Central Florida Water Initiative

Appendices, Volume IIA






REGIONAL WATER SUPPLY PLAN APPENDICES TO VOLUME II

2015

A comprehensive plan for Orange, Osceola, Polk, Seminole, and southern Lake counties

This document is the Central Florida Water Initiative (CFWI) Regional Water Supply Plan (RWSP), 2035 Water Resources Protection and Water Supply Strategies Plan (Solutions Strategies), Volume IIA, Appendices. Staff from the South Florida Water Management District (SFWMD), St. Johns River Water Management District (SJRWMD), and Southwest Florida Water Management District (SWFWMD) worked together and in conjunction with members of various Central Florida Water Initiative technical teams and other stakeholders to generate the CFWI RWSP. Section 373.709, Florida Statutes (F.S.), details the components of regional water supply plans.

In November 2015, the respective governing boards of the three water management districts approved the 2015 CFWI RWSP, Volumes I and II with their associated appendices. These documents are available at cfwiwater.com.

Table of Contents

This Page Intentionally Left Blank.

Acronyms and Abbreviations

AACE	Association for the Advancement of Cost Engineering
AADF	average annual daily flow
ADF	average daily flow
AFSIRS	Agricultural Field Scale Irrigation Requirements Simulation
AG	agriculture
AMI	advanced metering infrastructure
AMR	automatic meter reading
AWE	Alliance for Water Efficiency
AWS	alternative water supply
AWWA	American Water Work Association
BCWU	base condition water use
BEBR	University of Florida's Bureau of Economic and Business Research
bls	below land surface
BMAP	Basin Management Action Plan
BMPs	best management practices
C & SF	Central and Southern Florida Project
CDDs	Community Development Districts
CE Tool	Cost Estimating Tool
CERP	Comprehensive Everglades Restoration Plan
CFCA	Central Florida Coordination Area
cfs	cubic feet per second
CFWI	Central Florida Water Initiative
CII	commercial/industrial/institutional
CUP	consumptive use permit

DEO	Florida Department of Economic Opportunity
DSS	domestic self-supply
EAC	equivalent annual cost
ECFT	East Central Florida Transient Groundwater Model
EEST	Environmental Evaluation Subteam
ELU	existing legal user
ENR	Engineering News Record
ENRCCI	Engineering News Record Construction Cost Indices
EPA	United States Environmental Protection Agency
ERP	Environmental Resource Permit
ERUSA	East Regional Utility Service Area, Polk County
ET	evapotranspiration
F.A.C.	Florida Administrative Code
FAQs	Frequently asked questions
FARMS	Facilitating Agricultural Resource Management Systems
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
F.S.	Florida Statute
FY	Fiscal Year
FYE	full year estimate
GAT	Groundwater Availability Team
GIS	Geographic Information System
gpcd	gallons per capita per day
gpd	gallons per day
GW	Groundwater subteam
HAT	Hydrologic Analysis Team

IFAS	Institute of Food and Agricultural Services
IWA	International Water Association
kgal	1,000 gallons
LEC	Lower East Coast
LEED	Leadership in Energy and Environmental Design
LFA	Lower Floridan aquifer
LRA	landscape/recreational/aesthetic
LSI	landscape supplemental irrigation
LUSI	Lake Utility Services, Inc.
LWR	Lake Wales Ridge
MAC	minimal aquifer connection
MAL	minimum aquifer level
MALPZ	Minimum Aquifer Level Protection Zone
MD	mining dewatering
MDF	maximum daily flow
MFL	Minimum Flow and Level
MG	million gallons
mg/L	milligrams per liter
mgd	million gallons per day
MIA	Most Impacted Area
MIL	mobile irrigation laboratory
MOR	Monthly Operating Report
MOU	Memorandum of Understanding
MS4s	Municipal Separate Storm Sewer System
ND	Not determined
NERUSA	Northeast Regional Utility Service Area, Polk County

NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resource Conservation Service
O&M	operation and maintenance
OPC	opinion of probable cost
OSS	other self-supply – combines DSS, LRA, CII, and PG
OUC	Orlando Utilities Commission
PCC	Peace Creek Canal
PDR	Preliminary Design and Review
PG	power generation
PPH	persons per household
PRMRWSA	Peace River Manasota Regional Water Supply Authority
PS	public supply
R-B use	Reasonable-beneficial use
RAA	Restricted allocation area
RC	**r**eference condition
RCID	Reedy Creek Improvement District
Res	residential
RFB	remaining freeboard
RIB	Rapid Infiltration Basin
RO	reverse osmosis
ROW	right-of-way
RW	Reclaimed Water subteam
RWSP	Regional Water Supply Plan
SAS	Surficial aquifer system
SBWRF	South Bermuda Water Reclamation Facility
SERUSA	Southeast Regional Utility Service Area, Polk County

SFWMD	South Florida Water Management District
SHA	significantly hydrologically altered
SJID	St. Johns Improvement District
SJMCA	St. Johns March Conservation Area
SJR	St. Johns River
SJRWMD	St. Johns River Water Management District
SLRWI	South Lake Regional Water Initiative
SMS	soil moisture sensor
SR	**s**tate road
ST	Stormwater subteam
STA	stormwater treatment area
SW	Surface Water subteam
SWCD	Soil and Water Conservation District
SWFWMD	Southwest Florida Water Management District
SWIMAL	Saltwater Intrusion Minimum Aquifer Level
SWUCA	Southern Water Use Caution Area
SWTP	surface water treatment plant
SWWTP	Southwest Water Treatment Plant
TAZ	traffic analysis zone
TBD	to be determined
TBW	Tampa Bay Water
TCR	Taylor Creek Reservoir
TECO	Tampa Electric Company
TM	Technical Memorandum
TN	total nitrogen
TP	total phosphorus

TWA	Tohopekaliga Water Authority
UF	University of Florida
UFA	Upper Floridan aquifer
UPC	unit production cost
UPR	Upper Peace River
USACE/USACOE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
Water CHAMP℠	Water Conservation Hotel and Motel Program
WaterSense®	USEPA WaterSense® water conservation program
WCCF	Water Cooperative of Central Florida
WCDs	Water Control Districts
WF	wellfield
WMD	Water Management District
WRAP	Water Restoration Action Plan
WRF	water reclamation facility
WSIS	Water Supply Impact Study
WSPO	water supply project option
WTP	water treatment plant
WUCA	water use caution area
WUP	water use permit
WWTP	wastewater treatment plant

This Page Intentionally Left Blank.

A

Conservation Projects, BMPs, and Programs

OVERVIEW

Water conservation (conservation) includes any activity or action which reduces the demand for water including those that prevent or reduce wasteful or unnecessary uses and those that improve efficiency of use. Conservation is one of the primary solutions to meet future water demands or current permitted allocations. This Appendix describes conservation projects, best management practices (BMPs), and programs available for use by public supply (PS) and other self-supplied (OSS) water users and the agriculture community to prevent or reduce unnecessary water use and to increase overall efficiency.

SECTION 1: PUBLIC SUPPLY AND OTHER SELF-SUPPLIED WATER USERS

Conservation Projects

The applicability of ten (10) specific PS and OSS conservation projects was evaluated in Chapter 2 for implementation in the CFWI Planning Area as part of the Solutions Planning Phase and these projects are summarized here.

- CII facility water use assessment/audit
- High efficiency showerhead replacement
- High efficiency toilet replacement
- High efficiency faucet aerator replacement
- High efficiency pre-rinse spray valve replacement
- High efficiency urinal replacement
- Irrigation system audits
- Soil moisture sensors
- Advanced ET irrigation controllers
- Waterwise Florida landscaping

Over 80 conservation projects were identified as applicable to PS and OSS. Of these, 12 were identified for further evaluation, with 10 meeting the criteria for inclusion as recommended Solutions Strategies document conservation projects. All 10 of these projects were considered feasible and no anticipated limitations due to rule constraints are expected. Funding sources for these projects include public suppliers, end users, state and local governments, and water management districts.

1. CII Facility Water Use Assessment/Audit

This project entails the formal assessment or audit of all aspects of a Commercial/ Industrial/Institutional (CII) facility's water use as a precursor to a water efficiency improvement program. These audits can be conducted by personnel trained in sustainability and efficiency improvements. Additionally, SFWMD has produced a Self-audit Guidebook to assist facility managers' conduct these types of audits in-house. This project includes existing and future CII users, which are supplied water from a PS utility or are self-supplied. The potential savings for each sector are listed in **Table A-1**.

Cost

Capital costs for the project are listed in **Table A-1**; annual O&M is limited to program administration or staff costs that may be required. Capital costs include only the initial implementation cost regardless of assumed service life. Reliable savings are sustained only for the assumed service life. Replacements will be needed to sustain savings and additional capital costs will be incurred. Costs may be fully borne by end users, partially borne by end users and another entity (via rebate or other incentive), or may be fully borne by another entity. The cost of this project is estimated to be $2.41 per 1,000 gallons of water conserved.

Table A-1. Summary of CII facility water use assessment/audit project costs and water savings.

Sector	# Implementations	Costs	Savings
PS	169	$ 0.50 million	0.100 mgd
Other Self-supplied	8	$ 0.02 million	0.005 mgd
Total	**177**	**$0.52 million**	**0.105 mgd**

mgd = million gallons per day

Constraints

Securing funding is necessary to provide for financial incentives, successful marketing and advertising of the program and/or SFWMD Guidebook, and timing of implementation. The need for adequate funding is a significant constraint because, unlike costs associated with water supply projects, the costs to implement water conservation projects are not generally financed by bonding and must be borne immediately by the party implementing the project.

Potential Partners

Potential partners include end users, state and local governments, public water suppliers, and water management districts.

Other Considerations

Lack of adequate marketing and supporting education would likely impact the success of this project negatively. Funding to assist users implement efficiency improvement opportunities identified during the audit is critical in locking in and maximizing sustained savings potential.

2. High-Efficiency Showerhead Replacement

This project entails replacing older, less efficient showerheads with high efficiency models. This project includes existing and future residential (Res), domestic self-supply (DSS), CII, and power generation (PG) users, which are supplied water from a PS utility or are self-supplied. The potential savings for each sector are listed in **Table A-2**.

Cost

Capital costs for the project are listed in **Table A-2**; annual O&M is limited to program administration or staff costs that may be required. Capital costs include only the initial implementation cost regardless of assumed service life. Reliable savings are sustained only for the assumed service life. Replacements will be needed to sustain savings and additional capital costs will be incurred. Costs may be fully borne by end users, partially borne by end users and another entity (via rebate or other incentive), or may be fully borne by another entity. The cost of this project is estimated to be $0.09 per 1,000 gallons of water conserved.

Table A-2. Summary of high-efficiency showerhead replacement project costs and water savings.

Sector	# Implementations	Costs	Savings
PS	527,728	$ 11.30 million	8.66 mgd
Other Self-supplied	55,533	$ 1.19 million	0.90 mgd
Total	**583,261**	**$ 12.49 million**	**9.50 mgd**

mgd = million gallons per day

Constraints

Securing funding is necessary to provide for financial incentives, successful marketing and advertising of the program, and timing of implementation. The need for adequate funding is a significant constraint because, unlike costs associated with water supply projects, the costs to implement water conservation projects are not generally financeable by bonding and must be borne immediately by the party implementing the project.

Potential Partners

Potential partners include end users, state and local governments, public water suppliers, and water management districts.

Other Considerations

Lack of adequate marketing, supporting education, or funding would likely impact the success of this program negatively. As more efficient fixtures become available and are adopted by users in the future, additional water savings may be possible.

3. High-Efficiency Toilet Replacement

This project entails replacing older, less efficient toilets with high-efficiency models. This project includes existing and future Res, DSS, CII, and PG users, which are supplied water from a PS utility or are self-supplied. The potential savings for each sector are listed in **Table A-3**.

Cost

Capital costs for the project are listed in **Table A-3**; annual O&M is limited to program administration or staff costs that may be required. Capital costs include only the initial implementation cost regardless of assumed service life Costs may be fully borne by end users, partially borne by end users and another entity (via rebate or other incentive), or may be fully borne by another entity. Reliable savings are sustained only for the assumed service life. Replacements will be needed to sustain savings and additional capital costs will be incurred. The cost of this project is estimated to be $0.74 per 1,000 gallons of water conserved.

Table A-3. Summary of high-efficiency toilet replacement project costs and water savings.

Sector	# Implementations	Costs	Savings
PS	373,215	$74.70 million	7.45 mgd
Other Self-supplied	39,275	$7.86 million	0.78 mgd
Total	**412,490**	**$82.56 million**	**8.18 mgd**

mgd = million gallons per day

Constraints

Securing funding is necessary to provide for financial incentives, successful marketing and advertising of the program, and timing of implementation. The need for adequate funding is a significant constraint because, unlike costs associated with water supply projects, the costs to implement water conservation projects are not generally financeable by bonding and must be borne immediately by the party implementing the project.

Potential Partners

Potential partners include end users, state and local governments, public water suppliers, and water management districts.

Other Considerations

Lack of adequate marketing, supporting education, and funding would likely impact the success of this program negatively. As more efficient fixtures become available and are adopted by users in the future, additional water savings may be possible.

4. High-Efficiency Faucet Aerator Replacement

This project entails replacing older, less efficient faucet aerators with high efficiency models. This project includes existing and future Res, DSS, CII, and PG users, which are supplied water from a PS utility or are self-supplied. The potential savings for each sector are listed in **Table A-4**.

Cost

Capital costs for the project are listed in **Table A-4**; annual O&M is limited to program administration or staff costs that may be required. Capital costs include only the initial implementation cost regardless of assumed service life. Costs may be fully borne by end users, partially borne by end users and another entity (via rebate or other incentive), or may be fully borne by another entity. Reliable savings are sustained only for the assumed service life. Replacements will be needed to sustain savings and additional capital costs will be incurred. The cost of this project is estimated to be $0.40 per 1,000 gallons of water conserved.

Table A-4. Summary of high-efficiency faucet aerator replacement project costs and water savings.

Sector	# Implementations	Costs	Savings
PS	1,057,602	$16.30 million	7.35 mgd
Other Self-supplied	111,292	$1.72 million	0.77 mgd
Total	**1,168,894**	**$18.02 million**	**8.07 mgd**

mgd = million gallons per day

Constraints

Securing funding is necessary to provide for financial incentives, successful marketing and advertising of the program, and timing of implementation. The need for adequate funding is a significant constraint because, unlike costs associated with water supply projects, the costs to implement water conservation projects are not generally financeable by bonding and must be borne immediately by the party implementing the project.

Potential Partners

Potential partners include end users, state and local governments, public water suppliers, and water management districts.

Other Considerations

Lack of adequate marketing, supporting education, and funding would likely impact the success of this program negatively. As more efficient fixtures become available and are adopted by users in the future, additional water savings may be possible.

5. High-Efficiency Pre-Rinse Spray Valve Replacement

This project entails replacing older, less efficient pre-rinse spray valves with high-efficiency models. This project includes existing and future CII and PG users, which are supplied water from a PS utility or are self-supplied. The potential savings for each sector are listed in **Table A-5**.

Cost

Capital costs for the project are listed in **Table A-5**; annual O&M is limited to program administration or staff costs that may be required. Capital costs include only the initial implementation cost regardless of assumed service life. Reliable savings are sustained only for the assumed service life. Replacements will be needed to sustain savings and additional capital costs will be incurred. Costs may be fully borne by end users, partially borne by end users and another entity (via rebate or other incentive), or may be fully borne by another entity. The cost of this project is estimated to be $0.04 per 1,000 gallons of water conserved.

Table A-5. Summary of high-efficiency pre-rinse spray valve replacement project costs and water savings.

Sector	# Implementations	Costs	Savings
PS	307	$0.02 million	0.20 mgd
Other Self-supplied	18	$0.00 million[a]	0.01 mgd
Total	**325**	**$0.02 million**	**0.21 mgd**

mgd = million gallons per day

[a] Actual costs $1,173

Constraints

Securing funding is necessary to provide for financial incentives, successful marketing and advertising of the program, and timing of implementation. The need for adequate funding is a significant constraint because, unlike costs associated with water supply projects, the costs to implement water conservation projects are not generally financeable by bonding and must be borne immediately by the party implementing the project.

Potential Partners

Potential partners include end users, state and local governments, public water suppliers, and water management districts.

Other Considerations

Lack of adequate marketing, supporting education, and funding would likely impact the success of this program negatively. As more efficient fixtures become available and are adopted by users in the future, additional water savings may be possible.

6. High-Efficiency Urinal Replacement

This project entails replacing older, less efficient urinals with high-efficiency models. This project includes existing and future CII and PG users, which are supplied water from a PS utility or are self-supplied. The potential savings for each sector are listed in **Table A-6**.

Cost

Capital costs for the project are listed in **Table A-6**; annual O&M is limited to program administration or staff costs that may be required. Capital costs include only the initial implementation cost regardless of assumed service life. Reliable savings are sustained only for the assumed service life. Replacements will be needed to sustain savings and additional capital costs will be incurred. Costs may be fully borne by end users, partially borne by end users and another entity (via rebate or other incentive), or may be fully borne by another entity. The cost of this project is estimated to be $0.52 per 1,000 gallons of water conserved.

Table A-6. Summary of high-efficiency urinal replacement project costs and water savings.

Sector	# Implementations	Costs	Savings
PS	3,808	$1.40 million	0.30 mgd
Other Self-supplied	226	$0.08 million	0.02 mgd
Total	**4,034**	**$1.48 million**	**0.32 mgd**

mgd = million gallons per day

Constraints

Securing funding is necessary to provide for financial incentives, successful marketing and advertising of the program, and timing of implementation. The need for adequate funding is a significant constraint because, unlike costs associated with water supply projects, the costs to implement water conservation projects are not generally financeable by bonding and must be borne immediately by the party implementing the project.

Potential Partners

Potential partners include end users, state and local governments, public water suppliers, and water management districts.

Other Considerations

Lack of adequate marketing, supporting education, and funding would likely impact the success of this program negatively. As more efficient fixtures become available and are adopted by users in the future, additional water savings may be possible.

7. Irrigation System Audits

This project entails auditing a property's in-ground irrigation system to identify areas for water use efficiency improvements. The audit would include inspection and possibly reprogramming of irrigation controllers, conducting sprinkler precipitation tests, calculation of a site water budget, and derivation of an irrigation schedule based on test and local weather data. This project includes existing and future Res, DSS, CII, PG, and landscape/recreational/aesthetic (LRA) populations, which are supplied water from a PS utility or are self-supplied. The potential savings for each sector are listed in **Table A-7**.

Cost

Capital costs for the project are listed in **Table A-7**; annual O&M is limited to program administration or staff costs that may be required. Capital costs include only the initial implementation cost regardless of assumed service life. Reliable savings are sustained only for the assumed service life. Replacements will be needed to sustain savings and additional capital costs will be incurred. Costs may be fully borne by end users, partially borne by end users and another entity (via rebate or other incentive), or may be fully borne by another entity. The cost of this project is estimated to be $2.65 per 1,000 gallons of water conserved.

Table A-7. Summary of irrigation system audit project costs and water savings.

Sector	# Implementations	Costs	Savings
PS	99,605	$6.00 million	1.21 mgd
Other Self-supplied	TBD[a]	$4.8 million	0.95 mgd
Total	**TBD[a]**	**$10.8 million**	**2.15 mgd**

mgd = million gallons per day
TBD = to be determined

[a] Estimated number of implementations for DSS users is 4,459. The number of implementations for LRA cannot be determined using the tools and methods applied here.

Constraints

Securing funding is necessary to provide for financial incentives, successful marketing and advertising of the program, and timing of implementation. The need for adequate funding is a significant constraint because, unlike costs associated with water supply projects, the costs to implement water conservation projects are not generally financeable by bonding and must be borne immediately by the party implementing the project.

Potential Partners

Potential partners include end users, state and local governments, public water suppliers, and water management districts.

Other Considerations

Lack of adequate marketing, supporting education, and funding would likely impact the success of this program negatively. Funding to assist users implement efficiency improvement opportunities identified during the audit is critical in locking in and maximizing sustained savings potential.

8. Soil Moisture Sensors

This project entails installing sensors to bypass scheduled irrigation if soil moisture content is sufficient due to antecedent rainfall or irrigation. This project includes existing and future Res, DSS, PG, LRA, and CII building populations, which are supplied water from a PS utility or are self-supplied. The potential savings for each sector are listed in **Table A-8**.

Cost

Capital costs for the project are listed in **Table A-8**; annual O&M is limited to program administration or staff costs that may be required. Capital costs include only the initial implementation cost regardless of assumed service life. Reliable savings are sustained only for the assumed service life. Replacements will be needed to sustain savings and additional capital costs will be incurred Costs may be fully borne by end users, partially borne by end users and another entity (via rebate or other incentive), or may be fully borne by another entity. The cost of this project is estimated to be $1.07 per 1,000 gallons of water conserved.

Table A-8. Summary of soil moisture sensors installation project costs and water savings.

Sector	# Implementations	Costs	Savings
PS	28,617	$2.90 million	1.51 mgd
Other Self-supplied	TBD[a]	$2.30 million	1.19 mgd
Total	**TBD[a]**	**$5.20 million**	**2.70 mgd**

mgd = million gallons per day

TBD = to be determined

[a] Estimated number of implementations for DSS users is 1,310. The number of implementations for LRA cannot be determined using the tools and methods applied here.

Constraints

Securing funding is necessary to provide for financial incentives, successful marketing and advertising of the program, and timing of implementation. The need for adequate funding is a significant constraint because, unlike costs associated with water supply projects, the costs to implement water conservation projects are not generally financeable by bonding and must be borne immediately by the party implementing the project.

Potential Partners

Potential partners include end users, state, county and local governments, public water suppliers, and water management districts.

Other Considerations

Lack of adequate marketing, supporting education, and funding would likely impact the success of this program negatively.

9. Advanced ET Irrigation Controllers

This project entails installing signal, historical, or sensor-based, WaterSense® labeled, evapotranspiration (ET) irrigation controllers that automatically adjust the irrigation schedule according to the needs of the landscape based on site condition sensors or satellite signals for climate and weather pattern data. This project includes existing and future Res, DSS, CII, PG, and LRA populations, which are supplied water from a PS utility. The potential savings for each sector are listed in **Table A-9**.

Cost

Capital costs for the project are listed in **Table A-9**; annual O&M is limited to program administration or staff costs that may be required. Capital costs include only the initial implementation cost regardless of assumed service life. Reliable savings are sustained only for the assumed service life. Replacements will be needed to sustain savings and additional capital costs will be incurred. Costs may be fully borne by end users, partially borne by end users and another entity (via rebate or other incentive), or may be fully borne by another entity. The cost of this project is estimated to be $0.86 per 1,000 gallons of water conserved.

Table A-9. Summary of advanced ET irrigation controllers installation project costs and water savings.

Sector	# Implementations	Costs	Savings
PS	2,845	$1.14 million	0.26 mgd
Other Self-supplied	TBD[a]	TBD[a]	TBD[a]
Total	**TBD**[a]	**TBD**[a]	**TBD**[a]

mgd = million gallons per day

TBD = to be determined

[a] This BMP was not modeled for Other Self-supplied, though it may be applicable to this group

Constraints

Securing funding is necessary to provide for financial incentives, successful marketing and advertising of the program, and timing of implementation. The need for adequate funding is a significant constraint because, unlike costs associated with water supply projects, the costs to implement water conservation projects are not generally financeable by bonding and must be borne immediately by the party implementing the project.

Potential Partners

Potential partners include end users, state, county and local governments, public water suppliers, and water management districts.

Other Considerations

Lack of adequate marketing, supporting education, and funding would likely impact the success of this program negatively.

10. Waterwise Florida Landscaping

This project entails the replacement of turf and shrubs with Florida-friendly plant material. This project includes existing and future Res, DSS, CII, PG, and LRA populations, which are supplied water from a PS utility. The potential savings for each sector are listed in **Table A-10**.

Cost

Capital costs for the project are listed **Table A-10**; annual O&M is limited to program administration or staff costs that may be required. Capital costs include only the initial implementation cost regardless of assumed service life. Reliable savings are sustained only for the assumed service life. Replacements will be needed to sustain savings and additional capital costs will be incurred. Costs may be fully borne by end users, partially borne by end users and another entity (via rebate or other incentive), or may be fully borne by another entity. The cost of this project is estimated to be $1.77 per 1,000 gallons of water conserved.

Table A-10. Summary of Waterwise Florida landscaping installation project costs and water savings.

Sector	# Implementations	Costs	Savings
PS	3,956	$7.90 million	0.87 mgd
Other Self-supplied	TBD[a]	TBD[a]	TBD[a]
Total	**3,956+**	**$7.90+ m**	**0-.87+ mgd**

mgd = million gallons per day

TBD = to be determined

[a] This BMP was not modeled for Other Self-supplied although it may be applicable to this group

Constraints

Securing funding necessary to provide for financial incentives, successful marketing and advertising of the program, and timing of implementation. The need for adequate funding is a significant constraint because, unlike costs associated with water supply projects, the costs to implement water conservation projects are not generally financeable by bonding and must be borne immediately by the party implementing the project.

Potential Partners

Potential partners include end users, state, county and local governments, public water suppliers, and water management districts.

Other Considerations

Lack of adequate marketing, supporting education, and funding would likely impact the success of this program negatively.

Conservation BMPs and Programs

Public supply water users within the CFWI Planning Area have been successfully implementing a variety of water conservation BMPs for many years. However, there are other practices that can be implemented to achieve additional water conservation in the CFWI region. Many of the BMPs available for public supply can also be implemented by other self-supply users. Specific public supply BMPs and conservation programs are described below.

- Indoor water use
- Outdoor efficient landscaping
- Outdoor efficient irrigation
- Other outdoor water use efficiency
- Water use efficiency audits
- Conservation programs
- Public utility water efficiency improvement practices
- Standards and codes

Indoor Water Use

Air-Cooled Device (Replacing Water-Cooled Devices) – (CII)

This practice incorporates the replacement of water-cooled devices with air-cooled devices and could be applied to equipment at CII facilities. Examples of equipment that can use air cooling include air compressors, vacuum pumps, ice machines, refrigeration condensers, hydraulic equipment, and X-ray processing equipment.

Automatic Shut-off Valve Use – (CII)

This practice employs the use of water valves that automatically shut-off water flow to water-using equipment or shut off the equipment altogether when a user-determined water level, volume, or time interval is reached. Water savings are increased over manually operating valves primarily due to operator inconsistencies (e.g., letting water flow too long).

Car Wash Equipment, Low Flow/Recirculating – (CII)

This practice uses either a portable, high pressure, low-flow device to replace the use of a hose for car washing or uses a recirculating system that captures, treats, and reuses used wash and rinse water at commercial carwash facilities.

Clothes Washer High-Efficiency Replacement – (Res, DSS, CII)

This practice replaces conventional clothes washers with water efficient models (ENERGY STAR Qualified). High-efficiency models often feature innovative tub designs and high-speed spin cycles and are typically also more energy efficient than conventional models.

Combination Oven High-Efficiency Replacement – (CII)

This practice replaces conventional combination ovens in commercial kitchens with water efficient models. Combination ovens can function as a steam cooker or a conventional (hot air) oven. Conventional models consume up to 40 gallons per hour. Boilerless models and some new boiler-type models can save more than 100,000 gallons of water per year over traditional models. High-efficiency models are programmable, with low-energy idle settings.

Dishwasher High-Efficiency Replacement - (Res, DSS, CII, PG)

This practice involves replacement of a standard dishwasher with a water efficient (ENERGY STAR Qualified) model. High-efficiency dishwashers include several innovations, such as 'soil' sensors and high-efficiency jets, and innovative dish rack designs that reduce energy and water consumption and improve performance.

Facility Water Use Assessment/Audit – (CII, PG)

See Water Use Efficiency Audit section of this Appendix.

Faucet Aerator High-Efficiency Replacement – (Res, DSS, CII, PG)

This practice involves replacing existing faucet aerators with EPA WaterSense®-labeled, high efficiency kitchen and bathroom faucet aerators.

Faucet Installation, Metered-Flow – (CII, PG)

This practice uses faucets that have a specified flow rate and duration setting (in seconds) typically triggered by a sensor. The typical rate is 0.25 gallons per cycle. Water savings are obtained by allowing only a preset volume of water to flow for each cycle rather than allowing the user to manually control the faucets operation (or walk away leaving a faucet running while not in use).

Garbage Disposal Efficient Usage – (CII, PG)

This practice involves decreasing the time and flow rate of disposal and food grinder water use. Regular maintenance and water use monitoring (to maintain efficiency settings) can reduce water use. Auto shut-off (every 15 minutes) can help reduce loss as well. Using cold water only will reduce energy consumption. This practice may also include the scraping of food waste directly into the garbage and avoiding the use of a grinder or disposal altogether.

Greenroofs – (CII)

This practice involves the installation of a roof that is partially or completely covered with vegetation (aka "greenroof"). A green roof absorbs rainwater (reducing stormwater runoff), provides insulation to reduce heating thus reducing indoor cooling loads. By reducing cooling loads, less water is consumed by cooling tower units.

Heating Ventilation and Air Conditioning (HVAC) Cooling Tower Efficiency Improvements – (CII)

This practice involves increasing cooling tower water use efficiency through the use of all or some of the following: conductivity meters (to determine when to bleed off water), drift eliminators (to reduce water drifting away from towers), make-up and blowdown submeters (to calculate cycles of concentrations), and possibly pretreatment devices and chemicals.

Hot Water Use (Efficient) – (Res, DSS, CII, PG)

This practice uses close proximity "instant hot" heaters or electric showers which instantly heat water as it passes through the unit. Water savings are obtained by avoiding the purging of cold water first as the hot water moves from the water heater or boiler source through the system to the point of use.

Ice Making Machines High-Efficiency Replacement – (CII)

This practice replaces conventional ice machines with water efficient (ENERGY STAR Qualified) models. Efficient models use approximately 23 percent less water than standard models.

Indoor Residential Water Use Assessment/Audit – (Res)

See Water Use Efficiency Audit section of this appendix.

Metering and Submetering (Indoor) – (CII)

This practice involves the installation of water meters and/or submeters at pumping facilities, at critical locations throughout a manufacturing system, or on other high volume water using equipment. Information collected from meters can help detect leaks and calculate and maintain system efficiencies.

On-site Alternative Water Source Reuse – (Res, CII)

This practice involves the capture and reuse of water generated on-site for another secondary purpose. While not conservation in a traditional sense (as no improvement in water use efficiency occurs as a direct result), this practice can reduce demand from potable supply. Potential sources include graywater, rainwater, process water, condensate from air-handlers, and boilers. Potential uses include irrigation, cooling tower make-up, or some other use in an industrial process where high water quality is not essential. Some level of treatment may be required following capture.

Pre-rinse Spray Valve High-Efficiency Replacement – (CII, PG)

This practice involves replacing conventional pre-rinse spray valves with more efficient models, such as EPA WaterSense®-labeled equivalent products. These devices are used primarily in restaurants and bars, but are also found in commercial office buildings and other institutions that have cafeterias. Other possible applications include food processing/washing stations.

Restriction of One-Pass (Once-Through) Equipment – (CII)

This involves the practice of precluding any processes or equipment which use water only once before discharge. Types of equipment that typically use single pass cooling are ice machines, x-ray equipment, ice cream and yogurt machines, walk-in coolers, vacuum pumps, air compressors, condensers, hydraulic equipment, degreasers, CAT scanners and some air conditioning equipment.

Steam Boiler Efficiency – (CII)

This practice entails actions to increase the operating efficiency of steam boiler equipment. This may entail improving water quality, increasing boiler cycles, and capture and reuse of boiler condensate for make-up water.

Showerhead High Efficiency Replacement - (Res, DSS, CII, PG)

This practice involves replacing conventional showerheads with more efficient models, such as EPA WaterSense®-labeled equivalent products.

Steam Cooker Replacement, High-Efficiency – (CII)

This practice replaces conventional commercial kitchen steamers with (ENERGY STAR Qualified) water efficient models. ENERGY STAR qualified steam cookers use an average 3 gallons of water per hour versus approximately 40 gallons of water per hour for standard steam cooker models.

Toilets Fill Cycle Diverters – (Res, DSS, CII, PG)

This practice uses a diverter to redirect a majority of the water that would typically drain down the overflow tube back into the toilet tank during the fill cycle. The diverter increases efficiency by conserving up to 50 percent of the fill cycle water, which would otherwise flow down the drain.

Toilets, Flapperless Use – (Res, DSS, CII, PG)

Standard rubber flappers deteriorate over time due to toilet bowl cleaners placed in the toilet tank or by chemicals used by PS utilities causing the toilet to leak. This practice uses toilets designed to hold flush water in a pan within the tank, thus not requiring any flapper and avoiding all potential loss from this leak-source. Kits may be available to convert conventional tanks to flapperless.

Toilet, Redesigned Flapper Use – (Res, DSS, CII, PG)

This practice uses toilet flappers which are designed for longer life. Standard rubber flappers deteriorate over time causing the toilet to leak. Use of a long-life flapper decreases the frequency of leaking tank toilets due to flapper deterioration.

Toilet Replacement, Dual Flush – (Res, DSS, CII, PG)

This practice involves replacement of a standard tank toilet with more efficient models, such as an EPA WaterSense®-labeled, dual-flush toilet which features two buttons or handles to flush with different volumes of water. The smaller volume (typically 1.1 to 0.8 gallons) is designed for liquid waste and the larger volume (typically 1.6 to 1.28 gallons) is designed for solid waste.

Toilet Replacement, High Efficiency – (Res, DSS, CII, PG)

This practice involves replacing conventional toilets (using more than 1.6 gallons per flush) with more efficient models, such as EPA WaterSense®-labeled equivalent products.

Urinal Replacement High-Efficiency – (CII, PG)

This practice involves replacing conventional urinals with more efficient models, such as EPA WaterSense®-labeled products.

Urinal Replacement, Waterless – (CII, PG)

This practice involves replacing conventional urinals with more efficient models, such as EPA WaterSense®-labeled equivalent products. This practice could be applied to new CII facilities but may have limited application. This device is recommended primarily in new construction as there are challenges to successful implementation in existing buildings. In all applications, special maintenance is required.

Water Use Efficiency Improvement Plan Development – (CII)

This practice involves intentionally developing a written water use plan, which is focused on increased water use efficiency. The plan should outline a specific implementation roll-out and monitoring program This is typically preceded by a comprehensive water use audit (or survey). (See *Facility Water Use Assessment/Audit*).

Outdoor Efficient Landscaping

Fertilization Efficiency Practices – (Res, DSS, CII, PG, LRA)

This involves optimizing fertilizer use (through application timing, volume, and watering methods) with the goal of protecting groundwater and surface water quality. Additionally, efficient fertilizer use can reduce the need to irrigate.

Landscape Efficiency Audit – (Res, DSS, CII, PG, LRA)

See Water Use Efficiency Audit section of this appendix.

Limiting High Volume Irrigation Areas – (Res, DSS, CII, PG, LRA)

This practice entails decreasing or eliminating high-volume irrigation areas within a landscape. This would include any sprinkler or emitter with a flow rate of 30 gallons per hour or 0.5 gallons per minute or greater.

Limiting Irrigated Areas – (Res, DSS, CII, PG, LRA)

This practice involves decreasing or eliminating irrigation of landscape areas. This is accomplished by adding or increasing areas landscaped with plant material that does not need irrigation supplemental to the area's natural rainfall and can withstand periods of drought. In practice, this usually allows irrigation for the establishment of plant material, but not thereafter.

Limiting Turf Traffic on Golf Courses – (LRA)

This practice involves limiting cart and pedestrian traffic to paths to minimize turf wear and limit soil compaction thus reducing stress and water needs of the turf.

Prudent Use of Turfgrass in Landscapes – (Res, DSS, CII, PG, LRA)

This practice entails the use of turfgrass for appropriate and prudent use where it serves an identified purpose. When integrated in the landscape with intention, turfgrass has many benefits such as erosion control, creating recreational areas, and stormwater runoff reduction. However, turfgrass very often requires the greatest amount of irrigation supplemental to rainfall in a man-made landscape and is typically over used. This is congruent with the water wise and Florida-Friendly Landscaping™ program's principle of planting the right plant in the right place.

Soil Amendment Use for Water Efficiency – (Res, DSS, CII, PG, LRA)

This practice involves amending the soil to improve its physical properties, such as water retention, permeability, water infiltration, drainage, aeration, and structure. Improved soil conditions can decrease the frequency of required irrigation.

Soil Cultivation Techniques for Water Efficiency – (Res, DSS, CII, PG, LRA)

This practice involves spiking, slicing, and core aerification of the soil to improve permeability, water infiltration, drainage, aeration, and structure. Improved soil conditions can decrease the frequency of required irrigation.

Turfgrass, Improved Cultivar Uses – (Res, DSS, CII, PG, LRA)

This practice involves the use of drought tolerant turfgrass cultivars. Cultivars would be selected to accommodate the intended use pattern and survive under the local soil and climate conditions with minimal or no need for irrigation supplemental to rainfall.

Turfgrass Maintenance for Water Efficiency – (Res, DSS, CII, PG, LRA)

This practice involves employing management techniques directed at increasing drought-tolerance of turf. Techniques include proper mowing height, fertilizer application, thatching, aerating, seeding, and top dressing applications.

Water Budgeting – (Res, DSS, CII, PG, LRA)

This practice involves designing a landscape and an accompanying irrigation system, which would irrigate a regionally appropriate amount of water, typically quantified in inches per year, calculated based on plant needs. Plant type, irrigation design options, as well as soil and local climate conditions are considered quantifying the irrigation budget. EPA's WaterSense® program has an Excel-based tool designed to help create such budgets. (http://www.epa.gov/watersense/docs/home_final_waterbudget508.pdf)

Waterwise Florida Landscaping – (Res, DSS, CII, PG, LRA)

This incorporates the replacement of high water requiring turf and shrubs with Florida-friendly (climate adaptive) species. When landscaping with plant material appropriate for local soils and natural hydrology, outdoor irrigation can be greatly reduced or eliminated. By reducing excessive irrigation, a Waterwise landscape can also reduce the amount of stormwater runoff.

Outdoor Efficient Irrigation

Cyclic Scheduled Irrigation – (Res, DSS, CII, PG, LRA)

This practice improves irrigation efficiency by applying water in several short cycles rather than one long cycle, to ensure effective infiltration occurs with minimal runoff.

Irrigation Efficiency Nozzle and Head Use – (Res, DSS, CII, PG, LRA)

This practice involves increasing irrigation efficiency by switching irrigation hardware to utilize more efficient nozzles and heads. Efficiency can be achieved through increased distribution uniformity and less drift loss.

Irrigation Scheduling – (Res, DSS, CII, PG, LRA)

This practice involves properly scheduling irrigation to minimize water use. Water savings are obtained by not allowing the over watering of plant material, depending on the plants' supplemental irrigation requirements.

Irrigation System Audit/Evaluation – (Res, DSS, CII, PG, LRA)

See Water Use Efficiency Audit section of this Section.

Irrigation System Maintenance (Routine) – (Res, DSS, CII, PG, LRA)

This involves the practice of routinely looking for and repairing leaks and inefficient or damaged hardware components.

