EXECUTIVE SUMMARY

JEA's Integrated Water Resources Plan (IWRP) and Demand Side Management (DSM) Strategy

March 2021

FINAL

JEA®

Building Community®

1 Introduction and Background

INTRODUCTION AND BACKGROUND

JEA is the eighth largest community owned utility in the United States, and by customers served, is the largest community owned electric and water utility in Florida. JEA's goal is to provide reliable services at the best value for 478,720 electric, 367,145 water, 288,275 sewer and 18,015 reclaimed water customers in northeast Florida.

Population of Greater Jacksonville Area is **1.5M** based on 2017 estimate by the U.S. Census

4th largest GDP in Florida and **2nd highest** wage growth in Florida

JEA's Service Area covers **900 square miles** including all of Duval County and parts of Clay, St. Johns and Nassau counties

134 Floridan Aquifer wells, **38 WTPs** and over **4,449 miles** of water lines

3,900 miles of sewer collection lines and **11 WRFs**

Production capacity up to **40 mgd** of reclaimed water with a current average demand of about **19 mgd**

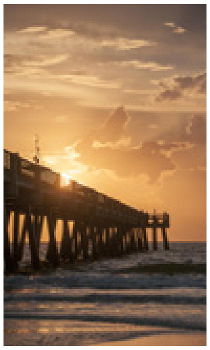
300 miles of reclaimed water transmission lines

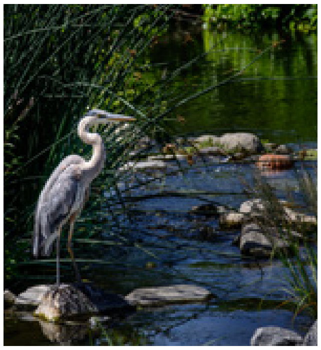
Drivers for Change

JEA and our community has been blessed with access to the one of the most productive groundwater aquifers in the United States, the **Floridan Aquifer**. This high-producing, high-quality aquifer has served as the region's sole source of water supply going back as far as the 1800s and has allowed JEA to reliably serve its customers with some of the lowest cost water in Florida. Given the robust and vibrant growing economy of the region, it is critically important for JEA to continuously plan for the future. Already a Florida leader in the use of reclaimed water to help conserve groundwater supplies, **it will be necessary for JEA to further diversify its water supply portfolio—developing alternative water supplies for continued sustainability of groundwater and assurance of reliability for decades to come.**

One of the reasons for northeast Florida's rapid growth rate is the local quality of life, including access to numerous water resources from the St. Johns River, beautiful beaches, and bountiful creeks, streams, springs and lakes. JEA has a responsibility, as does the community at large, to protect these water resources.

One factor driving JEA toward a diversified water supply portfolio is the need to renew the existing 20-year consumptive use permit (CUP) with the St. Johns River Water Management District (SJRWMD). For the renewal in 2031, SJRWMD will examine how JEA meets its customer water supply needs, while protecting the environment and making continued strides in conservation and expansion of reclaimed water for non-potable water demand. The future allocation of additional groundwater may be limited and is likely going to be tied to continued advancements by JEA in beneficial reuse of reclaimed water. This includes the potential for potable reuse, either Direct Potable Reuse (DPR) or Indirect Potable Reuse (IPR) via aquifer recharge.





Preservation of water quality is always at the forefront of JEA's long term water sustainability plan. To help ensure water quality on the South Grid, aquifer recharge will be considered to help maintain low chlorides in the existing JEA wellfield.

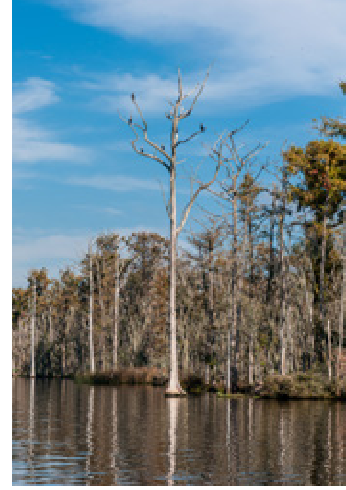
Another consideration is that SJRWMD and the Florida Department of Environmental Protection (FDEP) are responsible for implementing regional Minimum Flows and Minimum Water Levels (MFLs) to balance meeting public water supply needs while maintaining the healthy natural systems essential to our region's economy and quality of life. There are several on-going MFLs moving toward implementation that could have an impact on regional public water supplies. These MFLs include two in the Sandhill Lakes Region (Lake Brooklyn and Lake Geneva) in Keystone Heights and the Lower Santa Fe and Ichetucknee River MFLs in the Suwannee River Water Management District.

Another potential consideration is a Florida legislative initiative that could come into law as early as 2021 that requires utilities in Florida to eliminate treated wastewater effluent discharge to surface water over a potential 5-year implementation period. While ambitious, this proposed legislation supports the implementation of potable reuse as part of its water supply portfolio which aligns with JEA's goals and objectives.

JEA's Integrated Water Resources Plan

As an industry leader, JEA has long embraced the concept of One Water and the principles of Integrated Water Resources Management. Knowing that water is an interconnected system and that resources are maximized by implementing multipurpose projects, JEA initiated this Integrated Water Resources Plan (IWRP) in 2019 and coupled that with the development of a comprehensive Water Demand-Side Management (DSM) Strategy for water conservation.





Mission Statement

JEA will prepare an Integrated Water Resource Plan and Water Demand-Side Management Strategy that results in:

- Water supply certainty in meeting current and future water demands;
- Maximum use of reclaimed water;
- Well-targeted and cost-effective water conservation programs;
- Enhanced resiliency, accounting for future uncertainties; and
- Recommendations for specific projects and programs that are aligned with JEA's Strategic Areas of Focus (earn customer loyalty, deliver business excellence, and develop an unbeatable team).

One of the key first steps in developing an IWRP, is to develop the planning objectives that can be used as criteria to evaluate future water supply and conservation alternatives. While maximizing each of these objectives is difficult, the goal of the IWRP is balancing them to provide the best overall strategy for the future.

Planning Objectives

Water Supply Certainty	Cost-Effectiveness	Environmental Stewardship	Community Acceptance/ Implementation Ease	Operational Flexibility
Ability to meet seasonal water demands during average and dry weather conditions	Accounts for both near-term change in customer water rates and long-term levelized unit cost of water supply	Reduced treated wastewater discharge to St. Johns River and increased groundwater sustainability	Addresses community concerns and ease of implementation of projects	Ability to move water supplies from part of the water service area to another to maximize reliability

2 Water Supply Needs

WATER SUPPLY NEEDS

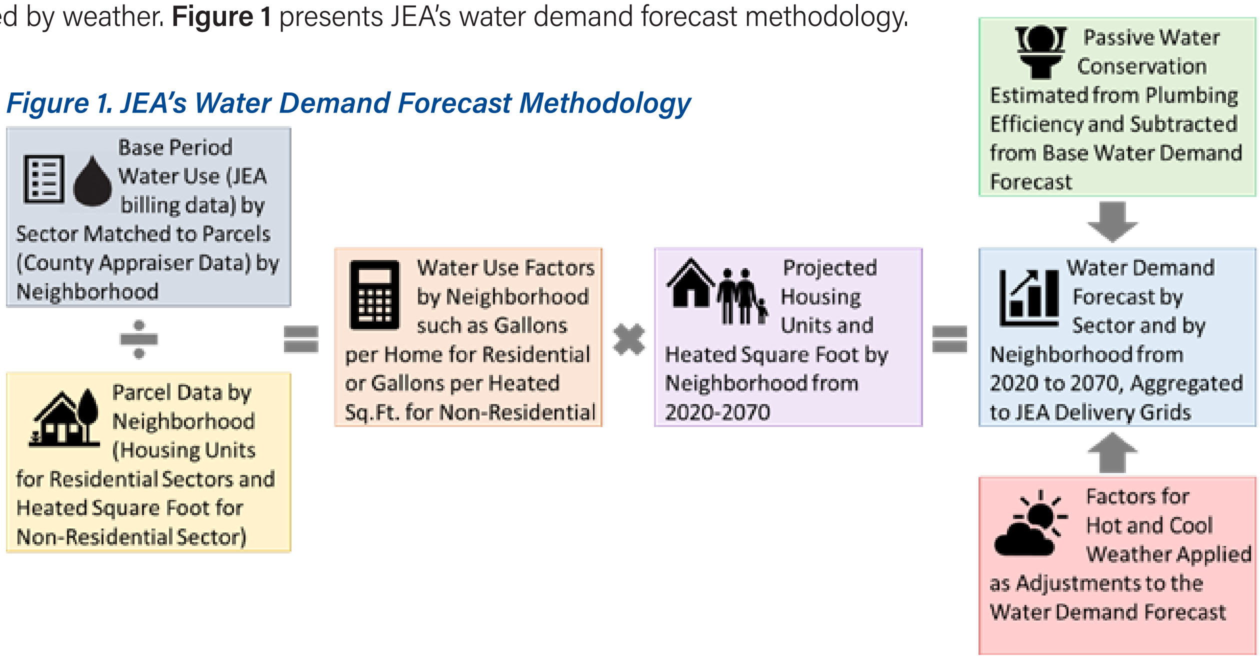
To properly plan for the future use of JEA's water resources, it is critical to understand how and where water is currently used, as well as to estimate how much water will be needed in the future. Under the IWRP, total water demands were forecasted through 2070 and compared to the existing supplies and operational constraints to determine future water supply needs.

