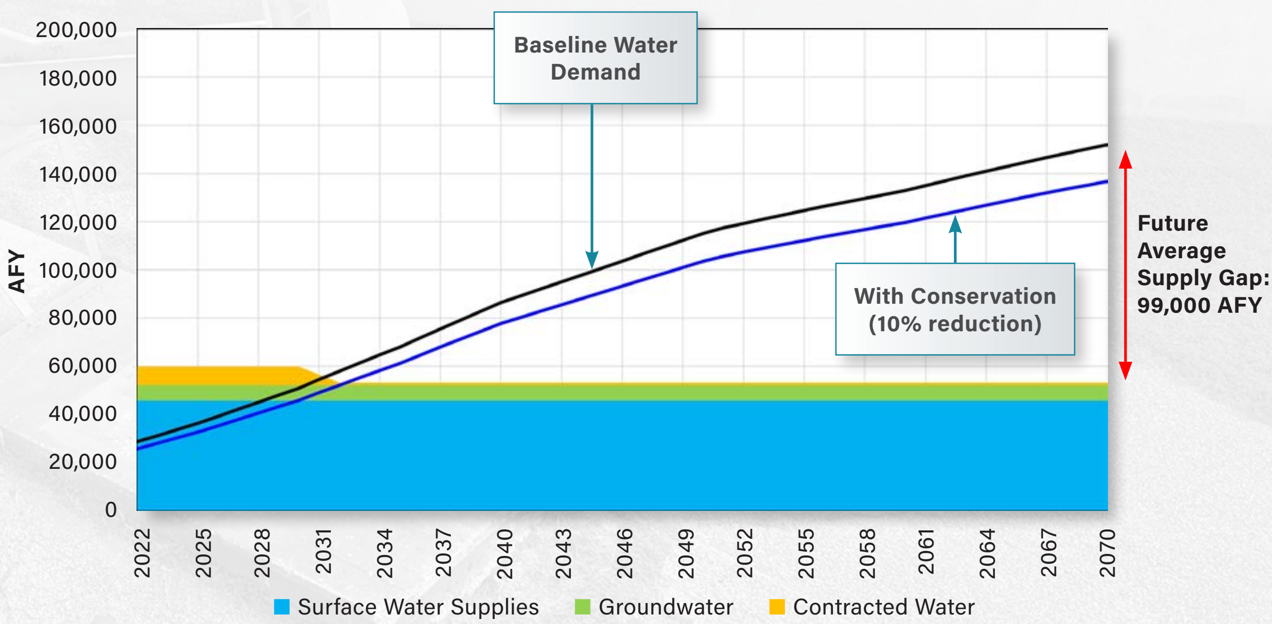

Figure 2. Comparison of Existing Water Supplies to Projected Water Demands

Water Supply Options

Six new water supply options, as well as conservation and aquifer storage and recovery (ASR), were analyzed for their impact on long-term supply reliability. Along with the new supplies, two infrastructure projects were also analyzed to fully use the new supplies. Each is described below, with key features summarized in **Table 1**. Conservation efforts are assumed to begin immediately, while all other options have an earliest implementation date of 2030.

Supply Options

Conservation: Conservation efforts are assumed to reduce the City annual demand by 10 percent.

Aquifer Storage and Recovery (ASR): ASR involves seasonal recharge of surplus water. During times when there is spare water treatment capacity and supply, treated water is sent to a wellfield for recharge into the aquifer. Then during periods of high water demand or drought, the stored water can be recovered and used to meet demands.

Water Reclamation: Excess reclaimed water from the City's five water reclamation plants and the Liberty Hill water reclamation plant would be discharged into the San Gabriel River and then diverted in Circleville to a new water purification facility.

Hosston Groundwater: The City is currently developing up to 12 MGD of Hosston groundwater. Under this option, wellfields and conveyance infrastructure would be constructed to use this supply.

Regional Groundwater: The City could purchase future groundwater supply developed by BRA to be connected and treated near Circleville.

New Groundwater: The City could try to permit additional new groundwater supply.