Isolation Valve Use – (Res, DSS, CII, PG, LRA)

This practice involves installation of valves, which separate main irrigation lines and major laterals from the water supply source. These valves isolate all or part of the system for repairs, maintenance, or winter shut down. These devices can save water as it allows for the repair of a portion of the system without running the entire system.

Licensed Irrigation and Design Professional, Working with – (Res, DSS, CII, PG, LRA)

This practice entails contracting with an irrigation company licensed with a local government or the State of Florida. This ensures that projects are overseen by an individual who has demonstrated technical and financial competency and experience at the management level. Obtaining a state license is currently voluntary.

Metering and Submetering Water (Outdoor) – (Res, DSS, CII, PG, LRA)

This practice involves the installation of water meters in pumping facilities and at critical locations throughout an irrigation system. Irrigation meters typically register a flow rate and a total volume. Information collected from meters can help detect leaks and calculate irrigation efficiencies.

Microirrigation Use (Drip/Bubbler/Microjets) – (Res, DSS, CII, PG, LRA)

This practice involves increasing irrigation efficiency by switching irrigation methods to low-flow hardware in landscape beds. Most types of microirrigation deliver water below the plant canopy and directly to the root ball, resulting in higher application efficiencies than sprinklers. Microirrigation emitters apply less than 30 gallons per hour.

Net Irrigation-Requirement-based Irrigation Calculations – (Res, DSS, CII, PG, LRA)

This involves calculating the specific water needs of an irrigated landscape-based on plant material, soil type, irrigation system efficiency, and weather.

Rain Sensor Shut-off Device – (Res, DSS, CII, PG, LRA)

This practice uses a device that interrupts the operation of an automatic irrigation system during and shortly after significant rainfall events. Water is conserved by preventing the application of irrigation water when it is not necessary. Functioning automatic shut-off devices are required by state statute on all irrigation systems regardless of the year built.

"Smart" Irrigation Controllers – (Res, DSS, CII, PG, LRA)

Smart irrigation controllers are those which monitor and use information about site conditions (such as soil moisture, rain, wind, slope, soil, plant type, and more), and apply the amount of water necessary to meet plant needs based on those factors and plant species (www.irrigation.org). There are generally two types of smart controllers: Climatologically-based controllers (also known as weather-based or evapotranspiration [ET]-based controllers) and soil moisture-based controllers.

Weather-Based (ET) Controllers

There are three types of ET-based controllers:

1. Signal-based controllers receive weather and climate data from publicly available sources or a paid provider.

2. Historical ET-based controllers use a pre-programmed crop water use curve for different regions. On-site weather conditions can also be monitored by these systems to modify irrigation scheduling.

3. On-site sensor-based controllers use real-time, on-site measurements of soil and weather conditions to calculate ET continuously and adjust the irrigation scheduling accordingly. http://edis.ifas.ufl.edu/ae442

Soil Moisture Sensor (SMS) Controller-based Systems

There are two types of soil moisture sensor (SMS)–based controllers:

1. Bypass systems are most commonly used for small sites including most residential ones. A SMS-based system will irrigate according to soil moisture thresholds, set by the user, which should correspond to plant species needs, accounting for soil and other local climate conditions. This arrangement will bypass a scheduled irrigation event if soil moisture content is sufficient due to antecedent rainfall or irrigation.

2. On-demand SMS controller systems are set to irrigate when soil moisture falls below a set threshold and terminate the irrigation event when the threshold has been met. http://edis.ifas.ufl.edu/ae442

Other Outdoor Water Use Efficiency

On-site Rain Harvesting and Reuse – (Res, DSS, CII, PG, LRA)

This practice employs the capture and storage of rainfall runoff in a barrel (small-scale) or cistern (large-scale). This water is typically used for irrigation, but can be used for other purposes. While not conservation in a traditional sense (as no improvement in water use efficiency occurs as a direct result), this practice can reduce demand from potable or other supply sources.

Sidewalk and Driveway Cleaning, Waterless – (Res, DSS, CII, PG, LRA)

This practice involves the switch from using a hose to sweep debris to using a broom or leaf blower to conserve water.

Swimming Pool and Hot Tub Efficiency Maintenance – (Res, DSS, CII)

This involves active practices such as routinely and consistently using pool covers, detecting and repairing leaks, and reducing drains and fills by increasing water quality.

Water Use Efficiency Audits

Facility Water Use Assessment/Audit – (CII, PG)

This practice involves a formal, comprehensive assessment or audit of all aspects of a CII facility's water use (indoors and outdoors). This self-audit process precedes the development of a water use efficiency improvement plan. SFWMD has developed a full-facility water use efficiency self-audit guidebook for commercial and institutional facilities (SFWMD Commercial institutional self-audit guidebook). This guidebook may also have some applicability in residential settings (See *Water Use Efficiency Improvement Plan Development*).

Indoor Residential Water Use Assessment/Audit – (Res)

Many utilities provide indoor water audits to customers requesting them or the audit may be initiated by the utility as a result of high water use on a customer's bill. The purpose of the audit is to assess the customer's water use to determine how much can be saved versus how much is being used and to educate and assist the customer in conserving water and reducing their water bill. Water conservation kits and conservation literature are often provided to the customer as part of the audit. Auditors typically check the water meter for movement in order to detect water leaks; check the faucets, shower heads, and hot water heaters for leaks; and check under cabinet sinks, the hot and cold water hoses on the customer's clothes washer, and the outside water spigots and hoses for leaks.

Irrigation System Audit/Evaluation – (Res, DSS, CII, PG, LRA)

This practice involves an evaluation of in-ground irrigation systems. Most audit evaluations include; inspection of the irrigation equipment and controllers, performance of sprinkler precipitation tests, calculation of a site specific water budget, and derivation of an irrigation schedule-based on test and local weather data that serve as a precursor to a water efficiency improvement program. SFWMD has developed a full-facility water use efficiency self-audit guidebook for commercial and institutional facilities, which includes irrigation system evaluation procedures (SFWMD Commercial institutional self-audit guidebook). Many elements of this guidebook could also be used for residential systems.

Landscape Efficiency Audit – (Res, DSS, CII, PG, LRA)

This practice involves a formal audit of a landscape to evaluate elements that can improve water use efficiency. The audit typically includes an inspection of the plant's compatibility with local climate and soil conditions, placement (with respect to shading and size at maturity), grouping (plants arranged with similar needs; such as water and fertilizer), and management (including mulching, weeding, and pruning) SFWMD Commercial institutional self-audit guidebook. This guidebook could also be referenced for residential landscapes.

Conservation Programs

Florida-Friendly Landscaping Program™ – (Res, DSS, CII, PG, LRA)

The Florida-Friendly Landscaping Program™ is implemented by the University of Florida/Institute of Food & Agricultural Science (UF/IFAS) and the FDEP. This program promotes low maintenance plants and environmentally sustainable landscaping and irrigation practices through its nine principles. The nine principles of Florida-friendly landscaping are described in Chapter 373.185, F.S. These principles guide property owners on how to design and maintain a beautiful landscape using minimal water, pesticide, and fertilizer inputs while preserving local water resources and local wildlife. Watering efficiently and planting the right plant in the right place are two of the nine program principles that conserve water. The program has also developed a model ordinance and covenant that can be adopted for local governments and homeowner associations, respectively. Local governments' utilities and water management districts can collaborate with the FFL Program™ or act independently to promote the nine principles. http://ffl.ifas.ufl.edu/index.html.

Florida-Friendly Yard Recognition Program – (Res, DSS, CII, PG, LRA)

This program recognizes landscapes that have been designed and managed using environmentally friendly techniques. These techniques aim to minimize the use of potable water for irrigation, avoid excess fertilizer and pesticide runoff, and provide habitat and other benefits to wildlife. This program is implemented though the UF, local county extension agents, and master gardener programs. Local governments, utilities, and water management districts can collaborate to promote and/or incentivize participation in this recognition program and/or have their own facilities meet the program standards. http://ffl.ifas.ufl.edu/homeowners/recognitions.htm

Florida Green Building Coalition – (Res, DSS, CII, PG)

The Florida Green Building Coalition's certification program applies holistic efficiency standards to single and multi-family homes and commercial buildings. Water Conservation is one of the areas of sustainable operations criteria. Facilities are evaluated using a points-based system governing sustainability practices and hardware employed and installed at the facility. This program is functionally linked to the Florida Water Star program. Local governments, utilities, and water management districts can collaborate to promote and/or incentivize participation in this recognition program and/or have their own facilities meet the program standards.

Florida Green Lodging Program – (CII)

The FDEP's Green Lodging recognition program identifies lodging facilities that have made a commitment to conserve and protect Florida's natural resources. Water Conservation is one of the areas of sustainable operations criteria. Facilities are evaluated using a points-based system governing sustainability practices and hardware employed and installed at the facility. Local governments, utilities, and water management districts can collaborate to promote and/or incentivize participation in this program.

Florida Water Star – (Res, DSS, CII, PG)

The Florida Water Star certification program, developed by the St. Johns River Water Management District, applies both indoor and outdoor water efficiency standards and design principles to single and multi-family homes, commercial buildings, and master-planned communities. This program is functionally linked to the Florida Green Building Coalition. Local governments, utilities, and water management districts can collaborate to promote and/or incentivize participation in the recognition program and/or have their own facilities meet the program standards.

Green Restaurant Association Program – (CII)

The Green Restaurant Association program certifies restaurants who have implemented a suite of sustainability actions, which include water use efficiency measures and BMPs. Local governments, utilities, and water management districts can collaborate to promote and/or incentivize participation in this program.

Leadership in Energy and Environmental Design (LEED) – (Res, DSS, CII, PG)

The U.S. Green Building Council's LEED certification program is a points-based program, which certifies buildings, homes, and neighborhoods that use environmentally friendly strategies and practices. In regards to water conservation it applies both indoor and outdoor water efficiency standards and design principles. Local governments, utilities, and water management districts can collaborate to promote and/or incentivize participation in the recognition program and/or have their own facilities meet the program standards.

Urban Mobile Irrigation Labs – (PS - Utility)

Urban Mobile Irrigation Labs (MILs) provide on-site auditing services to analyze irrigation systems and educate property owners on how to improve water use and promote conservation. MIL technicians give recommendations on how to improve the efficiency of existing irrigation systems and educate their customers and the general public on water conservation, irrigation planning, and irrigation management. Local governments, utilities, and water management districts can collaborate to promote and/or incentivize participation in this program.

Water Conservation Hotel and Motel Program (Water CHAMP) – (CII)

The Water CHAMP recognition program, developed by the SWFWMD, recognizes lodging (hotel/motel) facilities that have a linen reuse and education program. Water savings are achieved by a reduction in towel and linen laundering services. Additional benefits include reduced energy and detergent consumption. In SFWMD, the program requires all lavatory faucets be fitted with 1.0 gpm aerators. Local governments, utilities, and water management districts can collaborate to promote and/or incentivize participation in this recognition program.

WaterSense® Program (EPA) – (Res, DSS, CII, PG, LRA)

WaterSense® is a partnership and certification program (U.S. Environmental Protection Agency). The program is best known for its efforts to promote the value of water efficiency, provide information on improving water use efficiency, and for its third-party certification label for products and services that help users identify water efficiency products. Products and services that have earned the WaterSense® label have been certified to be at least 20 percent more efficient than standard or conventional equivalent models without sacrificing performance. Local governments, utilities, and water management districts can collaborate to promote and/or incentivize participation in this program. More information about the program is available at the Watersense® website (http://www.epa.gov/watersense).

Public Utility Water Efficiency Improvement Practices

AMR/AMI Technology – (PS - Utility)

Automatic meter reading, (AMR), refers to technology, which automatically collects consumption data from water meters and transfers that data to a central database for billing, troubleshooting, and analyzing. Advanced Metering Infrastructure, (AMI), represents the networking technology of fixed network meter systems that go beyond AMR into remote utility management. In addition to saving labor costs, these technologies help water providers to more accurately monitor water use and demand management program effectiveness, detect leaks, and account for revenue and non-revenue water.

Conservation Analysis Using a Planning Tool – (PS - Utility)

This involves the use of predictive models, which can evaluate conservation measures and practices to estimate their associated program costs, savings, impacts on revenues, as well as other financial considerations. These tools help public supply utilities develop water conservation plans with a numerical goal for achievable water savings. These goals are typically expressed as gallons per capita per day (gpcd) or a specified volume reduction. These tools currently include the EZ Guide developed by Conserve Florida Water Clearinghouse; the Alliance for Water Efficiency (AWE) Water Conservation Tracking Tool, available free of charge to AWE members via (www.allianceforwaterefficiency.org); and the

SJRWMD Florida Automated Water Conservation Estimation Tool, available free of charge by contacting the SJRWMD (www.sjrwmd.gov).

Distribution System Audits, Leak Detection and Repair - (PS - Utility)

A water distribution system audit helps utilities understand the various components of their water balance and their non-revenue water sources and costs. The IWA/AWWA Manual 36 for standard water balance is an excellent method of examining a utility's non-revenue water (http://www.awwa.org/portals/0/files/publications/documents/toc/M36ed3.pdf). Tools are available to help utility managers conduct this type of analysis. Acoustic equipment is often used to pinpoint leaks in the distribution system. A successful leakage management strategy requires pressure management, active leakage control, pipeline and asset management, and speedy and quality repairs.

Goal-Based Water Conservation Planning – (PS - Utility)

This practice entails creating a demand management plan tied to a measureable, numeric goal (gallons per capita per day or a volume) to be met within a specified time according to an implementation schedule. A well-designed plan identifies a variety of measures and practices that target specified user groups. The circumstances of the utility will determine which conservation practices and measures are economically feasible and desirable to implement. Water conservation planning tools are available to help water utilities develop their plans. See *Conservation Analysis Using a Planning Tool* in this section.

Improved Billing and Accounting Software – (PS - Utility)

Improved billing and accounting software is used by utilities to decrease non-revenue water by identifying billing and data handling errors and inconsistencies and by identifying meter inaccuracies. Many billing software packages have built-in analysis functions that can identify potential data handling errors, by either meter readers or the utility's billing department, and report them for verification. In addition, billing software will report monthly estimated readings and zero reads, both of which may indicate a problem with a customer's meter. Site visits will help identify meters needing replacement.

Line Flushing, Automatic Devices – (PS - Utility)

Flushing water lines is a routine practice of public supply utilities, done to meet and maintain water quality requirements within its distribution lines. An automatic device is able to achieve and maintain the desired water quality levels in a water distribution system by releasing prescribed volumes of water, at a regulated frequency or (when 'Smart' technology is incorporated) as per automatic on-site water quality sampling. These devices are typically more efficient than manually opening a fire hydrant.

Line Flushing, Looping – (PS – Utility)

Line looping is a design approach for water supply conduit infrastructure which entails the installation of new piping that connects existing dead-end lines to an existing section of piping that has higher demands (usually the main trunk line). By installing flow-regulating valves and diverting additional flows through the local area where the dead-end was, the need for flushing can often be reduced or eliminated.

Line Flushing, Unidirectional – (PS - Utility)

Unidirectional line flushing is a routine practice of public supply utilities, done to meet and maintain water quality requirements and to scour biofoul and sediments from distribution lines. Distribution lines are flushed at high velocity in a pattern whereby only previously scoured pipes (clean) precede the next section of pipe targeted for cleaning. This method of flushing has been shown to scour distribution lines using less water than other methods.

Rate Structure, Water Conservation – (PS - Utility)

The primary purpose of water pricing is to cover public supply utility costs, but it can simultaneously be an effective means to promote water conservation through rate structure design. A water conservation-based rate structure provides a financial incentive for end users to reduce wasteful use. A structure that responsibly minimizes fixed charges, places more emphasis on volume-related charges, and has an inclining block rate structure will typically conserve more water than a flat or uniform rate structure that generates the same amount of revenue. Users faced with proper rate incentives will achieve water conservation by implementing a number of conservation measures. Forecasting and rate models designed to analyze the effects of rate structures, such as the WATERATE spreadsheet tool, can be used to help utilities develop rates for their service area. WATERATE is available via water management districts' webpages.

Treatment System Efficiency Increases – (PS - Utility)

There may be opportunities for a utility to reduce water losses within their water treatment process itself and at the treatment plant site. This may be achieved via the following actions: metering unit processes, increasing the water use efficiency of the treatment components, re-circulating water where feasible, checking the processes routinely for water leaks, and outfitting storage tanks and reservoirs with overflow check valves. Domestic water use at the plant site may also be reduced by using indoor plumbing retrofits/replacements and efficiency upgrades to the site's irrigation system. Facilities with access to reclaimed water should use it for landscape irrigation and other non-potable uses.

Standards and Codes

Indoor High-Efficiency Standard Adoption – (Res, DSS, CII, PG)

This practice involves the adoption of codes with standards requiring high efficiency fixtures and devices in new construction and major renovations of existing structures. New appliances and fixtures typically reduce water use 20 percent (or more) than equivalent conventional models. These codes can be adopted in conjunction with high-efficiency irrigation standards as well as high-efficiency landscaping standards or separately. High-efficiency indoor water use codes can be adopted statewide, by local governments, per ordinance, by water management districts, by rule, while some utilities may be able to require their implementation as a condition of service.

Irrigation Standards, Adoption of Higher Efficiency – (Res, DSS, CII, PG, LRA)

This practice involves the adoption of codes with high efficiency irrigation design standards for a region, county, municipality, or utility service area. The codes aim to reduce the volume of water used to meet plant needs, supplemental to rainfall, and to deliver water in application patterns that minimize waste. Examples of these codes would include water efficient and/or pressure regulating sprinkler heads, requiring head-to-head coverage, the use of microirrigation (where applicable), and to irrigate plants with similar water needs separately from other plant types with different needs. These codes can be adopted in conjunction with high-efficiency landscaping standards as well as high-efficiency indoor standards or separately. High-efficiency irrigation water use codes can be adopted statewide, by local governments, per ordinance, by water management districts, by rule, while some utilities may be able to require their implementation as a condition of service.

Landscape Standards, Adoption of Water Efficiency – (Res, DSS, CII, PG, LRA)

This practice involves the adoption of codes with high-efficiency landscape design standards for a region, county, municipality, or utility service area. The codes aim to reduce the volume of water used, supplemental to rainfall, to meet plant needs. Examples of these codes would include the use of plants adapted to the local environment limiting the use of high-irrigation needing plants, and requiring some part of the landscape to remain unirrigated. These codes can be adopted in conjunction with high-efficiency irrigation standards as well as high-efficiency indoor standards or separately. High-efficiency landscape codes can be adopted statewide, by local governments, per ordinance, by water management districts, by rule, while some utilities may be able to require their implementation as a condition of service.

SECTION 2: AGRICULTURAL WATER USERS

Conservation Projects

The applicability of seven (7) specific agriculture conservation projects was evaluated for implementation in the CFWI Planning Area as part of the Solutions Planning Phase. These projects are summarized here.

- Maintenance and management
- Electronics
- Irrigation system retrofits
- Water control
- Additional practices
- Tailwater/surface water recovery
- Frost/freeze protection

Funding sources for the implementation of these projects can be shared between the grower, Florida Department of Agriculture and Consumer Services (FDACS), water management districts, legislative appropriations, soil and water conservation districts (SWCDs), local governments, Resource Conservation & Development districts, USDA-Natural Resources Conservation Service (NRCS), and other partners. There are no limitations due to rule constraints expected from any of the identified projects.

1. Maintenance and Management

This practice involves the regular maintenance and intensive management of an existing agricultural irrigation system. Funding for this practice would not be for equipment or capital improvements, but rather for educational outreach services and programs to help growers identify ways of maintaining and increasing irrigation efficiency.

Cost

Grower specific. Unavailable for this practice.

Constraints

The typically low participation rates in training and educational programs and for on-farm evaluations associated with this practice will likely limit effectiveness. Failing to secure the funding and instructors' necessary to administer the educational outreach service programs could limit effectiveness or implementation.

Potential Partners

Potential partners include growers, UF/IFAS, FDACS, water management districts, SWCDs, local governments, Resource Conservation & Development districts, and USDA-NRCS.

Project Feasibility

Many larger operations within the CFWI Planning Area already have maintenance and management programs in place so the water savings on these operations may be minimal. The largest applicability of this practice is with smaller operations and from growers who operate multiple farm locations across a broad range of practices.

Other Considerations

Lack of adequate marketing, outreach, and grower participation could limit the success of implementing this practice.

2. Electronics

This practice involves the use of electronics such as soil moisture sensors, weather stations, automatic control valves, and automatic pump start/stop mechanisms to schedule irrigation based on crop water needs.

Cost

Costs are highly variable for these practices depending on the items purchased, components installed, and the combination of agricultural measures used. The SWFWMD Model Farms Economic Study contains a methodology for conducting a cost/benefit analysis for agricultural BMPs.

Constraints

Several factors can limit the implementation and effectiveness of this practice including: securing the funding necessary to cost-share project implementation, successful marketing and advertising of the cost-share funding, growers embracing electronics over more traditional methods, and growers' hesitation to enter into a contract (if applicable) with a government entity. After implementation, success of the practice can be limited by inadequate training of growers on how to use the information provided by electronics projects.

Potential Partners

Potential partners include growers, UF/IFAS, FDACS, water management districts, SWCDs, local governments, Resource Conservation & Development districts, and USDA-NRCS.

Project Feasibility

Many growers have already implemented one or more of the electronics practices included in this group. The potential savings in operating costs from implementing the practices may provide extra motivation for growers to implement these practices in their agricultural operations.

Other Considerations

Lack of adequate marketing/outreach, cost-share funding, and grower participation could limit the success of implementing this practice. Past negative experiences with technology could prevent some growers from implementing the practices.

3. Irrigation System Retrofits

This practice involves replacing an existing irrigation system or system components with a more efficient irrigation system or components. Examples include, but are not limited to

- Drip or microirrigation system conversion
- Linear move sprinkler irrigation system conversion
- Low pressure center pivot sprinkler irrigation system conversion
- Fully enclosed seepage irrigation system conversion
- For containerized plants, replacement of overhead irrigation with drip, microirrigation, or subirrigation

Cost

Costs are highly variable for these practices depending on the items purchased, components installed, and the combination of agricultural measures used. The SWFWMD Model Farms Economic Update contains a methodology for conducting a cost/benefit analysis for agricultural BMPs.

Constraints

Several factors can limit the number of implementations and effectiveness of this practice including: securing the funding necessary to cost-share project implementation, successful marketing and advertising of the cost-share funding, and growers' hesitation to enter into a contract (if applicable) with a government entity.

Potential Partners

Potential partners include growers, UF/IFAS, FDACS, water management districts, SWCDs, local governments, Resource Conservation & Development districts, and USDA-NRCS.

Project Feasibility

Project is fully feasible. Some irrigation conversions are not practical as the existing irrigation is used for daily irrigation and cold protection and a more efficient system would not allow for cold protection. The total capital costs for most irrigation system retrofits are high compared to other practices, which may limit implementation.

Other Considerations

Lack of adequate marketing/outreach, cost-share funding, and grower participation could limit the success of implementing this practice.

4. Water Control

This practice involves the use of structures and irrigation practices to manage surface water and reduce seepage or evaporation losses. Examples may include, but are not limited to

- Water control structures
- Water table observation wells

Cost

Costs are highly variable for these practices depending on the items purchased, components installed, and the combination of agricultural measures used. The SWFWMD Model Farms Economic Update contains a methodology for conducting a cost/benefit analysis for agricultural BMPs.

Constraints

Several factors can limit the number of implementations and effectiveness of this practice including: securing the funding necessary to cost-share project implementation, successful marketing and advertising of the cost-share funding, and growers' hesitation to enter into a contract (if applicable) with a government entity.

Potential Partners

Potential partners include growers, UF/IFAS, FDACS, water management districts, SWCDs, local governments, Resource Conservation & Development districts, and USDA-NRCS.

Project Feasibility

Fully feasible however, the use of surface water is required for this practice. The active management of surface water is required to maximize the benefits of this practice which can be neglected and reduce the water savings.

Other Considerations

Success of implementing this practice could be limited by lack of adequate marketing/ outreach, lack of cost-share funding, and limited grower participation. Modifications to surface water management systems will likely require some form of agency authorization, such as a surface water permit or modification of an existing permit. This adds additional costs to implement the project.

5. Additional Practices

This category includes practices that do not fit into the other categories. These practices have been proven to conserve water or are thought to conserve water and are undergoing further research. These practices may not currently be in wide use. Service programs can be used to advise growers on implementation of these and other practices. Not all of these practices will be supported by a cost-share program.

- Reclaimed water
- Other proven water conservation techniques and ideas

Cost

Costs are highly variable for these practices depending on the items purchased, components installed, and the combination of agricultural measures used. The SWFWMD Model Farms Economic Update contains a methodology for conducting a cost/benefit analysis for agricultural BMPs.

Constraints

Several factors can limit the number of implementations and effectiveness of this practice including: securing the funding necessary to cost-share project implementation, successful marketing and advertising of the cost-share funding, and growers' hesitation to enter into a contract (if applicable) with a government entity. Low participation rates in the training programs and on-farm evaluations associated with other practices may limit their effectiveness.

Potential Partners

Potential partners include growers, UF/IFAS, FDACS, water management districts, SWCDs, local governments, Resource Conservation & Development districts, and USDA-NRCS.

Other Considerations

Lack of adequate marketing/outreach, cost-share funding, and grower participation could limit the success of implementing this practice. While not conservation in a traditional sense (as no improvement in water use efficiency occurs as a direct result), beneficial use of reclaimed water can reduce demand from traditional supply sources.

6. Tailwater Recovery

This practice involves the collection of rainwater, surface water runoff, and excess irrigation water for use or reuse for bed preparation, crop establishment, supplemental irrigation, and other agricultural water uses.

- Tailwater recovery and reuse system pump stations and delivery systems
- Capturing roof runoff and recycling irrigation water to ponds or holding tanks in greenhouse operations

Cost

Costs are highly variable for these practices depending on the items purchased, components installed, and the combination of agricultural measures used. The SWFWMD Model Farms Economic Update contains a methodology for conducting a cost/benefit analysis for agricultural BMPs.

Constraints

Several factors can limit the number of implementations and effectiveness of this practice including: securing the funding necessary to cost-share project implementation, successful marketing and advertising of the cost-share funding, growers' hesitation to enter into a contract (if applicable) with a government entity.

Potential Partners

Potential partners include growers, UF/IFAS, FDACS, water management districts, SWCDs, local governments, Resource Conservation & Development districts, and USDA-NRCS.

Project Feasibility

Soil conditions may limit the applicability of this project type to certain operations within the CFWI Planning Area. There are significant capital costs associated with tailwater recovery projects.

Project Limitations or Constraints Resulting from Rule Inconsistency

Food safety and plant pathogen issues may limit the implementation of this practice. Modifications to surface water management systems will likely require some form of agency authorization, such as a surface water permit or modification, water use permit modification, or other type authorization, which adds additional implementation costs.

Other Considerations

Lack of adequate marketing/outreach, cost-share funding, and grower participation could limit the success of implementing this practice. Growers may be hesitant to implement this practice if they will lose groundwater quantities on their consumptive water use permits.

7. Frost/Freeze Protection

This practice uses cold protection methods that either do not require the use of groundwater or that reduce peak uses of groundwater during frost/freeze events.

- Crop cloth
- Wind machines
- Selective inverted sinks
- Sprinkler heads and spacing retrofits
- Use of fog for cold protection in greenhouses/shade houses
- Tailwater recovery and reuse system pump stations and delivery systems

Cost

Costs are highly variable for these practices depending on the items purchased, components installed, and the combination of agricultural measures used. The SWFWMD Model Farms Economic Update contains a methodology for conducting a cost/benefit analysis for agricultural BMPs.

Constraints

Several factors can limit the number of implementations and effectiveness of this practice including: securing the funding necessary to cost-share project implementation, successful marketing and advertising of the cost-share funding, and growers' hesitation to enter into a contract (if applicable) with a government entity. Some of the practices are not effective during some of the cold protection events.

Potential Partners

Potential partners include growers, UF/IFAS, FDACS, water management districts, SWCDs, local governments, Resource Conservation & Development districts, and USDA-NRCS.

Project Feasibility

Project is fully feasible, but is limited. This project is only applicable to crops that require cold protection. There are substantial capital costs associated with certain proposed practices.

Other Considerations

Lack of adequate marketing/outreach, cost-share funding, and grower participation could limit the success of implementing this practice. The use of some of the practices may be limited due to location near residential areas, labor costs, and food safety or plant pathogen issues.

Agriculture Conservation BMPs and Programs

Water savings for agriculture are mostly associated with improvements in irrigation system efficiency. Other water conservation measures implemented on citrus groves, pasture lands, and other agricultural areas have also contributed to water savings. Brief descriptions of some of these agriculture BMPs and conservation programs include

- Electronics
- Irrigation system replacement/retrofit
- Maintenance and management
- Water control
- Additional practices
- Tailwater/surface water recovery and rainwater harvesting
- Frost/freeze protection
- Agriculture irrigations efficiency program

Electronics

Automatic Meter Reading/Advanced Metering Infrastructure (AMR/AMI) Technology

This practice relies on the remote monitoring of meter readings using an irrigation system controller or computer system. This technology detects leaks or problems in the irrigation system immediately and shuts down the pump to prevent excess water loss. Some growers apply water based on the number of gallons per plant and the automatic meter readings are used to shut the pump off when the desired volume per plant is reached.

Automated Valves

This practice uses irrigation system valves, which can be operated remotely or automatically shut off when a sensor indicates a certain water level, soil moisture level, irrigation volume, or time interval is reached. Water savings are realized over manually operated valves primarily due to operator inconsistencies (e.g., letting water flow too long) as logistics often prevent growers from ending irrigation at the ideal time.

Auto Pump Start / Stop

These devices automatically start and stop the irrigation pump engines. The grower controls the pumps remotely or by using other sensor data such as air temperature, rain or soil moisture sensors. Water is conserved by allowing growers or farm managers who are responsible for multiple pumps (often more than 10 pumps) to start and stop pumps based on crop needs instead of when time allows them to visit each pump station.

Multistage Greenhouse Control Systems

In Florida, greenhouses commonly are cooled using fog or fan and pad evaporative systems. As temperatures rise, multistage controllers can separately open greenhouse vents, then run cooling fans and then delay turning on the fog system or wetting system for the evaporative cooling pads until needed. These controllers operate in the reverse direction as temperatures drop. These adjustments in water use can reduce the amount of water lost to evaporation.

Smart Irrigation Controllers

These devices allow the grower to schedule irrigation using the inputs from many sensors or sources based on the crop water needs. Inputs can include soil moisture, rainfall, wind, air temperature, and forecasted rainfall. These controllers can be configured to automatically start or stop irrigation based on the input or will alert the grower of required actions. In some cases no real time data is input to the controller, but the controller is used to schedule irrigation to supply only the crop water needs. Water is conserved by providing the grower with the information necessary to irrigate to the water needs of the crop or automatically controlling the system based on crop water needs.

Soil Moisture Sensor(s)

These devices interrupt the operation of an irrigation system when the soil reaches field capacity or excess irrigation water is draining below the root zone of the crop. Water is conserved by preventing the application of water when it is not necessary. Soil moisture sensors can also indicate when the soil moisture drops too low and irrigation is required. In some cases, the use of this measure has increased water use.

Weather Station with ET Measurement

An irrigation controller or computerized system incorporates real-time weather data to automatically update scheduled irrigation events. This can include a rain sensor that interrupts the operation of an automatic irrigation system during and after rainfall events, or a temperature and relative humidity sensor that helps the grower decide when to turn his irrigation system on or off for frost or freeze protection. Some irrigation controllers do not automatically change scheduled irrigation events, but the data collected by the weather station can be used by the grower to limit irrigation to only the amount of water that was not supplied by rainfall.

Irrigation System Replacement/Retrofit

Irrigation Retrofit/Replacement with a More Efficient Irrigation System or System Components

This practice involves replacing an existing irrigation system with a more efficient system or part of a system with a more efficient component. Some examples of system retrofits are listed below; however, this is not intended to be an exhaustive list of current or future retrofit options.

Drip/Microirrigation System Conversion

This practice involves the replacement of an irrigation system with a more efficient irrigation method that uses low-flow hardware (e.g., drip or microirrigation) to deliver water near the plants' root zone. The applicability of this is dependent upon crop type.

Fully Enclosed Seepage Irrigation System Conversion

This involves the replacement of open or semi-closed seepage irrigation systems with a more efficient fully enclosed seepage system. Fully enclosed seepage irrigation systems increase irrigation efficiency by reducing losses due to evaporation and runoff from open or semi-closed seepage irrigation systems.

Gated and Flexible Pipe for Field Water Distribution Systems

This practice involves the use of gated and flexible irrigation piping in an agricultural operation. This is applicable to agricultural producers who plant row crops and is used to convey irrigation water to furrow or border irrigated fields. This reduces seepage losses associated with open channel distribution, and increases efficiency and uniformity of delivery to the furrows (e.g., by reducing deep percolation of irrigation water near the head of the field). Cost effectiveness is variable based on site-specific seepage rates in open channels, and field layout (i.e., furrow spacing). Furrow dikes are typically used in arid and semi-arid regions, so applicability in Florida is limited.

Irrigation and Lateral Canal Replacement with Pipelines

Replacing open channels (irrigation and lateral canals) with pipelines decreases conveyance losses from seepage. This practice is applicable to water districts that use open channels to convey water from a source to farms or irrigation turnouts, and as an alternative to lining the canals. Application is limited by canal capacity (typically limited to canals with less than 100 cubic foot per second [cfs] capacity) and cost. In Florida, water district irrigation canals often also serve as drainage conveyance during the wet season, requiring even greater flow capacities – this further impacts the applicability of this practice in Florida.

Linear Move Sprinkler Irrigation System Conversion

This practice involves increasing irrigation efficiency by installing a more efficient linear move sprinkler irrigation system in place of a less efficient irrigation system.

Lining of Irrigation Canals and On-Farm Irrigation Ditches

This practice involves the lining of open conveyance canals and on-farm ditches with impervious material to decrease conveyance losses from seepage.

Low Pressure Center Pivot Sprinkler Irrigation System Conversion

This practice replaces an irrigation system with more efficient low pressure center pivot sprinklers. These systems increase irrigation efficiency by reducing losses due to evaporation and runoff when compared to high pressure center pivot systems or seepage irrigation systems.

On-Farm Irrigation Ditch Replacement with Pipelines

This practice entails the replacement of on-farm conveyance ditches with pipelines to decrease conveyance losses from seepage by replacement of open channels with pipelines. This is applicable to irrigated farms that use an open ditch to convey irrigation water, and as an alternative to lining the ditch. It is limited by ditch capacity (typically limited to ditches with less than 5 cfs capacity) and cost. Cost effectiveness is variable based on site-specific seepage rates in open channels and required pipe size based on capacity..

Overhead Irrigation of Containerized Plants Replacement with Sub-irrigation

Sub-irrigation systems (capillary mat, ebb and flow, flood floor, and trough) are very effective at reducing water use. These systems also reduce needed fertilizer inputs and may reduce foliar diseases.

Maintenance and Management

Cyclic Scheduled Irrigation; Applying Water in Several Short Cycles Rather than One Long Cycle

This practice applies surface irrigation over a short period of time until surface water pooling starts to occur, and then stops irrigation to allow infiltration. This is applicable to nearly all direct application (i.e., surface) irrigation methods, applying irrigation in short bursts rather than in longer cycles. This conserves water by reducing runoff, thereby increasing application efficiency. Cyclic irrigation can also be used to decrease water loss in container nurseries.

Irrigation Scheduling

This practice involves the development of an irrigation schedule used to determine when and how much to irrigate crops based on the irrigation system type and efficiency, weather conditions, crop requirements, and soil characteristics. Local weather stations and soil moisture-sensing devices can help adapt the schedule to the actual real time site conditions.

Irrigation System Evaluation (or Survey)

This involves the collection of information about and evaluation of a grower's irrigation system by a trained irrigation technician. Recommendations for system improvements and more effective irrigation scheduling and, in some cases, the redesign of the irrigation system are then provided. Typically, if all recommendations are implemented, overall system irrigation efficiency can improve up to an estimated 15 to 20 percent.

Net Irrigation Requirement Based Irrigation Determination

The difference between the daily crop demand (evapotranspiration) and the daily effective rainfall (amount of natural rainfall available to the plant's root zone, which excludes deep percolation, runoff, and plant interception) will closely predict the daily net irrigation requirement. This practice entails the tracking of a water balance estimate, by a trained technician (Irrigation Manager or Auditor), to give the grower a refined schedule of when to irrigate and how much water to apply.

Routine System Maintenance

This practice involves inspecting the irrigation system components for compromised integrity and ensuring that any previously replaced emitters are compatible with the original irrigation system design. Pressure losses through leaks and inappropriately sized components can cause inefficiencies and non-uniform irrigation patterns throughout the production field.

Volumetric Measurement of Irrigation Water Use

This practice entails maintaining an accurate assessment of the irrigation water use. Helpful direct volumetric measuring devices include properly calibrated (propeller/magnetic flux/ultrasonic) flow meters and pipe pressure meters. Indirect measuring devices include energy use of the pump and the duration of the irrigation event.

Water Budget Development

This practice involves evaluating natural rainfall and plant evapotranspiration to determine the relationship between input and output of water to and from the site. The budget takes into account plant type, plant water needs, irrigation system design, and the water received by the crop's root zone either by rainfall or irrigation during times of water deficit. Water budgets are associated with a specific amount of time (i.e., weekly) to schedule irrigation events and reduces or eliminates overwatering.

Water Control

Furrow Dikes

This practice involves the addition of dikes in irrigation furrows to control distribution of surface water within the field. This practice reduces runoff and increases infiltration of rain or applied irrigation. Furrow dikes are typically used in arid and semi-arid regions, so applicability in Florida is limited.

Water Control Structures

This practice involves the use of a structure or series of structures in a water management system to convey water, control the direction or rate of flow, and/or maintain a desired water surface elevation. Typical water control structures may consist of one or a combination of drops, chutes, turnouts, surface water inlets, pipe drop inlets, box inlets, head gates, flashboard risers, culverts, and pipes, all in varying sizes and shapes.

Water Table Observation Well(s)

This practice entails the use of water table monitor wells placed in agricultural fields to show the grower how high the water table is in the field. The depth to the water table indicates whether further irrigation is required and prevents irrigation when it is not needed. Depth readings can be read either manually or monitored remotely. This practice is limited to certain soils, such as those with a spodic or clay horizon.

Additional Practices

Brush Control / Management

This practice involves the removal and/or reduction of brush to reduce evapotranspiration. It is typically applicable to non-irrigated land in areas with sufficient rainfall. Brush near the crop competes with the crop for the available water resulting in a need for irrigation.

Crop Residue Management and Conservation Tillage

This involves soil tillage to improve the ability of soil to hold moisture, reduce the amount of water that runs off the field, and reduces evaporation of water from the soil surface.

Group Nursery Plants According to Water Needs

This practice involves the practice of grouping plants with similar water needs together (to be irrigated on the same irrigation zone). Water savings are realized by not overwatering plants with a lower irrigation need in order to meet the higher irrigation demands of plants in the same irrigation zone.

Laser Land Leveling

This practice entails using a laser transmitter to produce a horizontal laser plane to grade a field to the conditions needed to conserve water use on the site. This practice increases irrigation uniformity and decreases runoff.