Water Demand Forecast

For the IWRP and Water DSM Strategy, JEA developed its first-ever neighborhood-level water demand forecast. By analyzing water use and future growth at the neighborhood level, more accurate forecasts at the water delivery grid and sub-grid can be achieved. In addition, neighborhood-level water demand analysis allows for more optimal targeting of DSM programs. For example, by knowing the age of homes, a DSM program that replaces older, non-conserving toilets with high-efficiency toilets would be targeted to those neighborhoods that are older than 1994 (the date when federal plumbing codes required 1.6 gallon-flush toilets).

The neighborhood-level demand forecast started with matching customer-level billing data, parcel data from county assessor databases, and neighborhood demographics to estimate water use by customer type by neighborhood. Some neighborhoods have higher per unit water use than others due to larger residential lot sizes, affluence, and other factors. Forecasts by neighborhood also distinguished areas close to being built-out from areas that have significant potential for new development. In addition, passive water conservation (the water savings that will occur from efficiency gains from adherence to plumbing codes for new development) was estimated. Finally, historical water use data was analyzed to estimate the annual and seasonal variations in demand caused by weather. **Figure 1** presents JEA's water demand forecast methodology.

Figure 1. JEA's Water Demand Forecast Methodology

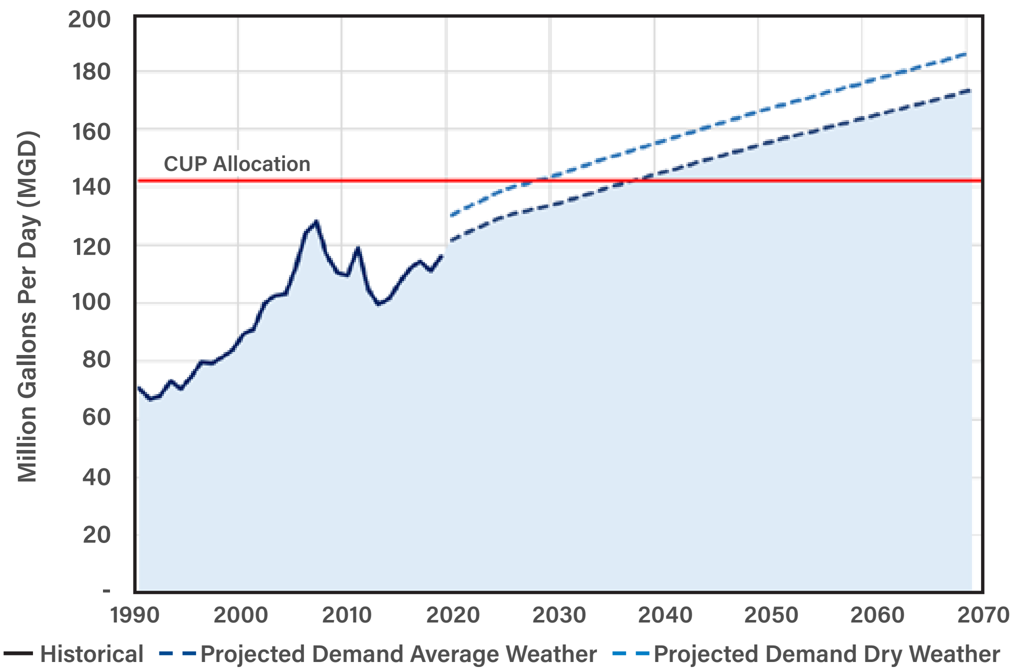


The total water demand forecast is presented in **Table 1** for the annual average demand under both average and dry weather conditions. Various reclaimed water growth projections were studied under the IWRP. Also listed in Table 1 is the reclaimed water forecast for the IWRP recommended strategy of continued expansion of the South Grid reclaimed water system as well as expansion of reclaimed water provision in the Nassau East Grid. These reclaimed water demands do not include on-site uses at the WRFs. When the reclaimed water demand is subtracted from the total water demand, it provides the future potable demand. The potable water demand forecast is shown in **Figure 2**, and compared to the current 2021 CUP allocation of 142 MGD. The potable water demand forecast is projected to surpass the available CUP allocation in 2028 under dry weather conditions.

Table 1. JEA Water Demand Forecast (MGD)

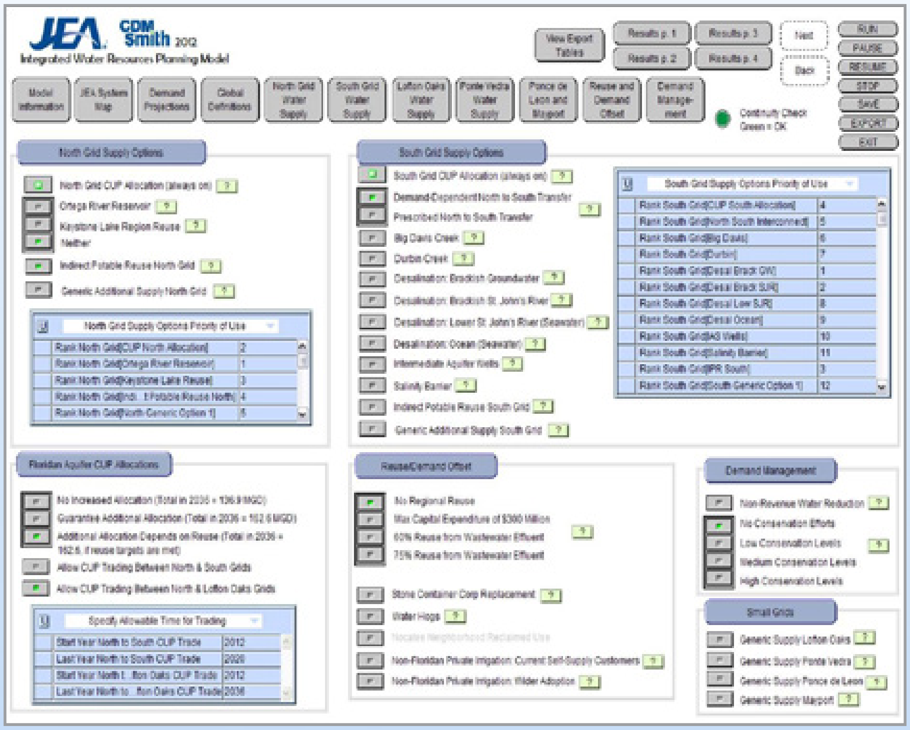
Year	Total Demand		Projected Reclaimed	Potable Demand	
	Average Weather	Dry Weather		Average Weather	Dry Weather
2020	132.4	140.8	10.5	121.9	130.4
2025	144.3	153.4	14.3	129.9	139.1
2030	156.2	165.9	22.0	134.2	144.0
2035	164.9	175.2	25.1	139.8	150.1
2040	172.5	183.2	27.7	144.8	155.5
2050	186.8	198.4	31.9	155.0	166.6
2060	199.1	211.4	35.0	164.1	176.4
2070	210.1	223.1	36.7	173.4	186.4

Figure 2. JEA'S Potable Water Demand Forecast and CUP

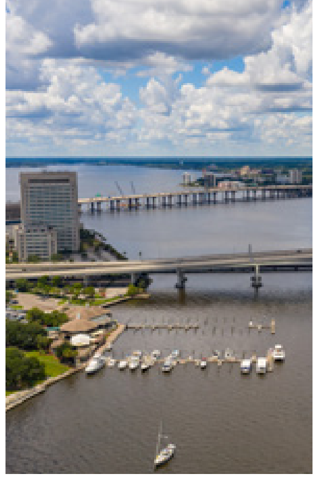


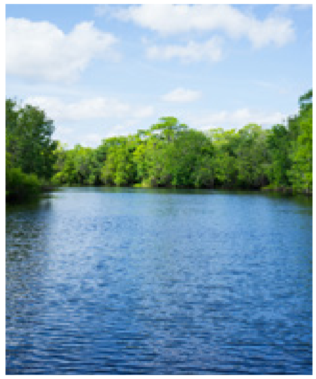
System Constraints

To evaluate water supply needs by JEA's grid and sub-grid delivery areas, an integrated systems model was developed using the commercial simulation software STELLA (Systems Thinking Experimental Learning Laboratory with Animation).