Georgetown Flood Flows: The City could divert surplus unallocated water from Lake Georgetown to ASR for storage.

Granger Flood Flows: The City could divert surplus unallocated water from Lake Granger to ASR for storage.

Infrastructure Projects

Circleville to South Lake WTP Pipeline: This pipeline could bring Lake Granger water, reclaimed water, and regional groundwater to the City distribution system downstream of the South Lake WTP.

Lake Granger to Circleville Pipeline: A pipeline from Lake Granger to Circleville could transport reclaimed water and Lake Granger flood flows.

Photo Courtesy of City of Georgetown

Supply Option	Year Online	2070 Maximum Supply (AFY)	Cost ($ per AF)	Dependability	Permitting Complexity	Public Acceptance
Conservation	2022	15,200	$0	Moderate	Easy	Low
Water Reclamation	2030	5,000 to 27,000 (% of total groundwater use)	$1,530	High	Difficult	Low
Hosston Groundwater	2030	13,260	$696	High	Easy	High
Regional Groundwater	2030	25,000	$1,160	Moderate	Difficult	High
New Groundwater	2030	45,000	$1,600	Moderate	Difficult	High
Georgetown Flood Flows	2030	4,200	$590	Low	Moderate	Moderate
Granger Flood Flows	2030	19,060	$738	Low	Moderate	Moderate
ASR*	2030	0 to 46,000	$314 to $820	Moderate	Difficult	High

*ASR works in combination with other supplies to improve reliability via storage.

Table 1. Supply Option Summary

Water Integration Tool

As part of the IWRP analysis, a systems model was created using the Water Integration Tool (WIT) model developed by CDM Smith. The WIT is designed to simulate changes to surface water, groundwater, and recycled water budgets with changing hydrology or new project implementation. The WIT systems approach is a high-level water supply simulation that is lower in precision but more comprehensive and integrated than models used in master planning and capital improvements project development. Elements incorporated into WIT are shown in **Figure 3**.

The WIT model used historical hydrology from 1941 to 2013 within the analysis for supply reliability. A 49-year planning horizon from 2022 to 2070 is examined, looping through different potential hydrologic sequences to arrive at a probability for supply reliability and ending period storage for any given forecast year.