Other Proven Water Conservation Techniques and Ideas

This practice allows new or other proven water conservation and water savings techniques, measures, and ideas to be included for water conservation and/or savings. These measures should be proven to have a net water resource benefit consistent with this plan and may include practices currently being researched, unknown, or not presently recognized and proven in this list of Agricultural BMPs. These BMPs are considered on a case-by-case basis, and may or may not be considered for cost-share assistance.

Reclaimed Water

This practice is intended to increase the efficient use of reclaimed water projects to reduce or conserve groundwater or other water sources intended for agricultural irrigation purposes. These measures may include pipe connections and other water collection and delivery system items and hardware when connected into an existing waste water treatment plant's reclaimed water line running along the agricultural operations property limits.

Shade Control Structures

This practice involves the installation of structures to provide shade and temperature control from direct sun light, reducing evapotranspiration and soil drying, which reduces irrigation needs. Shade structures provide other advantages for crops such as bird protection, hail protection, and some wind protection. Since shade structures can reduce air mixing during cold radiation events, temperatures inside are often colder than outside so the need for supplemental heating may be increased.

Soil Amendments

This practice involves amending the soil to provide a better environment for plants to grow. Some soil amendments improve its physical properties, such as water retention, permeability, water infiltration, drainage, aeration, and structure. Improved soil conditions can decrease the frequency of required irrigation.

Surge Flow Irrigation Use for Field Water Distribution Systems

This practice applies water intermittently to furrows in seepage irrigation systems. It is applicable to agricultural producers that currently use gated pipe or flexible pipe (see above) to distribute irrigation water to furrow irrigated fields, and who have soil types that swell and reduce infiltration rates in response to irrigation. This practice increases efficiency and uniformity of delivery to the furrows (i.e., by reducing deep percolation of irrigation water near the head of the field), and reduces the potential for ponding and runoff. Water saved by switching to surge flow is estimated to be between 10 and 40 percent.

Soil Cultivation Techniques

This practice incorporates the practice of spiking, slicing, and core aerification of the soil to improve permeability, water infiltration, drainage, aeration, and structure. Improved soil conditions can decrease the frequency of required irrigation.

Water Metering

This practice involves the installation of water meters at pumping facilities and in critical locations throughout the irrigation system. Irrigation meters typically register a flow rate and a total volume. Information collected from meters can help detect leaks and calculate irrigation efficiencies.

Tailwater/Surface Water Recovery and Rainwater Harvesting

Capturing Greenhouse Roof Runoff and/or Irrigation Water Runoff for Reuse

This practice involves capture and reuse of rainwater, surface water runoff, and/or irrigation water. This practice encompasses a wide variety of water storage techniques designed to capture and hold water for a period of time for later reuse. Storage may be in ponds, cisterns, or tanks. Conveying water to the storage facility may involve all or some of the following: rain gutters, down spouts, control structures/culverts, piping, spillways, and other water conveyance devices. This practice may involve a pump station, filtration system, and piping necessary to connect the collected water into the irrigation system. Additionally, these systems may include decontamination facilities to remove potential plant and human pathogens before the water is reused.

Tailwater/Surface Water Recovery and Reuse System

This practice consists of establishing a reservoir(s) with a series of ditches and/or pipelines to collect and convey rainwater, surface water runoff, and excess irrigation water to the storage tailwater recovery reservoir(s) (typically below the grade of the irrigated land). Tailwater recovery and reuse systems typically include construction of the tailwater recovery and reuse pond, pump station(s), filtration system(s), underdrains, outfall structure(s), culvert(s), and piping to convey tailwater to irrigated fields for use and reuse. Natural lakes within the region may also serve and be used, pursuant to applicable regulations, as a source of 'tailwater' for irrigation purposes. In containerized plant nurseries, plants can be grown on impermeable surfaces that collect almost all of the unused irrigation water and channel it into storage facilities. Growers using these systems may need to include decontamination facilities to remove potential plant and human pathogens before the water is reused.

Frost/Freeze Protection

Crop Row Covers/Frost Blankets

Crop row covers/frost blankets are fabrics that cover crops during frost/freeze events to help prevent damage to the plants. These products serve as weak insulators but reduce convectional heat loss, thereby creating a microclimate around the plant that is warmer than outside the cover. This practice can reduce or eliminate the need to use water during frost/freeze events. Crop row covers/frost blankets can be used if there is a sufficient labor force available to deploy the covers before freeze events and anchor them down so the wind does not blow them away.

Selective Inverted Sink

Selective inverted sinks use an engine driven propeller placed parallel to the ground surface to push cold air that accumulates in low areas where crops are grown upward, creating a suction effect that draws warmer air at higher elevations down during a radiation frost/freeze event. The use of inverted sinks can prevent the application of water for frost/freeze protection during certain frost/freeze events.

Sprinkler Heads and Spacing Retrofits

This practice employs the use of irrigation systems that more efficiently apply water for frost/freeze protection. The measure can include changing the sprinkler spacing to improve uniformity or changing the sprinkler type to decrease the rewetting intervals. Decreasing the rewetting interval allows reduced application rates.

Use of Fog for Cold Protection in Greenhouses/Shade Houses

In greenhouses or polyethylene film wrapped shade houses, using a low volume fog system can effectively provide heat and reduce the heat loss from the soil and plant surfaces during periods where cold protection is required. The use of a low volume system reduces the volume of water required for crop protection compared to a mist or sprinkler system.

Wind Machines

The movement of air by an engine driven wind machine mixes the warmer air above a temperature inversion layer with the cooler air at ground level during a radiation frost/freeze event. The use of wind machines may also require selective inverted sinks and prevents the need for water application during certain frost/freeze events. Wind machines are only effective during radiation freezes (calm wind conditions) where temperature inversions develop when cold air builds up near the ground (crop). Wind machines may eliminate the need to use water for cold protection in central Florida during some radiation freezes but water may still be needed when advective freezes occur.

Agriculture Irrigation Efficiency Programs

Agricultural Mobile Irrigation Labs

Mobile Irrigation Labs (MILS) are staffed by trained specialists who conduct field audits of agricultural irrigation systems. System design, maintenance, efficiency, uniformity, and/or operations costs are evaluated. Specific recommendations for efficiency improvements on reducing water applications are also given to the user.

Environmental Quality Incentives Program (EQIP)

EQIP is a program, administered by the USDA NRCS, that provides technical assistance and financial assistance to implement conservation practices. Assistance is offered for a variety of practices that address natural resource concerns and deliver environmental benefits such as improving water quality, conserving water, reducing soil erosion, and creating wildlife habitat.

Facilitating Agricultural Resource Management Systems (FARMS) Program - SWFWMD

The FARMS Program is an agricultural BMP cost-share reimbursement program, available exclusively within the Southwest Florida Water Management District (SWFWMD).The program is a public/private partnership developed by the SWFWMD and the Florida Department of Agriculture and Consumer Services (FDACS) with qualifying BMP cost-share reimbursement rates up to 75 percent pursuant to Rule 40D-26, Florida Administrative Code (F.A.C.). The purpose of the FARMS initiative is to provide an incentive to the agricultural community within the SWFWMD, to implement agricultural BMPs that will provide resource benefits that include an emphasis on reduced Upper Floridian aquifer withdrawals, and/or improving water quality or natural-system functions within specified watersheds. For more information on the SWFWMD's FARMS Program go to http://www.swfwmd.state.fl.us/agriculture/farms/.

References for Additional Information

Farley, M., G. Wyeth, Z. Ghazali, A. Istandar, and S. Singh. 2008. *The Manager's Non-Revenue Water Handbook, A Guide to Understanding Water Losses*. Publisher: Ranhill Utilities Berhad and the United States Agency for International Development (USAID).
http://warrington.ufl.edu/centers/purc/docs/resources_NRWManagersHandbook.pdf

Texas Water Development Board. 2013. Best Management Practices for Agricultural Water Users, Texas Water Development Board, Austin, TX.
http://www.twdb.texas.gov/conservation/BMPs/Ag/doc/AgMiniGuide.pdf

Vickers A. 2001. *Handbook of Water Use and Conservation*. WaterPlow Press, Amherst, MA.

B

Cost Estimating Tool

SECTION 1: COST ESTIMATING (CE) TOOL INSTRUCTIONS

The intended purpose for development of a CFWI CE Tool is that it be used to develop project cost estimates for all Water Supply Project Options (WSPOs).

Background

The CFWI Solutions Team established a Cost Estimating Group (Group). The Group's primary goal was to provide sub-teams with a "Planning Level Cost Estimating Tool". The tool's intended use was to provide consistent calculation of Capital, O&M, Equivalent Annual Cost (EAC, \$/yr), and Unit Production Cost (UPC, \$/kgal), for those projects to be considered in this CFWI Solutions Planning Phase. Given the timeframes associated with this effort, the Group determined that a spreadsheet cost-estimating tool (CE Tool) would be most effective. The intent was for the CE Tool to be used by the subteams and other users to develop costs for each project.

The Cost Estimating Group began this process by gathering costing data from various central Florida projects. After a review of this data, the Group concluded that an existing study, "Engineering Assistance in Updating Information on Water Supply and Reuse System Component Costs", 2008-SP10, by Black & Veatch for SJRWMD, revised May 2008, comprised a reasonable and well-documented basis for the identified CFWI water resource projects. This document can be found at the following link:

https://floridaswater.box.com/s/b32aiwskmwgd1nba1hi3

Throughout this appendix, this SJRWMD study will be referred to as the "Report". The Report forms the basis for development of CE Tool.

The Report characterizes projects into base "Systems" and "Components". In the early stages of the Solutions Planning Phase, the Group proceeded to categorize each of the original CFWI Projects into their major Systems and Components. "Systems" comprise larger processes or operations (i.e., a treatment processes or a wellfield), while "Components" are infrastructure specific (i.e., piping and valves or wells). All costing information was escalated to 2014 dollars by using the Engineering News Record Construction Cost Indices (ENRCCI), for March 2014 (http://enr.construction.com/economics/). The Systems and Components information represents true "Construction Costs", and incorporate construction markups and contingency allowances. "Non-construction Costs", such as "facilities planning", "design", "permitting", "services during construction", and "administration", have also been incorporated into the CE Tool. Understanding that some projects are already bid, or are in the construction phase, the CE Tool was developed to allow bid/construction costs to be incorporated. In this case, the "non-construction costs" are determined by the CE Tool.

Systems and Components

Each System or Component is provided with a letter and number designation, along with a brief description (e.g., "S-2.1b Wellfield"). This particular identifier designates that this item is a water infrastructure *System* (S), which is consists of various *Components,* and can be found in Section 2.1 Wellfield of the Report. This reference was included so that you can read the corresponding item description that was included in the Report. Items with a "C" prefix are a component. Components are found in Section 1 of the Report, and Systems are described in Section 2 of the Report. The Report provides more detailed descriptions for the definitions of the Systems and Components. Below is a list of the major Systems and Components that adequately characterize the CFWI Projects:

Systems	Components
Conventional surface water treatment	Surface water intakes
Brackish surface water treatment with concentrate mgmt.	Production, injection, and ASR wells
Brackish groundwater treatment with concentrate mgmt.	Pipelines (Urban/Rural)
Wellfields (UFA and LFA)	Deep Bed Filters
Residual Disinfection for Transmission	ASR Monitoring Wells
Booster Pump Stations	Chlorine Disinfection
Injection Wells Systems, LFA	Pumps and pump stations (Transfer/Lift and High Service)
Treated ASR	Tanks
Modifications to Existing WWTP's for Public Access Reuse	
RIBs and Reclaimed Ponds	
Reservoirs	

The Tool was designed to achieve *The Association for the Advancement of Cost Engineering International* Class 5 Estimate level (AACE 2005). A Class 5 Estimate is considered a "Conceptual Screening" level, with an expected accuracy range of -50% to +100%.

The current version of the CE Tool is available for download from the BOX at: https://floridaswater.app.box.com/s/nuculucdm7p00ssjcry4#/s/nuculucdm7p00ssjcry4/1/2114964610?&_suid=140554193236806940590967770168

The CE Tool is comprised of 27 tabs, the tabs are

- **Tab 1 - "Summary"**: This tab summarizes the inputs from the System and Component tabs. The only input that you can make on this page is to enter the project name, all other fields are locked.
- **Tab 2 - "Gen Info"**: This covers the CE Tool references, assumptions, and abbreviations, it's important to review this page.

- **Tabs 3-27 - Systems and Components**: These 25 tabs reflect the base "Systems" and "Components" for the proposed project. All inputs should be entered within these tabs.

For effective utilization of the CE Tool it's very important to utilize the correct "units" and input variables. For example, there is a significant difference between 'Average Daily Flow' (ADF) and 'Max Daily Flow' (MDF), and most inputs are in terms of millions of gallons (MG) or million gallons per day (mgd).

How to use the CE Tool

1. Open the "Summary" tab, and type the project name into the "Project Name" cell.
2. Select the "Component" and "System" tabs that apply to the project, and for which costs are to be computed.
3. Input the corresponding project variables (i.e., ADF, MDF, pipe diameters, lengths, depths) into the corresponding system and component tabs.
4. Confirm that the project cost information in each system and component tab was correctly recorded by the spreadsheet program on the "Summary" tab.
5. The "Summary" tab, beneath the Project Name cell, will provide a composite cost total from each of the system and component tabs.
6. Save the project spreadsheet.

The CE Group received numerous inquiries regarding the use of the CE Tool, so a Frequently Asked Questions (FAQs) document has been developed, and it is available for download from the Cost Estimating folder (BOX), at the following link:
https://floridaswater.app.box.com/s/nuculucdm7p00ssjcry4#/s/nuculucdm7p00ssjcry4/1/2228703307?&_suid=140597474159906711390890229387

Some of the items addressed in the FAQ are:

- A description of how "new" projects are to be incorporated into the Solutions Planning Phase.
- A clarification of whether or not land costs are to be included.
- An explanation of the differences between Systems vs. Components. In general, follow the recommended list of systems and components for each project as identified in the WSPO's list (at the link to the CE Tool above), column N.
- An explanation of the differences between various well systems and components.
- How the Utilization Factor is incorporated for facilities that are used seasonally.
- How to handle unique equipment and technology.
- How to handle piping sizes larger than 42".

SECTION 2: TECHNICAL MEMORANDUM 2014-09

Cost Estimating and Economic Criteria for 2014 - April 23, 2014

Background and Purpose

This Technical Memorandum (TM) provides cost definitions and cost estimating and economic criteria to be used in the development of regional planning level water supply facilities cost estimates for the Central Florida Water Initiative (CFWI) Solutions Strategies document and Regional Water Supply Plan (RWSP). The definitions and criteria summarized in this TM (Water Supply Solutions, Inc. 2010) have been incorporated with certain modifications and updates as appropriate for application to the 2015 CFWI Document Series. The Water Supply Solutions, Inc. (2010) TM is available for download on the SJRWMD website as Special Publication SJ2010-SP04.

This TM provides a consistent set of definitions and criteria for the development of comparable planning level life cycle cost estimates for all CFWI water supply project options (WSPOs). They will be applied to all cost estimates and economic comparisons developed as part of the 2015 CFWI RWSP to ensure that all cost estimates are directly comparable.

Definitions

The following definitions will be used in the CFWI RWSP project and should be adhered to when applicable.

Construction Cost

Construction cost is the total amount expected to be paid to a qualified contractor to build the required facilities at peak design capacity.

Non-construction Capital Cost

Non-construction capital cost is an allowance for the following elements associated with the constructed facilities:

- Facilities planning
- Engineering design
- Permitting
- Services during construction
- Administration

Land Cost

The market value of the land required to implement the water supply alternative.

Land Acquisition Cost

The estimated cost of acquiring the required land, exclusive of the land cost.

Total Capital Cost

Total capital cost is the sum of construction cost, non-construction capital cost, land cost, and land acquisition cost.

Operation and Maintenance Cost

The estimated annual cost of operating and maintaining the water supply facility when operated at average day capacity.

Equivalent Annual Cost

Total annual life cycle cost of the water supply alternative based on service life and time value of money criteria established herein. Equivalent Annual Cost accounts for:

- Total Capital Cost
- Operations and Maintenance (O&M) costs (with the facility operating at average day capacity)
- Time value of money (annual interest rate)
- Facilities service life

Unit Production Cost

Equivalent Annual Cost divided by total annual water production. The Unit Production Cost will be expressed in terms of dollars per 1,000 gallons.

Criteria

Cost estimating and economic criteria are guidelines for estimating costs associated with water supply options.

Peak Flow Ratio

Construction and capital cost of water supply facilities will be based on maximum installed capacity designed to accommodate peak or maximum daily flow (MDF) requirements. O&M costs and total annual water production are based on the average daily flow (ADF) produced. The peak flow ratio (MDF/ADF) for an individual water supply system depends on the demand characteristics of the service area.

For public supply systems the required peak flow ratio is generally at least 1.25 for large systems and can be greater than 2.0 for small systems. However, the total system peaking requirement may or may not apply to individual components of an integrated water supply system.

In CFWI RWSP applications it is anticipated that some alternative water supply options, including brackish surface water or seawater, may be designed to provide a relatively steady state base flow, to one or more demand centers, with peak demand (MDF) satisfied by the traditional in-place fresh groundwater water supply facilities. In this case, the design peak ratio for the alternative water supply facilities may approach 1.0. Therefore, it is important to understand and establish the role of a particular alternative water supply option prior to determining the required peak flow ratio.

For water supply options where the service area peak flow ratio is known and satisfaction of peak demands is required, the known value should be used. In cases where satisfaction of peak demands is required and a service area specific value is unknown, a peak ratio of 1.5 should be used.

For base load (steady state) water supply options a peaking factor of 1.05 should be applied. In the steady state application, the design peak capacity of the facility is only nominally (i.e., 5%) larger than the steady state demand.

The *facilities utilization factor*, a parameter sometimes reported in water supply facilities planning and design applications, is equal to the inverse of the peak flow ratio. The utilization factor represents the ratio of average production to total installed capacity. For example, a utilization factor of 0.67 is equivalent to a peak flow ratio of 1.5 and indicates that the facility is normally operated at 67 percent of maximum day capacity.

Cost Index

Engineering News Record (ENR) publishes a Construction Cost Index (CCI) that can be used to adjust the cost basis of a given construction project for past and future times. The ENRCCI is based on the following construction items:

- 200 hours of common labor at the 20-city average of common labor rates
- 2,500 pounds of standard structural steel shapes at the mill price prior to 1996 and the fabricated 20-city price from 1996
- 1.128 tons of Portland cement at the 20-city price
- 1,088 board-ft of 2 x 4 lumber at the 20-city price

Cost estimates for the CFWI WSPOs will be expressed in March 2014 dollars.

Construction and Operation and Maintenance Cost

SJRWMD sponsored development of a comprehensive collection of water supply and reuse system component costing information for application in development of opinion of probable cost (OPC) for WSPOs, including those developed for the CFWI RWSP. The work addressed planning level construction and operation and maintenance (O&M) costs and was conducted by Black and Veatch, Inc. The final report (Black and Veatch 2008) is available for download on the SJRWMD web site as Special Publication SJ2008-SP10.

The cost basis for the water supply systems included in the Black and Veatch report is third quarter 2007. At that time, the Engineering News Record Construction Cost Index (ENRCCI) was 8005. The ENRCCI for March 2014 was 9702.

Cost data for individual water supply system components, extracted from the Black and Veatch final report, were used to develop construction and O&M cost equations and unit costs for application in the SJRWMD water supply planning process. All complete water supply system components, such as water treatment plants and booster pumping stations, include provisions for industry standard system redundancy.

The construction cost equations also include mark-ups for construction contingencies, overhead and profit and mobilization/demobilization, as recommended in the Black and Veatch final report and therefore represent total construction OPC.

The cost equations are summarized in a Technical Memorandum (TM), prepared by Water Supply Solutions, Inc. (2008), available for download on the SJRWMD web site as Special Publication SJ2008-SP13.

The construction and O&M guidance provided by the Black and Veatch report and by the Water Supply Solutions TM provide planning level estimates. These planning level estimates (OPCs) are not based on site-specific detail.

If more detailed construction and/or O&M costing information is available for a given WSPO, the more detailed information should be used.

Non-construction Capital Cost

Non-construction capital cost will equal 20 percent of the planning level estimated construction cost. The non-construction capital cost provides for project planning, engineering design, permitting, services during construction, and administration.

Land Cost

Unit land cost ($/acre) for each parcel type are based upon general land use classifications as supplied by SJRWMD land acquisition staff (Raymond Burton, personal communication, 2014).

General land use classifications include residential, commercial, industrial and timberlands/rural. The mid-range value for typical unit costs for these land classifications are reported in **Table B-1**. If actual site-specific land values are available for a given parcel and water supply option, then the site-specific value should be used in lieu of these typical regional values.

Table B-1. Typical unit land costs for the CFWI Planning Area.

Land Use	Unit Cost -- $/acre
Residential	$30,000
Commercial	$135,000
Industrial	$55,000
Timberlands/Rural	$5,000

Unit costs ($/ft^2) for pipeline right-of-way (ROW) corridors vary based on the land use classification. **Table B-2** presents unit costs for pipeline ROW corridors to be applied in the CFWI Planning Area.

Table B-2. Typical unit pipeline ROW corridor costs for the CFWI Planning Area.

Land Use	Unit Cost -- $/ft sq.
Urban (Commercial and Industrial)	$3.00
Suburban (Residential)	$1.00
Rural	$0.50

Recommended minimum ROW width requirements, as a function of pipe diameter, are reported in both Black and Veatch Report (2008) and Water Supply Solutions Technical Memorandum (2008).

Land Acquisition Cost

Land acquisition cost estimates will vary as a function of condemnation requirements, as follows:

- 12% of land value for known non-condemnation parcels
- 25% of land value for known condemnation parcels
- 18% of land value where condemnation status is unknown

In most cases, at the conceptual regional planning level of analysis, it is anticipated that condemnation status will be unknown and therefore the 18% value will apply.

Interest Rate

For the CFWI WSPOs, the interest rate to be used in all economic analysis calculations is the (FY 2014) federal water resources planning rate. This rate, set annually by the US Bureau of Reclamation for use by all federal agencies, is based on US Treasury bond rates. Although it is adjusted annually, it cannot be changed by more than 0.25 percent in any single year. At the time, the (FY 2014) federal water resources planning rate was 3.5 percent per annum (USACOE Economic Guidance Memorandum, Oct. 17, 2013). This value was used in all economic calculations for the CFWI WSPOs.

Economic Life of Facilities

Table B-3 provides the economic service life, in years, based on water supply system component type. These values will be used in all annual cost calculations.

In all cases, land is considered a permanent resource and therefore has an infinite service life.

Table B-3. Economic service life of water supply system components.

Component Type	Service Life in years
Water Conveyance Structures (pipelines, collection and transmission systems)	40
Other Structures (buildings, tankage, site improvements, etc.)	35
Wells	30
Process and Auxiliary Equipment (treatment equipment, pumps motors, mechanical equipment, etc.)	20
Reverse Osmosis Membranes	5

The non-construction capital costs associated with a given project, or major project component, were distributed in proportion to expected service life of the project. For example, if a given project, or major project component, had an economic service life of 20 years then the non-construction capital cost for that project, or major project component, also has an economic service life of 20 years.

Summary

Generally, definitions and cost estimating and economic criteria applied to the CFWI RWSP WSPOs are the same as those documented in *Cost Estimates and Economic Criteria for 2010 District Water Supply Plan*, Special Publication SJ2010-SP04, updated as appropriate. The main updates were the cost basis, the unit land cost, and the interest rate.

In addition, planning level construction and O&M cost estimating information applicable to the SJRWMD planning area, developed by Black and Veatch (2008) were incorporated into these criteria by reference.

References

Association for the Advancement of Cost Estimating International (AACE). 2005. *Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries*. TCM Framework: 7.3 – Cost Estimating and Budgeting. AACE International Recommended Practice No. 18R-97.

Black and Veatch, Inc. 2008. *Engineering Assistance in Updating Information on Water Supply and Reuse System Component Costs* Prepared for St. Johns River Water Management District, Palatka FL. Special Publication SJ2008-SP10.

Burton, Raymond B., Director, Division of Land Acquisition, SJRWMD, personal communication, 2014.

U.S. Army Corps of Engineers (USACOE). 2013. *Economic Guidance Memorandum*, October 17, 2013.

Water Supply Solutions, Inc. 2008. *Water Supply Facilities Cost Equations for Application to Alternative Water Supply Projects Investigations and Regional Water Supply Planning*. Prepared for St. Johns River Water Management District, Palatka FL. Special Publication SJ2008-SP13.

Water Supply Solutions, Inc. 2010. *Cost Estimates and Economic Criteria for 2010 District Water Supply Plan*. Prepared for St. Johns River Water Management District, Palatka FL. Special Publication SJ2010-SP04.

SECTION 3: COST ESTIMATING TOOL FAQ

Q –How are new projects to be integrated into the Solutions Phase?

A –New projects that met the Steering Committee's evaluation criteria are included in the subteam chapters of the CFWI RWSP 2035 Water Resources Protection and Water Supply Strategies Plan (Solutions Strategies). All Water Supply Project Options (WSPOs) are included as part of a comprehensive list in CFWI RWSP, Volume IIA, **Appendix D**.

Q –Are land costs to be included in the CE Tool cost Estimates?

A –Yes, land costs are to be included.

Q –How are land costs to be estimated if the land costs are unknown?

A –See **Tables B-1** and **B-2** in this appendix or see page 5 of the document "CFWI WSP Economic Criteria May 1, 2014: *Technical Memorandum - Cost Estimating and Economic Criteria for 2014*" that includes a section with land costs by land use. This document can be found on the BOX at

https://floridaswater.app.box.com/s/nuculucdm7p00ssjcry4#/s/nuculucdm7p00ssjcry4/1/1993605449?&_suid=1405706874475038568332281105544

Q –When should a "System" be used versus a "Component"?

A –When selecting Systems and Components, review the Systems first. For example, if the wellfield costs in tab 2.1b are used (Systems), then the cost of the wells as calculated in tab 1.5 for water productions wells (Components) typically does not need to be added. Users of the CE Tool are encouraged to review the Report *Engineering Assistance in Updating Information on Water Supply and Reuse System Component Costs* (Black and Veatch 2008), hereinafter referred to as the Report. The Report provides a detailed explanation of Systems and Components included in the costs calculated in the CE Tool spreadsheet tabs. The Report can be found in the Box at

https://floridaswater.app.box.com/s/nuculucdm7p00ssjcry4#/s/nuculucdm7p00ssjcry4/1/1880756799?&_suid=1405541929934020414076828653527

The naming of tabs in the CE Tool spreadsheet generally follows the section numbers of the Report. Tabs that have a number that start with 1 are generally separate

"Components". Tabs that have a number 2 are generally complete "Systems" comprised of multiple "components". It is recommended to review available systems first, and then review the equivalent section number in the Report. The Report will provide a list of components that are included in that system, and with a few exceptions (generally transmission lines), all the necessary components will be included in the system (additional components **don't** need to be added). **Adding component costs to a system cost that already includes the components will count component costs twice**. Again, it is recommended the System descriptions in the Report be reviewed before adding additional Components.

The WSPOs spreadsheet provides guidance on the Systems and Components that are likely required to develop costs for a project. The systems and components are listed in column N. The 2014-06 WSPOs spreadsheet is located in the FINAL CE Tool, Instructions, & Project Characterization Spreadsheet folder at

https://floridaswater.app.box.com/s/nuculucdm7p00ssjcry4/1/2114964610

Q –What are the differences between various well systems and components?

A –Tabs 2.1a/b "Wellfields" are for wellfield systems, given the assumptions (well details) in the Report*, Engineering Assistance in Updating Information on Water Supply and Reuse System Component Costs* (Black and Veatch 2008). Tab "1.5 Water Production Well" is for single wells that can be added to the "Wellfield" systems if needed over and above the wells included in the wellfield system.

Q –How is the Utilization Factor incorporated when facilities are used seasonally?

A –On occasion, a facility will only be fully utilized for part of a year and has a peaking factor much higher than the typical 1.5 and a matching utilization factor of .67 that are used as defaults in many of the components and systems in the CE Tool. Since Qd (MDF) (the design maximum daily flow) is calculated by the CE Tool based on the entered Qadf (ADF) and the peaking factor, it may be necessary to input a peaking factor different than the default or the Qd (MDF) will be calculated incorrectly and produce an incorrect capital cost.

This example illustrates how to modify the default peaking factor for a high speed pump that would only be used seasonally.

- The projected average daily flow (Qadf) for the pump was 1.4 mgd (total gallons per year/365 days/1,000,000)
- The facility needed to be sized to handle a maximum day flow of 6 mgd, so the known Qd (MDF) is 6 mgd.

- Using the default peaking factor of 1.5 would produce a Qd (MDF) of 1.4 x 1.5 = 2.1 mgd, only about a third of the facility's required capacity.

In this example, a replacement peaking factor can be calculated in two easy steps. Assume that the Qadf (ADF) and the Qd (MDF) are the same as in the example.

1. In cell B8, enter the known Qadf (ADF) in mgd as you would normally do (1.4 mgd).
2. Replace the default peaking factor in cell B9 with "=known Qd (MDF)/B8" or in this example, =6/B8.

In this example, the new peaking factor would be 6/1.4 = 4.29. The correct Qd (MDF) of 6 will now be produced in cell B10 and the facility will be sized and cost estimated correctly. The model calculated utilization factor in cell B11 will also change.

Q – How are large/unique, or unusual technology to be handled in the costing process?

A –Please contact a member of the Cost Estimating Group when working on very large or complex projects, or projects with unique systems and components.

Q – How are cost estimates to be developed for piping with diameters larger than 42"?

A –It was concluded that pipe diameters greater than 42" are more of a "custom build" and therefore data needed to be gathered on a case-by-case basis. Regarding the CE Tool, there is a separate section for piping "Diameters > 42". However, there are currently no formulas built into the cells associated with the "Diameters > 42" pipeline fields (just a reference in the "Cost" cell to the "Construction OPC"). So for "Diameters > 42", input the final "Cost", which will then be included above in the "Construction OPC". For the "Diameters > 42" fields, use the "Diameter" and "Length" simply as a reference for that cost.

C

Solutions Strategies Projects

INTRODUCTION

This Appendix provides detailed project information evaluated by the Groundwater (GW), Reclaimed Water (RW), Surface Water (SW), and Stormwater (ST) subteams (**Table C-1**) The approximate locations of these Solutions Strategies projects are shown on **Figure C-1.** The Solutions Planning Team charged the subteams with further assessing the projects identified in the CFWI RWSP (Volume IA, Appendix F) and newly developed projects from the Solutions Planning Phase (**Appendix D**) which met the Steering Committee criteria. The criteria focus on project capacity, projects that are multi-jurisdictional, and those projects that encourage regional interconnections and maximize economies of scale. The project capacity criteria for each subteam are

- Groundwater - 5 mgd or greater
- Reclaimed Water - 1 mgd or greater
- Surface Water - 10 mgd or greater
- Stormwater - 1 mgd or greater

Cost estimates were developed using the Cost Estimating (CE Tool). These estimates are designed to achieve a Class 5 Estimate level (AACE 2005), which is considered a "Conceptual Screening" level, with an expected accuracy range of -50% to +100%. Given these considerations, the results of the CFWI CE Tool provide a conceptual level estimate of cost that will need to be refined as each project progresses.

A project identified for inclusion in the Solutions Strategies document may not necessarily be selected for development by the listed water supplier. In accordance with Section 373.0361(6), Florida Statutes (F.S.), there is no legal requirement for these project options to be implemented by local governments, public or privately owned utilities, special districts, self-suppliers, multi-jurisdictional entities and other water suppliers. Current permits and laws limit the scope of regulatory actions that can be taken to impose specific solutions on users. However, the WSPOs included in this Appendix have been screened for feasibility and the Districts have indicated if projects have a likelihood of being permittable.

Table C-1. List of Solutions Strategies projects.

Solutions Strategies Project ID	Updated RWSP Project #	County	CFWI Sub-Regions	Project Name	Est. Water Generated (AADF mgd)
Brackish/Nontraditional Groundwater					
GW1	1 & 2[a]	Lake	SJRWMD	South Lake County Wellfield	12.7
GW2	3, 4, & 5	Osceola	SFWMD	Cypress Lake Wellfield	20.5[b]
GW3	28	Polk	SFWMD	Southeast Polk County Wellfield	30
GW3a	6-9, 11, 14, 16-18, 21-24, 26, 30, & 37	Polk	SWFWMD/ SFWMD	Polk County Blended LFA Distributed Wellfield	9.8
Reclaimed Water					
RW1	44	Orange	SJRWMD	Project RENEW	9.2
RW2	59	Osceola	SFWMD	West Ditch Stormwater for Reuse Augmentation	1.5
RW3	60	Osceola	SFWMD	160-acre Site Indirect Potable Reuse	5.0
RW4[d]	100	Polk	SWFWMD	TECO Polk Power Reuse	10.0
RW5[d]	106	Orange	SJRWMD	AFIRST	4.5
Surface Water					
SW1	126	Orange	SJRWMD/ SFWMD	St. Johns River/TCR	54
SW2	135	Seminole	SJRWMD	St. Johns River Near SR 46	40
SW3	138	Seminole	SJRWMD	St. Johns River Near Yankee Lake	40
SW4	144[a]	Okeechobee /Indian River	SFWMD/ SJRWMD	Grove Land Reservoir & STA	122[c]
SW5	150[a]	Polk	SWFWMD	Polk County Regional Alafia River Basin	10
Stormwater					
ST1	128	Osceola	SFWMD	Judge Farms Reservoir and Impoundment	5
ST2	143a[a] or 143b[a] -	Polk	SWFWMD	Lake Wailes Stormwater Mitigation	1.4
ST3	145[a]	Orange	SFWMD/ SJRWMD	Reedy Creek Stormwater Mitigation / Recharge	4

AADF = average annual daily flow

[a] Newly developed CFWI WSPOs identified during the Solutions Planning Phase.

[b] Total project is 30 mgd of finished water

[c] 122 mgd is raw water

[d] These projects are funded and currently under construction.

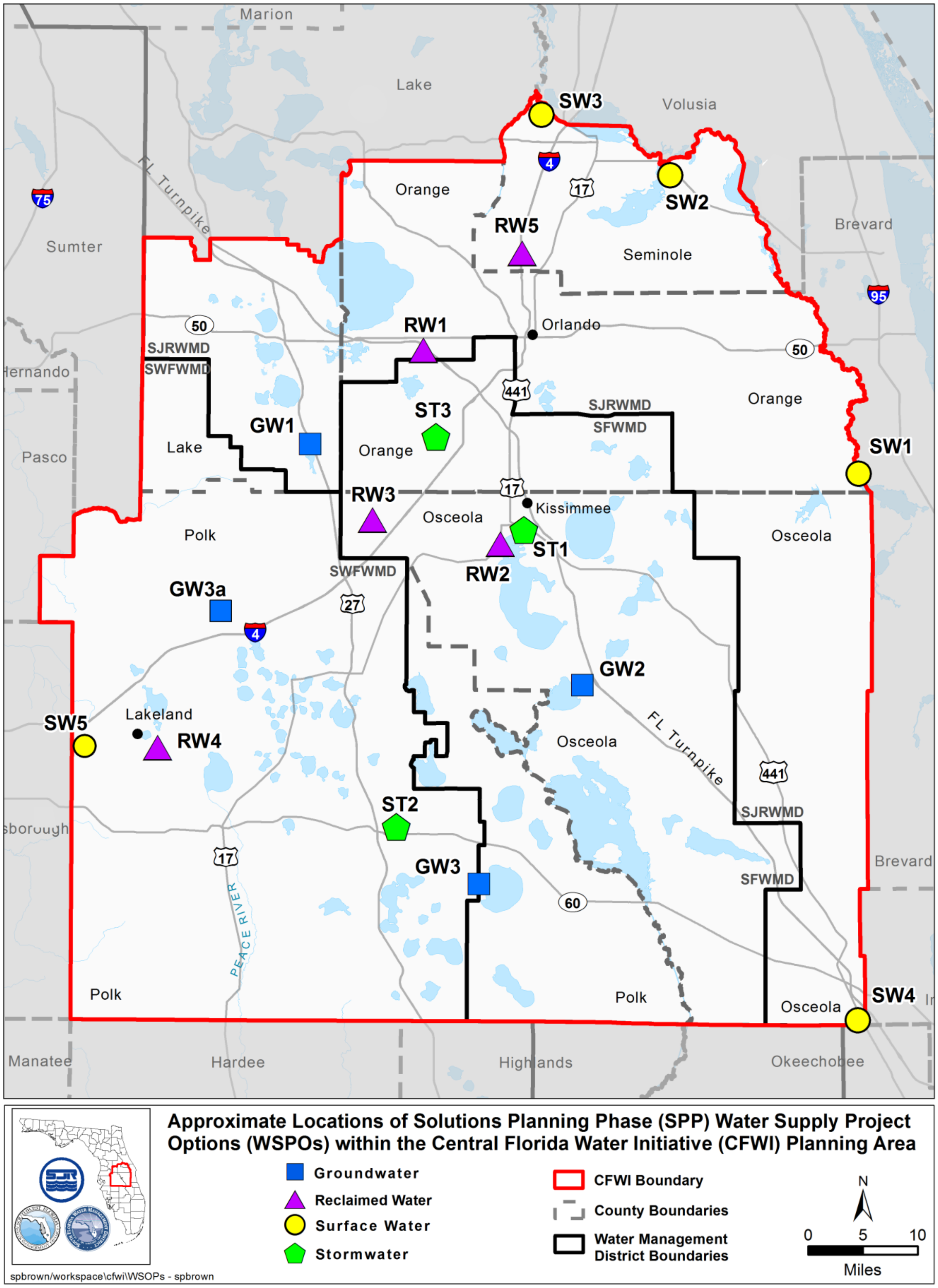


Figure C-1. Approximate locations of Solutions Planning Phase (SPP) Water Supply Project Options (WSPOs) within the CFWI Planning Area.

REGULATORY REVIEW OF PROJECT OPTIONS

The Regulatory Team's review of Water Supply Project Options consists of several components: (1) a planning level review for permittability, (2) identification of consumptive use permit program inconsistencies between the water management districts which may impact each project, (3) identification of Chapter(s) 373 or 403, F.S., impediments, if any, associated with each project, and (4) identification of unusual, non-Chapter 373, F.S., considerations. This information is provided to assist the Solutions Planning Team and that Team's effort to fulfill the statutory requirement to list water supply development project options from which users may choose and that have undergone initial screening for feasibility and have a likelihood of being permittable. (See §373.709(2)(a)2 and FDEP's Guidance for Improved Linkage between Regional Water Supply Plans and the Consumptive Use Permitting Process, March 23, 2012).

The identified projects were all reviewed from a planning level perspective. Moreover, each project has been reviewed as single project; a cumulative review of how projects may perform when considered cumulatively, with other projects, has not been conducted. The fact that there has been a planning-level determination should not be interpreted as a permitting determination or application of a water management district's (District's) consumptive use permitting criteria. Before such a determination can be made, all details of the project's design and operation must be prepared by an applicant and submitted to the appropriate District in a permit application. The application must then be reviewed for consistency with each of the District's consumptive use permitting criteria applicable to the project, including established MFLs and other environmental protection criteria. The proposed projects would be further refined during the final design and the permit application review process to address all permitting criteria. Examples of such refinements may include, but are not limited to, such matters as (1) setting specific criteria and schedule for when water can be withdrawn, (2) design of riverine intake structure(s), (3) addition of off-line storage facilities, (4) if appropriate, mitigation, (5) wellfield operation program, (6) interference with existing legal users, and (7) demand calculation.