The systems model tracks water demands and water supplies at the sub-grid level, estimating potential supply gaps at a monthly basis. For JEA's groundwater supply, the system model reflects JEA's CUP for each water treatment plant, which is aggregated to a specific sub-grid. The systems model also incorporates major water, sewer and reclaimed system capacities, including permitted treatment capacities and major conveyance pipeline capacities. Transfer of raw water between the North Grid and South Grid via two existing St. Johns River crossings, considering both the raw water available to be transferred as well as the hydraulic capacity of the pipelines, is simulated as part of meeting water demands. New supply alternatives can also be evaluated in terms of timing of supply benefits, unit costs, and water quality.




Gap Analysis by Sub-Grid

Future water demands were compared against the current water supplies by sub-grid, including new supply projects that JEA has already initiated. In doing so, the future total water supply need (or gap) is identified both in temporal and spatial form.

Outdoor water demands vary seasonally throughout the year due to more water being needed for irrigation during the hotter summer months. To account for this variation, monthly peaking factors, developed from historical water use data, were utilized to convert annual demand values into a seasonal pattern. It is the supply gaps identified during these peak summer months which were utilized in planning for new alternative water supply. The dry weather maximum monthly water demand is about 12% higher than the dry weather annual average. The total dry weather max month supply gap is expected to be 14 MGD by 2030 and nearing 60 MGD by 2070 (see **Table 2**). The identified supply gaps do not include any assumed conservation efforts or further expansion of the reclaimed water service area.

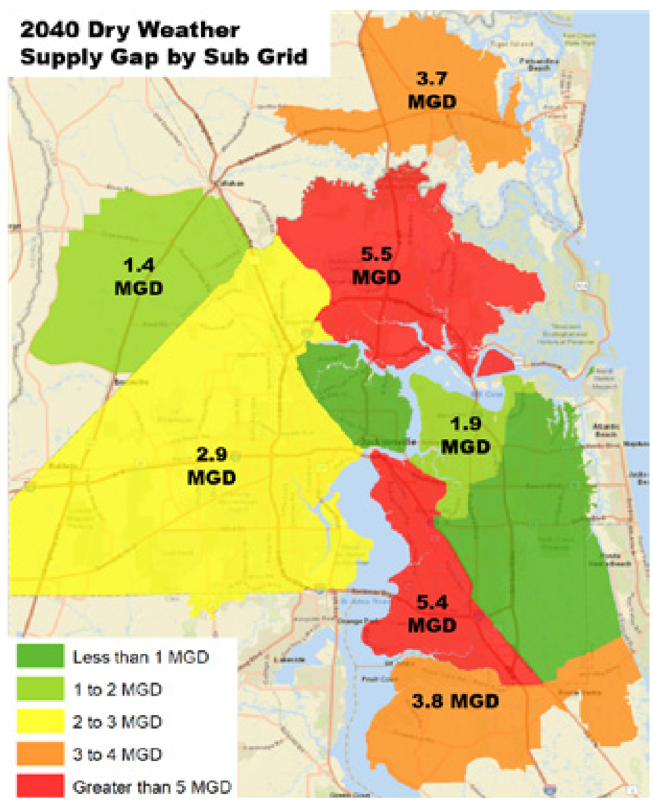


Table 2. Total Water Supply Needs by Major Grid

Water Grid	Dry Weather Max Monthly Deficit (MGD)				
	2030	2040	2050	2060	2070
South Grid	8	11	13	15	16
North Grid	2	8	17	26	34
Nassau	4	5	6	7	8
Overall Total	**14**	**24**	**36**	**48**	**58**

3 Water Supply Options

WATER SUPPLY OPTIONS

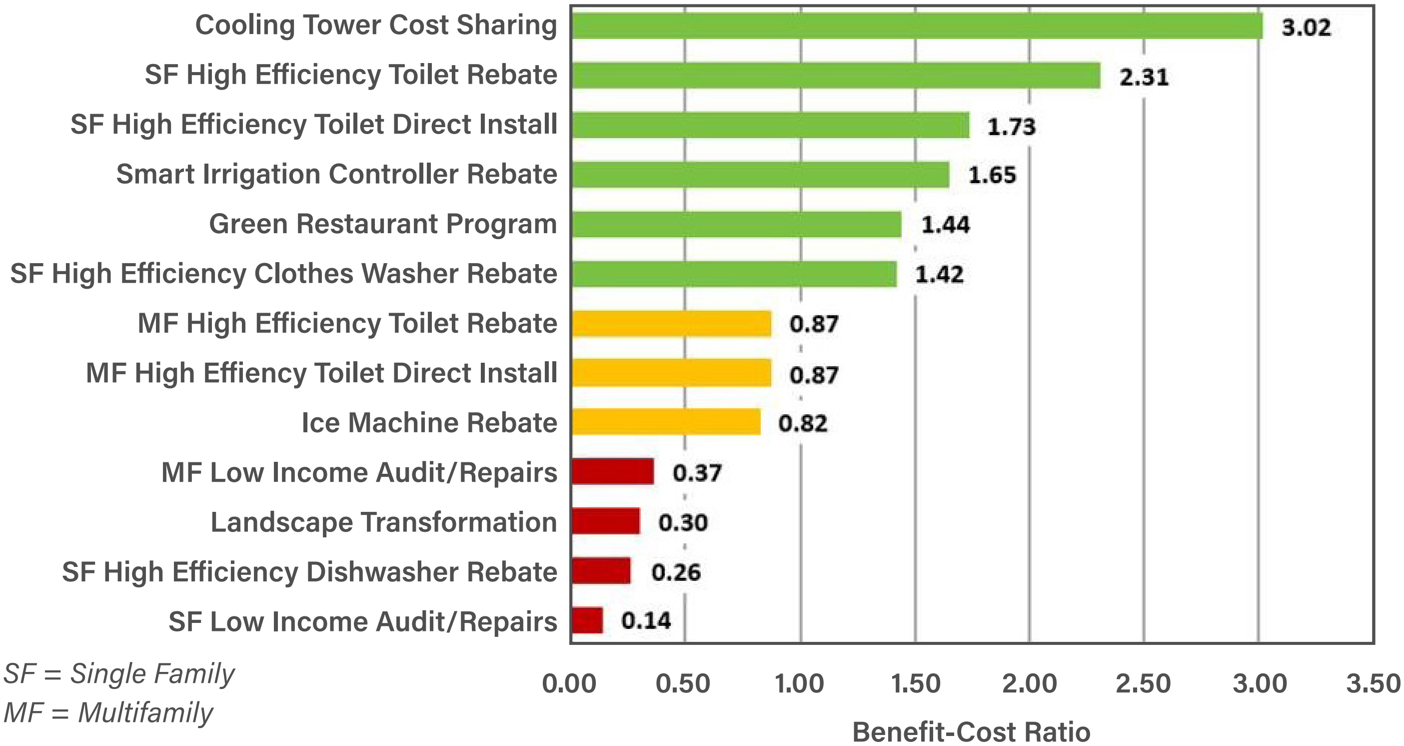
The IWRP's main goal is to develop a long-range strategy that provides water supply certainty far into the future and considers continued investments in conservation, expansion of reclaimed water to meet outdoor demands and bringing online alternative water supplies (AWS) in a cost-effective way.

Water Conservation

As part of the IWRP, a Water DSM Strategy was developed by analyzing a universe of feasible DSM measures. These DSM measures were evaluated using a sophisticated water conservation model that estimated water use and potential efficiency gains by sector and major end uses of water (e.g., toilet flushing, showers, clothes washing, dishwashing, landscape irrigation, cooling towers, etc.).

Each DSM measure was targeted to appropriate water customer types by neighborhood. Assumed levels of customer participation were made over an initial 5-year implementation period. Costs for the DSM measures were based on rebate programs from around the United States. Benefits were based on reduced O&M costs for water and sewer, as well as deferred costs for new water supply projects. **Figure 3** presents the benefit-cost ratio of the evaluated DSM measures.

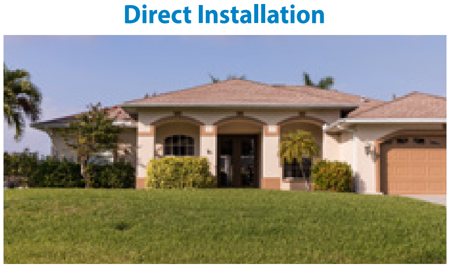
Figure 3. Ranking of DSM Measures by Benefit-Cost Ratio



The final DSM Strategy selected for implementation included 5 indoor measures and 2 outdoor measures. Expected implementation cost for JEA will total $34 million, with an economic return of $49 million when accounting for reduced O&M costs and deferments of new alternative supply costs. In total, the program will achieve a peak savings of up to 4.5 MGD and an overall benefit-cost ratio of 1.45 (i.e., every $1 spent saves JEA and customers $1.45). An additional benefit of DSM is enhanced customer experience, as participants in the program will enjoy reduced water bills (and in some cases reduced energy bills). For the IWRP, an expanded DSM Strategy was assumed with 9 measures being implemented over a longer period providing an extended savings of 6.5 MGD at a total cost of $130 million.