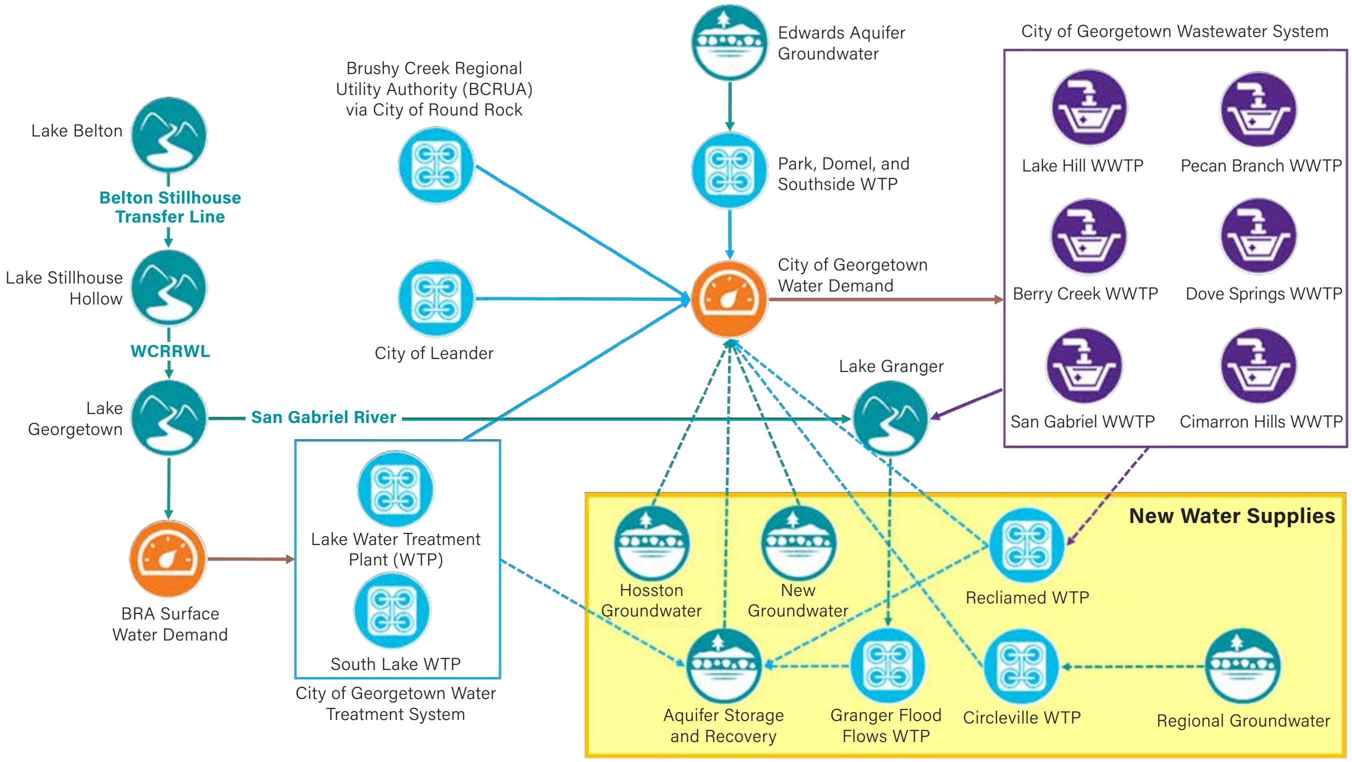

Figure 3. Water Integration Tool Elements

Portfolio Development

One single supply option is not sufficient to address the projected water supply gaps. Instead, groups of options were combined into supply portfolios (**Table 2**). The portfolios prioritize either the new groundwater source (GW in name) or reclaimed water (RW in name). When new groundwater is prioritized over reclaimed water, the reclaimed volume is constrained by the amount of water required by Georgetown demands after surface and contract water is used minus the total groundwater. The different prioritizations allow the City to determine how best to move supplies around on an annual basis to minimize cost and ASR land requirements..

The WIT simulates the volumes required from each supply under each portfolio. **Figure 4** shows the total supplies used to meet City demands in 2070, including existing supplies.

Portfolio	Hydrologic Future	Water Demands	New Groundwater	Water Reclamation	Regional Groundwater	ASR Source
GW1A: All Supplies online (AS)	Historical	With Conservation	Yes	Yes	Yes	Reclaimed Water
RW1A: All Supplies online (AS)	Historical	With Conservation	Yes	Yes	Yes	Reclaimed Water
GW1B: AS minus Regional Groundwater	Historical	With Conservation	Yes	Yes	**No**	Reclaimed Water
RW1B: AS minus Regional Groundwater	Historical	With Conservation	Yes	Yes	**No**	Reclaimed Water
RW1C: AS minus New Groundwater	Historical	With Conservation	**No**	Yes	Yes	Reclaimed Water & Flood Flows
GW1C: AS minus Reclaimed Water	Historical	With Conservation	Yes	**No**	Yes	Regional Groundwater & Flood Flows