In the CFWI Planning Area, key criteria in determining whether an application meets the conditions for issuance include whether the proposed consumptive use satisfies resource protection standards and does not result in interference with existing legal users. The CFWI process has previously identified concerns with minimum flows and levels (MFLs) and impacts to wetlands among other water resource constraints.

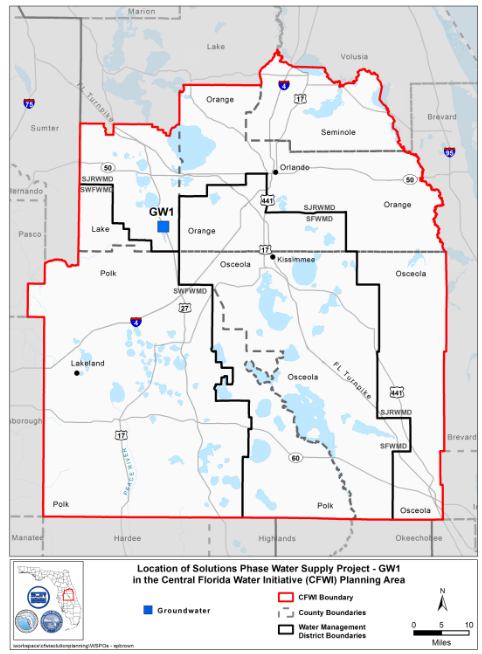
Many of the reviewed projects are regional projects that propose transport and use of groundwater or surface water across county or water management district boundaries. Such projects require consideration of additional statutory requirements. First, Section 373.223(3), F.S., requires the water management districts to consider the factors listed in this statute in determining whether the proposed use is consistent with the public interest. Further, as required by Section 373.223(3), F.S., each District will use the information in its applicable regional water supply plan as the basis for its consideration of the special public interest criteria ("local sources first") during its review of the permit application. As to transfer of groundwater across district or county boundaries, Section 373.2295, F.S., applies and further defines the public interest test of Section 373.223, F.S.

GROUNDWATER PROJECT OPTIONS

South Lake County Wellfield Project

Project Location: Lake County
Solutions Project ID: GW1
RWSP Project Number: 1 and 2 (new)

Project Description



The South Lake County Wellfield project is a collaborative effort between the members of the South Lake Regional Water Initiative (SLRWI), which includes Lake County government, the Lake Utility Services, Inc. (LUSI) company, and the communities of Clermont, Mascotte, Groveland, Minneola, and Montverde. These entities have already entered into an interlocal agreement creating the structure for cooperatively managing this water supply project. The goal of the project options is to supply the SLRWI members 12.7 mgd of potable water to meet their projected demand through 2035.

In general, there are two project options for implementing this project. The Centralized wellfield project entails the development of a Lower Floridan aquifer (LFA) wellfield or series of wellfields located in southern Lake County. The water from the LFA (below middle confining unit II) in this area is likely brackish and it was assumed to be brackish for the Solutions Planning Phase. The project includes the construction of a new wellfield(s), a brackish groundwater treatment facility, a concentrate disposal well, a water storage tank, a transmission pump station, and transmission mains to facilitate water wheeling among the SLRWI partners. Internal infrastructure upgrades by each participating utility to address distribution and water quality concerns will also be completed but are not included in this project. The Distributed wellfield project entails the construction of a distributed series of LFA wells at existing municipal Upper Floridan aquifer (UFA) wellfield sites owned by the SLRWI member communities. Because the LFA (below middle confining unit I) is anticipated to be of potable quality in this area, the Distributed wellfield project assumes a similar water quality will be found in each of the distributed wells, thus eliminating the need for the brackish groundwater treatment facility and concentrate disposal well. The Distributed wellfield project also greatly reduces the need for storage and transmission infrastructure by colocating the wells at existing UFA well sites. A transmission pump station and transmission main will be needed to convey water from the southernmost LFA wellfield to an area of predicted high growth potential in the south Clermont/LUSI service area.

The SLRWI members recently secured the services of an engineering firm to further evaluate this option. This study will help to finalize quantities of water required by each entity, perform further groundwater modeling including lowering existing wells to the LFA to compliment the South Lake County Wellfield project, and recommend water wheeling alternatives between SLRWI members. Results of the study, anticipated in mid to late 2015, are expected to identify the best strategy and combination of projects to reduce MFL impacts while yielding sufficient water to satisfy future area demands.

Planning-level Project Details

The South Lake County Wellfield–Centralized project includes the following systems and components: four production wells, a brackish groundwater treatment facility, a concentrate disposal well, a water storage tank, a transmission pump station, and transmission main construction to SLRWI partner utilities. The South Lake County Wellfield-Distributed project includes the following components and systems: nine production wells, a water storage tank, a transmission pump station, and transmission main construction to the south Clermont/LUSI service area.

Lower Floridan Wellfield

The SLRWI entities anticipate meeting the 2015 demand of 18.26 million gallons per day (mgd) through their existing wells. The projected 2035 demand for the SLRWI entities is estimated at 30.99 mgd (**Table C-2**) which is 12.73 mgd above the 2015 demand. The additional 12.73 mgd will come from the proposed South Lake County Wellfield. The number, size, depth, and placement of wells will be determined by the outcome of exploratory testing of the LFA and the modeling effort. For the purposes of the Centralized wellfield project, it is assumed that four wells, 16 inches in diameter will be installed to a depth of 1,600 feet (based on 3.125 mgd per 16" well). For the Distributed wellfield project, the LFA wells will be distributed among seven wellfield sites owned by the cities of Groveland (2 sites), Mascotte, Minneola, and Clermont plus the Town of Montverde and the Lake Utility Services, Inc. (LUSI). The LUSI site has three proposed production wells and all other sites contain a single production well. It is assumed that all nine wells will be installed to a depth of 1,600 feet and will be sized based on the demand at each specific well.

Table C-2. SLRWI public supply water demand in million gallons per day (from CFWI RWSP, Volume IA, Table A-1).

Utility	Demand Projections (mgd)					
	2010	2015	2020	2025	2030	2035
Lake Utility Services Inc. (CUP 2700)	7.47	8.92	11.22	13.70	15.66	16.94
City of Clermont (CUP 2478)	4.47	5.26	6.04	6.50	6.78	7.01
City of Groveland (CUP 2796, 2913)	0.97	1.36	1.78	2.16	2.52	2.86
City of Minneola (CUP 2886)	1.48	1.62	1.80	2.00	2.21	2.46
City of Mascotte (CUP 2453)	0.53	0.60	0.69	0.79	0.89	0.99
Town of Montverde (CUP 2671)	0.43	0.50	0.60	0.66	0.69	0.73
Totals (mgd)	**15.35**	**18.26**	**22.13**	**25.81**	**28.75**	**30.99**

Water Treatment Plant

LFA water quality in the South Lake County Wellfield area is highly variable, ranging from potable quality north of SR 50 to slightly brackish further south. As a worst case scenario, the South Lake County Wellfield-Centralized project includes construction of a treatment facility for removing total dissolved solids (TDS) from the raw water. The likely treatment technology will be a membrane system resulting in the creation of, and need to dispose, a concentrate side stream. A deep injection well is included in the project components for concentrate disposal. Water testing of the proposed wellfield area will be necessary to confirm water quality. If brackish water is encountered, the SLRWI partners will review treatment options available at that time. For the Distributed wellfield project, assuming the LFA water quality is similar to the water quality at existing withdrawal points and would be potable at the proposed distributed well sites, no treatment facilities are currently proposed.

Raw Water Transmission Mains

It is anticipated that the transmission mains from the South Lake County Wellfield-Centralized project will use public rights-of-way for routing. The primary transmission routes will be the US 27, Hartwood Marsh Road, and Hancock Road rights-of-way to the City of Clermont Water Treatment Plant. From there, water will be stored and wheeled to the other members. At the halfway point between the wellfield and Clermont facility, approximately 63 percent of the flow will be diverted for use in the south Clermont/LUSI service area. Proposed pipe size, lengths, and flow quantities are summarized in **Table C-3**.

Table C-3. South Lake County Wellfield–Centralized project proposed pipe lengths, pipe diameters, and flow volumes (mgd).

From/To	Length (mile)	Length (ft)	Flow (mgd)	Diameter (in)
SLRWI wellfield/LUSI	6.75	35,640	12.73	30
LUSI/Wellness Way	2	10,560	8.02	20
LUSI/Clermont	6.75	35,640	4.48	16
Clermont/Groveland	8.78	46,358	1.89	10
Groveland/Mascotte	4.5	23,760	0.39	6
Clermont/Minneola	5.45	28,776	0.84	8

At this time, a transmission main to the Town of Montverde is not envisioned as it does not appear to be cost effective to extend a main from Clermont to Montverde. Montverde's ultimate demand is relatively small and will likely be satisfied with local sources. The project quantities based on Montverde's 2035 demand could be delivered to another SLRWI members reducing their existing need for UFA supplies offsetting the UFA increase at Montverde.

For the South Lake County Wellfield-Distributed project, transmission costs will be minimized as the proposed Lower Floridan wells will be collocated with UFA wells at existing municipal wellfield sites. LFA and UFA water will be blended and conveyed through the existing distribution systems. A 2-million gallon storage tank, transmission pump station, and transmission main will be needed from the southernmost LFA wellfield to convey water to the south Clermont/LUSI service area. Proposed pipe size, lengths, and flow quantities are summarized in **Table C-4**.

Table C-4. South Lake County Wellfield–Distributed project proposed pipe length, pipe diameter, and flow volume (mgd).

From/To	Length (mile)	Length (ft)	Flow (mgd)	Diameter (in)
SLRWI wellfield/LUSI	8.75	46,200	8.02	20

Estimated Planning-level Costs

The planning-level cost estimate for the South Lake County Wellfield Centralized project was developed using the CFWI cost estimating (CE) tool. The project components contained within the Centralized project cost estimates given below include the four LFA wells, a brackish groundwater treatment facility, a concentrate disposal well, a water storage tank, a transmission pump station, and the transmission piping described in the "Planning Level Project Details" section.

The cost estimates for the South Lake County Wellfield-Centralized project were prepared and reviewed as part of the Solutions Planning Phase. The total costs associated with the South Lake County Wellfield-Distributed project were also estimated using the CE tool and are significantly less than the Centralized wellfield project. Two main factors associated with the reduced costs are lack of brackish water treatment facilities and the reduced need for water transmission. Both estimates are shown in **Table C-5**.

Table C-5. Summary of estimated planning-level costs for the South Lake County Wellfield Centralized and Distributed projects.

Planning-level Cost Estimate	Centralized Wellfield Millions	Distributed Wellfield Millions
Construction Costs	$97.1	$22.4
Non-construction Costs	$19.4	$4.5
Land Costs	unknown	–
Total Capital Costs	$116.5	$26.8
Equivalent Annual Costs (over 30 years)	$6.1	$1.30
Annual Operation and Maintenance	$6.2	$0.20
Total Annual Costs	$12.3	$1.50
Unit Cost of Production ($/kgal)	**$3.57**	**$0.33**

Estimated Implementation Schedule

Project implementation will depend on the findings of the planning study and the success of demand management efforts by the SLRWI members. The following provides a preliminary estimate of project implementation schedule (dates are in calendar years):

- Planning study to determine ultimate demand, appropriate local source utilization strategy and characterization of a LFA wellfield needed to meet future demands: 2015
- Complete South Lake County Wellfield investigation and recommend wellfield location and configuration: 2016
- Acquire wellfield property (Centralized Wellfield): 2017
- Wellfield, treatment, and transmission main design: 2017-2018
- Production well construction: 2019
- Treatment facility construction (Centralized Wellfield): 2019-2022
- Water main construction: 2019-2021

Water Resource Constraints

The CFWI modeling for the South Lake County Wellfield project area shows MFL impacts to several lakes for 2035 demand condition when using traditional UFA groundwater sources. The Apshawa lakes are shown being impacted in Baseline Condition of total water use. For future demands satisfied by the South Lake County Wellfield, CFWI modeling of both

Centralized and Distributed projects shows MFL impacts at four water bodies (**CFWI RWSP, Volume II**, **Chapter 4**). North and South Lake Apshawa have 0.3 feet of impact in the UFA below the lakes, and Starbuck and Wekiwa springs have 0.1 and 0.2 cubic feet per second (cfs) impact, respectively. The model also predicts non-MFL impacts in one area of Seminole County. Although the model does show impacts, producing water from the LFA should minimize the potential for impacts when compared to traditional UFA sources. However, the projected increases in groundwater use represented by this project are currently not permitted for either the UFA or LFA.

At a minimum, the following water bodies would need to be considered during project design and permitting: Boggy Marsh, Cherry Lake, Lake Emma, Lake Louisa, Lake Lucy, Lake Minneola, North Lake Apshawa, Pine Island Lake, South Lake Apshawa, Rock Springs, Starbuck Springs, and Wekiwa Springs.

Project Feasibility

The planned components of the South Lake County Wellfield project are feasible. What is lacking at this point is the identification of a wellfield location that can yield a sufficient quantity of water to satisfy the SLRWI group's demands without violating MFLs or detrimentally impacting wetlands. MFL impacts could potentially be addressed through the construction of a recovery project(s), such as a RIB in the vicinity of the Apshawa lakes and participation in a regional mitigation project for the affected springs.

Cost-benefit Analysis of Yield

The proposed project may be the most cost effective approach to providing nontraditional water supplies to the SLRWI member communities. The Distributed wellfield project is expected to be the most cost effective option as it takes advantage of a significant amount of existing infrastructure.

Other Considerations

None.

Potential Partners and Governance Options

Current members of the SLRWI and Phase 1 planning study funders through the interlocal agreement are

- Lake County government
- City of Clermont
- City of Groveland
- City of Mascotte
- City of Minneola

- Town of Montverde
- Lake Utility Services, Inc. (LUSI)

It is anticipated that participation in construction will be proportional to the quantity of water received by each entity. An amendment to the existing interlocal agreement will establish the roles and relationships of the parties participating in the project construction. It is anticipated that one of the participating entities will serve as the project lead with the remaining entities contributing their proportional cost share to the lead.

Funding Sources

The SLRWI received a $300,000 grant approved in the FY 2014/2015 state budget to fund the planning study. Potential funding sources for construction include state grants, impact fees, revenue bonds, and state revolving fund loans.

Regulatory Review: South Lake County Wellfield Project

Planning Level Review for Permittability

There are concerns on the permittability of this project as currently proposed, based on a number of factors. The reasonable likelihood of permittability of this project as currently proposed is unknown in light of planning level concerns regarding satisfying conditions for issuance for the project's duration, as may be requested, including potential interference with existing legal users and water resource impacts. The project's demand is a related matter.

The SLRWI project partners have already entered into an interlocal agreement setting forth the structure for cooperatively bringing this water supply project option forward.

The SLRWI members are in the process of conducting a study to help finalize quantities of water required by each entity, perform further groundwater modeling including lowering existing wells to the LFA to compliment the South Lake County Wellfield project, and recommend water wheeling alternatives between SLRWI members. Results of the study, by mid to late 2015, are expected to identify the best strategy and combination of projects to reduce MFL impacts while yielding sufficient water to satisfy future area demands.

Project refinements may occur prior to the application process. The actual number and placement of wells will be determined by the outcome of exploratory testing of the LFA and the modeling effort. The size and depth of wells will also depend on the findings of the exploratory testing.

Modeling of this wellfield project by the CFWI Hydrologic Analysis team (HAT) indicates potential impacts to four water bodies with adopted minimum flows and levels (MFLs) - North Lake Apshawa, South Lake Apshawa, Starbuck Springs, and Wekiwa Springs. The model also predicts non-MFL impacts in one area of Seminole County. Although the model does show impacts, producing water from the LFA should minimize the potential for impacts when compared to traditional LFA production sources. However, most of the projected increases in groundwater use represented by this project are currently not permitted to utilize either the UFA or LFA.

At a minimum, the following water bodies would need to be considered during project design and permitting: Boggy Marsh, Cherry Lake, Lake Emma, Lake Louisa, Lake Lucy, Lake Minneola, North Lake Apshawa, Pine Island Lake, South Lake Apshawa, Rock Springs, Starbuck Springs, and Wekiwa Springs.

Identification of Project-based Inconsistencies, Impediments, or Unusual Considerations

Consumptive Use Permit (CUP) Program Inconsistencies among Districts

Each District has slightly different numeric wetland impact criteria that may affect the permittability of the South Lake County Wellfield project differently, depending on the permitting agency. There may be other permitting inconsistencies between the Districts. However, there is an existing Memorandum of Understanding (MOU) between the three Districts that details how the review of water use applications that involve inter-district transfers of water and applications near District borders are handled. This MOU is designed to alleviate inconsistencies in permitting criteria.

Identification of Chapter(s) 373 or 403, F.S. Project-based Impediments or Benefits

There is a potential concern of the South Lake County Wellfield project regarding the interference of existing legal users of water and potential impacts to MFL water bodies. This would need to be evaluated in further detail during the application process.

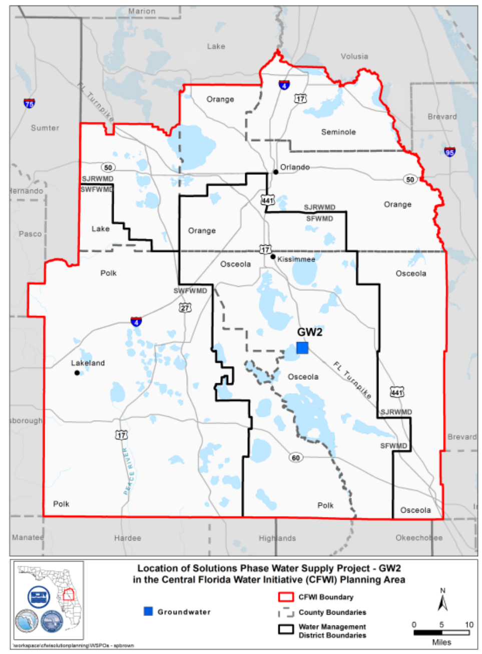
Identification of Unusual, non-Chapter 373, F.S. Project-based Considerations

None identified.

Cypress Lake Wellfield Project

Project Location: Osceola County
Solutions Project ID: GW2
RWSP Project Numbers: 3, 4, and 5

Project Description



The Cypress Lakes Wellfield project is the combination of three projects included in the CFWI RWSP: a wellfield, a water treatment plant and the associated infrastructure, and a finished water transmission system. These combined projects represent a collaborative effort between the members of the Water Cooperative of Central Florida (WCCF) (comprised of the Tohopekaliga Water Authority, Orange County Utilities, Polk County Utilities, and the City of St. Cloud) and Reedy Creek Improvement District (RCID).

This proposed project will develop a nontraditional LFA groundwater wellfield in central Osceola County. The project includes the construction of a new water treatment plant (WTP), wellfield and raw water transmission systems, concentrate disposal well(s), and the construction of the distribution water mains to facilitate water wheeling among the WCCF partners. A groundwater withdrawal of 37.5 mgd has been authorized for this project by SFWMD Water Use Permit issued in 2011 with a 30-year duration. The project has been identified as having a 15 mgd and 30 mgd finished water construction phases.

Planning-level Project Details

The project includes the following systems and components: 12 LFA wells, a reverse osmosis (RO) facility to treat the brackish water source to potable standards, one or more deep injection wells for RO concentrate management, approximately 12 miles of raw water transmission pipelines (16- to 36-inches in diameter), approximately 75 miles of new finished water distribution pipelines (12- to 54-inches in diameter) and associated booster pump stations, and existing distribution system upgrades required for each participating utility to receive water from the Cypress Lake Wellfield project; such as upsized distribution system pipelines, new booster pump stations, interconnects between utilities, and additional system peaking capacity to meet the conjunctive use needs associated with the Cypress Lake Wellfield project.

Estimated Planning-level Costs

Planning-level costs for the 30 mgd (finished supply) brackish groundwater wellfield project were made using the cost estimation (CE) tool developed for the CFWI Solutions Team process, except for costs associated with internal utility partner distribution system upgrades associated with the water wheeling required to implement the Cypress Lake Wellfield project that were obtained from a study performed by the WCCF and RCID. **Table C-6** summarizes the estimated planning-level costs.

Table C-6. Summary of estimated planning-level costs for the Cypress Lake Wellfield project.

Planning-level Cost Estimate	Millions
Construction Costs	$309.3
Non-construction Costs	$61.9
Land Costs	$3.1
Total Capital Costs	$374.3
Equivalent Annual Costs (over 30 yrs)	$19.2
Annual Operation and Maintenance	$15.4
Total Annual Costs	$34.6
Unit Cost of Production ($/kgal)	**3.57**

Estimated Implementation Schedule

Phase 1 (15 mgd) project implementation is on the following schedule:

- Planning: 2010 – 2015
- WTP and well head property acquisition: FY15 - FY17
- Design: FY14 – FY18
- Construction oversight: FY18 – FY19
- Production well construction: 1 existing well, 2 wells in FY18 and 4 wells in FY19
- WTP Construction: FY18-FY19
- Raw water main construction: FY15 – FY20
- Finished water transmission main construction: FY15 – FY20

<u>**Phase 2 (30 mgd) project implementation is on the following schedule:**</u>

- Production well construction: To be determined (TBD)
- High service pumps and WTP expansion: TBD
- Additional injection well construction: TBD
- Raw and finished water transmission main construction: TBD

Water Resource Constraints

The project was issued a consumptive use permit by the SFWMD including an environmental monitoring program.

Project Feasibility

This project is feasible and the WCCF and RCID are currently implementing the planning, preliminary design, and property acquisition required to initiate the project.

Cost-benefit Analysis of Yield

The WCCF and RCID are currently implementing the planning, preliminary design, and property acquisition required for the project; therefore, the project has been deemed cost effective.

Other Considerations

The project is currently being designed and implemented.

Potential Partners and Governance Options

Current members of the WCCF and RCID are partners in this project. The partners have initiated the preliminary design of the project through an interlocal agreement, which contains each partner's capacity and cost share of the project.

Funding Sources

The project is being funded by the members of the WCCF and RCID. The SFWMD provided $465,000 to help fund the related Water Wheeling Study that is reviewing transmission routes and water sharing opportunities among the WCCF partners.

Other potential funding sources for construction include state grants, impact fees, revenue bonds, and state revolving fund loans.

Regulatory Review: Cypress Lake Wellfield Project

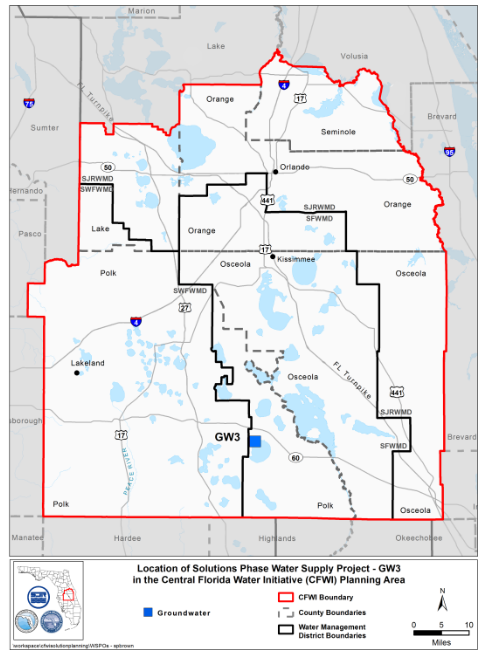
Planning Level Review for Permittability

A planning level review for permittability was deemed unnecessary for this project by the Regulatory Team. A consumptive use permit was issued for the Cypress Lake Wellfield in 2011 by the SFWMD (WUP 49-02051-W). The permit was issued for 30-years for the amount of 37.5 mgd. The potential impacts to wetlands and MFL water bodies from this project have been addressed under the issued permit.

Southeast Polk County Wellfield Project

Project Location: Polk County
Solutions Project ID: GW3
RWSP Project Number: 28

Description of Project



The proposed Southeast Polk County Wellfield project includes the construction of a new water treatment plant and associated infrastructure. This project is a collaborative effort among Polk County Utilities and 10 municipalities in Polk County. The 10 municipal service areas are the cities of Auburndale, Davenport, Eagle Lake, Frostproof, Haines City, Lake Alfred, Lake Wales, Winter Haven, the Town of Dundee, and the Town of Lake Hamilton. There are three Polk County Utilities service areas: East Regional Utility Service Area (ERUSA), the Polk County Northeast Regional Utility Service Area (NERUSA), and the Polk County Southeast Regional Utility Service Area (SERUSA).

The proposed project will develop a nontraditional LFA water public supply wellfield in southeast Polk County. The project includes the construction of a new water treatment plant (WTP), wellfield and raw water transmission systems, concentrate disposal well(s), the construction of distribution water mains to the project partners, and internal system upgrades by individual project partners. A groundwater withdrawal of 37.5 mgd has been authorized for this project by the SFWMD under WUP No. 53-00293-W, a 40-year WUP issued to Polk County Board of County Commissioners on January 27, 2014. The project is proposed to be built in three phases, with 10 mgd, 20 mgd, and 30 mgd finished water construction phases.

The project partners will take the water from this wellfield project to meet their current demands, up to the quantities indicated in the Potential Partners and Project Governance section below. This water will be used in lieu of additional future withdrawals from the traditional UFA supply source. This project will potentially benefit surface waters and wetlands by not increasing withdrawals from the UFA.

Planning-level Project Details

Components for this project include the following systems and components: production wells, WTP, concentrate disposal wells, raw water pipelines, finished water pipelines to project partners, and individual project partner internal system upgrades.

Wellfield

A total of 15 LFA production wells are planned for this project including 1 existing and 14 proposed wells. The wellfield infrastructure will be completed in three phases, with five wells constructed per phase. The existing well (Well-1) is 18-inches in diameter and has a total depth of 2,140 feet. The casing depth is set at 1,400 feet below land surface (bls). The remaining 14 proposed wells are planned to be 18-inches in diameter at a total depth of 1,875 feet, with the casing depth around 1,530 feet bls.

Project Sequencing

The Southeast Polk County Wellfield project is proposed to be constructed in three distinct phases. The Phase 1 portion will be capable of producing a minimum of 10 mgd of treated water (12.5 mgd of raw water withdrawn).

Phase 1 construction includes the installation of five production wells, one standby well, a raw water pipeline from the production wells to a regional treatment facility, treatment facilities, and transmission pipelines to deliver the treated water. Also included in this phase will be the construction of one deep injection well and one standby injection well (construction details are to be determined) for reject water generated by the treatment process.

Phase 2 construction includes the installation of an additional five wells, additional raw water pipeline from the wells to the existing raw water pipeline constructed in Phase 1, and treatment facilities to provide a total treated water capacity of 20 mgd (25 mgd of raw water withdrawn). A second deep injection well will be constructed during Phase 2 of the Project.

Phase 3 construction includes the installation of an additional four wells, completion of all raw water pipelines from the wells to the existing raw water pipeline constructed under Phase 2, and completion of treatment facilities to provide a total treated water capacity of 30 mgd (37.5 mgd raw water withdrawn).

Water Treatment Plant

Based on water quality sampling from aquifer performance tests conducted on Well-1 (PBS&J Construction and Testing Report, Southeast Deep Exploratory Well, April 2010), the chloride concentration has been routinely found to be less than 100 mg/L. However, sulfate concentrations were found to exceed 500 mg/L and total dissolved solid levels exceed 1,000 mg/L. Therefore, the water from the LFA at this project location will be considered "brackish" and require specialized treatment. Polk County has indicated that the raw water withdrawn will be conveyed to a regional treatment facility (with 1 or more WTPs) for advanced treatment using an anti-scalent system as well as a membrane reverse osmosis (RO) system. The locations of the WTPs are yet to be determined. This project is intended to serve as a "base load" water supply project that provides a constant water supply (no substantive peaking capability). Property for the wellfield facilities, water treatment plant(s), and piping still needs to be acquired by Polk County or the regional entity. They plan to do this either by purchase or by using eminent domain authority.

Deep Injection Wells

At full project build-out, there will be two active deep injection wells and one standby injection well which will be used for disposal of brine concentrate and other by-products following the water treatment process. The location and other details of the injection wells are still in the process of being determined.

Raw Water Mains

It is anticipated that as much of the transmission piping as possible will be installed in public rights of way. Estimated quantities of piping for each project phase are shown below:

- Phase 1: 20,400 linear feet (lf)
- Phase 2: 19,000 lf
- Phase 3: 18,100 lf

Finished Water Mains

The treated (finished) water mains will be located in public right-of-ways whenever practical. The transmission pipelines will connect to each of the project partners via a series of interconnects. All finished water mains will be completed during Phase 1. An estimated 172,100 linear feet of finished water trunk lines and an estimated 212,700 linear feet of finished water submains will be installed.

Estimated Planning-level Costs

Planning-level costs for each phase of the Southeast Polk County Wellfield project were made using the cost estimation (CE) tool developed for the CFWI Solutions Team process. **Table C-7** summarizes the estimated planning-level costs. The total estimated cost for this project is $284,596,177. The CE Tool (**Appendix B**) was designed to provide cost estimates with an expected accuracy range of -50% to +100%. Given these considerations, the results of the CFWI CE Tool provide a conceptual level estimate of cost that will need to be refined as each project progresses. In the case of the Polk County Southeast Wellfield project, Polk County Utilities independently estimates the capital cost of the project to be $359 million, which is within the accuracy range of the CE Tool estimate. Factors contributing to the cost differences may include assumptions regarding land costs, unit cost, interest rates, etc.

Table C-7. Summary of estimated planning-level costs for the Southeast Polk County Wellfield Project.

Planning-level Cost Estimate	Millions
Construction Costs	$233.0
Non-construction Costs	$46.6
Land Costs	$5.0
Total Capital Costs	$284.6
Equivalent Annual Costs (over 30 yrs)	$14.6
Annual Operation and Maintenance	$14.4
Total Annual Costs	$29.0
Unit Cost of Production ($/kgal)	**$2.59**

Estimated Implementation Schedule

The project implementation is anticipated on the following schedule:

Phase 1: 10 mgd Finished Water (2014-2023)

- Construct wells 2-5; conduct aquifer performance tests;
- Construct raw water pipeline from wells to a regional water treatment plant (WTP)
- Construction of regional WTP (production capacity 10 mgd finished);
- Construction of transmission pipelines to deliver the treated water;
- Permitting and construction of Class V injection well (details TBD)

Phase 2: 20 mgd Finished Water (2023-2032)

- Construct Wells 6-10; conduct aquifer performance tests;
- Construct additional raw water pipelines between Phase 1 and Phase 2 wells;
- Construct additional treatment facilities, expanding capacity to 20 mgd finished
- Permitting and construction of Class V injection well (details TBD)

Phase 3: 30 mgd Finished Water (2032-2048)

- Construct Wells 11-15; conduct aquifer performance tests;
- Completion of all raw water pipelines
- Construct additional treatment facilities, expanding capacity to 30 mgd finished

Water Resource Constraints

The project has already been issued a WUP by the SFWMD. Permit conditions include an extensive environmental monitoring program, an environmental harm contingency plan, and annual project status verification reports.

Project Feasibility

The permit for this project has been issued by SFWMD (WUP No. 53-00293-W). There is a possibility that this WUP could be modified to decrease the withdrawals based on the actual water demands agreed upon by each project partner. This will be known upon execution of Project Partner Agreements, anticipated in mid-2015.

The property needed for the 14 proposed wells, WTPs, and infrastructure still needs to be acquired by Polk County or the regional entity. This may be accomplished through purchase or through eminent domain authority.

Cost-benefit Analysis of Yield

As an alternative water supply (AWS) project, the Southeast Polk County Wellfield project is intended to provide a new sustainable source of water supply to meet the growing demands in Polk County and numerous municipalities within Polk County that currently meet those demands using traditional fresh groundwater from the UFA. To meet the future water demands of this rapidly growing region, Polk County or the regional entity intends to construct an interconnected treatment and water delivery system throughout Polk County by using water from the LFA.

Polk County and numerous municipalities within Polk County currently provide public water supplies through a network of water supply systems using groundwater from the UFA. This existing system will not provide sufficient water to meet future demands and lacks the economies of scale associated with regional, multijurisdictional water supply development. To meet the future water demands of this rapidly growing region, Polk County or the regional entity intends to construct an interconnected treatment and water delivery system throughout Polk County by using water from the LFA. SWFWMD and Polk County are in the process of finalizing an agreement regarding Central Florida Water Resource Development, including this wellfield project. The agreement will specifically address funding for this wellfield project and formation of a multijurisdictional entity responsible for its development. The partnership to be formed through this agreement represents a substantial State commitment to assuring sustainable, certain water supplies for this region of Florida. Regionalization of water supply development will have significant benefits for Polk County by providing certainty and availability of supply for the individual partners through regional treatment and distribution infrastructure. The regional infrastructure is complimented by remote location and proposed use of the LFA.

Other Considerations

The WUP for this project has been issued by SFWMD (WUP No. 53-00293-W) and requires a series of agreements and partnerships to be executed for the project to move forward. These agreements and partnerships are the foundation for Polk County to secure a portion of the funding from SWFWMD for this project. The first steps in this process involve the execution of "participation agreements" and the formation of a regional water supply entity. The WUP conditions set forth requirements and a schedule for the execution of the necessary agreements between the proposed project partners, the formation of a regional water supply entity, and the securing of funding to construct the project. By mid-2015, Participation Agreements are supposed to be executed between Polk County and the regional project partners. By December 31, 2016, the Permittee is required to provide a fully-executed "Central Florida Partnership Agreement" between the regional water supply entity and SWFWMD. Without completion of these steps, funding of the project could be compromised and the WUP conditions indicate the Permit may either need to be modified to reduce the allocated water use or the Permit could be revoked.

Potential Partners and Project Governance

The Permittee is Polk County. However, 10 municipalities have been designated as "project partners" and have signed letters of intent to participate in the project and ultimately these municipalities, along with Polk County Utilities and 3 of its regional utility service areas (East Regional Utility Service Area, Northeast Regional Utility Service Area, and Southeast Regional Utility Service Area), will be included in the opportunity to form a regional water supply entity. Polk County indicated that once the regional water supply entity is formed, they will submit a request to modify the permit to reflect the entity as the Permittee for the Southeast Polk County Wellfield project.

The project partners and the estimated portion of the total finished water of the projected 30 mgd they may receive for their respective service areas are listed below:

1. Polk County ERUSA	up to 0.06 mgd
2. Polk County NERUSA	up to 10.84 mgd
3. Polk County SERUSA	up to 0.18 mgd
4. City of Winter Haven	up to 10.00 mgd
5. Haines City	up to 4.00 mgd
6. City of Auburndale	up to 1.00 mgd
7. City of Lake Wales	up to 2.37 mgd
8. Town of Frostproof	up to 0.15 mgd
9. City of Lake Alfred	up to 0.40 mgd
10. City of Davenport	up to 1.00 mgd

Polk County and SWFWMD are in the process of finalizing an agreement referred to as the Central Florida Water Resource Development Agreement, which includes this project. That agreement is the foundation for the partial funding of this project and addresses the formation of the regional water supply entity between Polk County and their municipal project partners identified above.

The Southeast Polk County Wellfield project WTP, wellfield, raw and finished water transmission mains are currently in preliminary design.

Funding Sources

Proposed funding sources include a $160 million grant from SWFWMD, contingent upon execution of a Central Florida Water Resource Development Agreement and formation of a regional water supply entity with the project partners listed herein. Additional funding may be secured through the offering of municipal bonds and impact fees.

Regulatory Review: Southeast Polk County Wellfield Project

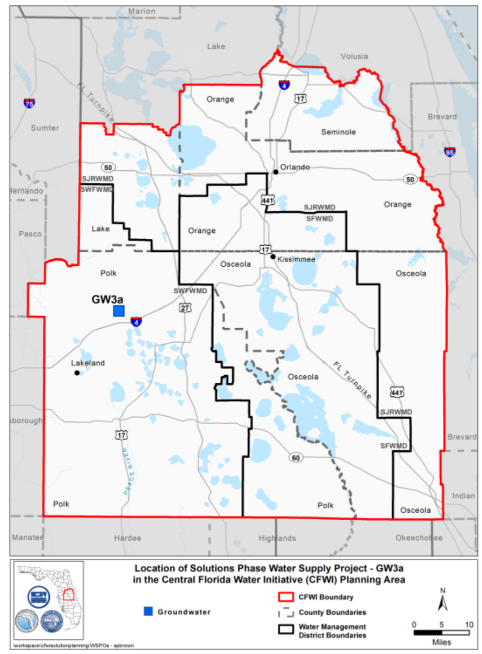
Planning-level Review for Permittability

A consumptive use permit was issued for the Southeast Polk County Wellfield by the SFWMD (53-00293-W). The permit was issued for 40-years for the amount of 37.5 mgd. The potential impacts to wetlands and MFL water bodies solely from this project have been addressed under the issued permit. A planning-level review for permittability was deemed unnecessary for this project by the Regulatory Team.

Polk County Blended LFA Distributed Wellfield Project

Project Location: Polk County
Solutions Project ID: GW3a
RWSP Project Numbers: 6-9, 11, 14, 16-18, 21-24, 26, 30, 37

Project Description



This project is a combination of 16 individual projects under the category of brackish/ nontraditional groundwater supply, totaling 9.84 mgd for public supply. These 16 individual projects are new LFA wells to be drilled for blending with existing and new UFA well sources at 16 water treatment plants distributed throughout Polk County in 14 cities. This project is proposed as an alternative to the centralized LFA wellfield in Southeast Polk County at 30 mgd; the benefit being to distribute the impact of the withdrawals across a larger area in the LFA. The remaining 20.16 mgd in this scenario will still need to come from a source such as the Southeast Wellfield to meet a total of 30 mgd of future demands.

The capital cost for these 16 projects totals approximately $28.6 million and does not include the membrane treatment costs or disposal costs, if needed, as the water is anticipated to be blended with high quality UFA water. It is assumed that a majority of the infrastructure components needed for this project are existing. Capital costs include drilling the well, disinfection, and high service pumping. In addition, given the higher anticipated demand for the City of Lakeland and the City of Winter Haven, costs for booster stations and one 1 mgd storage tank for each utility have been included. The weighted average production cost for the same is $0.31 per 1,000 gallons; the maximum being $3.76 per 1,000 gallons for Lake Hamilton.

Planning-level Design of Project

The project includes the following systems and components: LFA production wells and raw water pipelines. The project includes a total of 16 LFA wells throughout Polk County located at or near the project partners' existing water treatment facilities. This project will blend the brackish LFA water with potable Upper Floridan water to meet the required drinking water standards so no specialized treatment is included in this project.

Estimated Planning-level Costs

For each of the 16 projects, the Polk County Comprehensive Water Supply Plan quantities and the individual Cost Estimating team CE Tool spreadsheets were used as the basis for the planning-level cost estimates for 9.84 mgd (**Table C-8**).