Recommended Water DSM Strategy

Single-Family High Efficiency Toilet Direct Installation



Multifamily High Efficiency Toilet Direct Installation

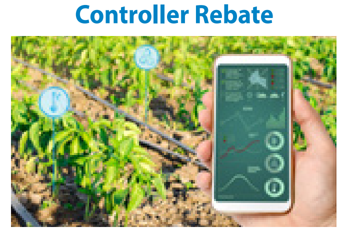
Single-Family High Efficiency Clothes Washer Rebate

Green Restaurant Program

Ice Machine Program

Cooling Tower Cost Sharing

Smart Irrigation Controller Rebate



Peak Water Savings = 4.5 MGD	Implementation Cost = $34 Million	Benefit = $49 Million	Net Benefit = $15 Million

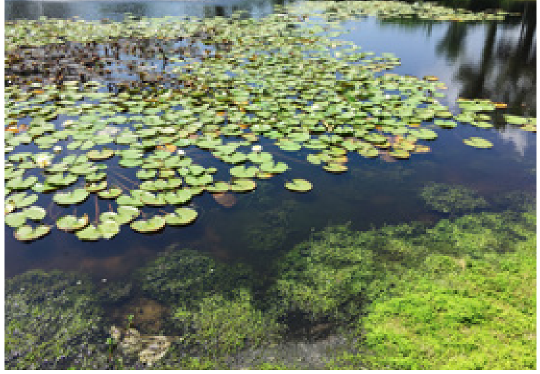
Given that the IWRP looks far beyond 5-years out, a key assumption in evaluating AWS, is how, and to what level, can conservation gains continue to be made. Focused conservation programs, when implemented successfully, are more cost effective than AWS, because conservation reduces the amount of new supplies brought online while also reducing water reclamation costs with almost no infrastructure investment. That said, there are technical limitations to how much conservation can be achieved and many of the measures include trying to change a customer's awareness and behaviors associated with their water use practices. Because of these added complexities, it is important to be practical on what can be achieved via conservation. The success of the DSM program should be monitored as it is being implemented because of implications related to timing and quantity of AWS needs.

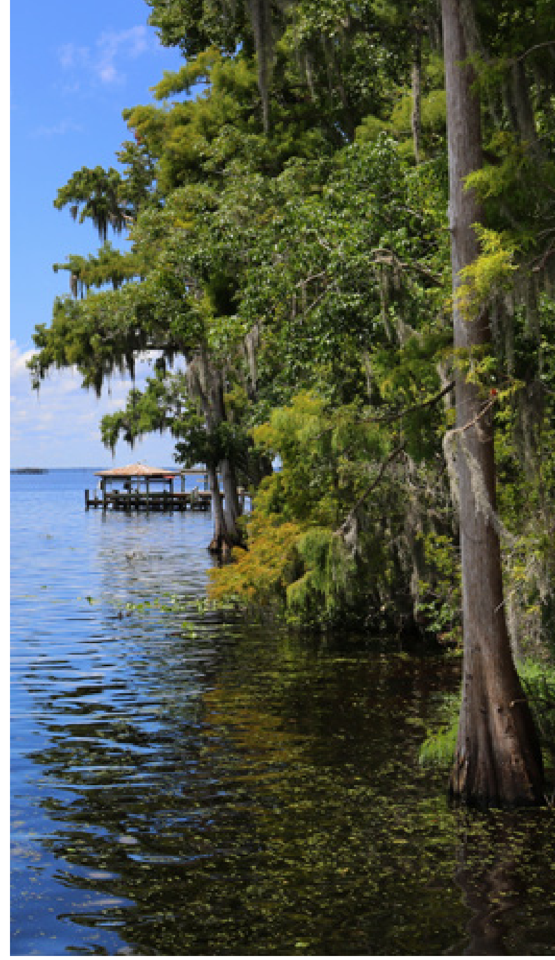
Alternative Water Supplies

Given JEA's long history of evaluating and planning for alternative water supplies, this effort gained significantly from that past work and allowed the team to add additional details including some of the following:

- Water supply options were evaluated, and cost estimated down to the sub-grid level, including conveyance and hydraulic analysis
- Given the potential for leveraging membrane technologies associated with AWS, several variants for concentrate disposal were evaluated and cost ranges developed
- Significant effort was devoted to evaluating the potential need to eliminate surface water discharges of treated wastewater effluent, recognizing the existing legislation that is being considered in early 2021
- Reclaimed water was considered over a broad range, including adding membrane treatment for potable reuse (purified water) and the possibility of retrofitting already built out neighborhoods with reclaimed water to meet outdoor irrigation demands

Future Alternative Water Supplies will likely make use of membrane reverse osmosis (RO) technologies that produce highly purified water but also require management of a brine concentrate. Concentrate management can range in costs from $1 per 1,000 gallons of water produced (deep well injection) to upwards of $2 per 1,000 gallons of water produced (zero liquid discharge).



Over all of the sub-grids evaluated for new supplies, more than 30 new supply options were conceptualized, including increments as small as 2 mgd and as large as 30 mgd with a cost range from $1.3 to $7.2 per 1,000 gallons (kgal) of water. The ranges of water supply and unit costs within each category reflects different project sizes and project locations, as well as level of treatment for desalination options.

Water Conservation

Supply: 5 to 7 MGD
Unit Cost: $1.3 to $2.4/kgal

Traditional Reclaimed

Supply: 2 to 16 MGD
Unit Cost: $3.0 to $5.3/kgal

Stormwater Augmentation

Supply: up to 5 MGD
Unit Cost: $3.0/kgal

Potable Reuse

Supply: 5 to 32 MGD
Unit Cost: $2.9 to $6.1/kgal

Brackish GW Desalination

Supply: 2 to 24 MGD
Unit Cost: $2.6 to $5.3/kgal

Surface Water Desalination

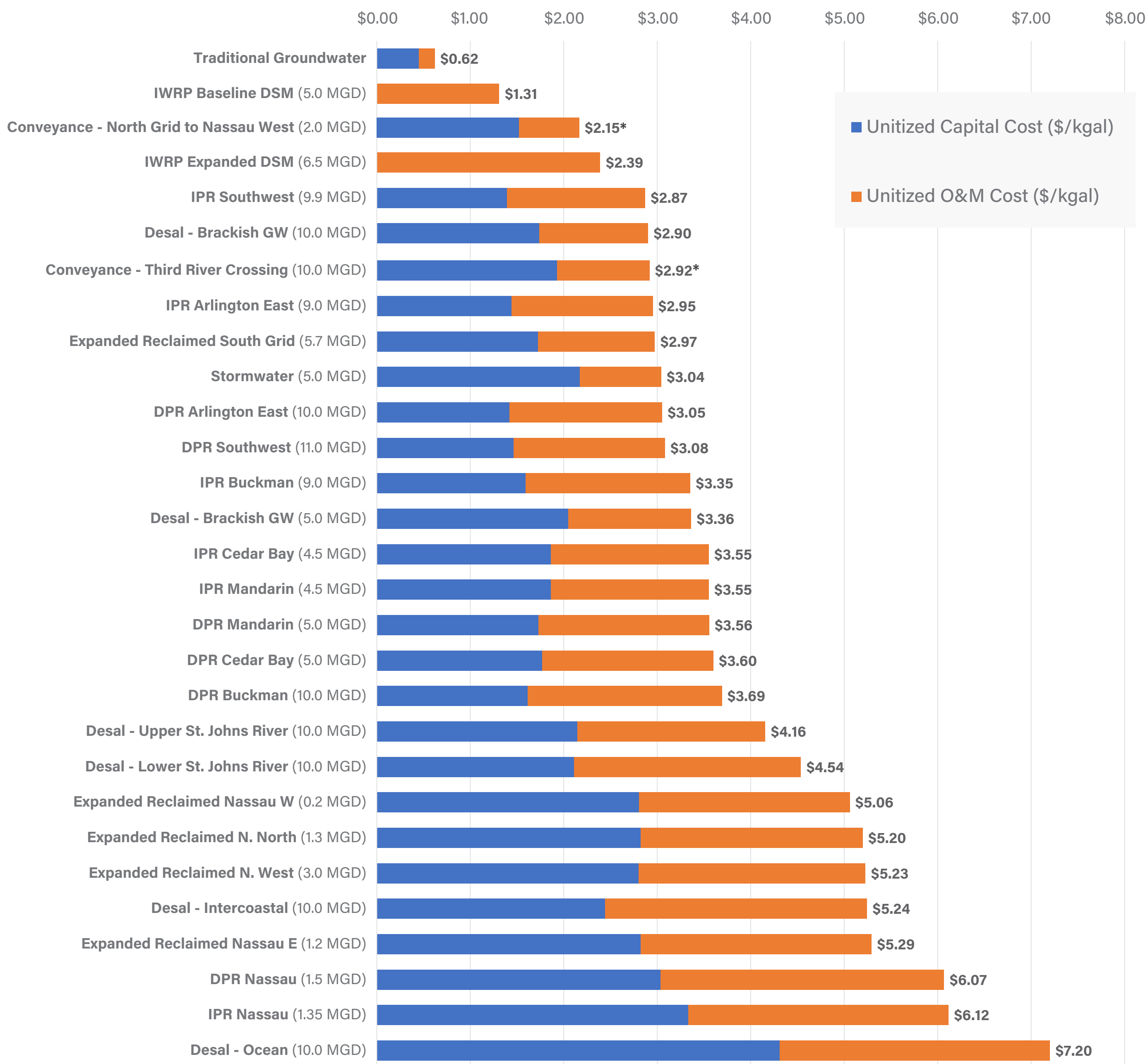
Supply: 4 to 30 MGD
Unit Cost: $4.2 to $7.2/kgal