Table 2. Project Portfolios

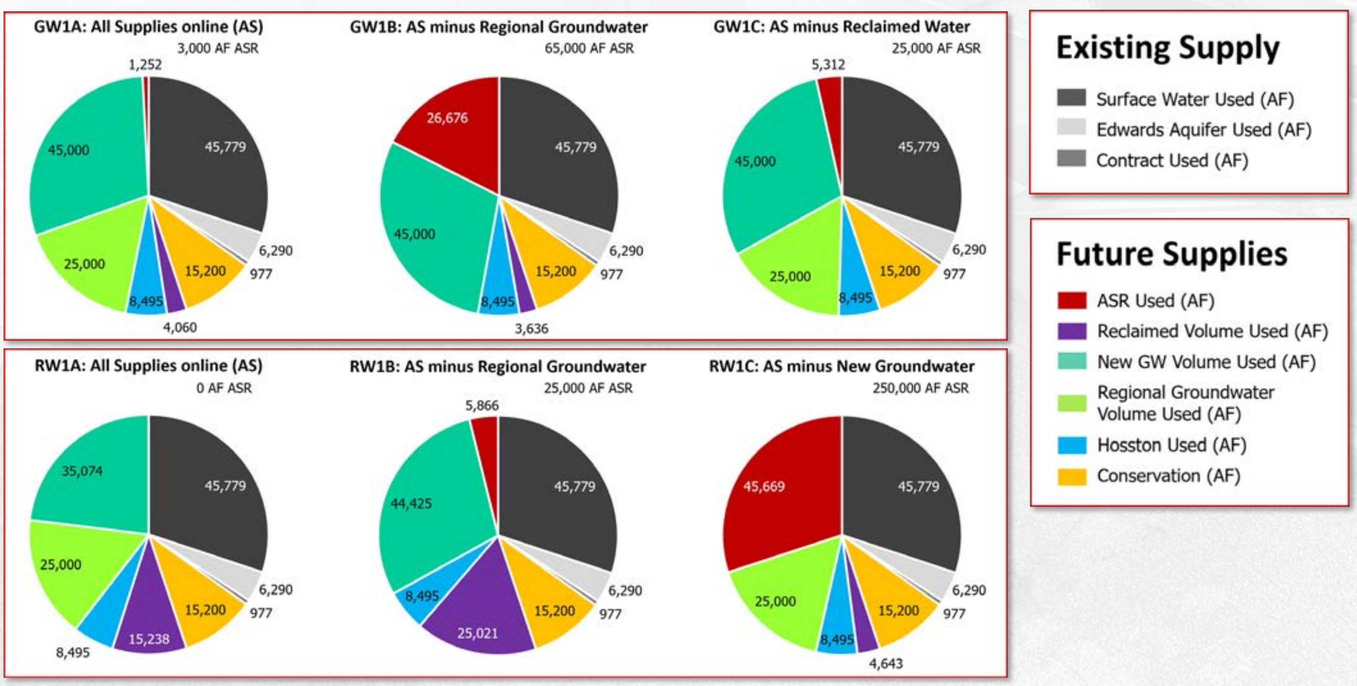

Figure 4. Average 2070 Supplies for Each Portfolio

Photo Courtesy of City of Georgetown

Total costs for each portfolio including both capital and operation and maintenance (O&M) was calculated. O&M costs were evaluated over an assumed 50-year life cycle, while capital costs were assumed to be incurred in the year of project construction. Both costs were discounted to present value at a rate of 3 percent. A comparison of portfolio costs is shown in **Figure 5**.