Table C-8. Summary of estimated planning-level costs for the Polk County Blended LFA Distributed Wellfield Project for 9.84 mgd.

Planning-level Cost Estimate	Millions
Construction Costs	$22.9
Non-construction costs	$5.7
Land Costs	-
Total Capital Costs	$28.6
Equivalent Annual Costs (over 30 yrs)	$1.4
Annual Operation and Maintenance	$0.2
Total Annual Costs	$1.6
Unit Cost of Production ($/kgal)	**$0.31**

Costs for developing the remaining 20.16 mgd in this scenario will still need to come from another source such as the Southeast Polk County Wellfield to meet a total of 30 mgd of future demands.

Estimated Implementation Schedule

The implementation schedule for this project is listed below. The Southeast Polk County Wellfield project would need to be implemented for the remaining 20 mgd of needed supply.

Phase 1: 9.84 mgd Finished Water from this project (2014-2023)

- Construct 16 wells; conduct aquifer performance tests;
- Construct raw water pipeline from wells to a municipal water treatment plant (WTP)

Phase 2: 10 mgd Finished Water from the Southeast Polk County Wellfield project (2023-2032)

- Construct Wells 2-5; conduct aquifer performance tests;
- Construct raw water pipeline from wells to a regional water treatment plant (WTP)
- Construction of regional WTP (production capacity 10 mgd finished);
- Permitting and construction of Class V injection well (details TBD)

Phase 3: 10 mgd Finished Water from the Southeast Polk County Wellfield project (2023-2032)

- Construct Wells 6-10; conduct aquifer performance tests;
- Completion of all raw water pipelines;
- Construct additional treatment facilities, expanding production capacity to 20 mgd total finished water from Southeast Polk County Wellfield.

Water Resource Constraints

The area of Polk County generally south of Interstate 4 in the SWFWMD is included within the Southern Water Use Caution Area (SWUCA). This area was designated as a water use caution area in 1992 by the SWFWMD in response to impacts to environmental systems from regional groundwater withdrawals. Principal resource concerns include saltwater intrusion in coastal areas of the basin, lowered lake levels, and decreased baseflows to the Upper Peace River. In 2006 the SWFWMD Governing Board adopted a Saltwater Intrusion Minimum Aquifer Level (SWIMAL), minimum levels on eight lakes and minimum "low" flows on the Upper Peace River. Because these levels and flows were not being met, a Recovery Strategy for the SWUCA was adopted to restore these water levels and flows to impacted water bodies. Currently, within Polk County, seven of 15 lakes with minimum levels are not meeting adopted levels and minimum "low" flows in the Upper Peace River are not being met. As part of the strategy, the SWFWMD adopted levels for two sets of UFA wells for the Upper Peace River (UPR) and Lake Wales Ridge (LWR) areas that are used in their Regulatory program to assess cumulative effects of withdrawals in the basin. Though these levels are currently being met, the LWR levels are projected to fall below the adopted threshold level as a result of 2015 withdrawals, whereas, the UPR levels are projected to remain above the adopted threshold level.

Evaluation of withdrawals from this project indicates that up to 0.3 feet of additional lowering of water levels in the UFA will occur beneath lakes not meeting minimum levels. These lakes include Eagle, McCleod, Crooked, and Wailes. A review of projected water level drawdowns in the surficial aquifer indicates the potential for the project to also result in the lowering of non-MFL water bodies. Additionally, the project is anticipated to cause further lowering of the LWR wells to a level that is projected to be below the threshold value as a result of 2015 pumping.

Project Feasibility

The absence of any economy of scale benefits and the need to increase UFA withdrawals to effectively blend for suitable water quality both substantially decrease the feasibility of this project proposal. The assumption has been made that the property needed for the 16 proposed wells and substantial infrastructure and interconnections are already in place. However, this combination project would need to be compared to a regional alternative water supply project that can singly supply the demand with pipeline transmission costs included. This would provide an equitable comparison from a financial as well as an environmental impact perspective.

Cost-benefit Analysis of Yield

Polk County and numerous municipalities within Polk County currently provide public water supplies through a network of water supply systems using groundwater from the UFA. This existing system can be augmented with supplies from the LFA to meet future demands. Although the project lacks the economies of scale associated with regional, multijurisdictional water supply development, it does not include the large cost associated with extensive transmission piping of considerable distance.

Other Considerations

Polk County and SWFWMD are in the process of finalizing an agreement referred to as the Central Florida Water Resources Development Agreement, which indirectly includes this project. That agreement is the foundation for the funding of alternative water supply projects within Polk County and addresses the formation of the regional water supply entity between Polk County Utilities and their municipal project partners identified above. A water use permit has been issued by the SFWMD for the Polk County Blended LFA Distributed Wellfield for 30 mgd of base-load public supply within Polk County, to include municipal partners identified above. This distributed blended LFA project has been identified as an alternative to a portion of the projected public supply from the Southeast Polk County Wellfield project. This project will be pursued if deemed more favorable in terms of environmental constraints and financial considerations in comparison to implementing the full 30 mgd as permitted for the Southeast Polk County Wellfield project.

It is assumed that 3.4 mgd of additional UFA quantities will be permitted and currently permitted UFA quantities will be upheld for blending with 6.4 mgd of groundwater from the LFA in order to meet targeted water quality goals for these utilities.

Potential Partners and Project Governance

A total of 14 municipalities have been identified as potential locations for drilling a LFA well for blending, and ultimately these municipalities, along with others in Polk County, including Polk County Utilities, will form a regional water supply entity. The individual municipalities will incur the costs and receive the benefits from their own Lower Floridan well; however, these municipalities will need to receive supplies beyond the 9.84 mgd from another alternative water supply source such as the Southeast Polk County Wellfield through the regional entity.

The potential municipal locations and the estimated portion of the Lower Floridan groundwater they anticipate for their respective service areas are shown below:

Auburndale	up to 0.62 mgd	Lake Alfred	up to 0.18 mgd
Bartow	up to 0.63 mgd	Lake Hamilton	up to 0.06 mgd
Davenport	up to 0.17 mgd	Lake Wales	up to 0.66 mgd
Dundee	up to 0.11 mgd	Lakeland	up to 4.23 mgd
Fort Meade	up to 0.16 mgd	Mulberry	up to 0.09 mgd
Frostproof	up to 0.22 mgd	Polk City	up to 0.06 mgd
Haines City	up to 0.66 mgd	Winter Haven	up to 10.00 mgd

Funding Sources

Proposed funding sources include SWFWMD and formation of a regional water supply entity within Polk County with the Project partners listed herein. Additional funding may be secured through the offering of municipal bonds and impact fees.

Regulatory Review: Polk County Blended LFA Distributed Wellfield Project

Planning Level Review for Permittability

There are concerns on the permittability of this project as currently proposed, based on a number of factors. All of the proposed wells are located in the Southern Water Use Caution Area (SWUCA), where 7 out of 15 water bodies are not meeting the minimal levels adopted by SWFWMD. Based on the groundwater modeling conducted by the CFWI Hydrologic Analysis Team (HAT), the withdrawals from this project may produce up to 0.3 feet of additional lowering of water levels in the UFA beneath lakes not meeting minimum levels. A review of projected water level drawdowns in the surficial aquifer indicates the potential for the project to also result in the lowering of non-MFL water bodies. The project is also anticipated to cause further lowering of the Lake Wales Ridge wells to a level that is projected to be below the threshold value as a result of 2015 pumping. Another concern is an additional 3.4 mgd of UFA water above the current permitted allocation would need to be withdrawn in order for the LFA water blending to successfully eliminate the need for specialized treatment.

The planning level review indicates concern regarding satisfying conditions for issuance for the project's duration, as may be requested, including potential interference with existing legal users and water resource impacts. The project's demand is a related matter.

In order for this Project to satisfy the permitting criteria, refined groundwater modeling may be necessary to hone in on the impacts to MFL water bodies identified in the zone of influence. In addition, refinements to the wellfield operating program, modification of the actual withdrawal rates, and a detailed environmental monitoring program may be necessary during the permit application process to minimize resource impacts and satisfy the conditions for issuance of a permit.

Identification of Project-based Inconsistencies, Impediments, or Unusual Considerations

Consumptive Use Permit (CUP) Program Inconsistencies among Districts

Each District has slightly different numeric wetland impact criteria that may affect the permittability of the Polk County Blended LFA Distributed Wells project differently, depending on the permitting agency. There may be other permitting inconsistencies between the Districts. However, there is an existing Memorandum of Understanding (MOU) between the three Districts that details how the review of water use applications that involve inter-district transfers of water and applications near District borders are handled. This MOU is designed to alleviate inconsistencies in permitting criteria.

Identification of Chapter(s) 373 or 403, F.S. Project-based Impediments or Benefits

There is a potential concern of the Polk County Blended LFA Distributed Wellfield project regarding the interference of existing legal users of water and potential impacts to MFL water bodies. This would need to be evaluated in further detail during the application process.

Identification of Unusual, non-Chapter 373, F.S. Project-based Considerations

The feasibility of this project may be dependent upon funding, and the steps necessary to secure that funding. Polk County and SWFWMD are in the process of finalizing an agreement referred to as the Central Florida Water Resources Development Agreement, which is the foundation for the funding of alternative water supply projects within Polk County and addresses the formation of a regional water supply entity between Polk County Utilities and their municipal project partners.

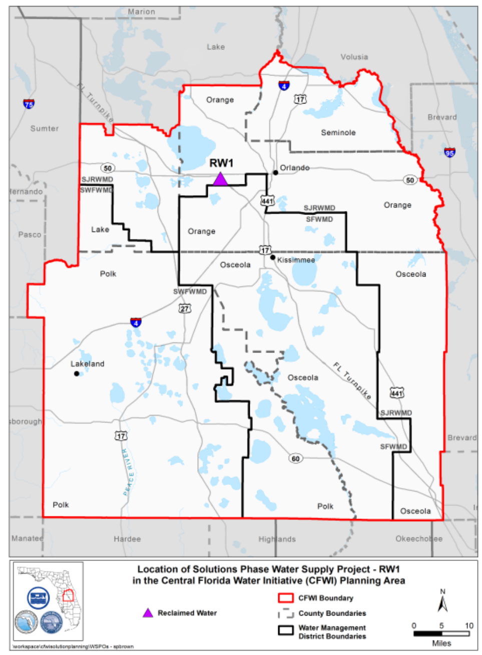
In addition, the Southeast Polk County Wellfield project has already been permitted to supply up to 30 mgd of base-load public supply to many of the same municipal partners identified for the Polk County Blended LFA Distributed Wellfield Project. The feasibility of this Project and the actual quantity of groundwater withdrawals will be dependent on execution of the above development agreement and also on Project Participation Agreements for this Project as well as for the Southeast Polk County Wellfield Project.

RECLAIMED WATER PROJECT OPTIONS

Project RENEW

Project Location: Orange County
Solutions Project ID: RW1
RWSP Project Number: 44

Project Description



Project RENEW is a regional reuse project. The original project planned to provide 9.2 mgd of reclaimed water from the City of Orlando to Northwest Orange County to offset adverse impacts from Orlando Utilities Commission's (OUC's) pumping at the full CUP allocation. RENEW was modeled and accepted by the SJRWMD in 2006 to bring 8.55 mgd of reclaimed water to Apopka and 0.65 mgd to Winter Garden for a total of 9.2 mgd. The source of the reclaimed water is the City of Orlando's Iron Bridge Water Reclamation Facility (WRF) or raw wastewater diverted from the Iron Bridge service area and treated at the Conserv II WRF (also known as McLeod Rd. WRF). The project as currently planned includes wastewater collection system upgrades to divert wastewater to the Conserv II WRF, wastewater treatment improvements at the Conserv II WRF, and construction of a reclaimed water pump station and transmission mains.

The project will be re-evaluated in order to determine the best location(s) for reclaimed water in the region that is environmentally, technologically, and economically feasible. Project RENEW may also be used to meet an adopted MFL prevention and recovery strategy.

Planning-level Project Details

Components of the project include the following

<u>Wastewater Collection and Treatment System Upgrades</u>

Wastewater collection system upgrades will be needed in order to divert raw wastewater from the City of Orlando's Iron Bridge service area to the Conserv II WRF for treatment. This includes upgrades to City of Orlando lift station Nos. 1, 5, and 7 and wastewater collection piping improvements. The City of Orlando recently completed several improvements to the

Conserv II WRF, which provides reliable treatment up to 18 mgd including nutrient removal. Additional treatment improvements may be needed depending on the amount of raw wastewater diverted for RENEW and the results of the rerating study of the recent improvements.

Reclaimed Water Pump Station

A reclaimed water pump station will be constructed at the Conserv II WRF in order to pump reclaimed water to Apopka**.**

Transmission Mains

A 24-inch diameter, 13 mile transmission main will be constructed to convey 8.55 mgd on an average annual basis from the Conserv II WRF to the City of Apopka WRF.

Project Yield

Project RENEW is planned to provide a total of 9.2 mgd of reclaimed water as follows:

1. Phase 1 – 3 mgd
2. Phase 2 – 6.2 mgd additional; 9.2 mgd total

Estimated Planning-level Costs

Planning-level costs for Project RENEW were made using the cost estimation (CE) tool developed for the CFWI Solutions Team process and the costs are summarized in **Table C-9**. Phase I includes the construction of the full size reclaimed water pump station and transmission pipeline from Orlando's Conserv II WRF to Apopka's WRF with O&M costs for pumping 3 mgd. More than half of the land costs have been spent on acquiring necessary pipeline easements. Phase II consists of building improvements to Orlando's raw wastewater collection and Conserv II treatment system to redirect flow from east to west, so that 9.2 mgd of reclaimed can be delivered to the northwest area of Orange County.

Table C-9. Summary of estimated planning-level costs for Project RENEW.

Planning-level Cost Estimate	Phase 1 (3 mgd delivered) (Millions)	Phase 2[a] (9.2 mgd delivered) (Millions)
Construction Costs	$19.7	$45.5
Non-construction Costs	$3.9	$4.0
Land Costs	$1.0	$1.0
Total Capital Costs	$24.6	$50.5
Equivalent Annual Costs	$1.2	$2.6
Annual Operation and Maintenance	$0.1	$0.3
Total Annual Costs	$1.3	$2.9
Unit Cost of Production ($/kgal)	**1.17**	**0.89**

[a] Total project cost includes Phase 1 costs.

Estimated Implementation Schedule

Per Orlando Utilities Commission's (OUC) CUP No. 3159, an engineering study must be submitted within 2 years after adoption of the MFL Prevention/Recovery Strategy for south Lake, Orange, and Seminole counties by the SJRWMD Governing Board. Phase 1 of Project RENEW is required to be completed by October 2020, and be capable of supplying at least 3 mgd of reclaimed water for reuse and/or recharge. Phase II shall be completed by October 2022, and must provide a total of 9.2 mgd of reclaimed water for reuse and/or recharge.

Water Resource Constraints

The intent of Project RENEW is to offset adverse impacts to wetlands and lakes from Orlando Utilities Commission's (OUC's) pumping at full CUP allocation. Project RENEW is being re-evaluated given changes that have occurred over the last ten years to determine if a better regional option is viable considering the MFL Prevention/Recovery Strategy for south Lake, Orange, and Seminole counties.

Project Feasibility

The construction of the project is feasible given the amount of design work that has been completed. The preliminary design report for the reclaimed water pump station is final (HDR 2009) and a draft preliminary design report for the raw wastewater collection system (AECOM 2010) has been submitted. Also, the construction drawings for the reclaimed water pipeline are 80 percent complete and all necessary easements were identified and most were acquired.

Because Project RENEW is being re-evaluated, RENEW in its current form is uncertain. Completion of the CFWI Solutions Planning Phase and the MFL Prevention/Recovery

Strategy for south Lake, Orange, and Seminole counties in the next few years will assist in re-evaluating and optimizing the project for regional benefit.

The availability of the reclaimed water, in the quantities specified for Phases I and II, could be a project constraint depending on when the project is needed. It is possible that the reclaimed water quantities may be less than originally planned. The extended period of reduced growth during the economic downturn has reduced both the availability of reclaimed water and the need for reclaimed water by end users for many years into the future.

Cost-benefit Analysis of Yield

Given the low unit production cost of $0.89/kgal for Phase I and II, the cost benefit is favorable when compared to other AWS costs. As currently planned, the reclaimed water from this project is directly offsetting pumping from two utilities from the UFA to serve irrigation water.

Other Considerations

OUC will be coordinating with the City of Orlando to explore viable reclaimed water options throughout the city's system including Orlando's 50 percent share of the Water Conserv II reclaimed water transmission and distribution system.

Potential Partners and Governance Options

OUC currently has agreements with the City of Orlando and the City of Apopka for Project RENEW. The City of Orlando has an agreement to serve reclaimed water to Winter Garden. If RENEW is revised, existing agreements may need to be modified and/or new agreements may be needed.

Funding Sources

Orlando Utilities Commission (OUC) applied for SJRWMD District funding under the Water Protection and Sustainability Program for Project RENEW for a number of years until funding was cut in FY 2009. OUC plans to apply for any available District and State funding in the future when appropriate. OUC and the end-use partners would pay for the remaining portions of the project that are not covered by funding.

References

AECOM. 2010. *Project RENEW Phase 2 – Lift Stations and Force Mains Project*. Preliminary Design Report, Draft. Prepared for the Orlando Utilities Commission, September 2010.

HDR. 2009. *Project RENEW Reclaimed Water Pumping Station*, Preliminary Design Report, Final. Prepared for the Orlando Utilities Commission, August 2009.

Regulatory Review: Project RENEW

Planning Level Review for Permittability

The project appears to be reasonably permittable from a planning level perspective based on the following:

- OUC's existing CUP authorizes the implementation of Project RENEW and provides an impact offset and substitution credit equivalent to 9.2 mgd of permitted water use by OUC.
- The FDEP permits for the Iron Bridge WRF and/or the Conserv II WRF may have to be modified to reflect reclaimed water use in northwest Orange County.

Identification of Project-based Inconsistencies, Impediments, or Unusual Considerations

Consumptive Use Permit (CUP) Program Inconsistencies among Districts

None anticipated. The 2004 Interagency Agreement between SJRWMD and SFWMD grants SJRWMD full permitting authority with regards to implementation of Project RENEW.

Identification of Chapter(s) 373 or 403, F.S. Project-based Impediments or Benefits

None identified.

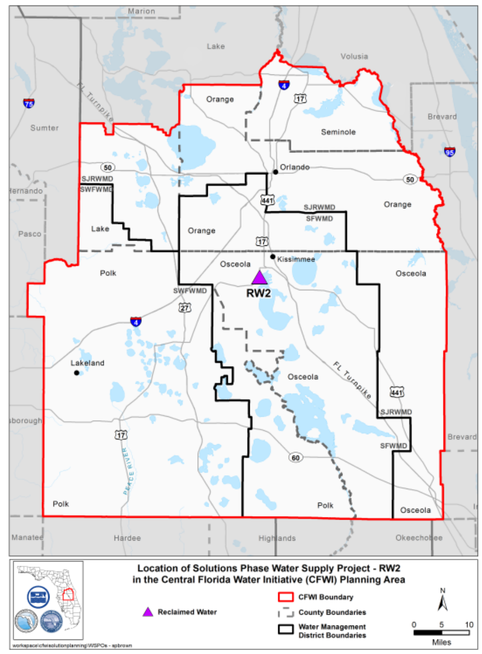
Identification of Unusual, non-Chapter 373, F.S. Project-based Considerations

None identified.

West Ditch Stormwater for Reuse Augmentation

Project Location: Osceola County
Solutions Project ID: RW2
RWSP Project Number: 59

Project Description



This project is one of several being evaluated to meet the anticipated demand by capturing and managing stormwater from several small properties near Tohopekaliga Water Authority's (TWA's) South Bermuda Water Reclamation Facility (SBWRF). The TWA currently has a surface water treatment system located at the SBWRF for water withdrawals from Shingle Creek. The stormwater capture system would be used to further supplement the alternative water supply on an as-available basis.

Currently, the City of Kissimmee's West Ditch City basin drains stormwater to Lake Tohopekaliga through a system of ditches and a canal. TWA is planning to collect water from the West Ditch City canal and route it through a series of interconnected ponds to provide stormwater as a reuse supplementation at the SBWRF (**Figure C-2**). It was determined that on average, approximately 1.5 mgd of stormwater runoff would be available 60 percent of the time (approximately 0.9 mgd finished water), with a peak rate of 2.5 mgd.

The Total Capital Costs for the project is approximately $28,200,000. Most of the cost is for the construction of the storage ponds.

It is assumed that this project will not be necessary until development resumes. Additionally, the project timing will be adjusted based on the results of the CFWI Solutions Planning process.

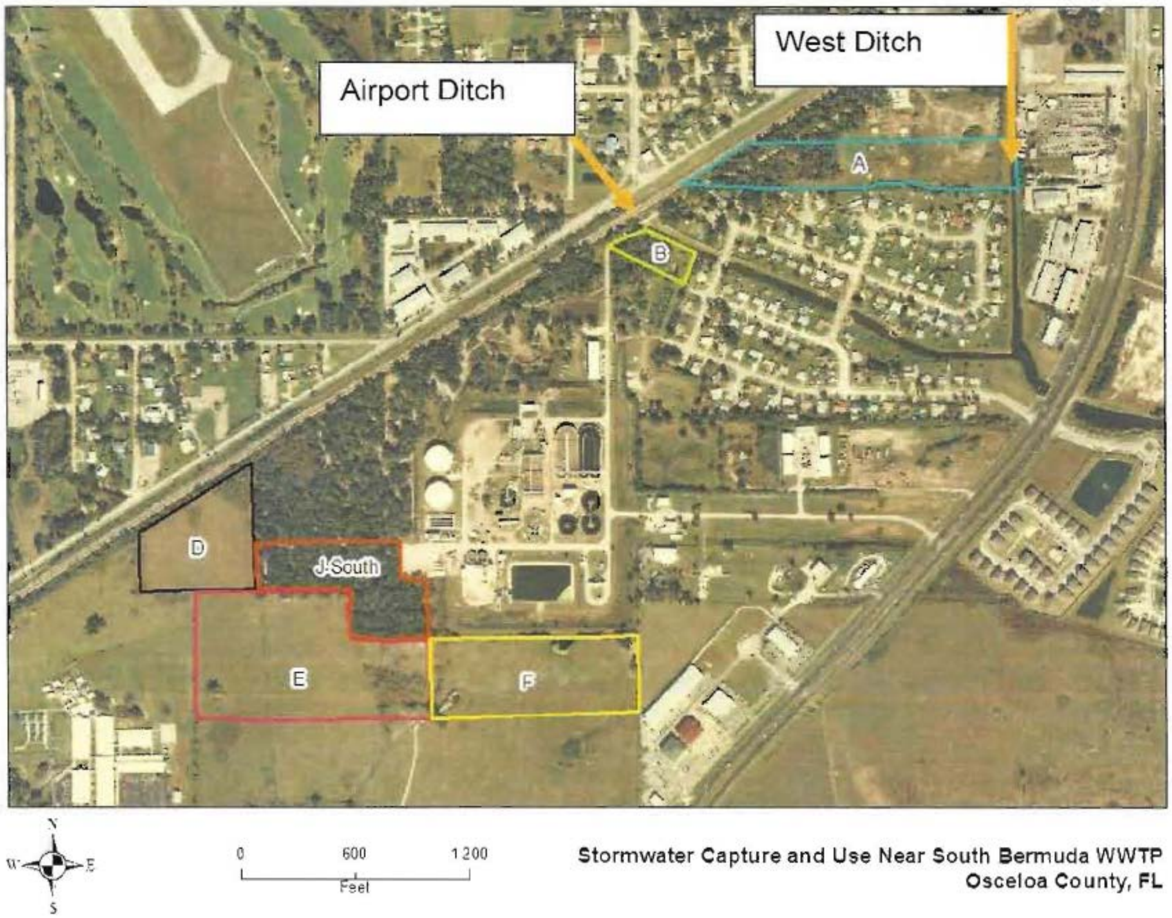


Figure C-2. Location of the West Ditch Stormwater for Reuse Augmentation Project.

Estimated Planning-level Costs

Planning-level costs for the West Ditch Stormwater for Reuse Augmentation Project were made using the cost estimation (CE) tool developed for the CFWI Solutions Team. The costs are summarized in **Table C-10**.

Table C-10. Summary of estimated planning-level costs for the West Ditch Stormwater for Reuse Augmentation Project.

Planning-level Cost Estimate	Millions
Construction Costs	$23.5
Non-construction Costs	$4.7
Land Costs	-
Total Capital Costs	$28.2
Equivalent Annual Costs	$1.3
Annual Operation and Maintenance	$0.4
Total Annual Costs	$1.7
Unit Cost of Production ($/kgal)	**$3.23**

Water Resource Constraints

Currently, the West Ditch City basin drains stormwater to Lake Tohopekaliga through a system of ditches and a canal. TWA is planning to collect water from the West Ditch City canal and route it through a series of interconnected ponds to provide stormwater as an alternate water supply for reuse supplementation to the South Bermuda Water Reclamation Facility service area. A study-level analysis determined that, on average, approximately 1.5 million gallons per day (mgd) of stormwater runoff, with a peak rate of 2.5 mgd would be available approximately 60 percent of the time. This yield assumes relatively high runoff rates based on the available land use and soil information for the watershed and that pond seepage would be controlled to a relatively low value. It also assumes a high stormwater capture rate from the drainage ditches around the potential pond sites.

Potential Partners and Governance Options

The stormwater captured at the South Bermuda Water Reclamation Facility (SBWRF) would be used to supplement reclaimed water at the facility's reuse system. The proposed project would also serve as a stormwater treatment system for the City of Kissimmee.

Pumping, Storage, and Transmission Configurations

The project concept is to collect water from the West Ditch City canal and route it through a series of interconnected ponds to provide stormwater as a reuse supplementation at the South Bermuda Water Reclamation Facility (SBWRF). The TWA already has a surface water treatment system located at the SBWRF for water withdrawals from Shingle Creek. Therefore, pumping, storage, and transmission configurations at the treatment facility would not need to be altered for this project.

Project Feasibility and Estimated Property Requirements

In 2008/2009 a consultant performed a preliminary evaluation to determine the feasibility for capturing and managing stormwater near the South Bermuda Water Reclamation Facility. The feasibility analyses estimated the available stormwater runoff and a planning-level budgetary estimate. An agreement with the City of Kissimmee would be needed for this project.

The TWA is assuming that this project will not be necessary until growth and development resumes in the area. It is possible that ahead of reuse demands, this stormwater could be captured and distributed to rapid infiltration basins for aquifer recharge. Project timing will be adjusted based on the results of the CFWI efforts.

Property and/or easements will be needed to collect water from the West Ditch City canal and route it to the South Bermuda Water Reclamation Facility (SBWRF). If all the property shown in the map above is necessary for the project, a total of about 55 acres would be required. It is assumed that the land required for storage ponds would be an in-kind service provided by the City of Kissimmee.

Cost-benefit Analysis of Yield

Total Capital Cost: $28.2 Million

Yield: 1.5 mgd, on average, available 60 percent of the time

Funding Sources

Potential funding sources or in-kind services for this project include the Toho Water Authority, any benefiting neighboring utilities, the City of Kissimmee, Osceola County, the South Florida Water Management District and/or State of Florida as a cost-share partner, and other sources that might be identified through the CFWI solution phase.

Regional Water Supply Project Limitations/Constraints from Rule Inconsistency

Not applicable

Other Considerations (Public Concerns, Non-Technical Obstacles)

Possible issues with attracting birds into the airport flight paths. A permit from the Federal Aviation Administration may be required.

Estimated Implementation Schedule

It is assumed that this project will not be necessary until growth and development in the area resumes. Additionally, the project timing will be adjusted based on the results of the CFWI groundwater availability analysis.

Regulatory Review: West Ditch Stormwater for Reuse Augmentation

Planning Level Review for Permittability

The project appears to be reasonably permittable from a planning level perspective based on the following:

- The project will require a CUP for the withdrawal and potentially an ERP for the stormwater holding/retention pond (although DEP may take final action on the ERP under its existing MOU with SFWMD).
- Provided the holding/retention ponds do not have berms in excess of three feet there should not be any special permitting required related to an impoundment. It is not anticipated that berms will be in excess of three feet.
- Permitting will be required from FDEP for treatment of stormwater for mixing with the reclaimed water produced by the South Bermuda WRF.

Identification of Project-based Inconsistencies, Impediments, or Unusual Considerations

Consumptive Use Permit (CUP) Program Inconsistencies among Districts

None anticipated.

Identification of Chapter(s) 373 or 403, F.S. Project-based Impediments or Benefits

None identified.

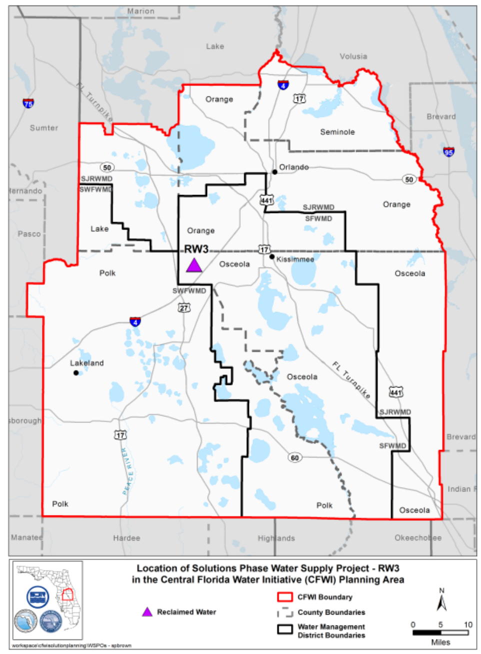
Identification of Unusual, non-Chapter 373, F.S. Project-based Considerations

None identified.

160-Acre Site Indirect Potable Reuse

Project Location: Osceola County
Project Number: RW3
RWSP Project Number: 60

Project Description



The South Florida Water Management District (SFWMD) projects the UFA may not be able to support increasing groundwater withdrawals in the future. This project is one of several being evaluated to meet anticipated future demands.

Tohopekaliga Water Authority (TWA) operates several Rapid Infiltration Basins (RIBs) in northwestern Osceola County, including the 160-acre site. The 160-acre site is located on the Lake Wales Ridge, which is characterized by permeable sand, lack of a confining layer, and a deep water table. The permeable sand provides for a large amount of "mounding" or water storage. As a result, the RIBs function well in this area for recharging the UFA.

The 160-acre RIBs currently have a permitted capacity of 5.38 mgd (annual average). This capacity is based on a maximum loading rate of 11.2 gallons/day/square foot, as mandated by FDEP. TWA received a variance to increase the permitted capacity to its current amount in April 2014.

Based on groundwater model simulations, TWA estimates that it can install water supply wells near the RIBs - taking advantage of the aquifer recharge from the reclaimed water. The model simulations indicated that 5.0 mgd may be available for withdrawal at a RIB application rate of 11.2 gallons/day/square foot, which is the current permitted loading capacity of the RIBs.

This concept of using recharge to indirectly provide water supply could be accomplished in two different ways:

1. Use proposed wells in the area of the 160-acre site to withdraw recharge water and transmit that water to TWA's Southwest Water Treatment Plant for potable use (Indirect Potable Use), or

2. Use proposed wells in the area of the 160-acre site for irrigation of the neighboring Stoneybrook South and ChampionsGate areas.

For the purposes of this evaluation it is assumed that the Indirect Potable Reuse (#1) option is implemented. This assumes that five wells will be installed to recover the water. Each well will have a capacity of 1 mgd, for a total capacity of 5 mgd. Raw water will be sent to the Southwest Water Treatment Plant using a 24-inch diameter raw water main.

Estimated Planning-level Costs

Planning-level costs for the 160-Acre Site Indirect Potable Reuse project were made using the cost estimation (CE) tool developed for the CFWI Solutions Team. The costs are summarized in **Table C-11**. The CE Tool (**Appendix B**) was designed to provide cost estimates with an expected accuracy range of -50% to +100%. Given these considerations, the results of the CFWI CE Tool provide a conceptual level estimate of cost that will need to be refined as each project progresses. In the case of the 160-Acre Indirect Potable Reuse project, TWA independently estimates the capital cost of the project to be $14.3 million, which is within the accuracy range of the CE Tool estimate. Factors contributing to the cost differences may include assumptions regarding land costs, unit cost, interest rates, etc.

Table C-11. Summary of estimated planning-level costs for the 160-Acre Site Indirect Potable Reuse project.

Planning-level Cost Estimate	Millions
Construction Costs	$6.4
Non-construction Costs	$1.3
Land Costs	-
Total Capital Costs	$7.7
Equivalent Annual Costs	$0.4
Annual Operation and Maintenance	$0.1
Total Annual Costs	$0.5
Unit Cost of Production ($/kgal)	**$0.29**

Cost-benefit Analysis of Yield

Total Capital Cost: $7,649,602

Yield: 4.5 million gallons per day (annual average basis)

Water Resource Constraints

The water resource constraints include

- The availability of reclaimed water to send to the RIBs and recharge the aquifer.
- The constraint of the withdrawal wells to pump without adversely impacting levels in the aquifer or existing permitted users, or wetlands.

- A minimum of 5.0 mgd will be needed to recharge the aquifer to get a 4.5 mgd withdrawal rate from the wells.

Potential Partners and Governance Options

The potable water supply provided by this project will be treated at a TWA facility. However, TWA's potable water service area is interconnected with Polk County and is planned to be interconnected with Orange County. Because this water source could potentially be used by another utility, there is an option for both counties to be partners in this project.

Pumping, Storage, and Transmission Configurations

The reclaimed water will be sent to the RIBs at the 160-acre site for recharge of the aquifer, and the wells that will be used to capture the recharge water before sending water to the water treatment plant.

Project Feasibility and Estimated Property Requirements

This project was deemed by TWA to be less costly than other alternative water supply (AWS) projects such as the Cypress Lake Water Treatment Plant (WTP) project. However, additional treatment modifications to the Southwest WTP or other facilities may be necessary for this project, depending on the option selected.

This project is deemed to be feasible given that the loading rate variance was obtained and the indirect potable reuse component can be permitted by FDEP.

The property requirements are minimal. The RIBs are already in place. The property/easements may be difficult to obtain. The cost and level of difficulty is unknown at this time.

Funding Sources

Potential funding sources for this project include the Tohopekaliga Water Authority, any benefiting neighboring utilities, the South Florida Water Management District and/or State of Florida as a cost-share partner, and other sources that might be identified through the CFWI Solutions Planning phase.

Regional Water Supply Project Limitations/Constraints from Rule Inconsistency

Potential issues related to the precedence of permitting an indirect potable reuse project.

Other Considerations

This would be a ground-breaking project in the State in terms of intentional indirect potable reuse; therefore, regulatory and public acceptance would be considerations.

Estimated Implementation Schedule

It is assumed that this project will not be necessary until growth and development in the area resumes. Additionally, the project timing will be adjusted based on the results of the CFWI groundwater availability analysis. TWA's FYE 2015-2019 Capital Improvement Plan state that the beginning project construction will be budgeted for FYE 2019 and beyond, or as adjusted based on the CFWI results.

Regulatory Review: 160-Acre Site Indirect Potable Reuse

Planning Level Review for Permittability

The project appears reasonably permittable from a planning level perspective based on these factors:

- The 160-Acre Rapid Infiltration Basin site has received a variance from FDEP allowing a high rate of application at double the regulatory rate.
- The project will require FDEP permitting for the treatment of withdrawn groundwater and for application of the reclaimed water. Although a project of this nature may not have been previously permitted by FDEP, there is no known fatal flaw to preclude DEP approval.
- The project should reasonably meet the Water Management District requirements for groundwater withdrawal.
- The project would withdraw 80-90% of the quantity of reclaimed water applied and does not increase the quantity of water withdrawn from the aquifer.

Identification of Project-based Inconsistencies, Impediments, or Unusual Considerations

Consumptive Use Permit (CUP) Program Inconsistencies among Districts

None anticipated.

Identification of Chapter(s) 373 or 403, F.S. Project-based Impediments or Benefits

None identified.

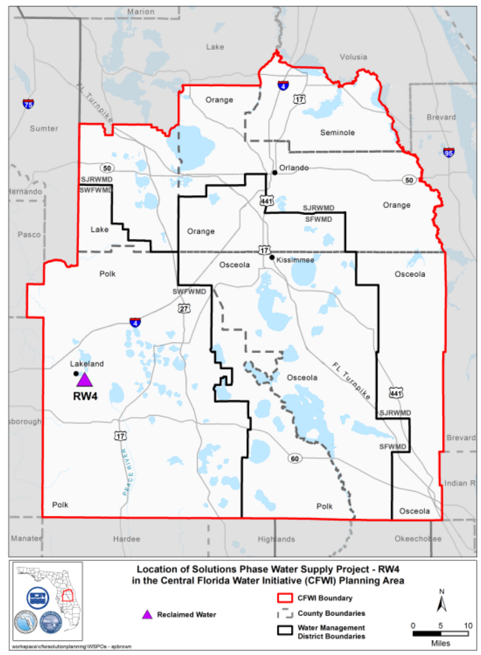
Identification of Unusual, non-Chapter 373, F.S. Project-based Considerations

The key permitting issues will be associated with FDEP requirements for water quality of the reclaimed water to be applied to the RIBs and the degree of monitoring and treatment required for the finished water.

TECO Polk Power Reuse

Project Location: Polk County
Solutions Project ID: RW4
RWSP Project Number: 100

Project Description



An ongoing FY2009-FY2016 reclaimed water supply project within the SWFWMD portion of Polk County, to supply 10 mgd of reclaimed water to the TECO Polk Power Generation Facility. The project includes the design, permitting, construction and or purchasing of a 10 mgd reclaimed water pump station (expandable to 17 mgd) at the Lakeland Wetland Treatment System, a 2.0 mgd pump station at the Mulberry Wastewater Treatment Plant (WWTP), a 0.5 mg storage tank at the TECO Polk Power Station, a 10 mgd advanced membrane reclaimed water treatment system (expandable to 17 mgd) at the TECO Polk Power Station, a 2.0 mgd membrane concentrate deep disposal well at the TECO Polk Power Station, approximately 80,000 linear feet (lf) of 30-inch diameter transmission main from the Lakeland Wetland Treatment System to the TECO Polk Power Station, approximately 24,000 lf of 18-inch diameter, and approximately 10,000 lf of 12-inch diameter transmission lines from Polk Southwest WWTP and Mulberry WWTP to the 30-inch diameter transmission line (**Figure C-3**), and other necessary appurtenances to supply available reclaimed water flows from Lakeland, Mulberry, and Polk Southwest WWTPs to the TECO Polk Power Station (WUP#11747).

Cost-benefit Analysis of Yield

Water Resource Benefit - The reclaimed water supply project will provide an estimated 10 mgd of reclaimed water and will enable the future supply of ultimately up to 17 mgd of reclaimed water in the Southern Water Use Caution Area (SWUCA).