The total unitized cost of water is the sum of unitized capital costs and operating costs. Unitized capital costs were developed assuming financing over 30 years at a discount rate of 2.5%. Depending on the supply alternative, unitized operating and maintenance costs (O&M) typically included variable costs such as electricity, chemicals and residual disposal as well as fixed costs such as labor, water quality analyses, and equipment repair and maintenance. The costs for water conservation are a net unit cost which includes the cost of the program and operational cost savings from conserving water.




Figure 4 below shows the annualized cost for each supply option in units of dollars per 1,000 gallons of water supplied and includes a breakdown between the required capital investment and the unitized O&M costs. The costs include water supply production and major transmission only. They do not include distribution system upgrades and administrative costs. The supply provided by each option is also listed. In many cases, larger or smaller capacities could be designed but the size listed corresponds to the provided cost. No single project will meet all the identified supply needs so a combination of projects is required.

Figure 4. Annualized Cost of Water Supply Options ($/kgal)



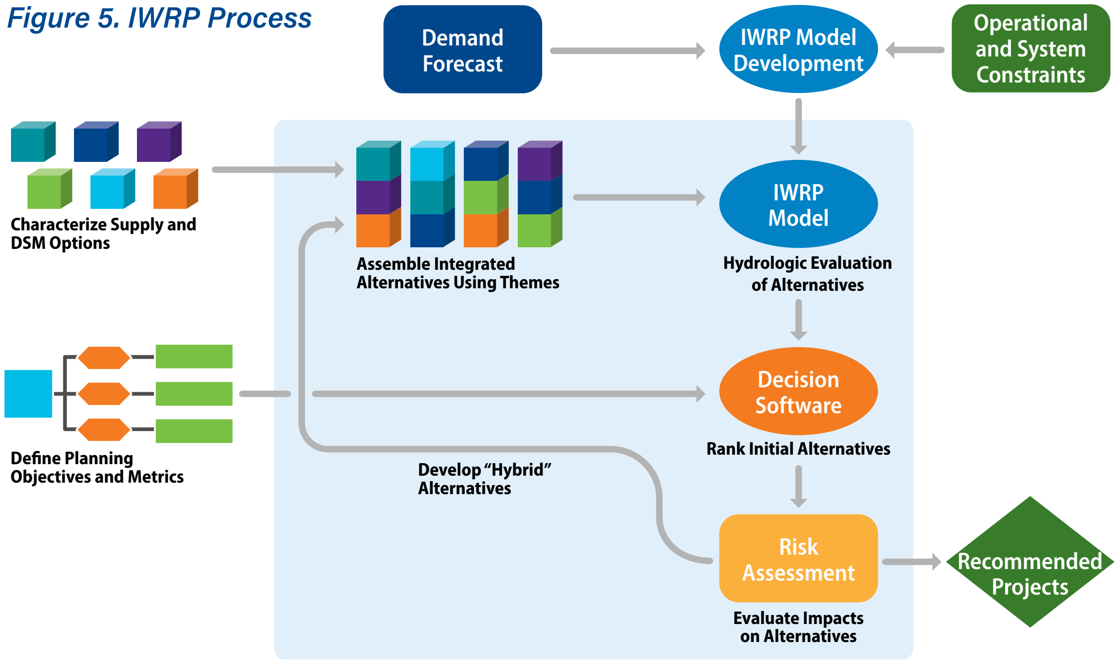
**Conveyance options such as the Third River Crossing do not ultimately provide new supply and would need to be in addition to a new supply option in order to meet long term supply needs.*

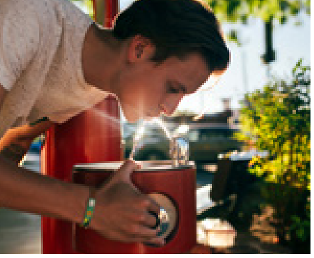
4 Evaluation Framework and Alternatives Analysis

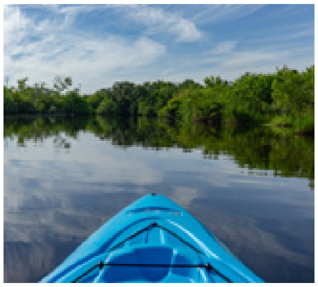
EVALUATION FRAMEWORK AND ALTERNATIVES ANALYSIS

Having a pre-established and agreed-upon evaluation framework is essential to ensure that the IWRP's recommendations are objective, transparent and defensible. **Figure 5** outlines the evaluation framework that JEA implemented for analyzing and developing the IWRP's baseline, hybrid and preferred alternatives.

Figure 5. IWRP Process



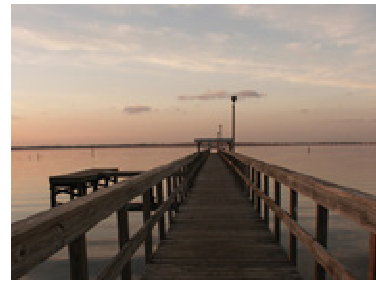


The IWRP evaluation framework is intentionally designed to be an iterative process that first starts with themed baseline alternatives that are singularly focused. This allows for understanding tradeoffs as hybrid alternatives, or alternatives that mix and match higher performing components of the baseline themed alternatives, are developed and analyzed for uncertainty or risk. It is through these iterations that the preferred alternative is developed. The baseline alternatives that were developed for JEA's IWRP are outlined in **Table 3** below:

Table 3. Baseline Alternatives

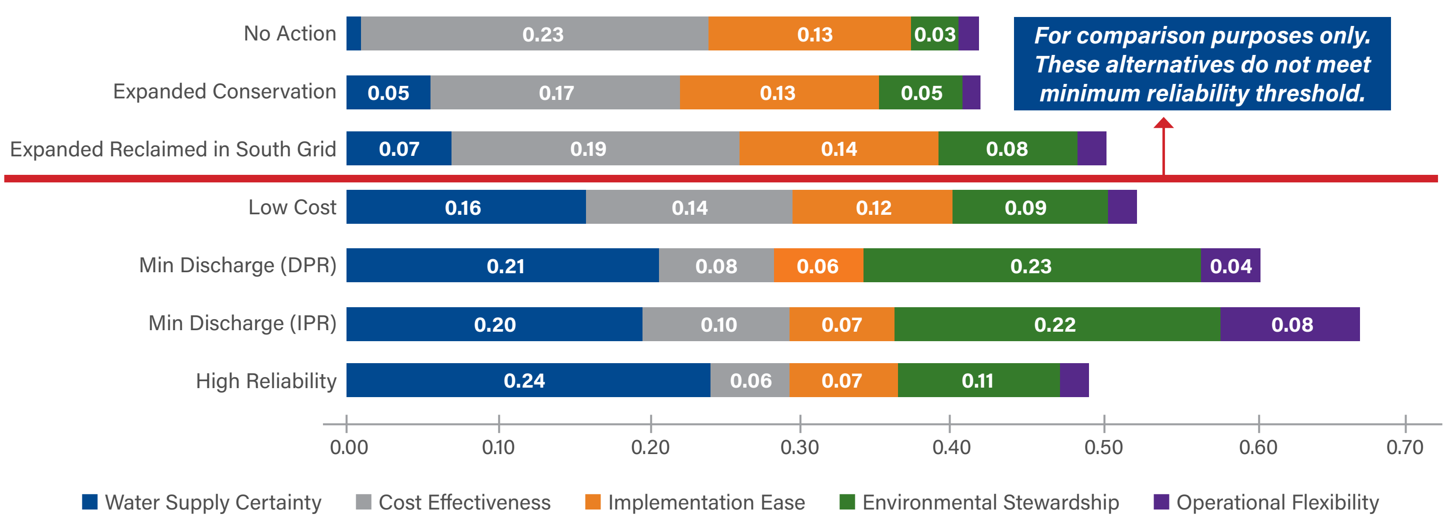
Alternative Name	Definition
No Action (Does not Meet Reliability Threshold)	Current groundwater and existing reclaimed plus committed reclaimed water in the South Grid, with no additional (future) water supply or water conservation.
Expanded Water Conservation (Does not Meet Reliability Threshold)	Expanded levels of water conservation, beyond the 5-Year DSM Program, coupled with existing reclaimed plus committed reclaimed water in the South Grid.
Expanded Reclaimed System in South Grid (Does not Meet Reliability Threshold)	Committed and new expansions of reclaimed water in the South Grid, coupled with baseline levels of water conservation.
Low Cost	Committed and new expanded reclaimed water in South Grid, brackish groundwater desalination, new intra-grid conveyance, and expanded levels of water conservation.
Minimize Treated Wastewater Discharge to St. Johns River (DPR Focus)	Committed and new expanded reclaimed water in the South Grid, direct potable reuse projects, new intra-grid conveyance, and baseline levels of water conservation.
Minimize Treated Wastewater Discharge to St. Johns River (IPR Focus)	Committed and new expanded reclaimed water in the South Grid, indirect potable reuse, new intra-grid conveyance, and baseline levels of water conservation.
High Reliability (Desalination Focus)	Committed and new expanded reclaimed water in the South Grid, brackish desalination, including river/intracoastal desalination, new intra-grid conveyance and baseline levels of water conservation.