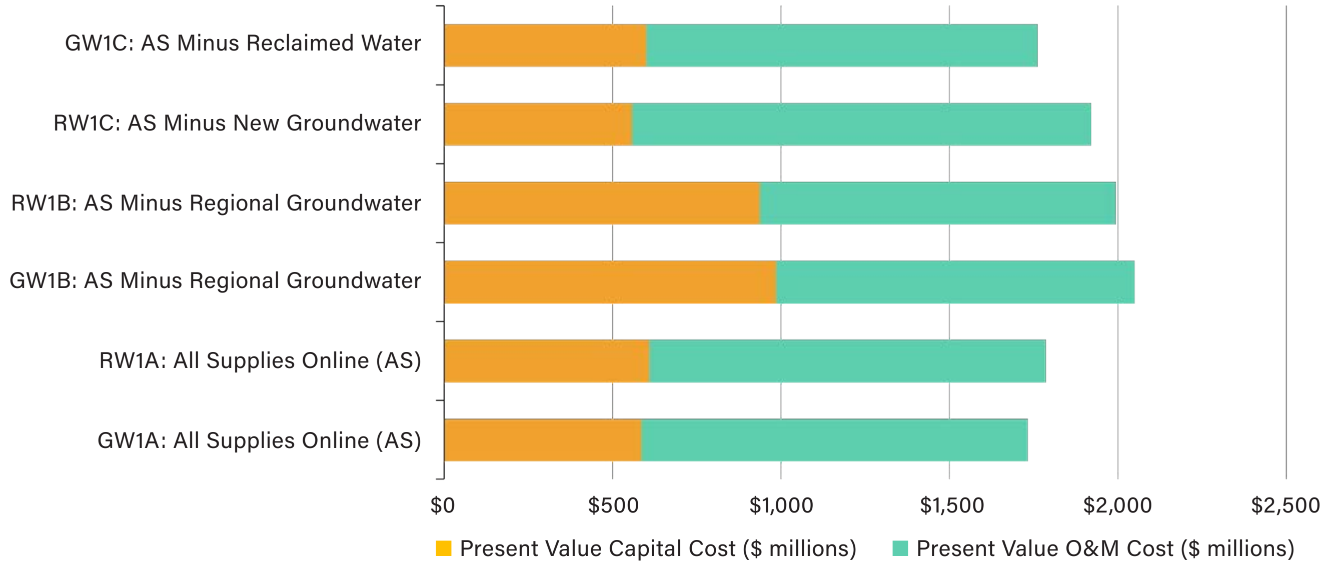

Figure 5. Comparison of Capital and O&M Costs per Portfolio

Portfolio Ranking and Recommendations

A final ranking of the portfolios was completed using metrics (**Table 3**) to indicate how well certain IWRP criteria were achieved. The results of the analysis are shown in **Figure 6** where the longer the color bar, the better the performance for a specific criteria. The total length of all bar segments indicate the overall ranking score for the portfolio.

Criteria	Metric	Performance	Source of Measurement	Metric Weighting
Reliability (40% importance)	ASR volume must not have gaps	Lower score is better	WIT Systems Model	20%
	Dependability	1 to 3 score; Higher is better	Expert Judgment	20%
Cost-Effectiveness (40% importance)	Annual cost (amortized capital plus O&M) above baseline ($ per year)	Lower $ is better	Engineer's Estimate	40%
Public Acceptance (10% importance)	Public perception	1 to 3 score; Higher is better	Expert Judgment	10%
Permitting Complexity (10% importance)	Partnership complexity	1 to 3 score; Higher is better	Expert Judgment	10%