Cost Effectiveness - It has an initial $9.69 per gallon of capital cost, which is below the $10 to $15 per gallon average for alternative supplies. The estimated cost/benefit is $2.34 per 1,000 gallons of initial water resource benefit (amortized 8%@30yrs), which is within the cost range for reuse projects which typically range from a low of ~$0.15/1,000 gpd for golf course projects up to ~$10.00/1,000 gpd for residential projects. Future flows are estimated to eventually increase project related reuse flows to 17 mgd and will use all existing and future reuse flows from Lakeland, Mulberry, and Polk Southwest WWTPs;

however, the cost effectiveness calculations above only include the initial near-term water resource benefits.

Figure C-3. TECO Power Reuse project concept diagram.

Estimated Planning-level Costs

Total Supply Project Cost: $96,960,725 (TECO; $46,717,331; SWFWMD $46,717,331; Water Resource and Protection-WRAP $3,526,063).

Water Resource Constraints

The project is located in the Southern Water Use Caution Area (SWUCA) in an area that has minimum flows or levels (MFLs) established that would apply to increases to the consumptive use permit (CUP) for anticipated water supply demands associated with the ongoing and planned future power generation facility expansions.

Partners and Governance Options

The ongoing project is cooperatively funded by the Tampa Electric Company (TECO) and the SWFWMD. The project will be owned and operated by TECO. Three utilities (Lakeland, Mulberry, and Polk County) have agreed to supply TECO with all excess reclaimed water for a period of 30 years at no charge.

Planning Level Design Quantities in mgd

Year	Power	Total Water	Groundwater	WUP Limit	Reclaimed Use
2014	930	3.14	3.14	3.14	0
2015	930	3.14	1.00	3.14	2.14
2017	1390	10.00	4.30	4.30	5.70
2025	2180	16.00	4.30	4.30	11.70
2035	2780	22.00	4.30	4.30	17.70
2045	2780	22.00	4.30	4.30	17.70

2017	Polk Unit 2 conversion 460 MW
2025	Additional Unit (2 on 1 NG) - Additonal 6 MGD
2035	Additional Unit (2 on 1 NG) - Additonal 6 MGD

Project Feasibility

The ongoing project (construction 85% complete) is technically, environmentally, and financially feasible.

Funding Sources and Amounts

The $96,960,725 project is funded by TECO; $46,717,331; the SWFWMD $46,717,331; and WRAP $3,526,063. TECO and the SWFWMD each budgeted a total of $38,001,957 between FY 2009-FY 2014, a FY 2015 funding request of $4,700,000 was conceptually approved by Governing Board July 2014, and FY 2016 request of $4,015,374 for final year District funding is anticipated to be requested.

Other Considerations – Public Concerns or Non-technical Obstacles

None.

Estimated Implementation Schedule

Design Commence	March 2009
Construction Commence	January 2011
Prelim. Construction Completion (utilizing Lakeland flows)	January 2015
Full Construction Completion	January 2017

Regulatory Review: TECO Polk Power Reuse

Planning Level Review for Permittability

The project appears to be reasonably permittable from a planning level perspective based on the following:

- CUP 11747 was issued by SWFWMD to TECO recognizing the use of reclaimed water at the Polk Power Station.
- Further CUP permits should not be required for this project.
- Permit modifications may be required from FDEP for the Lakeland, Mulberry and Polk Southwest Wastewater Treatment Plants as the project is expanded to 17 mgd.

Identification of Project-based Inconsistencies, Impediments, or Unusual Considerations

Consumptive Use Permit (CUP) Program Inconsistencies among Districts

None anticipated. This project is located entirely within SWFWMD.

Identification of Chapter(s) 373 or 403, F.S. Project-based Impediments or Benefits

None identified.

Identification of Unusual, non-Chapter 373, F.S. Project-based Considerations

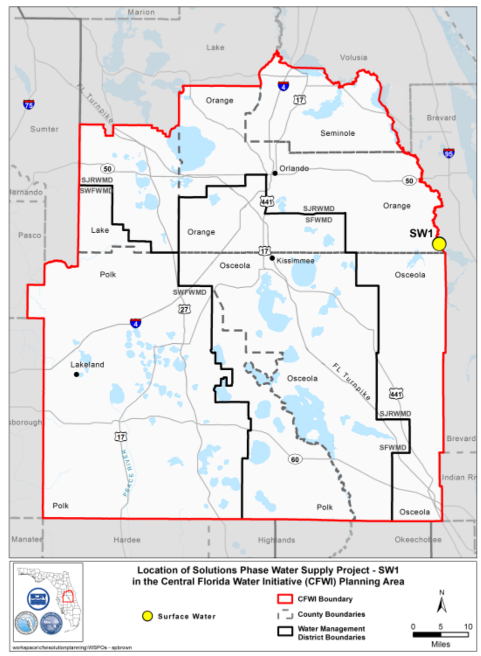
None identified.

SURFACE WATER PROJECT OPTIONS

St. Johns River/Taylor Creek Reservoir

Project Location: Osceola and Orange counties
Solutions Project ID: SW1
RWSP Project Number: 126

Project Description



The proposed St. Johns River/Taylor Creek Reservoir (SJR/TCR) Water Supply Project involves the withdrawal of surface water from the St. Johns River at State Road (SR) 520 for augmentation of the Taylor Creek Reservoir. After withdrawal, the water would be treated and transmitted to the users. The project includes several components, including raw water intakes, raw water transmission mains, potable water treatment plant and storage facilities, potable water transmission mains, and potentially potable water re-treatment by the end users. The project also includes reservoir enhancements funded by the SJRWMD, such as raising and improving the L-73 levee, expanding the S-164 structure, and updating the operation schedule for the reservoir.

This project is a regional alternative water supply (AWS) project that will develop a fresh surface water source and would supply water from a nontraditional source to meet 2035 future needs for public supply or agriculture water supply, or both. (Note: SJRWMD considers all sources other than fresh groundwater to be nontraditional.) It also involves the addition of new storage capacity for surface or groundwater and will use surface water captured predominantly during wet-weather flows when water quality does not require membrane treatment.

A conceptual-level project description was developed by SJRWMD in 2005. From 2006 to 2009, water supply entities (City of Cocoa, East Central Florida Services, Orange County, Orlando Utilities Commission, the City of Titusville, and the Tohopekaliga Water Authority), the SJRWMD, and the SFWMD funded and developed a preliminary design report (PDR; CH2M/PB Water JV 2009b) and environmental information document (EID; CH2M/PB Water JV 2009a) for this project. Based on the preliminary design, the project was determined to be feasible at an average annual daily flow (AADF) of 54 million gallons per day (mgd) above the existing permitted allocations (City of Cocoa, 8.83 mgd) from the TCR.

A preferred preliminary pumping, storage, and transmission configuration was developed. Generally, water could be distributed directly to water users near the water treatment facility in the eastern portion of the project area. To supply users further west, approximately 25 miles of transmission piping would need to be constructed.

Planning-level Project Details

The project includes the following systems and components: river intake and pump station on the St. Johns River; reservoir intake and pump station at Taylor Creek Reservoir; water treatment facility; raw and treated water transmission lines; and potentially construction of re-treatment facilities for the end-users.

St. Johns River Raw Water Intake and Pump Station (SJR-I/PS)

The SJR-I/PS is based on a maximum design capacity of 120 mgd.

Added Surface Water Storage Capacity

Increased surface water storage capacity will be accomplished by constructing a 10 million gallon (MG) ground storage tank at the WTP. In addition, expansion of the TCR by the SJRWMD, including raising the L-73 levee, is a priority water resource development project that will increase storage capacity.

Raw Water Mains (delivery from St. Johns River to TCR)

Water deliveries from the St. Johns River to the TCR will be conveyed through dual 60-inch pipelines approximately 11 miles to the TCR.

TCR Raw Water Intake and Pump Station (TCR-I/PS)

The TCR-I/PS is based on 60 mgd raw water pumping capacity from the TCR to the WTP.

Raw Water Mains

Water deliveries from the TCR to the WTP will be conveyed through dual 42-inch pipelines 4 miles to the WTP

Water Treatment Plant(s)

Construction of a new WTP.

Finished (Potable) Water Mains

Treated water will be conveyed to six delivery locations identified by the partners, approximately 45 miles and using pipe sizes ranging from 16- to 54-inches in diameter.

Project Yield

The project is not yet permitted but is estimated to produce up to 60 mgd (maximum annual average) of surface water to yield up to 54 mgd of long-term average finished water supply.

Estimated Planning-level Costs

Planning-level costs for a 54 mgd surface water project were made using the cost estimation (CE) Tool developed for the CFWI Solutions Team. **Table C-12** summarizes this planning-level cost estimate.

Table C-12. Summary of estimated planning-level costs for the St. Johns River/Taylor Creek Reservoir (SJR/TCR) Water Supply Project.

Planning-level Cost Estimate	60 mgd max average annual daily flow (AADF)/ 54 mgd supply (AADF)[a], (millions)
Construction Costs	$566.1
Non-construction Costs	$47.6
Land Costs (ROW for conveyance piping)	$23.8
Total Capital Costs	$637.6
Equivalent Annual Costs	$32.5
Annual Operation and Maintenance	$15.4
Total Annual Costs	$47.9
Unit Production Cost ($/kgal)	**$2.89**

[a] These costs do not include land acquisition or wetland mitigation

Estimated Implementation Schedule

Since 2009, consumptive use permit applications have been in review by the SJRWMD and are currently pending. It is anticipated that project detailed design and construction can be completed within 10 years.

Water Resource Constraints

Minimum flows and levels (MFLs) have been established for the St. Johns River at SR 50, the St. Johns River at Lake Monroe, the St. Johns River at SR 44, and Taylor Creek. The MFLs at all four of these locations apply for the SJR/TCR project. In addition to compliance with MFLs, ecological effects, if any, must be reduced to the extent feasible.

Project Feasibility

Based on results of the PDR and EID (CH2M/PB Water JV, 2009a,b), this project is technically feasible. Potential environmental effects can be managed by proper intake design and by appropriate timing of withdrawals from the St. Johns River. However, some stakeholders have expressed concerns for the potential environmental effects of withdrawals from the St. Johns River. To address these concerns, the District conducted the St. Johns River Water Supply Impact Study (WSIS) from 2007 to 2012 (SJRWMD, 2012). In the WSIS, the SJRWMD concluded that the St. Johns River could yield approximately 55 mgd, on an average day withdrawal basis, near Lake Poinsett without unacceptable ecologic and hydrologic impacts. Information from the WSIS should be used in formulating project design and operational regime to avoid any adverse impacts to the river.

The inclusion of this project in the SJRWMD District Water Supply Plan (SJRWMD District Water Supply Plan Technical Publication SJ2006-2); confirmation through the preliminary design and review (PDR) process; and examination through the WSIS indicate that the project is feasible and no project limitations due to rule inconsistencies have been identified.

Cost-benefit Analysis of Yield

As an alternative water supply (AWS) project, this project is intended to provide potable water to meet future water demands in the CFWI Planning Area. The SJR/TCR project is conceptualized to deliver 54 mgd at a unit production cost of $2.89 per 1,000 gallons.

Other Considerations

MFLs require close coordination with SJRWMD to develop operating protocols for withdrawals from the SJR and TCR and scheduled releases from TCR.

Potential Partners and Governance Options

The current project partners are the City of Cocoa, East Central Florida Services, Orange County, Orlando Utilities Commission, and the Tohopekaliga Water Authority. These partners are working on governance and the final project configuration and implementation details.

Contingent upon the project partners executing one or more agreements regarding the terms for developing and operating the project, the St. Johns River/Taylor Creek Reservoir (SJR/TCR) option is a regional alternative water supply (AWS) project that will develop a fresh surface water source and would supply water from a nontraditional source to meet 2035 future public supply, or 2035 future agriculture water supply, or both. This project was and will remain a “regional” project as contemplated by applicable Florida law, irrespective of the addition of an agricultural water supply component to the previous descriptions of this project in prior water supply plans.

Funding Sources

Significant funds will be required to support implementation of this project. Possible funding sources include the project partners, State of Florida, SJRWMD, and federal grants and loans. Challenges/obstacles to funding include numerous projects and entities competing for the same funding; long-term funding commitments needed by local partners.

References

CH2M/PB Water Joint Venture. 2009a. *St. Johns River/Taylor Creek Reservoir Water Supply Project: Environmental Information Document*. Prepared for City of Cocoa, City of Titusville, East Central Florida Services, Orange County Utilities, Orlando Utilities Commission, Tohopekaliga Water Authority. Orlando, FL.

CH2M/PB Water Joint Venture. 2009b. *St. Johns River/Taylor Creek Reservoir Water Supply Project: Preliminary Design Report*. Prepared for City of Cocoa, City of Titusville, East Central Florida Services, Orange County Utilities, Orlando Utilities Commission, Tohopekaliga Water Authority. Orlando, FL.

SJRWMD (St. Johns River Water Management District). 2012. *St. Johns River Water Supply Impact Study (WSIS)*. Technical Publication SJ2012-1. St. Johns River Water Management District, Palatka, FL.

Regulatory Review: St. Johns River/Taylor Creek Reservoir Project

Planning Level Review for Permittability

The project appears to be reasonably permittable from a planning-level perspective. One of the key criteria in the permit application review will be whether the proposed consumptive use is "in accordance with any minimum flow or level and implementation strategy established pursuant to Sections 373.042 and 373.0421, F.S." See Rule 40C-2.301(2)(i), F.A.C. Minimum flows and levels have been established for the St. Johns River at SR 50 [Rule 40C-8.031(1)(h), F.A.C.], the St. Johns River at Lake Monroe [Rule 40C-8.031(1)(i), F.A.C.], the St. Johns River at SR 44 [Rule 40C-8.031(1)(f), F.A.C.], and Taylor Creek [Rule 40C-8.031(1)(e)]. The minimum flows and levels at all four of these locations would apply if a consumptive use permit were to be sought for this project.

Because this is a regional project that would provide water for use across county boundaries, the Governing Board will also consider the factors in Section 373.223(3), F.S., as part of the completed permit application for a specific project, in making a determination of whether the project is consistent with the public interest pursuant to Section 373.223(5), F.S. As required by Section 373.223(3), F.S., SJRWMD will use the information in its applicable regional water supply plan as the basis for its consideration of the special public interest criteria ("local sources first") during its review of the permit application.

Three permit applications for TCR are currently pending. Competing applications are reviewed in accordance with District rule 40C-2.311 which provides that if two or more complete applications complying with the requirements for a CUP "are pending for a quantity of water that is inadequate for both or all, or which for any other reason are in conflict, the governing board shall have the right to approve or modify the application which best serves the public interest."

Identification of Project-based Inconsistencies, Impediments, or Unusual Considerations

Consumptive Use Permit (CUP) Program Inconsistencies among Districts

None identified.

Identification of Chapter(s) 373 or 403, F.S. Project-based Impediments or Benefits

None identified.

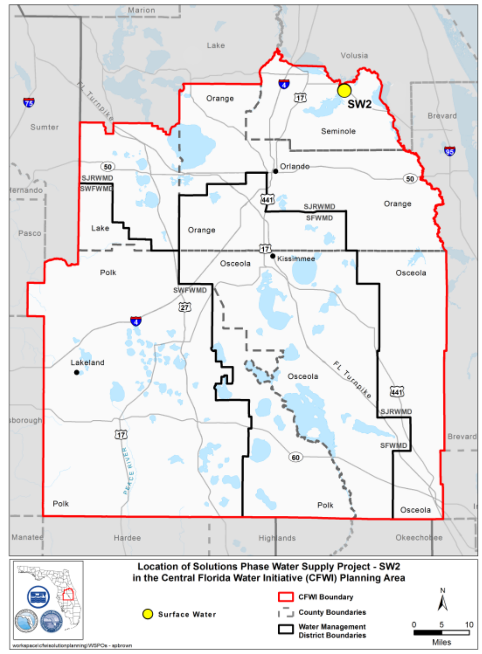
Identification of Unusual, non-Chapter 373, F.S. Project-based Considerations

None identified.

St. Johns River near State Road 46 Project

Project Location: Seminole County
Solutions Project ID: SW2
RWSP Project Number: 135

Project Description



The St. Johns River near State Road (SR) 46 Project involves the withdrawal of surface water from the St. Johns River for potable consumption and potential augmentation of reclaimed water systems. After withdrawal, the water would be treated and transmitted to the users. The project includes several components, including raw water intake, raw water transmission mains, potable water treatment and storage, potable water transmission, and potentially potable water re-treatment by the end users. The project also may include potential treatment to reclaimed water augmentation standards and a separate transmission system for this quality of water.

This project is a regional alternative water supply (AWS) project that will develop a brackish surface water source and supply water from a nontraditional supply source. (Note: SJRWMD considers all sources other than fresh groundwater to be nontraditional.) SJRWMD generally identifies source waters that do not always meet federal and state drinking water standards for chlorides, sulfates, or total dissolved solids as brackish waters. It also could involve the addition of new storage capacity for surface water and will utilize surface water captured predominantly during wet-weather flows.

A conceptual-level project description was developed by the St. Johns River Water Management District (SJRWMD) in 2007 and included in the SJRWMD District Water Supply Plan. In 2007 and 2008, interested water suppliers met with the SJRWMD to further refine the project concept. As part of those meetings, the project was conceptualized by the SJRWMD to provide an average annual daily flow (AADF) of up to 63.1 mgd. Subsequent to the conceptual project development, the District completed the St. Johns River Water Supply Impact Study (WSIS) (2012) which included a 50 mgd withdrawal at this location.

Planning-level Project Details

The project includes the following systems and components: river intake and pump station on the St. Johns River; new water treatment facility, an injection well for reverse osmosis

(RO) concentrate disposal; finished water storage, and treated water transmission pipelines.

Raw Water Intake and Pump Station

The St. Johns River pump station is based on a design capacity of 50 mgd, to provide a long-term average yield of 40 mgd.

Water Treatment Plant

Construction of a new 50 mgd brackish water SWTP, to provide a long-term average yield of 40 mgd.

RO Concentrate Disposal

Construction of a 10 mgd injection well for RO concentrate discharge.

Potable Water Storage

Construction of 31.57 MG of end-user system storage

Finished Water Mains

Treated water will be conveyed to a 12-point connection to ground storage tanks via approximately 66 miles of distribution system piping.

Project Yield

The project is expected to produce a maximum daily withdrawal rate of 50 mgd from the St. Johns River and is estimated to yield 40 mgd of finished water on a long-term annual average basis.

Estimated Planning-level Costs

Planning-level costs for 50 mgd St. Johns River withdrawal/40 mgd AADF of supply were made using the cost estimation (CE) tool developed for the CFWI Solutions Team. **Table C-13** summarizes the preliminary estimated planning-level costs.

Table C-13. Summary of estimated planning-level costs for the St. Johns River near State Road 46 Project.

Planning-level Cost Estimate	50 mgd average annual daily flow (AADF)/40 mgd supply (AADF) [a] (Millions)
Construction Costs	$464.5
Non-construction Costs	$92.9
Land Value	$26.9
Total Capital Costs	$584.3
Equivalent Annual Costs	$30.3
Annual Operation and Maintenance	$18.6
Total Annual Costs	$48.9
Unit Cost of Production ($/kgal)	**$4.68**

[a] Costs include right-of-way land value for transmission piping and for the SWTP; costs for wetland mitigation are not included.

Estimated Implementation Schedule

There is not a specific schedule for implementation at this time. However, within approximately five years of project initiation, the preliminary design could be completed. In the second five years of the project, the final design, permitting, and land acquisition could be completed. In the third five years of the project, construction could be completed.

Water Resource Constraints

Minimum flows and levels (MFLs) have been established for the St. Johns River at Lake Monroe and the St. Johns River at SR 44. The MFLs at both of these locations apply for SJR near SR 46 project. In addition to compliance with MFLs, ecological effects, if any, must be reduced to the extent feasible.

Project Feasibility

The project is technically feasible with appropriately designed components to treat potentially variable water quality from the SJR. Potential environmental effects can be managed by proper intake design and by appropriate timing of withdrawals from the SJR. However, some stakeholders have expressed concerns for the potential environmental effects of withdrawals from the SJR. To address these concerns, the District conducted the St. Johns River Water Supply Impact Study (WSIS) from 2007 to 2012. In the WSIS, the SJRWMD concluded that the St. Johns River could yield approximately 50 mgd, on a maximum annual average day withdrawal basis, at this location without unacceptable ecologic and hydrologic impacts. Information from the WSIS should be used in formulating project design and operational regime to avoid any adverse impacts to the river.

The inclusion of the project in the SJRWMD District Water Supply Plan and confirmation through the WSIS indicate that the project is feasible and no project limitations due to rule inconsistencies have been identified.

Cost-benefit Analysis of Yield

As an alternative water supply (AWS) project, the St. Johns River (SJR) near State Road (SR) 46 Project is intended to provide potable water to meet future water demands in the CFWI Planning Area. The project is conceptualized to deliver 40 mgd at a unit production cost of $4.68 per 1,000 gallons.

Other Considerations

To treat brackish surface water to potable standards, a reverse osmosis treatment system is required. A consequence of using reverse osmosis is the production of a concentrate that needs to be disposed. At full build out, expected concentrate flow could approach 10 mgd. The two potentially viable technical options to dispose of concentrate include deep well injection (which was assumed for this project) or dispersal into the St. Johns River. However, additional study regarding the ultimate viability of these two disposal options is required.

Potential Partners and Governance Options

The project partners, Altamonte Springs, Casselberry, Maitland, Orange County, Oviedo, Sanford, and Winter Springs executed an Agreement to conduct a preliminary design review in 2009. However, the Agreement has been on hold since 2011. Potential governance options may include the partners entering into a memorandum of understanding, where each partner is proportionally responsible for project decisions, funding, and management; or developing a water supply authority or a facility management board where one partner is responsible for oversight of operations and capital outlay and becomes a water supplier through contractual commitments with the other entities.

Funding Sources

Significant funds will be required to support implementation of this project. Possible funding sources include the project partners, State of Florida, SJRWMD, and federal grants and loans. Challenges/obstacles to funding include numerous projects and entities competing for the same funding; long-term funding commitments needed by local partners.

Regulatory Review: St. Johns River near State Road 46 Project

Planning Level Review for Permittability

The project appears to be reasonably permittable from a planning-level perspective. One of the key criteria in the permit application review will be whether the proposed consumptive use is "in accordance with any minimum flow or level and implementation strategy established pursuant to Sections 373.042 and 373.0421, F.S." See Rule 40C-2.301(2)(i), F.A.C. MFLs have been established for the St. Johns River at Lake Monroe [Rule 40C-8.031(1)(i), F.A.C.] and at SR 44 near DeLand [Rule 40C-8.031(1)(f), F.A.C.]. The MFLs at both of these locations would apply if a consumptive use permit were sought for this project.

Because this is a regional project that would provide water for use across county boundaries, the Governing Board will also consider the factors in Section 373.223(3), F.S., as part of the completed permit application for a specific project, in making a determination of whether the project is consistent with the public interest pursuant to Section 373.223(5), F.S. As required by Section 373.223(3), F.S., SJRWMD will use the information in its applicable regional water supply plan as the basis for its consideration of the special public interest criteria ("local sources first") during its review of the permit application.

Identification of Project-based Inconsistencies, Impediments, or Unusual Considerations

Consumptive Use Permit (CUP) Program Inconsistencies among Districts

None identified.

Identification of Chapter(s) 373 or 403, F.S. Project-based Impediments or Benefits

None identified.

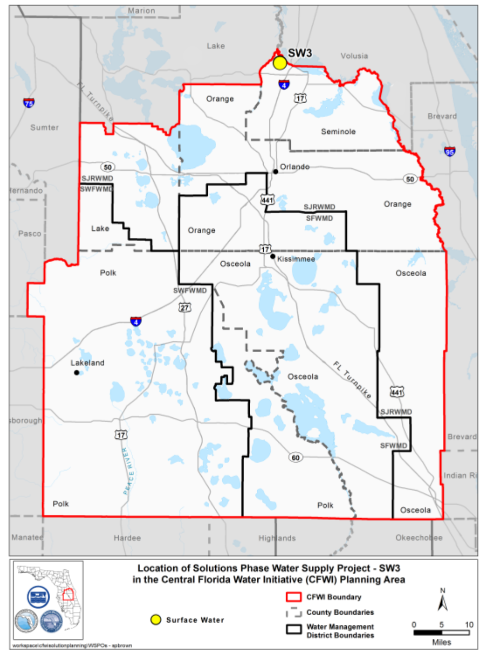
Identification of Unusual, non-Chapter 373, F.S. Project-based Considerations

None identified.

St. Johns River near Yankee Lake Project – Scenarios 1, 2, and 3

Project Location: Seminole County
Solutions Project ID: SW3
RWSP Project Numbers: 138a, b, and c

Project Description



The St. Johns River near Yankee Lake project involves the withdrawal of surface water from the St. Johns River for potable consumption. After withdrawal, the water would be treated at Yankee Lake Regional Water Treatment Facility and the finished potable water transmitted to various end users using one of three different scenarios. End users were identified by comparing potable water demands developed in the current Regional Water Supply Plan (RWSP) to various permittee's groundwater allocations in their consumptive use permit (CUP). Scenario 3 also provides 12.4 mgd of finished water to be injected into the aquifer near Wekiwa and Rock Springs, thus restoring spring flow for these spring to their MFLs The project includes several components, including potable water treatment of a brackish surface water (SWTP), an injection well for Reverse Osmosis (RO) concentrate disposal, approximately 90 miles of large diameter pipe for transmission of finished potable water, booster pumping stations, residual disinfection, and storage. The surface water intake structure and raw water transmission lines have already been constructed, and have been in operation since December 2012.

This project is a regional alternative water supply (AWS) project that will develop a brackish surface water source and supply water from a nontraditional supply source. (Note: SJRWMD considers all sources other than fresh groundwater to be nontraditional.) This project will produce potable water for various entities within the CFWI Planning Area. A conceptual transmission configuration was developed.

A conceptual-level project description was developed by the St. Johns River Water Management District (SJRWMD) in 2007 and included in the SJRWMD District Water Supply Plan. In 2007 and 2008, interested water suppliers met with the SJRWMD to further refine the project concept. Preliminary partnership meetings were held by Seminole County with various potential water users in the late 2000s to discuss partnership options. However, no partnership agreements were reached, largely due to the economic downturn. Subsequent to continued project development, the District completed the St. Johns River Water Supply Impact Study (WSIS) (2012) which included a 50 mgd withdrawal at this location.

Planning-level Project Details

The project includes the following systems and components: potable water treatment of a brackish surface water, an injection well for Reverse Osmosis (RO) concentrate disposal, approximately 90 miles (Scenarios 1 and 2) or 27 miles (Scenario 3) of large diameter pipe for transmission of finished potable water, booster pumping stations, residual disinfection, and storage.

Potable Water Treatment Plant

Construction of a new 50 mgd brackish water SWTP to provide 40 mgd of finished water supply on a long-term annual average basis.

Injection Well for RO Concentrate Disposal

Construction of a 10 mgd injection well for RO concentrate discharge.

Potable Water Storage

Construction of five tanks totaling 12 million gallons (Scenarios 1 and 2) or 13 million gallons (Scenario 3) of end-user system storage.

Finished Water Mains

Treated water will be conveyed to a 5-point connection to five ground storage tanks via approximately 90 miles (Scenarios 1 and 2) or 27 miles (Scenario 3) of distribution system piping.

Booster Pumping Stations and Residual Disinfection

Booster pumping and residual disinfection are likely needed for a transmission system of this size.

Project Yield

The project is expected to produce a maximum daily withdrawal rate of 50 mgd from the St. Johns River and is estimated to yield 40 mgd of finished water.

Estimated Planning-level Costs

Planning-level costs for 50 mgd St. Johns River withdrawal/40 mgd average annual daily flow (AADF) of supply were made using the cost estimation (CE) tool developed for the CFWI Solutions team process. **Table C-14** summarizes the preliminary estimated planning-level costs for Scenarios 1, 2, and 3.

Table C-14. Summary of estimated planning-level costs for the St. Johns River near Yankee Lake Water Supply Project (Scenarios 1, 2, and 3).

Planning-level Cost Estimate	50 mgd average annual daily flow (AADF)/40 mgd supply (AADF) (millions)		
	Scenario 1	Scenario 2	Scenario 3
Construction Costs	$448.9	$428.1	$405.0
Non-construction Costs	$89.8	$85.6	$81.0
Land Value	$27.1	$22.9	$15.5
Total Capital Costs	$565.8	$536.7	$501.5
Equivalent Annual Costs	$29.5	$28.1	$26.4
Annual Operation and Maintenance	$18.3	$18.2	$19.7
Total Annual Costs	$47.8	$46.3	$46.1
Unit Cost of Production ($/kgal)	**$4.01**	**$3.96**	**$4.09**

Land costs include right-of-way land value for transmission piping. There are no additional land costs for the water treatment facility, as Seminole County owns the land that would be used. Costs for potential wetland mitigation are not included, nor are land costs required for end-user storage tanks.

Estimated Implementation Schedule

For this scenario, it is assumed that the full build out of treatment facility and transmission system would need to be in place by 2025. To accommodate that schedule, design and permitting should begin no later than 2018, with construction starting by 2022. It may be possible to phase construction of some needed treatment capacity beyond 2025, but the transmission system should largely be in place by that time. A preliminary transmission routing study and a concentrate disposal feasibility study can be completed by 2017.

Water Resource Constraints

Minimum flows and levels (MFLs) have been established for Lake Monroe and the St. Johns River at SR 44 near DeLand. The MFLs at both of these locations apply for the Yankee Lake Project. In addition to compliance with MFLs, ecological effects, if any, must be reduced to the extent feasible.

Project Feasibility

The project is technically feasible with appropriately designed components to treat potentially variable water quality from the St. Johns River. The raw water intake structure, designed and constructed to accommodate flows of up to 50 mgd, has been in operation since December 2012. However, some stakeholders have expressed concerns for the potential environmental effects of withdrawals from the St. Johns River. To address these concerns, the District conducted the St. Johns River Water Supply Impact Study (WSIS) from

2007 to 2012. In the WSIS, the SJRWMD concluded that the St. Johns River at Yankee Lake could yield approximately 50 mgd, on a maximum annual average day withdrawal basis, at this location without unacceptable ecologic and hydrologic impacts. Information from the WSIS should be used in formulating project design and operational regime to avoid any adverse impacts to the river.

The inclusion of the project in the SJRWMD District Water Supply Plan and confirmation through the WSIS indicate that the project is feasible and no project limitations due to rule inconsistencies have been identified.

Cost-benefit Analysis of Yield

As an alternative water supply (AWS) project, this project is intended to provide potable water to meet future water demands in the CFWI Planning Area. The St. Johns River near Yankee Lake project is conceptualized to deliver 40 mgd. The unit cost of production per 1,000 gallons for Scenario 2 is of $3.96.

Other Considerations

To treat brackish surface water to potable standards, a reverse osmosis treatment system is required. A consequence of using reverse osmosis is the production of a concentrate that needs to be disposed. At build out, expected concentrate flow could approach 10 mgd, assuming full build out. The two viable technical options to dispose of concentrate include deep well injection (which is assumed for each scenario) or dispersal into the St. Johns River. However, additional study regarding the ultimate viability of these two disposal options at Yankee Lake is required.

Potential Partners and Governance Options

The project partners were identified by comparing potable water demands developed in the current Regional Water Supply Plan (RWSP) to various permittee's groundwater allocations in their consumptive use permit (CUP). For Scenario 1, the entities thus identified include Seminole County, Sanlando Utilities Corp., Leesburg, Lake Utility Services Inc., Apopka, and Volusia County. For Scenario 2, the entities thus identified include Seminole County, Sanlando Utilities Corp., Leesburg, Lake Utility Services Inc., Apopka, and OUC. For Scenario 3, the entities thus identified include Seminole County, Sanlando Utilities Corp., Apopka, and OUC. An additional 12.4 mgd is to be recharged into the aquifer at Wekiwa and Rock Spring in Scenario 3. Potential governance options are undetermined at this time, and would have to be negotiated by potential partners. An example framework of a governance option could be that the partners enter into a memorandum of understanding, where each partner is proportionally responsible for project decisions, funding and management. Another option could be to develop a water supply authority or a facility management board where one partner is responsible for oversight of operations and capital outlay and becomes a water supplier through contractual commitments with the other entities.

Funding Sources

Significant funds will be required to support implementation of this project. Possible funding sources include the project partners, State of Florida, SJRWMD, and federal grants and loans. Challenges/obstacles to funding include numerous projects and entities competing for the same funding; long-term funding commitments needed by local partners.

Regulatory Review: St. Johns River near Yankee Lake Project

Planning Level Review for Permittability

The project appears to be reasonably permittable from a planning-level perspective. One of the key criteria in the permit application review will be whether the proposed consumptive use is "in accordance with any minimum flow or level and implementation strategy established pursuant to Sections 373.042 and 373.0421, F.S." See Rule 40C-2.301(2)(i), F.A.C. Minimum flows and levels have been established for the St. Johns River at Lake Monroe [Rule 40C-8.031(1)(i), F.A.C.] and the St. Johns River at SR 44 [Rule 40C-8.031(1)(f), F.A.C.]. These minimum flows and levels would apply if a consumptive use permit were to be sought for this project.

Because this is a regional project that would provide water for use across county boundaries, the Governing Board will also consider the factors in Section 373.223(3), F.S., as part of the completed permit application for a specific project, in making a determination of whether the project is consistent with the public interest pursuant to Section 373.223(5), F.S. As required by Section 373.223(3), F.S., SJRWMD will use the information in its applicable regional water supply plan as the basis for its consideration of the special public interest criteria ("local sources first") during its review of the permit application.

Identification of Project-based Inconsistencies, Impediments, or Unusual Considerations

Consumptive Use Permit (CUP) Program Inconsistencies among Districts

None identified.

Identification of Chapter(s) 373 or 403, F.S. Project-based Impediments or Benefits

None identified.

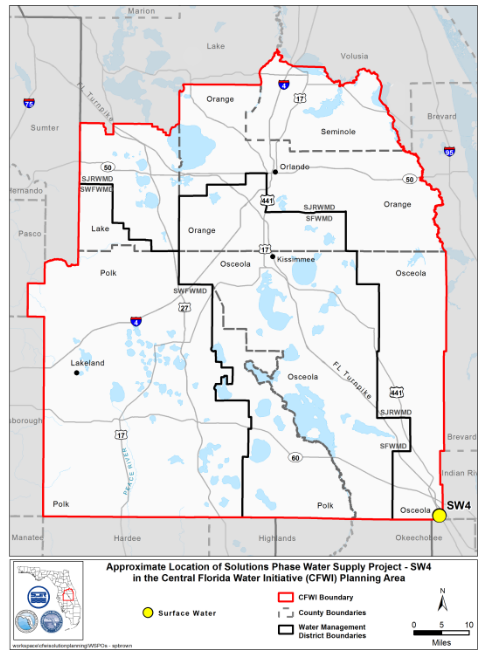
Identification of Unusual, non-Chapter 373, F.S. Project-based Considerations

None identified.

Grove Land Reservoir & Stormwater Treatment Area

Project Location: Okeechobee and Indian River counties
Solutions Project ID: SW4
RWSP Project Number: 144 (new)

Project Description



The proposed Grove Land Reservoir and Stormwater Treatment Area (GLRSTA) project is located in northern Okeechobee and southern Indian River counties on land owned by Evan's Properties, Inc. The project consists of a 5,000-acre reservoir, 2,000-acre stormwater treatment area (STA), intake/discharge structures, conveyance improvements, and other associated facilities. The GLRSTA project is selling storage and treatment, not water. This regional water supply project, its water source, and ultimate water supply destinations are provided in **Figure C-4.** The reservoir water supply would consist of excess stormwater runoff captured from the C-25, C-24, and C-23 basins via the C-25, C-24, and C-23 Canals owned by the South Florida Water Management District (SFWMD). The reservoir would also be able to store water flows from the C-52 watershed via the C-52 flow-way owned by the St. Johns River Water Management District (SJRWMD). As part of this project, the hydraulic connection between these two water management districts would be re-established.

Water from the reservoir would enter the stormwater treatment area (STA) which would be sited north of the reservoir. The STA would reduce total phosphorus (TP) and total nitrogen (TN) concentrations. This treated water could be discharged to the SJRWMD C-52 flow-way (and subsequently north to the St. Johns River) when water levels in the St. Johns River upper basin project are not too high or to the SFWMD C-25 Canal (and subsequently south to the C-24 and C-23 canals) for water supply and environmental deliveries.

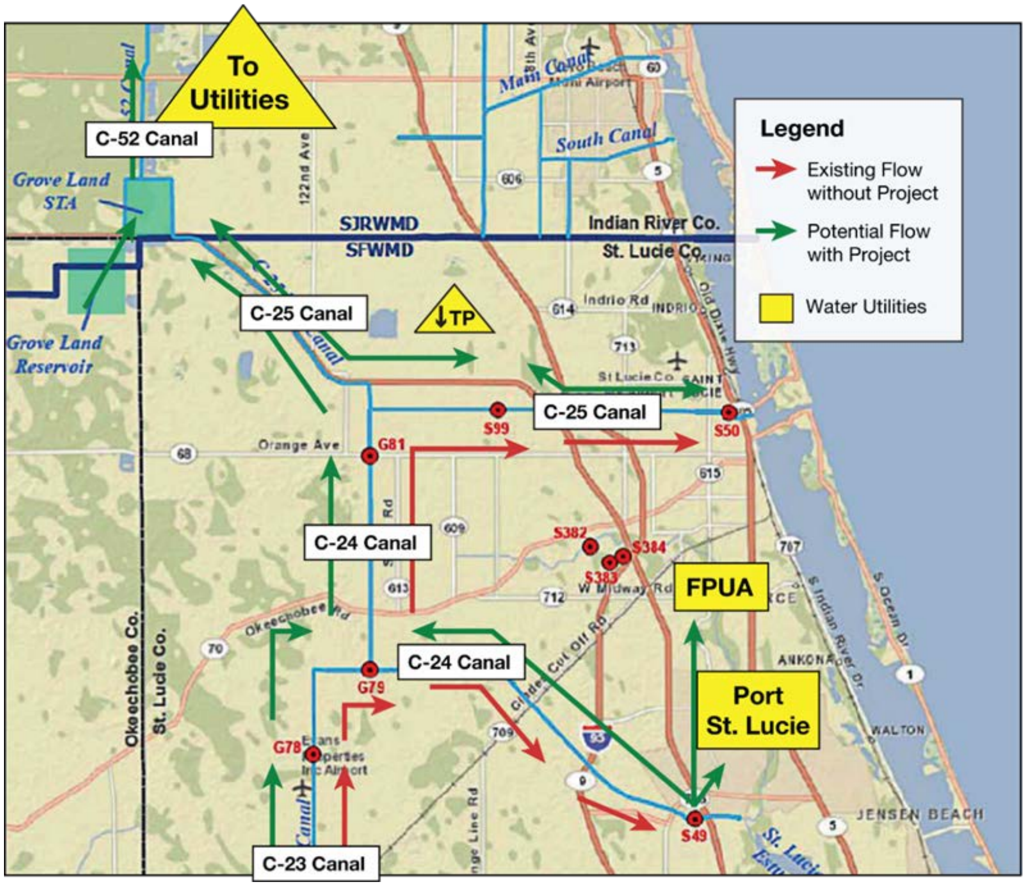


Figure C-4. Conceptual diagram of the Grove Land Reservoir and Stormwater Treatment Area.