The baseline alternatives were ranked against the five IWRP objectives using a decision software, where the longer the color bar the better the performance for a specific objective (**Figure 6**). The total length of all bar segments indicate the overall ranking score for the alternative. The Minimize Discharge with IPR focus had the best overall ranking score. Some items to note from the results include the following:

- The No Action, the Expanded Conservation and the Expanded Reclaimed baseline alternatives did not meet the minimum reliability threshold, which was set to ensure that there would not be any water supply gaps under average weather for the 2040 max month demands.
- The Lowest Cost alternative scored best for cost effectiveness but fell short on providing environmental benefits.
- The Minimize Discharge alternatives, with an emphasis on potable reuse, scored the best overall for the baseline alternatives, scoring well in most categories.
- The High Reliability baseline alternative scored well in water supply certainty but did not score well for cost effectiveness or operational flexibility.

Figure 6. Evaluation of Baseline Alternatives






Prior to developing and analyzing the hybrid alternatives, JEA conducted a risk analysis of the baseline alternatives that met the minimum reliability threshold. This allows for a better understanding of their ability to perform given possible future uncertainties.

Elements of Risk Exposure for Baseline Alternatives

Groundwater Withdrawal Limitations
Difficulty in withdrawing anticipated groundwater for brackish desalination and indirect potable reuse credit—with a 50% IPR recovery ratio and 50% reduction in groundwater produced from brackish desalination outside of the South Grid.

Zero Liquid Discharge
Increased capital and O&M costs associated with zero liquid discharge concentrate disposal for IPR, DPR, and desal options (brackish GW and surface).

Membrane Treatment Technology
Decreased capital and O&M costs associated with future technology gains in membrane treatment—assuming a 30% decrease in capital cost and 10% decrease in O&M cost.

Stranded Cost
Stranded capital costs associated with greater levels of water conservation that occur after new water supply projects are implemented.

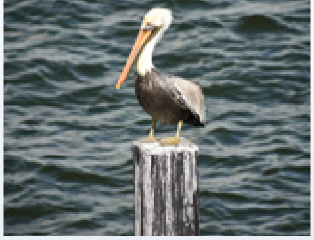
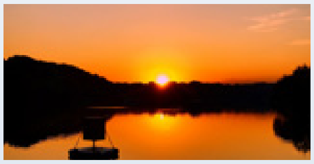
The risk analysis results are summarized in **Table 4**. The table provides a performance assessment of the baseline alternatives in terms of their ranking and exposure to risk from the sensitivity analysis. **Green** indicates relatively greater benefits/lower risk, while **red** indicates relatively lower benefits/higher risk, and **yellow** is somewhere in-between. Depending on the situation, having a high sensitivity can be either a benefit (reduced costs) or a risk (reduced groundwater recovery).

Table 4. Risk Exposure Heat Map

Alternative	Rank Score	Groundwater Recovery	Zero Liquid Concentrate Cost Risk	Membrane Technology Cost Savings	Stranded Investment Risk
Low Cost	0.52	High	Low	Med	High
Minimize Discharge (DRP)	0.55	Low	Med	High	Med
Minimize Discharge (IPR)	0.61	High	Med	High	Med
High Reliability	0.47	Med	High	High	HIgh

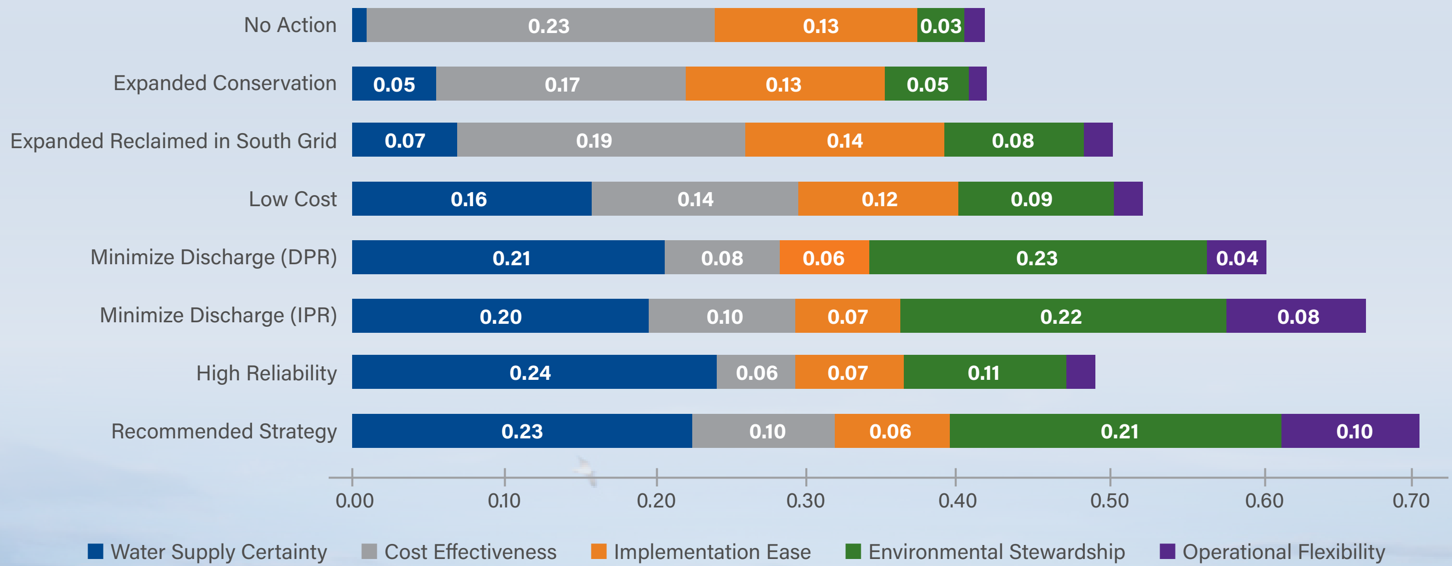
The following conclusion arise from the risk exposure heat table:

- The High Reliability and Low Cost alternatives have lower rank scores and higher potential risk exposure to uncertainties.
- While the Minimize Treated Wastewater Discharge (IPR Focus) alternative has the best rank score, it has a slightly higher risk exposure compared to the Minimize Discharge (DPR Focus) alternative.


The risk exposure analysis, along with other insights, were used to evaluate several hybrid alternatives. A final recommended strategy was developed that included a mix of expanded reclaimed and conservation, along with potable reuse and brackish desalination. **Figure 7** presents the ranking of the baseline alternatives and final recommended strategy. As seen, the recommended strategy performs best overall.

Figure 7. Ranking of Baseline Alternatives and Recommended Strategy

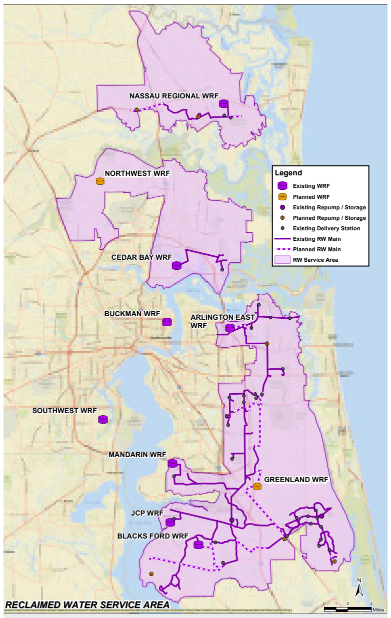


5 Conclusions and Recommendations

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The following conclusions can be made based on the evaluations within the IWRP:



JEA reuse service area.