Table 3. Portfolio Performance Metrics

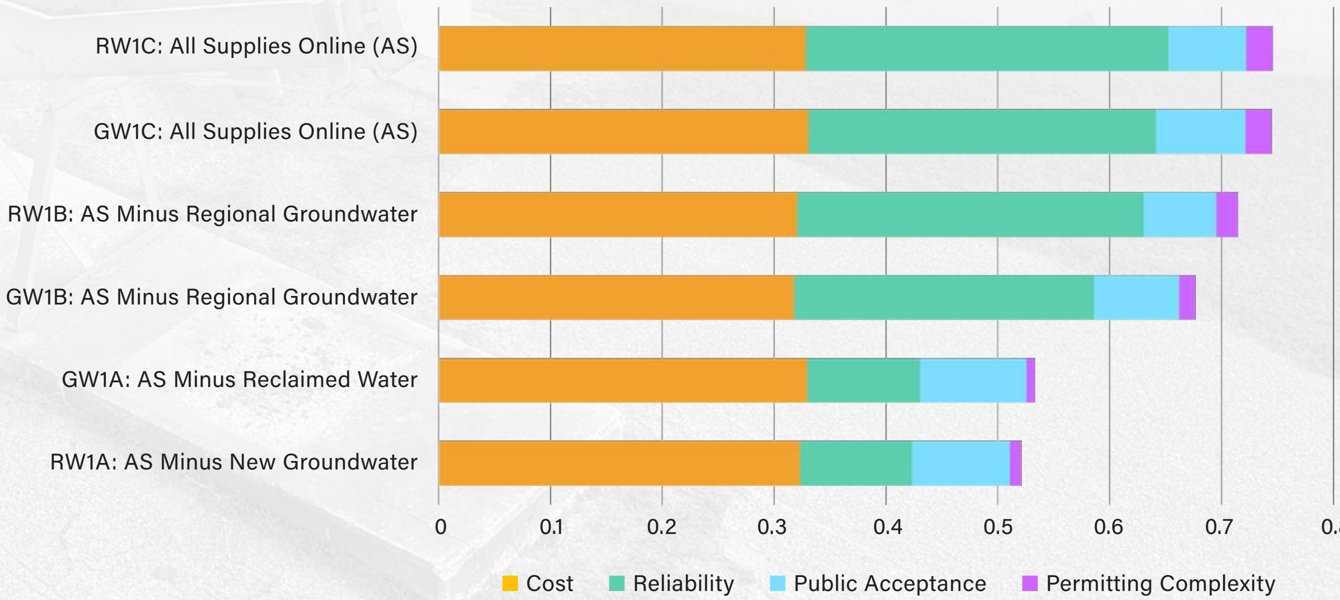

Figure 6. Portfolio Rankings

The results show that new groundwater and reclaimed water are required for all high-scoring portfolios. Reclaimed water is required to prevent supply gaps unless large areas are acquired for ASR, and ASR is required if regional groundwater is not purchased. Because of the uncertainty in volume and cost of regional groundwater supplies, the City may need to aggressively pursue new groundwater and regional partnerships.

Each portfolio requires that to keep up with increasing demands, the City must have a new supply online by 2030. The City should move forward with constructing wells and conveyance infrastructure for Hosston aquifer supplies, as well as facilities that will treat and connect regional groundwater to the distribution system. If BRA supplies are lower than anticipated and City high demands persist, the City should implement ASR. If demands continue on the trajectory to be 150,000 AFY in 2070 and the costs of BRA groundwater rise, the City should construct a facility for reclaimed water and treat this to drinking water standards for direct delivery or ASR storage.

IWRP Findings

- There are multiple supply portfolios that can meet long-term water needs.
- A new supply must be on line by 2030 to avoid supply shortages under current growth projections.
- New groundwater and reclaimed water options best provide supply reliability.
- Reclaimed water is required to prevent supply gaps unless large areas are acquired for ASR.
- ASR is required if regional groundwater is not purchased.
- Conservation efforts should be a part of all future portfolios.

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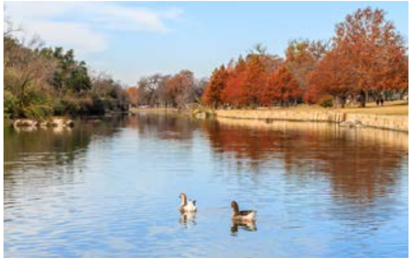

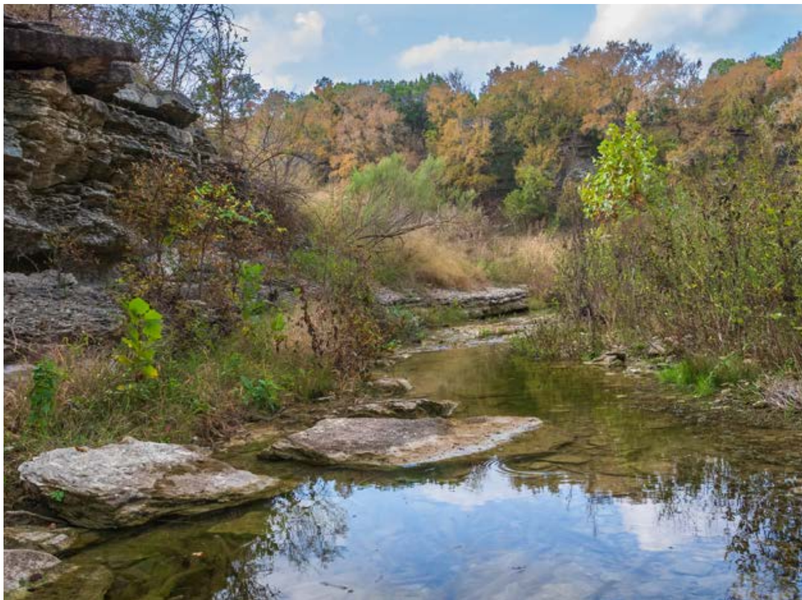

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