The GLRSTA project is expected to provide a variety of benefits to water utilities, landowners, and government agencies including

1. **Surface Water Augmentation**. Water users in the SJRWMD and the SFWMD would benefit as the Project provides supplemental water supplies using the St. Johns River, existing canals, and/or constructed conveyance infrastructure to move the water to surface or ground water storage areas in close proximity to water utilities and other users.

2. **Groundwater Recharge**. Water users and other water use permittees in the SJRWMD and the SFWMD within the project boundary would benefit as the Project's water is used for groundwater recharge of the surficial aquifer system allowing these entities to withdraw additional freshwater from the aquifer.

Other potential benefits include

1. **Reduction or Improved Timing of Water Discharges to Estuaries**. The SFWMD and local communities from Ft. Pierce to Stuart would benefit as the Project is used to reduce or to change the timing of stormwater flows to the Indian River Lagoon (IRL) and St. Lucie Estuary (SLE) to reduce environmental harm to coastal estuaries.

2. **Nutrient Reduction**. The SFWMD, the Florida Department of Environmental Protection (FDEP), local agencies and agricultural landowners in the St. Lucie Basin would benefit as the Project reduces the amount of total phosphorus (TP) and total nitrogen (TN) entering the IRL and SLE.

3. **MFL Compliance**. The SJRWMD would benefit as the Project provides additional freshwater to the St. Johns River that may help to maintain compliance with minimum flows and levels (MFLs) regulations.

4. **Water Management Flexibility**. The SJRWMD and the SFWMD would benefit as the Project improves the flexibility of managing water systems in the area.

5. **Replace Some Components of Indian River Lagoon – South CERP Project**. The Federal government would benefit as the Project provides the same benefits that would be provided by the proposed C-25 Reservoir and STA and a portion of the benefits provided by the C-23/24 Reservoir and STAs. The engineering design and construction of these projects have been indefinitely delayed.

Planning-level Project Details

The project site, as depicted in **Figure C-5,** is 7,788 acres of land historically used to grow citrus crops.

The Grove Land Reservoir would be constructed on a 5,683-acre parcel where the north portion is located in the SJRWMD and the south portion is located in the SFWMD. The reservoir storage area would be 5,000 acres and the remaining 683 acres would be used for the perimeter embankment and roadway, seepage collection ditches, and a buffer zone to minimize seepage impacts on adjacent properties. The reservoir would have a storage capacity of 24.4 MG. Water from the reservoir would enter the stormwater treatment area (STA) which would be sited north of the reservoir on 2,105 acres located in the SJRWMD. The effective treatment area of the STA would be 2,000 acres of water surface area and the remaining 105 acres would consist of embankments, canals, and other accessory features. The STA wetland treatment technology would consist of “floating aquatic vegetative tilling” or FAVT in the front-end of the system, and traditional submerged aquatic vegetation in the back-end.

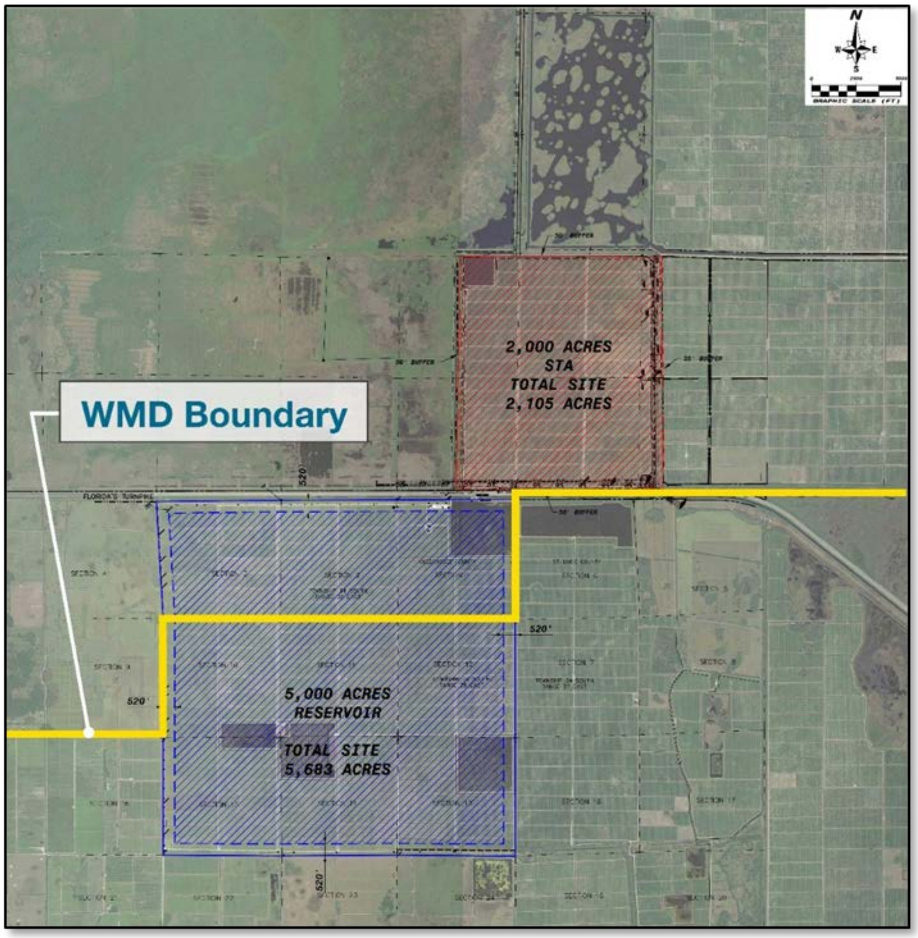


Figure C-5. Grove Land Reservoir and Stormwater Treatment Area proposed site.

The project components include

Water Source to Reservoir

To accommodate increased water flows through the C-25 Canal, the 8,140-foot section of the C-25 Canal southern extension beginning just north of the G-81 Structure to where it joins the main east-west section of the canal would need to be widened to a bottom width of 25 feet. In addition, the first 3,500 feet of the main canal as it heads east would be widened to a bottom width of 25 feet and deepened to a bottom elevation of 0.6 feet NGVD 1929. Finally, a 5,800-foot section of the C-25 Canal near the proposed reservoir would be enlarged.

Water would flow north along the C-25 Canal and through a new 12-foot by 16-foot box culvert road crossing placed under a private road over the canal near the southwest corner of the STA just west of the existing plug that separates the two water management districts. Water would pass through this culvert and enter the reservoir through a 700 cfs capacity inflow pump station that would be installed at the reservoir's northeast corner. This pump station would withdraw water from the C-25 Extension / Turnpike Canal.

Reservoir to STA

Untreated water would flow by gravity out of the north central part of the Reservoir through the Reservoir Outflow Gate into an existing canal that crosses north under the Florida Turnpike to the southwestern part of the STA. The water would enter the STA through the 230 cfs STA Inflow Pump Structure. Once in the STA, the water would flow by gravity to the northern end of the STA.

Water Flow Out of the STA

The project would be configured to convey water from the STA either north to the Upper St. Johns River Basin or south to the C-25 Canal.

(1) North: The water would flow from the STA through the Upper St. Johns River Basin to the channelized St. Johns River at Lake Hell'n Blazes.

The water would leave the STA through the Outflow Gate located at the north end of the STA. The existing S-253 weir structure would be improved and a 210 cfs pump station would be constructed. The water would then flow north through the L-79 Canal to SR 60. The L-79 channel and adjacent ground between the STA and SR 60 would be cleared of vegetation to improve conveyance capacity.

North of SR 60, the treated water would flow into the southwest corner of the Blue Cypress Water Management Area traveling along the western side, then through C-65 between L-76 and L-75, through S-96D, and into the southeast corner of the Stick Marsh. The water would then flow northwest through the Stick Marsh. At the northwest corner of Stick Marsh, a 10 foot by 10 foot vertical lift gate would be constructed to discharge water into the St. Johns Marsh Conservation Area (SJMCA). After flowing through the SJMCA, the water would enter an unnamed channel that would carry it west to Lake Hell'n Blazes where it would join the channelized St. Johns River.

SJRWMD Conveyance Investigation

In 2014, the SJRWMD conducted a high-level conceptual analysis using its HSPF (Hydrological Simulation Program – Fortran) Model to investigate the potential impact of water discharging from the GLRSTA Project on the St. Johns River from Florida's Turnpike in the upper reaches of the Upper St. Johns River to the inflow of Lake Harney at SR 46.The conceptual plan for the proposed GLRSTA was analyzed for four areas of concern: Long term hydrology in the affected project areas, flood control operations, environmental hydrologic criteria, and water quality. For the long term hydrology, the impacts were slight, since inflows to the project are matched by discharges through the two Water Management Areas. For flood control, there are two issues: the operation of the major flood control structures and the anticipated impact on St. John's Improvement District (SJID) discharges. Both of these concerns may be easily addressable by including criteria for cutting off GLRSTA releases during large storm events and/or the approach of tropical storm systems, with the possibility of increased discharges after stages have dropped back below critical levels. For the environmental criteria and water quality performance, the initial analyses showed no negative impact and the possibility of a net benefit to the SJMCA.

(2) South: Water from the STA may also exit the STA via a second Outflow Gate located at the southeast corner of the STA. Here, a 10 foot vertical lift gate would be installed to discharge treated water to the C-25/C-24/C-23 Canal system. The water discharge would be located on the north side of the Turnpike but there is no existing structure at the discharge location to convey the water directly to the C-25 Canal on the south side of the Turnpike. Therefore, an existing flow-way (C-52E) in the St. John's Improvement District (SJID) would convey the water east to a SJID canal at 122nd Ave. SW, which would then convey it south to the C-25 Canal. No improvements to the SJID canals are expected to be needed. A summary of the GLRSTA components and their sizes is provided in **Table C-15**.

Table C-15. Summary of planned components and sizes for the Grove Land Reservoir and Stormwater Treatment Area (GLRSTA) project.

Improvement	Value
Components Associated with Reservoir	
G-78 Pump Station (new)	260 cfs
G-81 Pump Station (new)	260 cfs
Reservoir Inflow Pump Station	700 cfs
Reservoir Outflow Gate Structure	(qty. 2) 20 ft & 20 ft
Reservoir Seepage Collection Pump	25 cfs
Reservoir Size	5,000 acres, 15 feet
Components Associated with STA	
STA Inflow Pump Station	230 cfs
STA Internal Water Control Structures	(qty. 26) gated culverts
STA Outflow Gate Structures (to C-52 and C-25)	(qty. 2) 10 ft vertical lift gate
STA Seepage Collection Pump	25 cfs
STA Size/Type	2,000 acre FAVT
Components Associated with Re-established District Connection	
S-253 Weir	To be improved
Pump Station at S-253 Weir	210 cfs
Lift Gate at NW corner of Stick Marsh	10 ft

The project could provide a raw water supply that would need to be treated to appropriate standards prior to use. The project costs do not include treatment or distribution.

Project Yield

The GLRSTA project would be capable of providing an average annual daily flow of 122 mgd raw water. No finished water supply is made available by this project. The potential additional water supply that could be made available by this project is currently unknown. The values for potential water supplies/deliveries, flow attenuation, and nutrient removal are estimates commensurate with a preliminary feasibility study. There are likely times/periods when design values cannot be met due to operational issues or extreme weather. However, meeting the estimated levels of delivery and treatment over the long term and at a statistically high percentage are expected. Similarly, the values used to estimate the benefits and costs for determining return on investment include various assumptions and risk factors that will have to be refined as project development proceeds.

The project has been conceptually designed to deliver 136 mgd. The analysis showed the reservoir was capable of delivering water at this rate 90 percent of the time using a 41 year simulation period utilizing historic daily rainfall and canal flow data. This is estimated to be roughly equivalent to a 1-in-10 year drought event. It was concluded there would be 122.4 mgd of water available for use accounting for losses in delivery to end users.

Estimated Planning-level Costs

The estimated total capital and annual O&M costs of the project and the Unit Production Cost are provided in **Table C-16**. These costs were estimated based on the project's conceptual design and assume that 90 percent of the water made available by the project can be used. The estimated capital cost is $435 million. The estimated annual O&M cost is $2.7 million and the estimated unit production cost is $0.48 per 1,000 gallons of raw water potentially made available. These costs do not include potable treatment and transmission costs, financing cost, contingency/financial risk and renewal and replacement. Additionally, the CE tool was not used to develop excavation costs for this project.

Basis for planning-level costs

These planning level cost estimates were prepared using the August 2014 Financial Feasibility Study of the Grove Land Reservoir and Stormwater Treatment Area, Phase 2 Study – FINAL Report developed by Hazen & Sawyer 2013. The Report utilized recent cost estimates and bid prices for other CERP-related projects in south Florida, cost curves developed in the HDR 2009 study (HDR 2009), unit prices provided by contractors based on recent bids for similar projects, and vendor quotations for specific construction materials and equipment.

Excavation quantities and costs for earthwork construction were estimated based on the available topographic and soils information, superimposed on a preliminary drawing of the reservoir and STA layout.

Table C-16. Summary of Total Estimated Planning-level Capital and Annual O&M Costs (Conceptual Level) for the Grove Land Reservoir and Stormwater Treatment Area, 2014 Dollars[a,b]

Planning-level Cost Estimate	Millions
Capital Costs	
Reservoir	$268.2
Stormwater Treatment Area	$47.9
Other Improvements:	
Increase Capacity of Intake Water Sources (SFWMD)	$29.6
Improvements at Upper St. Johns River Basin (SJRWMD)	$10.6
Total Capital Cost (without Land Costs)	**$356.3**
Reservoir Land Value	$57.7
STA Land Value	$21.4
Total Capital Cost (w/Land Costs)	**$435.4**
Annual O&M Cost	
Reservoir	$0.9
Stormwater Treatment Area	$0.7
Other Improvements:	
Increase Capacity of Intake Water Sources (SFWMD)	$0.1
Improvements at Upper St. Johns River Basin (SJRWMD)	$0.2
Project administration (includes estimated liability insurance premium)	$0.8
Total Annual O&M Cost	**$2.7**
Total Annualized Cost	
Annualized Capital Cost over 50 years at 3.5% annual discount rate	$18.6
Annual O&M Cost	$2.7
Total Annualized Cost with Land Costs	**$21.3**
Total Unit Cost of production with land costs ($/kgal for 122 mgd x 0.90)	**0.48**

[a] Costs do not include treatment and transmission costs, financing cost, contingency/financial risk and renewal and replacement

[b] August 2014 Financial Feasibility Study of the Grove Land Reservoir and Stormwater Treatment Area, Phase 2 Study – FINAL Report developed by Hazen & Sawyer 2013 costs updated to 2014

Estimated Implementation Schedule

It is estimated construction of this project could be completed in six years. Design would occur in Years 1 and 2, construction would take place in Years 3 through 5, and the project would be operational in Year 6.

Water Resource Constraints

The following potential water resource constraints regarding the GLRSTA project have been identified:

1. The GLRSTA project will need a SFWMD water use permit of at least 50 years and/or a SFWMD water reservation in order to secure the availability of water for the project.

2. The GLRSTA project will need to comply with the water reservation for the North Fork of the St. Lucie River; the President's and Governor's Agreement for the CERP projects; the MFLs for the St. Lucie Estuary and the St. Johns River; and the Restricted Allocation Area Rule for the C-23, C-24, and C-25 Canal System.

3. The GLRSTA project must not harm the permitted water quantities of existing legal users.

4. If water from the GLRSTA enters a part of the St. Johns River that has MFLs, and the water level or flow is below the MFL, then that GLRSTA water cannot be permitted for withdrawal. The GLRSTA would first need to satisfy all limiting MFLs and then provide additional water above the MFLs for permitted withdrawals. Results of the State/Federal Numeric Nutrient Criteria rule development process may limit the ability to transfer water between basins in the future, which could limit the amount of source water, or increase the cost to treat water prior to basin transfer.

5. The SFWMD, the SJRWMD, and Grove Land Utilities, Inc. will need to produce a Project operations agreement.

6. The GLRSTA project will need to be operated to manage flooding at receiving water bodies and to optimize water inflows and discharges from the project.

Project Feasibility

A conceptual evaluation of this GLRSTA project conducted by Hazen and Sawyer, P.C. in association with Federico, Lamb and Associates, Inc. and AMEC has found the project to be technically feasible as long as a sufficient water supply can be legally obtained from the C-25, C-24, and C-23 canals. This study was contracted by Grove Land Utilities, LLC. The project site property is owned by Evans Properties, Inc., the parent company of Grove Land Utilities, LLC.

Cost-benefit Analysis of Yield

A benefit-cost analysis of the GLRSTA project was conducted by Hazen and Sawyer in association with Federico, Lamb and Associates and AMEC under contract with Grove Land

Utilities, LLC. The results indicate that the present value of project benefits is greater than the present value of project costs. The estimated economic value of the benefits provided by the GLRSTA project is provided in **Table C-17**. These estimated benefits values are expressed in terms of dollar value per unit of benefit.

Table C-17. Summary of estimated benefit values associated with the GLRSTA project[a].

Beneficiaries	Benefit	Value, 2013 dollars
Water Utilities	Potable Water Supply	$3.84 per 1,000 gallons
SFWMD / FDEP / State of Florida[a]	Total Phosphorus (TP) Reduction Benefit to receiving waters	$124 per pound of TP removed
SFWMD / FDEP / State of Florida	Estuarine Water Discharge Reduction	$176 per acre-foot of discharge reduction
MS4s, WCDs, CDDs, non-MS4s	Total Phosphorus (TP) or Total Nitrogen (TN) Reduction to receiving waters	$240 per pound of TP or TN reduction
Federal Government	Avoided cost of CERP Projects	$110 per year per acre-foot of water storage
Agricultural Irrigators using C-23, C-24 and C-25 Canals for water source	Water Supply	$0.10 per 1,000 gallons

[a] Source: Financial Feasibility of the Grove Land Reservoir and Stormwater Treatment Area, Memorandum "Identification of Revenue Sources, Revenue Streams and Payment Metrics", from Hazen and Sawyer, P.C., to Grove Land Utilities, LLC, May 9, 2014, Table 2.16, page 31 of 40.

Other Considerations

None.

Potential Partners and Governance Options

Grove Land Utilities, LLC (GLU) was certificated by the Florida Public Service Commission (PSC) in 2012 as a water and wastewater utility with a service area that includes certain properties of its parent company, Evans Properties, Inc., in Okeechobee, Indian River, and St. Lucie counties. The proposed GLRSTA project is comprised of an above-ground reservoir and a stormwater treatment area located on certain portions of these lands in northern Okeechobee and southern Indian River counties. The project would be designed, permitted, constructed, operated, and maintained by GLU through a public-private partnership with the South Florida Water Management District (SFWMD) and/or the St. Johns River Water Management District (SJRWMD). The partnership has yet to be defined. The GLRSTA project is currently in the conceptual evaluation phase.

Funding Sources

It is anticipated that the GLRSTA project would be funded by the beneficiaries. The potential beneficiaries identified to date are

1. Water utilities in the SJRWMD for additional surface water supply
2. Water utilities located near the GLRSTA project
3. Existing and future water users located near the project's groundwater recharge areas
4. State of Florida and its agencies including state legislature, the SFWMD, the SJRWMD, and/or the Florida Department of Environmental Protection
5. Local agencies and agricultural landowners in the St. Lucie River and Estuary Basin
6. Federal government under the Comprehensive Everglades Restoration Plan (CERP)

References

HDR. 2009. St. Lucie and Indian River Counties Water Resources Study, Final Summary Report. Prepared for the SFWMD and the SJRWMD, November 2009.

Hazen & Sawyer, P.C. 2014. Financial Feasibility of the Grove Land Reservoir and Stormwater Treatment Area. Memorandum "Identification of Revenue Sources, Revenue Streams and Payment Metrics". Prepared for Grove Land Utilities, LLC, May 9, 2014, Table 2.16, page 31 of 40.

Regulatory Review: Grove Land Reservoir and STA Project

Planning Level Review for Permittability

The project appears to be reasonably permittable from a planning-level perspective. To the extent that future projects include actual water withdrawals from the St. Johns River in SJRWMD resulting from augmented flows from this project, the SJRWMD's consumptive use permitting criteria would be applicable to those future withdrawal projects. One of the key criteria in the permit application review will be whether the proposed consumptive use is "in accordance with any minimum flow or level and implementation strategy established pursuant to Sections 373.042 and 373.0421, F.S." MFLs have been established at various locations in the St. Johns River downstream of the project. All of the relevant MFLs in the St. Johns River would be applicable in the evaluation of the permits for those future withdrawal projects. See, for example, the permittability discussion for the following projects: St. Johns River/Taylor Creek, St. Johns River near Yankee Lake, and St. Johns River near SR 46.

Because this is a regional project that would provide water for use across county boundaries, the Governing Board will also consider the factors in Section 373.223(3), F.S., as part of the completed permit application for a specific project, in making a determination of whether the project is consistent with the public interest pursuant to Section 373.223(5), F.S. As required by Section 373.223(3), F.S., SJRWMD and SFWMD may use the information in its applicable regional water supply plan as the basis for its consideration of the special public interest criteria ("local sources first") during its review of the permit application.

Identification of Project-based Inconsistencies, Impediments, or Unusual Considerations

Consumptive Use Permit (CUP) Program Inconsistencies among Districts

None identified.

Identification of Chapter(s) 373 or 403, F.S. Project-based Impediments or Benefits

In addition to a water use permit, this project would involve activities requiring an environmental resource permit pursuant to Part IV of Chapter 373, F.S. Of particular importance would be criteria concerning not increasing flooding and not causing a violation of water quality standards.

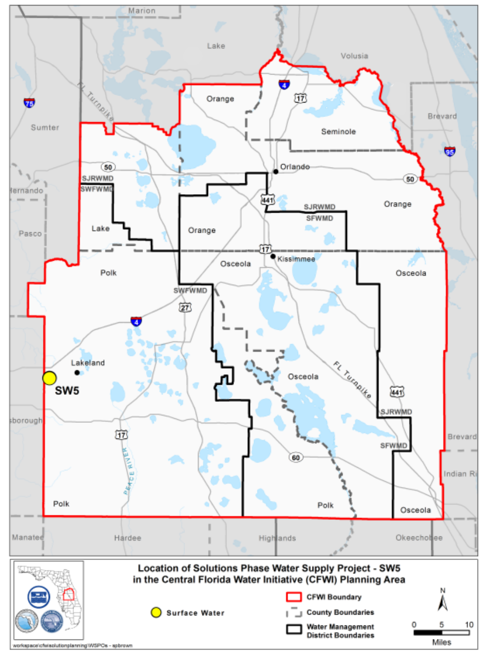
Identification of Unusual, non-Chapter 373, F.S. Project-based Considerations

None identified.

Polk County Regional Alafia River Basin Project

Project Location: Polk County (and potentially other counties)
Solutions Project ID: SW5
RWSP Project Number: 150 (new)

Description of Project



The Polk County Regional Alafia River Basin project is a plan to harvest 10 mgd of surface water from the Alafia River during high flows at one or more intake locations, treat/store, and then supply potable water to customers on the west side of Polk County. Surface water is not traditionally used within Polk County: the cities, county, and self-supplied customers rely primarily on UFA wells to supply potable water. This project is considered an alternative water supply (AWS) source.

After withdrawal, the river water would be treated and provided directly to potable water customers or may be blended with groundwater to augment the existing resources before transmission to partners and/or customers. Since the river is highly seasonal with a higher flow during the rainy season, an off stream reservoir(s) and/or aquifer storage and recovery system will be used to store water to help equilibrate the supply. The project components include two river water intakes, raw water transmission mains, preliminary raw water treatment, storage, potable water transmission, and potentially water re-treatment by the end users (depending on blending and final regional partners receiving the water). It is possible the water might be used to augment reclaimed water which would require a lower level of treatment and a separate transmission system for this quality of water.

A conceptual-level project description was developed by Polk County in their Comprehensive Water Supply Plan completed in 2009, but has been modified to include additional flexibility for other interested partners to participate in the project. This includes the Polk County Entity (partnership among the cities within Polk County and the County working on an agreement to address water supply needs now and in the future). On a planning level, it is estimated that the average annual daily flow (AADF) provided would be 10 mgd. It is understood that prior to the conceptual project development, the County would work with the Southwest Florida Water Management District (SWFWMD) to determine an expected yield at this location. An earlier estimate of potential yield from the Alafia River was conducted by SWFWMD in approximately 2008, and this project falls within the remaining yield not currently used by other permitted water users.

Planning-level Project Details

The project includes the following systems and components: river intake(s) and pump station on the Alafia River; a side-stream reservoir and/or a LFA aquifer storage and recovery well system to store finished water; a brackish surface water treatment plant, and treated water transmission pipelines.

Alafia Raw Water Intake and Pump Station

The water intake and pump station configuration is based on a design capacity of 30 mgd, to provide 10 mgd of finished water supply on an annual average basis.

Water Treatment Plant

Construction of a new 10 mgd surface water treatment plant

Aquifer Storage & Recovery (ASR) Storage Wells

Construction of a 10 mgd ASR well system

Side Stream Reservoir Storage

Construction of 3.8 billion gallons of side stream storage

Finished Water Transmission Mains

Treated water will be conveyed to an ASR system, to project partners and customers.

Project Yield

The project is expected to yield an average of 10 mgd of water, primarily during the rainy season.

Estimated Planning-level Costs

Planning level costs for 10 mgd withdrawal from the Alafia River were made using the cost estimation (CE) tool developed for the CFWI Solutions team process. **Table C-18** summarizes the preliminary estimated planning-level costs. The CE Tool (**Appendix B**) was designed to provide estimates with an expected accuracy range of -50% to +100%. Given the intended accuracy level of costs developed using the CFWI CE Tool, the costs developed as part of this plan will need to be refined as each project progresses. In the case of the Polk County Regional Alafia River Basin project, Polk County Utilities independently estimates the capital costs of the project to be $399.7 million with a unit production cost of $6.42 per 1,000 gallons. Factors contributing to the cost differences may include revised assumptions regarding land costs, unit cost, interest rates, etc.

Table C-18. Summary of estimated planning-level costs for the Polk County Regional Alafia River Basin Project.

Planning-level Cost Estimate	10 mgd average annual daily flow (AADF) (Millions)
Construction Costs	$194.5
Non-construction Costs	$38.9
Land Value	$30.0
Total Capital Costs	$263.4
Equivalent Annual Costs	$12.9
Annual Operation and Maintenance	$3.6
Total Annual Costs	$16.5
Unit Cost of Production ($/kgal)	**4.33**

Estimated Implementation Schedule

Demand projections show that utilities within Polk County will need 10 mgd of water supply in the western portion of the county by 2035. This project has been in the Polk County Comprehensive Water Supply Plan since 2008, and originally would have been required sooner but was deferred due to the economic downturn. Polk County will continue to develop agreements and seek partners for this project, with an estimated preliminary investigation targeted for 2020.

Water Resource Constraints

A minimum flow has been established for the Alafia River, with an available yield of 19 percent of the flow. This would be applied to help establish the permitted availability from the river. There is an existing legal user of the Alafia River, Tampa Bay Water, who withdraws and treats the water from the river from an intake located in Hillsborough County.

Project Feasibility

From a technical standpoint, the project is feasible. Conventional surface water treatment techniques can be applied to treat the surface water including coagulation, sedimentation, filtration, and disinfection. An ASR system could be constructed to store treated water during high flows for use during the rest of the year. Potential environmental effects can be addressed including ensuring the minimum flow is met and any wetland impacts are mitigated.

Cost-benefit Analysis of Yield

This project is intended to supply potable water using an alternative water supply (AWS) source, to meet future regional demands that are within the CFWI Planning Area. The concept project will provide 10 mgd of water at an estimated cost of $4.33/1,000 gallons.

Other Considerations

There is a potential for conjunctive use with existing UFA supplies.

Potential Partners and Governance Options

There are many potential project partners including other regional water suppliers, industrial, and commercial users. It is envisioned that the Polk County Regional Entity will be governed by the same laws that govern water supply authorities and will consider this project once they are formed. There are 17 cities located within the 2,000 square miles of Polk County, and all are considering membership in the Polk County Regional Entity. There are also potential agricultural and industrial partners, as well as at least three other regional water suppliers that may ultimately be interested as interconnections are strengthened.

Funding Sources

In order for this project to move forward, significant funds would have to be secured. Potential funding sources to be pursued include the SWFWMD, other state funds, federal grants, state revolving fund loans, the members/bonds, and possibly private partnerships.

Regulatory Review: Polk County Regional Alafia River Basin Project

Planning Level Review for Permittability

A Consumptive Use Permit has not been issued for this project. Upon submittal of an application, the project will require an evaluation of the District's Conditions for Permit Issuance as well as the Recovery Strategies for the Southern Water Use Caution Area, Northern Tampa Bay Water Use Caution Area, and Dover/Plant City Water Use Caution Area.

Identification of Project-based Inconsistencies, Impediments, or Unusual Considerations

Consumptive Use Permit (CUP) Program Inconsistencies among Districts

The project will require an evaluation of permittability in relation to the Southwest Florida Water Management District's Water Use Caution Areas including the Southern Water Use Caution Area, the Northern Tampa Bay Water Use Caution Area, and the Dover/Plant City Water Use Caution Area.

Identification of Chapter(s) 373 or 403, F.S. Project-based Impediments or Benefits

None identified.

Identification of Unusual, non-Chapter 373, F.S. Project-based Considerations

None identified.

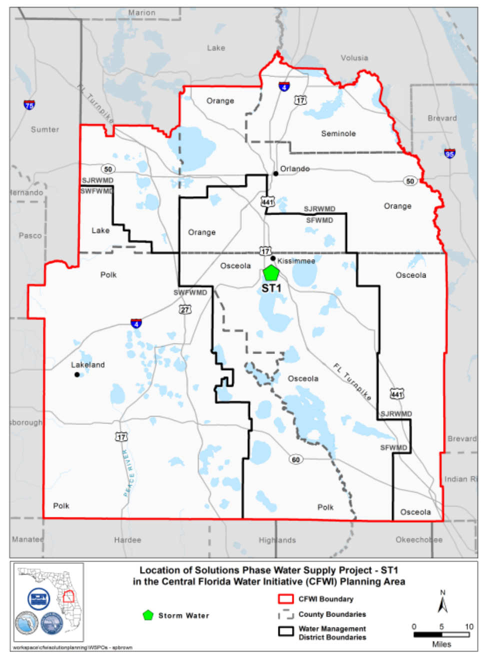
STORMWATER PROJECT OPTIONS

Judge Farms Reservoir and Impoundment Project

Project Location: Osceola County
Solutions Project ID: ST1
RWSP Project Number: 128

Project Description

Judge Farms Project is stormwater water storage facility using natural topography to create an approximately 200-acre reservoir. It is currently being permitted as a 5 mgd supplemental reclaimed water source with approximately 77 percent reliability.



Planning-level Project Details

The water storage facility receives inflows pumped from three tributaries, the Judge Farms ditch, Mill Slough, and the City of Kissimmee East City Drainage Ditch. Additionally, the reservoir will receive stormwater runoff from the adjacent development of the remaining Judge Farms property, approximately 400 acres, stormwater flow from the Heritage Park complex, and direct rainfall (see **Figure C-6**). The system loses water to evaporation and groundwater seepage. Water from the reservoir will be treated and used to augment/supplement the use of reclaimed water for non-potable purposes such as landscape irrigation by both Toho Water Authority (TWA) and the City of St. Cloud. Water from Mill Slough not retained in the reservoir will flow through the reservoir and out to Lake Tohopekaliga.

Project Yield

The project's permit application is for an average 5.0 mgd raw water withdrawal and is estimated to produce 5.0mgd of reclaimed water.

Estimated Planning-level Costs

Planning-level costs for a 5.0 mgd water project were made using the cost estimation (CE) tool developed for the CFWI Solutions team process. **Table C-19** summarizes the preliminary estimated planning-level costs. The project costs and description do not include the costs of treatment, pumping, and distribution. These costs are unknown at this time.

Figure C-6. Proposed site for the Judge Farms Reservoir and Impoundment Project.

Table C-19. Summary of estimated planning-level costs for the Judge Farms Reservoir and Impoundment Project.

Planning-level Cost Estimate	**Phase 1 (5.0 mgd) delivered (millions)**
Construction Costs	$18.7
Non-construction Costs	$4.6
Land Costs	$5.0
Total Capital Costs	$28.3
Equivalent Annual Costs	$1.4
Annual Operation and Maintenance	$0.3[a]
Total Annual Costs	$1.7[a]
Unit Cost of Production ($/kgal)	**$0.91**

[a] The project costs and description do not include the costs of treatment, pumping, and distribution. These costs are unknown at this time.

Estimated Implementation Schedule

Permits are in review by the South Florida Water Management District are currently pending. It is anticipated that the project can be implemented within the next 6 years.

Water Resource Constraints

There are no known water resource constraints at this time.

Project Feasibility

This project is feasible and the preliminary engineering report is completed. The property for the storage pond has already been purchased.

Cost-benefit Analysis of Yield

As an alternative water supply (AWS) project, the Judge Farms project is intended to collect stormwater runoff and treat it to reclaimed water standards. This reclaimed water will be used for Tohopekaliga Water Authority and City of St. Cloud reuse irrigation customers.

Other Considerations

The preliminary engineering report for this project has been completed. The Tohopekaliga Water Authority (TWA) and Osceola County purchased the property for this project.

Potential Partners and Governance Options

Potential partners include the Tohopekaliga Water Authority, City of St. Cloud, Osceola County, City of Kissimmee, and the South Florida Water Management District.

Funding Sources

Potential funding partners include the Tohopekaliga Water Authority, City of St. Cloud, Osceola County, City of Kissimmee, and the South Florida Water Management District. Additionally the project has received a $1.0 million dollar grant from the Florida legislature from the 2014 session.

References

TWA Application for New WUP #140318-17.

Regulatory Review: Judge Farms Reservoir and Impoundment Project

Planning Level Review for Permittability

Permits for this project are currently under review by the South Florida Water Management District. A Request for Additional Information was sent by the South Florida Water Management District on April 14, 2014 requesting clarification and additional information pertaining to the Consumptive Use Permit. In part, the outstanding issues associated with the permit application include documentation to support a reasonable demand, reasonable assurances that the project will not interfere with existing legal uses of water particularly those downstream of the proposed diversion, the submittal of an operating plan, reasonable assurances that the proposed withdrawals and hydrologic alterations will not adversely impact wetlands and other surface water features, and a modification of an existing Environmental Resource Permit. It is anticipated that these issues can be satisfactorily answered by the applicant. Therefore, the project appears to be reasonably permittable from a planning level perspective.

Identification of Project-based Inconsistencies, Impediments, or Unusual Considerations

Consumptive Use Permit (CUP) Program Inconsistencies among Districts

None identified.

Identification of Chapter(s) 373 or 403, F.S. Project-based Impediments or Benefits

None identified.

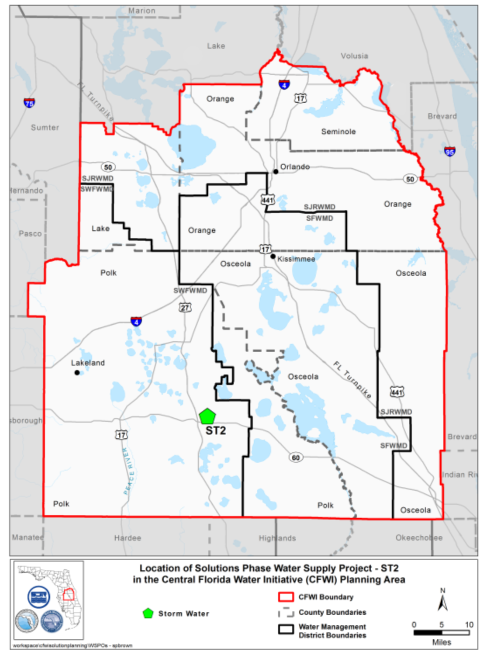
Identification of Unusual, non-Chapter 373, F.S. Project-based Considerations

None identified.

Lake Wailes Stormwater Mitigation Project

Project Location: Polk County
Solutions Project ID: ST2
RWSP Project Number: 143a and b (new)

Project Description



The Lake Wailes Stormwater Mitigation Project is a stormwater transmission project to transfer flows from the Peace Creek Canal (PCC), when available, to Lake Wailes for Minimum Flows and Levels (MFL) recovery. Lake Wailes is listed by the Southwest Florida Water Management District as not meeting its established minimum water levels. This is an alternative water supply (AWS) project that will develop an augmentation water source for MFL recovery from a nontraditional stormwater supply.

The projected capacity of the project is 1.4 mgd based on the estimated annual average flows available. No water supply is directly made available by this project. The project components will have a 6.0 mgd maximum flow design capacity, based on the high-flow availability of supply from the PCC and the viable capacity of pipeline and pumping station. The beneficial recovery of the lake level is estimated at 0.2 to 2.0 feet.

Two routing and discharge options are identified.

1. ***North Corridor****:* Intake structure would be located in PCC near the western terminus of Washington Ave. at Northside Dr. West. The corridor would cross land owned by Citrus World, Inc. and would require an easement. The proposed corridor would extend east along Washington Ave., crossing US 27. A railroad track just west of US 17 would have to be crossed. At US 17 the corridor would turn south along US 17, and then east at Dr. JA Wilshire Ave. The eastern terminus of the corridor would be at 5th St. just west of North Lake Wailes. A discharge structure would be constructed to convey water into North Lake Wailes. It is anticipated that the corridor would remain within existing City of Lake Wales utility easements to the extent practicable. A 30-inch diameter pipe would continue from a discharge structure at the south end of North Lake Wailes to discharge via gravity flow to Lake Wailes. The pipe would be parallel to an existing 30-inch diameter pipe that already conveys overflow from North Lake Wales to Lake Wailes.

2. ***South Corridor****:* Intake structure would be located in PCC south of SR 60. The corridor would initiate at PCC west of US 27 east of the Lake Wales Municipal Airport. The corridor would cross land under private ownership and would require an easement. Potentially, existing depressional areas on the property could be used as storage for withdrawn water. The proposed corridor would extend east along SR 60, crossing US 27. A railroad track just east of US 17 at SR 60 would have to be crossed. The corridor would turn north at Buckmoore Rd. and continue north to the proposed RIB locations east of Lake Wailes. It is anticipated that the corridor would remain within existing utility easements to the extent practicable.

Route options are illustrated in **Figure C-7**. Both options will require intake structures, a pump station at the Peace Creek Canal, 20- to -24-inch pipeline, and outlet structures to the RIB or North Lake Wailes. The northern corridor will require an additional culvert to Lake Wailes. Water quality requirements need more investigation. Using North Lake Wales to provide a level of treatment should improve water quality but additional treatment may still be needed at the intake.