1. Single-family residential water customers account for most of JEA's water demands, at about 62 percent of current total demand.
2. Landscape irrigation can represent 20 to 92 percent of total single-family residential water demand, averaging 57 percent for single-family homes in the service area. The range is noticeably large due to the fact that it is greatly dependent on the residential lot size and affluence of the neighborhoods.
3. If all of JEA's water customers were at their maximum-level of water efficiency for indoor and outdoor water uses, the theoretical water conservation savings by 2040 would be about 20 mgd—but this would be extremely costly, difficult to achieve, and would require significant regional municipal policy changes as well as customer behavior changes.
4. Based on JEA's Water DSM Strategy report, more achievable water conservation savings that provide a net benefit to JEA and its water customers range from 4 to 5 mgd by 2040. Implementation of the DSM program will be evaluated every 12-24 months and the results of that evaluation will be used to guide future longterm continued investments in conservation.
5. Traditional reclaimed water supply used to meet non-potable water demands can be beneficial in service areas where JEA has already made substantial investments in water reclamation treatment and reclaimed conveyance.
6. Implementation of targeted water conservation and traditional reclaimed will allow JEA to free up existing groundwater allocations under the CUP to serve additional customers, but there will be additional needs for alternative water supplies between 2025 and 2030 in order to meet seasonal water demands under dry weather conditions.
7. Potable reuse, either indirect or direct, offers multiple benefits such as providing alternative water supplies and reducing the treated wastewater discharge to the St. Johns River.
8. In some JEA service areas, brackish groundwater desalination is more cost-effective and easier to implement than potable reuse due to location and limited availability of potable reuse supply.
9. Water conveyance and river crossings to transfer available water supply from one area to another area with supply needs can be beneficial as long as future water demands in the area where supply is being transferred from do not increase significantly and cause stranded investments.

Recommendations

The recommendations for JEA's IWRP are made for near-term, mid-term, and long-term. The IWRP will be continuously monitored, with mid-term and long-term recommendations being potentially revisited should future conditions change. As of now, the following recommendations are being made:

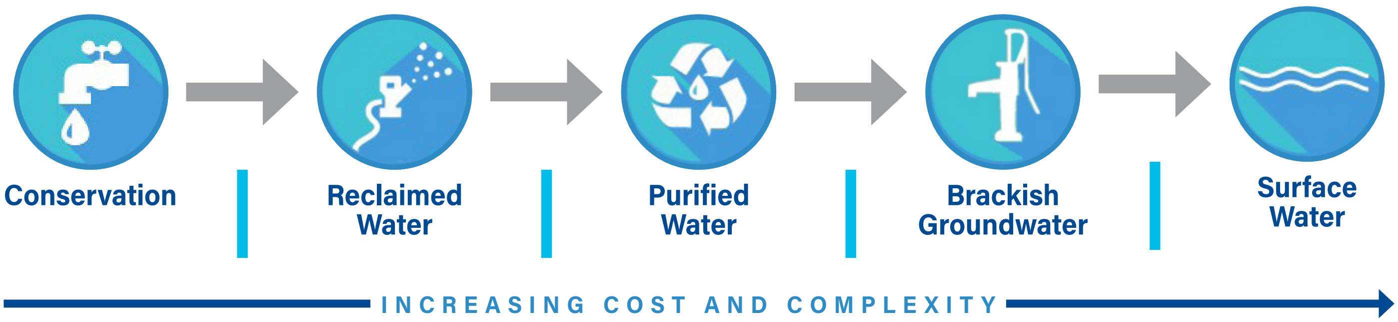
Short-Term Recommendations (2020-2030)

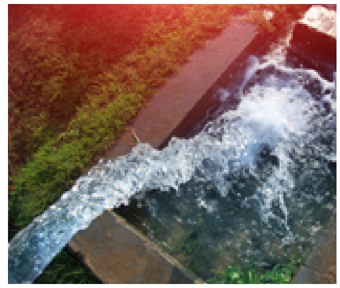
- Complete implementation of the Southside Integrated Piping System (SIPS) program to transfer more available water from the North Grid to the South Grid
- Continued implementation of the DSM Program based on continued evaluation of cost effectiveness and meeting conservation goal targets
- Work with developers to continue expanding traditional reclaimed water in the South Grid—providing an additional 3.0 mgd of non-potable water for the St. Johns County sub-grid
- Conduct public outreach, permitting, design and construction for an indirect potable reuse facility located in the South Grid, utilizing supply from the Arlington East Water Reclamation Facility (WRF)—providing an additional 2.7 mgd of alternative water supply for the South Grid
- Complete design and construction of water reclamation treatment and conveyance for expanded reclaimed water—providing an additional 1.0 mgd of non-potable water in the Nassau East area
- Conduct permitting, design and construction for a 3.0 mgd brackish groundwater desalination facility in the Nassau East Grid - the first phase of operations will provide 2.0 mgd of supply
- Conduct design and construction of a new water conveyance pipeline to transfer groundwater from the North Grid to the west Nassau West area
- Conduct permitting, design and construction for a 4.0 mgd indirect potable reuse facility at Cedar Bay WRF - the first phase of operations will provide 1.8 mgd of supply for the North sub-grid of the North Grid

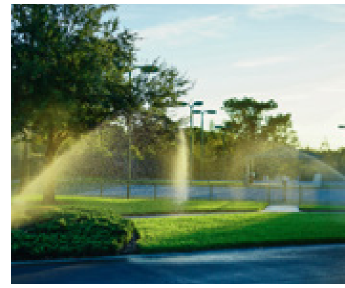
JEA is evaluating the potential to implement new cost effective treatment technologies such as reverse osmosis (RO) membranes as it looks to diversity the future water supply portfolio, to include brackish groundwater desalination and potable reuse.

Mid-Term Recommendations (2030-2040)

- Continued implementation of the DSM Program based on continued evaluation of cost effectiveness and meeting conservation targets
- Expand the operations for the second phase of indirect potable reuse at Cedar Bay WRF—providing an additional 1.8 mgd of alternative water supply for the North sub-grid of the North Grid
- Expand operations for the second phase of brackish groundwater desalination—providing an additional 1.0 mgd of alternative water supply for the Nassau East Grid
- Conduct permitting, design and construction of the first phase of indirect potable reuse at Southwest WRF—providing an additional 2.7 mgd of alternative water supply for the West sub-grid of the North Grid
- Conduct permitting, design and construction of the first phase of brackish groundwater desalination—providing an additional 2.0 mgd of alternative water supply for the North sub-grid of the North Grid







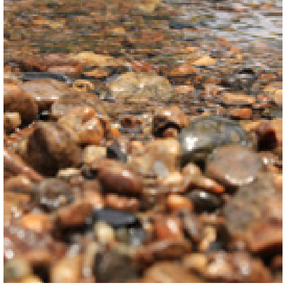
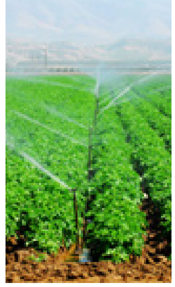
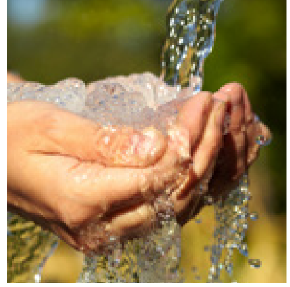
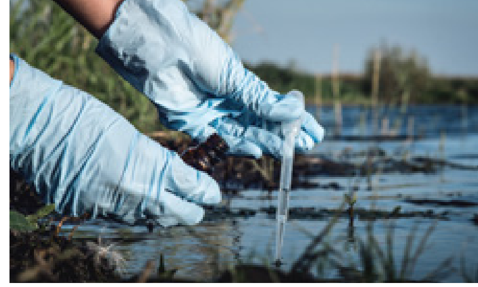
Long-Term Recommendations (Beyond 2040)

- Continued implementation of the DSM Program based on continued evaluation of cost effectiveness and meeting conservation targets
- Conduct public outreach, permitting, design and construction of direct potable reuse at Buckman WRF—providing an additional 8.0 mgd of alternative water supply for the South Grid and 12 mgd of alternative water supply for the West sub-grid of the North Grid
- Conduct permitting, design and construction of the second phase of indirect potable reuse at Southwest WRF—providing an additional 5.4 mgd of alternative water supply for the West sub-grid of the North Grid
- Conduct permitting, design and construction of the third phase of brackish groundwater desalination—providing an additional 1.0 mgd of alternative water supply for the Nassau East Grid
- Conduct permitting, design and construction of the second phase of brackish groundwater desalination—providing an additional 7.0 mgd of alternative water supply for the North sub-grid of the North Grid

POTABLE WATER RESIDENTIAL PER CAPITA

2010	2019
JEA AVERAGE	JEA AVERAGE
~100 *Gallons Per Day*	~75 *Gallons Per Day*

Serving 1 Million customers, 25 gpd of conservation saves 9.1 Billion Gallons per year

Capital Improvement Program

Based on the IWRP recommendations, a detailed capital improvement program (CIP) was developed for the next 10 and 20 years, with long-term projects being identified beyond 2040. **Figure 8** presents the CIP schedule for new water supply projects. Implementation of a conservation strategy and already planned continued expansion of the reclaimed water system in the South Grid and Nassau East Grid are also critical elements of meeting the supply gaps outlined in **Table 5.** In the near term, JEA has operational flexibility within the CUP to distribute groundwater pumping between grids. This flexibility provides the ability to maximize the timing of projects.

Table 5. Meeting Near-Term Supply Gap (MGD)

	Identified Supply Gap	2030	2040	2070
		14	24	58
Supply Options	Conservation	6.5	6.5	6.5
	Expanded Reclaimed	3.3	4.4	6.3
	New Supply	6.5	14.0	47.4
	Total Additional Supply	**16.3**	**24.9**	**60.2**

Figure 8. Recommended JEA IWRP CIP Schedule

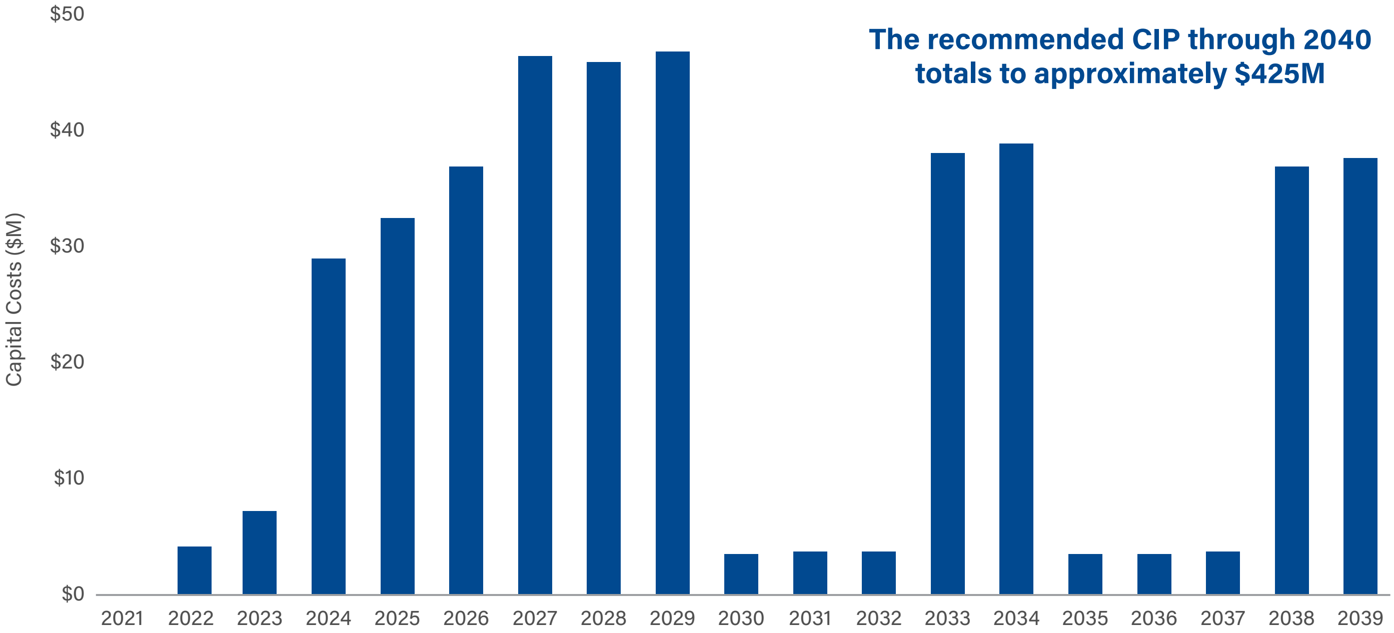
CIP Phase	Project	Grid	Capacity Size (MGD)	Water* Supply (MGD)	2020 to 2024	2025 to 2029	2030 to 2034	2035 to 2039	2040 and Beyond
10 Year	Purified Water South Grid (1.0 MGD Demo)	S Arlington	0.0	--	🟨🟨🟦🟦	🟧🟧🟧			
10 Year	Aquifer Recharge South Grid	S Arlington	3.0	2.7		🟨🟦🟩			
10 Year	Brackish GW Desalination – Nassau	Nassau East	3.0	2.0/3.0	🟨🟨	🟨🟦🟦🟩			🟩
10 Year	Aquifer Recharge at Cedar Bay WRF	N North	4.0	1.8/3.6		🟨🟨🟨🟦🟦	🟩	🟩	
10 Year	New Conveyance – Nassau West	Nassau West	2.0	1.0†		🟨🟦🟦	🟩		
20 Year	Aquifer Recharge at Southwest WRF	N West	3.0	2.7			🟨🟨🟨🟦🟦	🟩	
20 Year	Brackish GW Desalination – North	N North	2.0	2.0				🟨🟨🟨🟦🟦	🟩
Long-Term	Purified Water for Direct Use at Buckman WRF	S Grid (8) / N West (12)	20.0	20.0					*Timing TBD*
Long-Term	Aquifer Recharge at Southwest WRF – Expansion	N West	6.0	5.4					*Timing TBD*
Long-Term	Brackish GW Desalination – Nassau East – Expansion	Nassau East	1.0	1.0					*Timing TBD*
Long-Term	Brackish GW Desalination – North – Expansion	N North	7.0	7.0					*Timing TBD*

WRF – Water Reclamation Facility | 🟨 Design & Permit | 🟦 Construction | 🟧 Demonstration & Training | 🟩 Operational

**The supply available for withdrawal from aquifer recharge projects is assumed as 90 percent of the water stored.*
†New conveyance helps to meet localized supply gaps but does not represent a new source of supply.

The capital costs for new alternative water supply projects within the CIP through 2040 are shown in **Figure 9**. These costs include engineering, design, permitting, JEA indirect costs and a two percent escalation factor. Projects were grouped within five-year increments but could be further staggered to distribute financing requirements.

Figure 9. Capital Costs for JEA's CIP Through 2040.



DSM Strategy

Water conservation is an important component for JEA's IWRP, as it provides multiple benefits such as extending existing groundwater and reclaimed water supplies, reducing JEA's current operating costs for water and sewer, reducing/deferring future capital investments, and providing increased customer satisfaction by increasing water use efficiency and reducing water bills. Successful implementation of water conservation programs in JEA's service area requires a DSM Strategy.

In order to advance the DSM Strategy, existing and new water customers were characterized by neighborhood in terms of irrigable lot size, age of home, and income to develop a highly-targeted program that maximizes water conservation savings in a cost-effective manner. A five-year initial DSM Strategy was developed to first implement those water conservation measures with the highest net benefit to determine which ones have the greatest customer acceptance. Implementation of the initial DSM strategy is expected to conserve about 4 MGD of sustained water savings over the next 10 or so years, with a total cost of just under $40 million. **Table 6** presents the cost details for this strategy.

Based on the useful life of these DSM measures and the reduced costs for JEA's operations and deferred capital investments, the anticipated net benefit of this initial strategy is approximately $15 million.

Table 6. JEA Water DSM Strategy Costs

DSM Strategy Cost Categories	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Incentive and Administration Costs ($ millions)						
SF High Efficiency Toilet Direct Install	$0.96	$0.96	$0.96	$0.96	$0.96	$4.80
MF High Efficiency Toilet Direct Install	$1.73	$1.73	$1.73	$1.73	$1.73	$8.64
SF High Efficiency Clothes Washer Rebate	$3.52	$3.52	$3.52	$3.52	$3.52	$17.61
Green Restaurant Program	$0.05	$0.05	$0.05	$0.05	$0.05	$0.25
Ice Machine Rebate	$0.01	$0.01	$0.01	$0.01	$0.01	$0.05
Cooling Tower Cost Sharing	$048	$0.48	$048	$0.48	$0.48	$2.40
Smart Irrigation Controller Rebate	$0.58	$0.58	$0.58	$0.58	$0.58	$2.90
Sub-total	**$7.33**	**$7.33**	**$7.33**	**$7.33**	**$7.33**	**$36.65**
Programmatic Costs ($ millions)						
Marketing/Public Education	$0.40	$0.40	$0.40	$0.40	$0.40	$2.00
Program Evaluation	$0.08	$0.08	$0.08	$0.08	$0.38	$0.70
Sub-total	$0.48	$0.48	$0.48	$0.48	$0.78	$2.70
TOTAL COSTS	**$7.81**	**$7.81**	**$7.81**	**$7.81**	**$8.11**	**$39.35**

Because it is important that JEA continue implementation of water conservation measures beyond the initial five-year DSM Strategy, increased customer participation was projected over a 10-year expanded program implementation for the IWRP. Based on this expanded program, longer-term water savings were estimated to be between 6.5 and 7 MGD, with a cost of implementation being approximately $130 million, or $13 million per year.

Prepared by

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