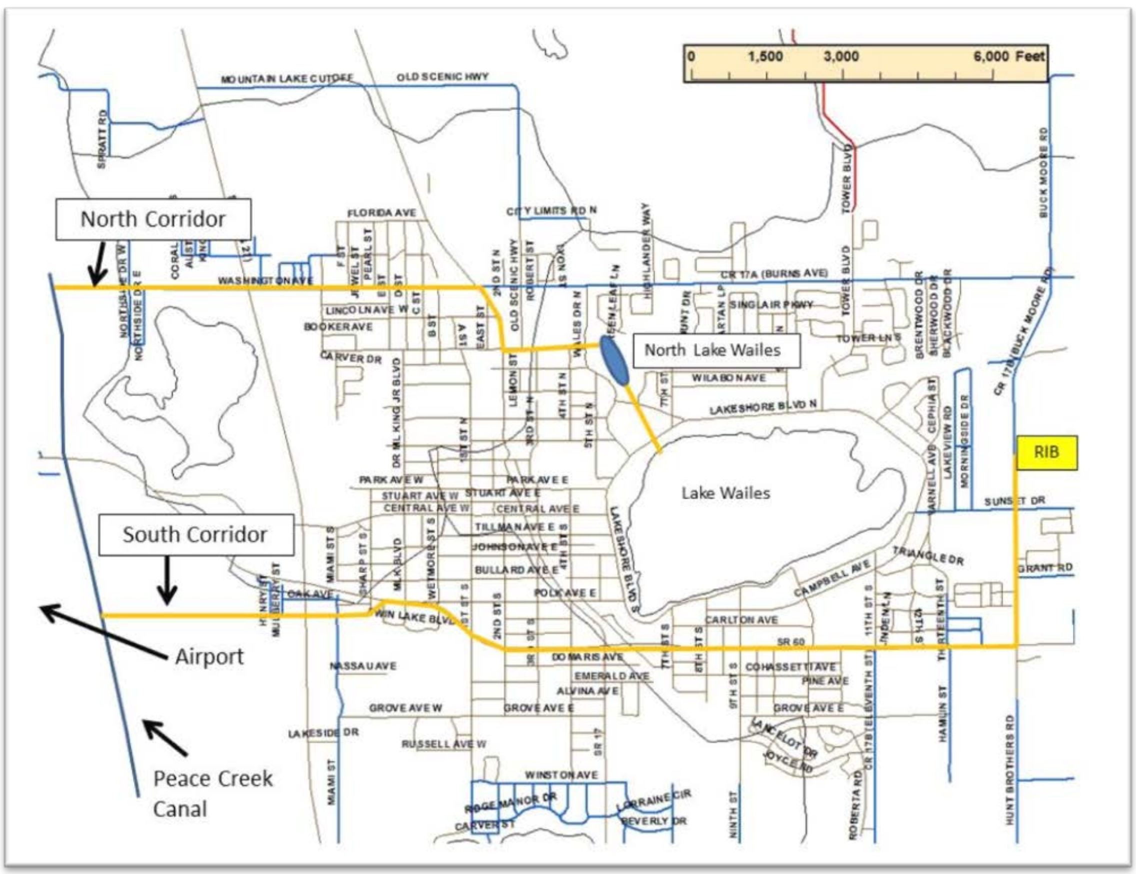


Figure C-7. Conceptual diagram for the Lake Wailes Stormwater Mitigation Project with routing options.

Planning-level Project Details

Components of the project include the following systems:

Surface Water Intake

The surface water intake would be located on the PCC, and would withdraw water when flows in the creek were available. The estimated capital cost of intake for both options is $9.1 million.

High Service Pumping System

The pump station for both options would have an average daily flow capacity of 1.4 mgd and a maximum daily flow capacity of 6.0 mgd. The estimated capital cost for pump station is $1.7 million.

Transmission Piping

The length, diameter, and land use criteria used for the cost analysis of transmission piping is shown in **Table C-20.**

Table C-20. Estimated transmission piping length and costs for Lake Wailes Stormwater Mitigation Project options.

		North Corridor Option		South Corridor Option	
Diameter	**Land Use**	**Length (ft)**	**Cost**	**Length (ft)**	**Cost**
20”	Suburban	10,200	$1,632,000	12,600	$2,016,000
20”	Rural	700	$84,000	5,000	$600,000
20”	Directional Drill	400	$112,000	3,400	$952,000
30”	Suburban	1,425	$342,000	0	$0
Total		**12,725**	**$2,170,000**	**21,000**	**$3,568,000**

Rapid Infiltration Basin (RIB)

The RIB is a component of the south corridor option. A preliminary review of drilling logs in the vicinity found conducive sands to below the lake water level, providing conditions favorable for RIB development. The land value was estimated from 2013 tax records of vacant land in project area. The estimated capital cost was $4.9 million.

Project Yield

Rainfall events and subsequent stormwater flows vary both within a year (seasonally), and from year to year (annually). Therefore, stormwater flows are difficult to predict over time. Flows available for this project were evaluated for a period of record from the 1970s through 2010 using a SWFWMD model used to test scenarios for the Peace River MFL. During that period, the project team evaluated the estimated available flows for Lake Wailes recovery after the Peace River MFL was met and with no impacts to existing permitted downstream users. The estimated annual average flow available at the proposed points of withdrawal is 1.4 mgd, though on some days high flows are limited to the 6 mgd capacity of the pipeline and intake flows for the lake recovery. It should be noted that in some years annual withdrawals from PCC will exceed the 1.4 mgd target, and in some years the target will not be met, depending on rainfall amounts. It is important to note that this is an MFL recovery project and water supply is not made available as a result of this project.

Estimated Planning-level Costs

Planning-level costs for the Lake Wailes Stormwater Mitigation Project were made using the cost estimation (CE) tool developed for the CFWI Solutions team process. **Table C-21** summarizes the preliminary estimated planning-level costs.

Table C-21. Summary of Estimated Planning-Level Costs for the Lake Wailes Stormwater Mitigation Project.

Planning-level Cost Estimate	North Corridor Option (millions)	South Corridor Option (millions)
Construction Costs	$11.2	$16.4
Non-construction Costs	$2.2	$3.3
Land Costs	$0.1	$0.3
Total Capital Costs	$13.5	$20.0
Equivalent Annual Costs	$0.6	$0.9
Annual Operation and Maintenance	$0.1	$0.2
Total Annual Costs	$0.7	$1.1
Unit Cost of Production ($/kgal)	**$1.30**	**$2.21**

Estimated Implementation Schedule

The project could begin a feasibility study and preliminary design in 2015 if interested parties begin discussions immediately to determine roles. Design and permitting could take 3.5 years and construction 1-2 years. Timing of this project could coincide with the Ridge Lakes Stakeholder group coming from an outreach effort of the Southern Water Use Caution Area Recovery Strategy update.

Water Resource Constraints

Lake Wailes is within the boundaries of the SWFWMD, however it is also within the Lake Okeechobee Basin Management Action Plan (BMAP) drainage area. North Lake Wales, Crystal Lake, and Lake Alta all drain into Lake Wailes. This configuration subjects the City of Lake Wales to the requirements of SWFWMD, Polk County, SWUCA, CFWI, and Lake Okeechobee BMAPs (directed by FDEP) and makes water management of the resource challenging. Recovery of lakes in the ridge area has been a very difficult task due to limited water resources. Lake Wailes is listed as needing additional recovery strategy.

Project Feasibility

Costs could be compared to estimated recovery in Lake Wailes levels. Easement/land acquisition will be required for:

1. **North corridor**: Easement or purchase of land at the intake and the beginning of the pipeline from Citrus World. Easement required for new culvert from North Lake Wales to Lake Wailes.

2. **South corridor:** Easement at intake or purchase of land and beginning of pipeline until reaching SR 60. Land will be purchased for RIB construction.

Cost-benefit Analysis of Yield

The goal for this project is to increase the water level in Lake Wailes to approach or meet its established minimum level regime. The test scenarios indicated that the North Corridor direct flow option could raise the lake water level by approximately 2 feet. The South Corridor RIB option would raise the lake level by 0.2 feet, although the RIB could potentially be augmented with reclaimed water to improve reliability for additional benefit of 0.2 feet. If reclaimed water is used the RIB may be relocated.

Other Considerations

Options to restore MFLs on the Lake Wales Ridge are limited. Each of the project options are located in urban areas and will result in impacts to the public during construction. Public concerns over flooding may be raised with augmentation of North Lake Wales.

Potential Partners and Governance Options

SWFWMD, City of Lake Wales, Polk County, and the FDOT are potential project partners. Discussions need to take place to establish organizational roles for the project.

Funding Sources

SWFWMD Cooperative Funding, state funding, and local sponsors.

Regulatory Review: Lake Wailes Stormwater Mitigation Project

Planning Level Review for Permittability

The project appears reasonably permittable from a planning perspective. A consumptive use permit will be required for either routing option as the project involves the diversion of water for either lake augmentation or a RIB. The permitting evaluation process will include the review of potential impacts to downstream users of the PCC including wetlands, surface water, and existing legal users based on the withdrawal quantity and schedule.

The project will also most likely require an Environmental Resource Permit (ERP) due to the proposed pipeline construction. The project must meet the public interest test criteria listed in SWFWMD's ERP Basis of Review reference document. Also, the project must demonstrate the use of controls to prevent flooding on local residential properties. Additionally, the proposal must not cause adverse impacts downstream. The intake in the PCC should be set with a level or flow threshold to support the pump and prevent the potential for drying up the PCC in the process. Wetlands may potentially be located near the PCC at the west origin of the south corridor option. Monitoring stations will be required to track the water flows and levels along the PCC and within any wetlands. Additionally, an Environmental Management Plan, including use of the Wetland Assessment Procedure, may be required to monitor potentially affected wetlands.

Since PCC is identified as 'impaired' waters, the project would incorporate water quality pre-treatment methods to the extent practicable to provide reasonable assurance that no component of the project will adversely affect the quality of receiving waters. However, the south corridor appears to be the most feasible option from a regulatory standpoint considering potential water quality conditions of PCC. Pollutants cannot be introduced into the lake, particularly if it's not currently meeting state water quality standards. Because Lake Wailes is already impaired, the north corridor option would not be permittable if it added to the annual average nutrient loading. Even with pre-treatment, it would be virtually impossible to eliminate 100% of the constituent in question. If there is the potential for even a small percentage of the constituent to enter the lake, the proposed discharge may not be permitted.

The RIB option (South Corridor) appears to meet the net improvement rules established by the SWFWMD. The RIB itself will serve to treat the water collected – it is a form of Best Management Practices for treating water quality and should be less complicated to permit than the north corridor option.

The RIB site will require a professional assessment for the presence of protected species and their habitat. Threatened and endangered species (e.g., gopher tortoise and sand skink) are expected to add approximately one year of permitting time to the project. Note that Polk County is in the process of developing a Habitat Conservation Plan, which should facilitate the permit process for protected species at this project site.

Identification of Project-based Inconsistencies, Impediments, or Unusual Considerations

Consumptive Use Permit (CUP) Program Inconsistencies among Districts

None identified.

Identification of Chapter(s) 373 or 403, F.S. Project-based Impediments or Benefits

None identified.

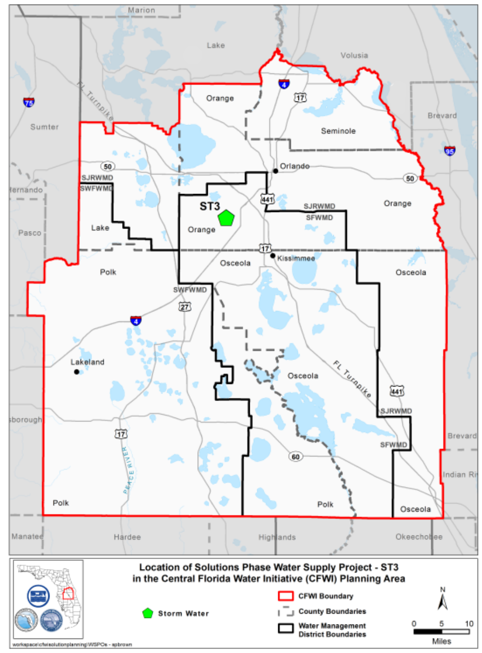
Identification of Unusual, non-Chapter 373, F.S. Project-based Considerations

None identified.

Reedy Creek Stormwater Mitigation/Recharge

Project Location: Orange County
Solutions Project ID: ST3
RWSP Project Number: 145 (new)

Project Description



The Reedy Creek Stormwater Mitigation/Recharge conceptual project includes several components, including stormwater compensatory treatment, flood protection, and surficial aquifer recharge. This effort potentially meets multiple outcomes in flood protection, water quality, natural systems, and water supply.

The project is a stormwater treatment project that initially focuses 4 mgd of recharge to areas that are shown in the regional groundwater model to have lower surficial aquifer conditions now that are projected to worsen in the future. This project could also provide a quantifiable water quality compensatory treatment alternative for future or instead of existing stormwater treatment. This project does not provide finished potable water, it is a source water project for recharge to extend and protect existing and possibly future increases in groundwater withdrawals. The quantity of water that could be made available has not been determined. Highest and best use of the water would be determined at the time of development.

The project components include a water elevation control weir to protect the area from flooding; an intake structure and low-head pump; and receiving wetlands/ surface water storage areas where the recharge can take place. The construction of a new water control structure within the Reedy Creek Basin would have to be designed and implemented to not cause any adverse flooding impacts upstream or adverse changes in flow downstream of the new weir. At this time, it is unknown a new water control structure could feasibly be implemented within the Reedy Creek Basin. For example, a significant portion of the Reedy Creek and Bonnet Creek Basins in this area are under the control of the Reedy Creek Improvement District (RCID). Additionally, this project could not adversely impact RCID's stormwater management system. Permit authorization will be sought through the Environmental Resource Permitting (ERP) process, though other permits may be required. Further, an applicant may pursue options to modify existing groundwater withdraw permits in the area to recognize the resulting enhanced recharge conditions that become apparent with the operation of the system. As currently configured, this project may be used toward a pollutant load reduction strategy and included in a future Lake Okeechobee Basin Management Action Plan.

Planning-level Project Details

The project includes the following systems and components.

Added Surface Water Storage Capacity

Increase surface/stormwater water storage capacity will be accomplished by pumping water back up into the contributing drainage area. The receiving sites selected will be based an optimum cost/benefit basis. In general, the locations could be existing wetlands, stormwater treatment ponds, or other water features that would enhance recharge into this area. Discharges to existing stormwater systems will need to be implemented as to not adversely affect the functionality of the ponds. Modifications of existing ponds may be required to accommodate the additional flow. The use of existing low-lying areas cannot result in adverse flooding impacts or impacts to adjacent land uses and will also require coordination with stakeholders.

Water Treatment

This project is, by its nature, a water quality treatment system. The design principal develops operating protocols for intake structures on ditch and canal systems that were constructed for flood control. The design approach removes the water from the canal and pumps it upstream to stormwater treatment areas or other low-lying areas to recharge the SAS. The applicant of the system gains a water quality compensatory treatment consideration within its watershed and the surficial aquifer receives increased recharge in potential areas of stress (potential wetland ecosystem impacts).

Raw Water Mains

Raw water is pumped upstream relatively short distances into the watershed under low pressure (head) conditions. Water is allowed to return to the surficial aquifer in a manner that more closely mimics the natural condition compared to the developed condition where the Directly Connected Impervious Area (DCIA) has increased discharge rates and volumes over various temporal scales. Getting the system back to a natural condition also requires increased monitoring and management actions likely through the use of Supervisory Control And Data Acquisitions (SCADA) systems to protect the area from flood conditions.

Project Yield

The Reedy Creek Stormwater Mitigation/Recharge project could yield water and value for the applicant in water quality compensatory treatment and possibly through enhanced groundwater withdrawal performance. The applicant will make the determination on these combined resource values at a later date. Preliminary project evaluations of the altered annual hydrographs in the area have shown that approximately 4 mgd of water may be available for redistribution with this approach at this location, at this time. This project does not directly yield water for water supply. The quantity of groundwater that may be protected for withdrawal or additional withdrawals was not determined as part of the project conceptualization.

Estimated Planning-level Costs

It was assumed that a potential applicant will not be pursuing external funding for the Reedy Creek Stormwater Mitigation/Recharge project. **Table C-22** summarizes the preliminary estimated planning-level costs.

Table C-22. Summary of estimated planning-level costs for the Reedy Creek Stormwater Mitigation/Recharge Project.

Planning-level Cost Estimate	Millions
Construction Costs	$1.3
Non-construction Costs	$0.3
Land Costs	-
Total Capital Costs	$1.6
Equivalent Annual Costs	$0.1
Annual Operation and Maintenance	
Total Annual Costs	$0.1
Unit Cost of Production ($/kgal)	**0.09**

Estimated Implementation Schedule

Design, permitting, and construction based on financial resources of the potential partners.

Water Resource Constraints

The final evaluation of the watershed hydrographs and resulting operating protocols will be developed by the design team. This will include a consideration of the altered downstream ecosystems. These considerations will include evaluating the enhanced wetland system performance upstream as well as a view of any potential effects to the altered ecosystems downstream.

The watershed has an upper limit on yield that can be used for these restorative efforts so that the downstream conditions can be maintained at a level consistent with a historic condition. This approach could be considered as an entrepreneurial effort; the first applicant that evaluates the watershed and implements a project through the permitting process will create a new paradigm in the hydrograph. Any subsequent property owners in the watershed will use this as a new “baseline” condition.

At this time, it is unknown if a new water control structure could feasibly be implemented within the Reedy Creek Basin. Additionally, this project could not adversely impact other existing stormwater management systems or result in adverse flooding to offsite users. This project may also require a consumptive use permit, depending on how the project is configured.

Project Feasibility

This project may be feasible. No project limitations due to rule inconsistencies have been identified.

Cost-benefit Analysis of Yield

This project does not provide a direct source of water supply, but could indirectly provide water supply through groundwater recharge. The potential yield and cost of this project are unknown.

Other Considerations

The project when implemented may limit other applicants from being able to do similar efforts in this particular watershed. Please note that the use of compensatory treatment mechanisms in this approach is limited by the total runoff volumes and the need to maintain some flow at the right times of the year to the downstream ecosystems. Therefore, there is a natural limit to the number of parties that could pursue this compensatory design alternative.

This approach increases recharge in a stressed ecosystem environment. It is well suited to protecting wetlands at this location. This approach is under consideration in areas of the CFWI where the enhanced recharge could have other water resource benefits like enhanced recharge for springs protection (Wekiwa Spring) and oligohaline ecosystem enhancement and restoration (Indian River Lagoon).

Other considerations include water quality impacts, flooding impacts, impacts to stormwater systems, and cost feasibility.

Potential Partners and Governance Options

Potential partners include but are not limited to Town of Celebration (CDD), Reedy Creek Improvement District (298 District), Town of Windermere, Celebration Central Florida Expressway Authority, FDOT, and other private property interests.

There may be interest in seeking other partnerships with groundwater permit holders in the region as the benefits to the surficial aquifer may enhance their respective ability to withdraw water.

Funding Sources

Implementation of the approach will be conducted by an entity that has an appropriate financial interest in the outcome. The result will be a financially sustainable approach with beneficial outcomes in water quality, flood protection, natural systems, and water supply.

Regulatory Review: Reedy Creek Stormwater Mitigation/Recharge Project

Planning Level Review for Permittability

The project is most likely permittable through the Environmental Resource Permit process. The final design will require an evaluation of the potentially altered downstream ecosystems and evaluating the enhanced wetland system performance upstream. Currently, there are no Consumptive Use Permits associated with this project. Any Consumptive Use Permits proposed that will benefit from the Reedy Creek Stormwater Mitigation/Recharge Project will need to be evaluated based on the Water Management District's Conditions for Issuance and are most likely to be permittable.

Identification of Project-based Inconsistencies, Impediments, or Unusual Considerations

Consumptive Use Permit (CUP) Program Inconsistencies among Districts

None identified.

Identification of Chapter(s) 373 or 403, F.S. Project-based Impediments or Benefits

None identified.

Identification of Unusual, non-Chapter 373, F.S. Project-based Considerations

None identified.

This Page Intentionally Left Blank.

D

Updated CFWI Water Supply Project Options

INTRODUCTION

This Appendix provides a list of 150 water supply project options (WSPOs) for the Central Florida Water Initiative (CFWI) Planning Area. The WSPOs listed in **Table D-1** include the 142 RWSP projects (CFWI 2015b; Appendix F, Table F-1) and 8 new projects identified during the Solutions Planning Phase. Projects are arranged by project type; brackish/nontraditional groundwater (GW), reclaimed water (RW), surface water (SW), stormwater (ST), and management strategy options. Within each type, projects are organized by Solutions Project ID and then RWSP project number.

Table D-1 replaces the CFWI RWSP, Volume IA, Appendix F, Table F-1. The updated list includes 37 brackish/nontraditional groundwater, 87 reclaimed water, 17 surface water, 6 stormwater, and 3 management strategies project options. Cumulatively, the 150 project options could potentially provide more than 334 mgd of additional finished water supply or water resource benefit, exceeding the 250 mgd estimated future demand deficit. An additional 122 mgd of raw water may be available as well. The CFWI WSPOs included in this Appendix are shown in **Figure D-1**. Detailed descriptions of the 16 Solutions Strategies Projects, which are included in 150 projects listed in **Table D-1**, are presented in **Volume IIA**, **Appendix C**.

A project identified for inclusion in the Solutions Strategies document may not necessarily be selected for development by the listed water supplier. In accordance with Section 373.0361(6), Florida Statutes (F.S.), nothing contained in the water supply component of a regional water supply plan (RWSP) should be construed as a requirement for local governments, public or privately owned utilities, special districts, self-suppliers, multi-jurisdictional entities and other water suppliers to select that identified project. However, the WSPOs included in this Appendix have been screened for feasibility and the Districts have indicated if projects have a likelihood of being permittable.

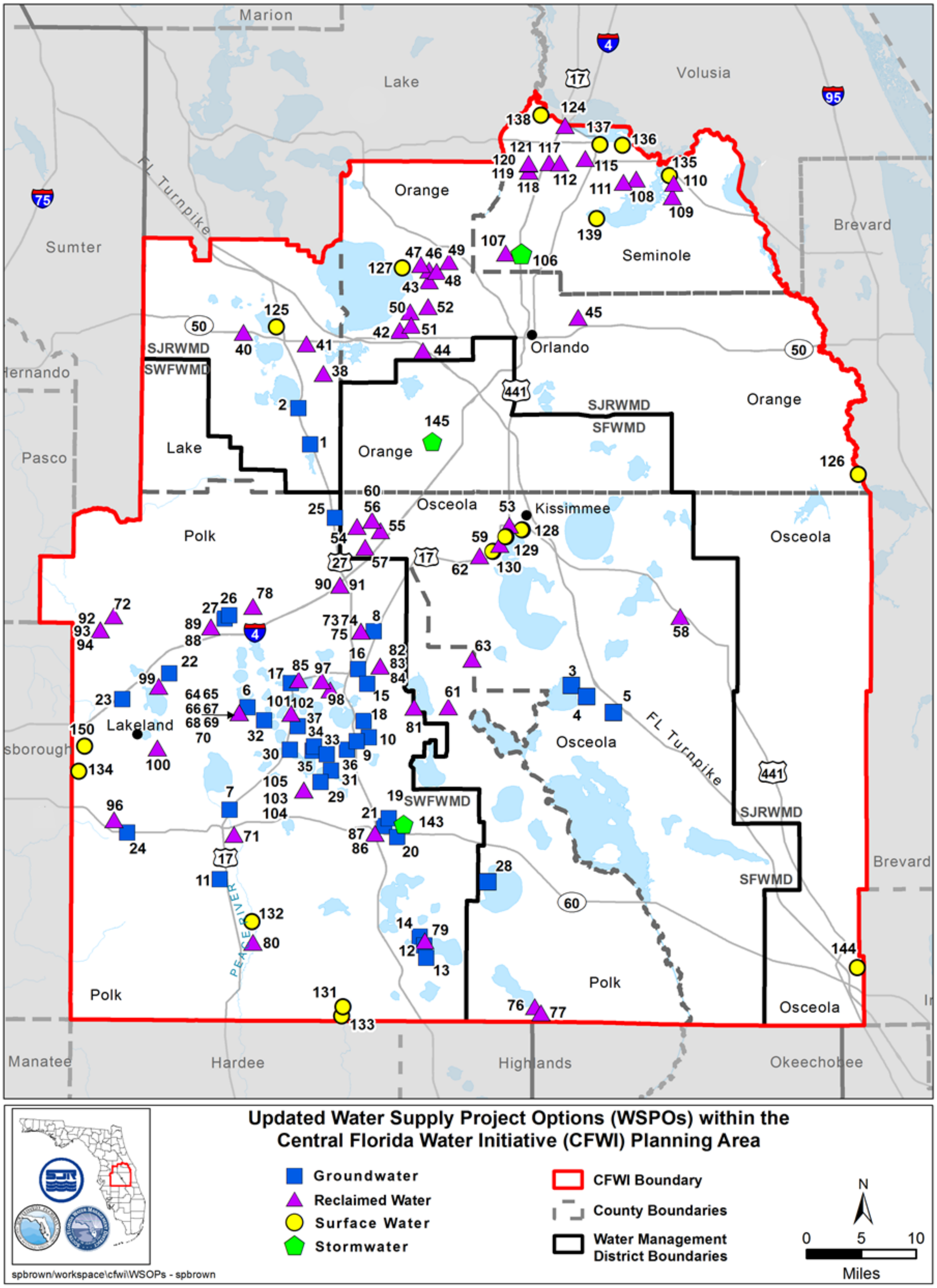


Figure D-1. Map of all CFWI Water Supply Project Options. Numbers correspond to the RWSP project numbers in Table D-1.

Table D-1. Updated Summary of CFWI RWSP Water Supply Project Options.

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Brackish/Nontraditional Groundwater												
1	**GW1**	Lake	SJRWMD	South Lake County Wellfield: Lower Floridan Aquifer Wellfield	South Lake Regional Water Initiative (SLRWI)	This project is for the construction of a LFA centralized or distributed wellfield to serve the SLRWI partners. Project may also involve lowering existing wells from UFA to LFA or expanding existing LFA wells. The construction of LFA wells has been designated as an AWS or non-traditional project. Project costs shown are for the centralized project and include transmission main, pumping station, storage and water treatment facility costs.	PS	15.9	12.7	116.5	3.57	2022
2		Lake	SJRWMD	South Lake County Wellfield: Transmission Main	South Lake Regional Water Initiative (SLRWI)	This project has been included in RWSP Project #1.						
GW1 – South Lake County Wellfield Project Total (Sum of RWSP Projects 1 & 2)								**15.9**	**12.7**	**$116.5**	**$3.57**	

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Brackish/Nontraditional Groundwater (continued)												
3	**GW2**	Osceola	SFWMD	Cypress Lake AWS Finished Water Distribution System	Water Cooperative of Central Florida (TWA, St Cloud, OCU, Polk County) and RCID	Construct distribution and transmission water mains to distribute the water from the Cypress Lake AWS WTP to the project partners.	PS	N/A	N/A	N/A	N/A	N/A
4	**GW2**	Osceola	SFWMD	Cypress Lake Wellfield: AWS WTP	Water Cooperative of Central Florida (TWA, St Cloud, OCU, Polk County) and RCID	This project is in association with the Cypress Lake Wellfield Well Construction. The project is to construct an AWS WTP plant and associated concentrate management system.	PS	N/A	N/A	N/A	N/A	N/A
5	**GW2**	Osceola	SFWMD	Cypress Lake Wellfield: Brackish Groundwater Wellfield - Well Construction	Water Cooperative of Central Florida (TWA, St Cloud, OCU, Polk County) and RCID	The Cypress Lake Wellfield project was issued a permit on October 3, 2011. The project is for construction of the remaining production wells and raw water transmission system.	PS	N/A	N/A	N/A	N/A	N/A
GW2 – Cypress Lake Wellfield Project Total (Sum of RWSP Projects 3, 4, & 5)								**37.5**	**30.0**	**$374.29**	**$3.57**	**Phase I by 2020; Phase II TBD**
28	**GW3**	Polk	SFWMD	Southeast Polk County Wellfield	Polk Regional Entity	Project consists of several LFA wells in the SE area of Polk County and treatment as a potable source to meet regional demands. Cost estimate includes 25 miles of transmission piping and membrane treatment. Permit issued on January 27, 2014.	PS	37.0	0.0 - 30.0	$284.60	$2.59	Phase I: 2023 Phase II: 2033 Comp: 2049

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Brackish/Nontraditional Groundwater (continued)												
6	**GW3a**	Polk	SWFWMD	Auburndale: Atlantic WTP Groundwater Blending	Auburndale	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.6	0.6	$2.10	$0.66	TBD
7	**GW3a**	Polk	SWFWMD	Bartow: 7 Mgd WTP – Groundwater Blending	Bartow	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.6	0.6	$2.10	$0.66	TBD
8	**GW3a**	Polk	SWFWMD	Davenport: Davenport WTP Groundwater Blending	Davenport	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.2	0.2	$1.80	$2.02	TBD
9	**GW3a**	Polk	SWFWMD	Dundee: Lake Riner WTP #1 Groundwater Blending	Dundee	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.1	0.1	$1.74	$5.38	TBD
11	**GW3a**	Polk	SWFWMD	Fort Meade: Fort Meade WTP Groundwater Blending	Fort Meade	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.2	0.2	$1.82	$2.14	TBD
14	**GW3a**	Polk	SWFWMD	Frostproof: Frostproof WTP #1 Groundwater Blending	Frostproof	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.1	0.1	$1.72	$8.10	TBD
16	**GW3a**	Polk	SWFWMD	Haines City: WTP #1 Groundwater Blending	Haines City	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.3	0.3	$2.02	$1.22	TBD

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Brackish/Nontraditional Groundwater (continued)												
17	**GW3a**	Polk	SWFWMD	Lake Alfred: Lake Alfred WTP Groundwater Blending	Lake Alfred	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.2	0.2	$1.83	$1.92	TBD
18	**GW3a**	Polk	SWFWMD	Lake Hamilton: Lake Hamilton WTP Groundwater Blending	Lake Hamilton	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.1	0.1	$1.74	$5.47	TBD
21	**GW3a**	Polk	SWFWMD	Lake Wales: Market Street WTP Groundwater Blending	Lake Wales	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.1	0.1	$1.75	$6.58	TBD
22	**GW3a**	Polk	SWFWMD	Lakeland: C.W. Combee WTP Groundwater Blending	Lakeland	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	1.2	1.2	$4.30	$0.67	TBD
23	**GW3a**	Polk	SWFWMD	Lakeland: T. B. Williams WTP Groundwater Blending	Lakeland	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	3.0	3.0	$6.90	$0.42	TBD

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Brackish/Nontraditional Groundwater (continued)												
24	**GW3a**	Polk	SWFWMD	Mulberry: Mulberry Plant #1 Groundwater Blending	Mulberry	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.1	0.1	$1.77	$3.69	TBD
26	**GW3a**	Polk	SWFWMD	Polk City: Bougainvilla WTP Groundwater Blending	Polk City	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.1	0.1	$1.75	$6.58	TBD
30	**GW3a**	Polk	SWFWMD	Winter Haven Water Dept: 3rd Street WTP Groundwater Blending	Winter Haven	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.3	0.3	$2.04	$1.13	TBD
37	**GW3a**	Polk	SWFWMD	Winter Haven Water Dept: Fairfax WTP - LFA below Middle Confining Unit II	Winter Haven, Auburndale	Lower Floridan Supply Well below MCU II. Cost does not include additional treatment if needed.	PS	2.0	2.0	TBD	TBD	2017
GW3a - Polk County Blended LFA Distributed Wellfield Project Total (Sum of RWSP Projects 6-9, 11, 14, 16-18, 21-24, 26, 30, 37)								**9.84**	**9.84**	**$28.60**	**$0.31**	

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Brackish/Nontraditional Groundwater (continued)												
10	--	Polk	SWFWMD	Dundee: Lake Ruth WTP #1 Groundwater Blending	Dundee	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.1	0.1	$1.73	$6.53	TBD
12	--	Polk	SWFWMD	Frostproof: Frostproof WTP #3 Groundwater Blending	Frostproof	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.1	0.1	$1.75	$4.71	TBD
13	--	Polk	SWFWMD	Frostproof: Frostproof WTP #2 Groundwater Blending	Frostproof	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.1	0.1	$1.73	$6.53	TBD
15	--	Polk	SWFWMD	Haines City: WTP #2 Groundwater Blending	Haines City	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.4	0.4	$2.12	$1.15	TBD
19	--	Polk	SWFWMD	Lake Wales: High School WTP Groundwater Blending	Lake Wales	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.3	0.3	$1.93	$1.14	TBD

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Brackish/Nontraditional Groundwater (continued)												
20	--	Polk	SWFWMD	Lake Wales: Grove Ave. WTP Groundwater Blending	Lake Wales	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.3	0.3	$1.80	$1.17	TBD
25	--	Polk	SWFWMD	NE Polk Co. LFA Well	PCU	New LFA well(s) situated below MCU II and advanced membrane treatment facility to meet regional needs in NE Polk County.	PS	4.0	4.0	$28.40	$1.76	TBD
27	--	Polk	SWFWMD	Polk City: Commonwealth Plant Groundwater Blending	Polk City	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.0	0.0	$1.74	$3.25	TBD
29	--	Polk	SWFWMD	Winter Haven Water Dept: Winterset Gardens WTP Groundwater Blending	Winter Haven	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.2	0.2	$1.96	$1.76	TBD
31	--	Polk	SWFWMD	Winter Haven Water Dept: Winterset WTP Groundwater Blending	Winter Haven	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.2	0.2	$1.82	$2.02	TBD

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Brackish/Nontraditional Groundwater (continued)												
32	--	Polk	SWFWMD	Winter Haven Water Dept: Inwood WTP Groundwater Blending	Winter Haven	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.2	0.2	$1.81	$2.27	TBD
33	--	Polk	SWFWMD	Winter Haven Water Dept: Garden Groundwater Blending	Winter Haven	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.1	0.1	$1.80	$2.43	TBD
34	--	Polk	SWFWMD	Winter Haven Water Dept: Callen WTP Groundwater Blending	Winter Haven	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.1	0.1	$1.78	$3.05	TBD
35	--	Polk	SWFWMD	Winter Haven Water Dept: Eloise Wood WTP Groundwater Blending	Winter Haven	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.1	0.1	$1.76	$4.72	TBD
36	--	Polk	SWFWMD	Winter Haven Water Dept: Cypresswood WTP Groundwater Blending	Winter Haven	New LFA well for blending with existing UFA sources at the WTP. Cost excludes membrane treatment.	PS	0.1	0.1	$1.75	$6.58	TBD
Total for Brackish/ Nontraditional Groundwater Projects								**106.5**	**58.8 to 88.8**	**$857.87**		

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water												
44	**RW1**	Orange	SJRWMD	Project RENEW	Orlando Utilities Commission (7 WPS)	Project RENEW is a regional reuse project. The project as currently proposed delivers 8.55 mgd to Apopka and 0.65 mgd to Winter Garden. The project consists of WW collection system upgrades to divert WW to the Conserv II WRF, WW treatment improvements at the Conserv II WRF, and construction of a RW pump station and transmission mains. This project will be re-evaluated to determine the best location for reclaimed water in the region that is environmentally, technologically, and economically feasible. Project RENEW may also be used to meet an adopted MFL prevention and recovery strategy.	Reuse	Phase I – 3.0 Phase II– 9.2	9.2	$50.52	$0.89	2020
59	**RW2**	Osceola	SFWMD	West Ditch Stormwater for Reuse Augmentation	TWA	This project will collect water from the City of Kissimmee West Ditch canal and route it through a series of interconnected ponds to provide stormwater as an alternate water supply for reuse supplementation to the S. Bermuda WRF. A feasibility study-level analyses has determined that on average, approximately 1.5 mgd of stormwater runoff.	Reuse	1.5	0.9	$28.19	$3.23	2020
60	**RW3**	Osceola	SFWMD	160-Acre Site Indirect Potable Reuse	TWA	Construction of five (5) 1 mgd wells and appurtenances along the 160-acre site RIBs which will be used to withdraw water as indirect groundwater reuse. Model simulations indicate that Toho can take advantage of the recharge to the aquifer created by the RIBs without adversely affecting the Upper Floridan aquifer levels. The project includes construction approximately 30,000 LF of 24-in raw water main to the SW WTP.	Indirect Potable Reuse	5.0	5.0	$7.65	$0.29	2019

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
100	**RW4**	Polk	SWFWMD	TECO Polk Power Reuse (IND, Power) (District #H076)	TECO, Lakeland, PCU	Industrial Reuse to TECO Polk Power Station, (District #H076)	Reuse	10.0	10.0	$96.96	$2.34	2017
106	**RW5**	Seminole	SJRWMD	AFIRST Altamonte Springs / FDOT Integrated Reuse & Stormwater Treatment	Altamonte Springs	Project consists of 1) modification to Cranes Roost stormwater pump station and force main, 2) additional stormwater treatment and associated facilities to produce public access reuse quality water, and 3) a new reclaimed water pipeline from Altamonte Springs to Apopka approximately 6 miles long. Project is under construction.	Reuse	4.5	4.5	$12.50	$0.50	2015
38	--	Lake	SJRWMD	Clermont Regional Reclaimed Water Storage Reservoir Project	Clermont, and potentially Groveland and Minneola	Project consists of site improvements to existing sand mine, to construct 80 mg, expandable to 120 mg, for reclaimed water storage reservoir to provide wet weather storage for City's RW system or to facilitate potential alternative regional water supply projections. Could potentially serve regional partners as part of South Lake Regional Water Initiative (SLRWI). Stored water would be distributed through the SLRWI network of proposed piping.	Reuse	TBD	TBD	TBD	TBD	TBD
39	--	Lake	SJRWMD	Thrill Hill Reservoir Note: Reservoir is outside of CFWI Planning Area	City of Mount Dora and others	Stormwater/reclaimed water reservoir and pump station. Multi-phased project through Dec 2017. Phase 1: transmission line extension to reservoir site. Implementing entity is no longer pursuing this project through the CFWI. Project will be removed from the CFWI RWSP WSPOs list.	N/A	N/A	N/A	N/A	N/A	N/A

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
40	--	Lake	SJRWMD	Eagle Ridge Reclaimed Water Distribution Facility	Groveland	Phase 1 – RW transmission main between North and South service area (potential transmission for RW to RIBs near L Apshawa's) – complete 2014. Phase 2 – RW transmission main along Hwy. 50 to Waterside Development (potential connection point to CONSERV II) – complete 2014. Project was completed and will be removed from the CFWI RWSP WSPOs list.	Reuse	1.0	0.6	$1.98	$0.23	Completed
41	--	Lake	SJRWMD	Utility System Interconnections	South Lake Regional Water Initiative	This project is in association with the SLRWI storage reservoir and LFA wellfield and transmission main projects. Project consists of various interconnections between the SLRWI members' water, wastewater, and reclaimed water systems to allow for distribution of water resources among the partners of the SLRWI.	Reuse	TBD	TBD	TBD	TBD	TBD
42	--	Orange	SJRWMD	City of Ocoee Northwest Reuse Re-Pump Station and Interconnection Mains	Ocoee	Increase availability of reclaimed water for landscape irrigation in Ocoee and vicinity. Includes construction of reclaimed water transmission pipelines and pump stations. As the North Service Area matures, additional storage and high service pumping will be required to meet demand and transfer flow to other storage facilities. When this project is constructed it will pump up to 1 mgd of RW from Orange County NWRF.	Reuse	1.2	0.6	$2.87	$0.23	TBD
43	--	Orange	SJRWMD	NWRF to Apopka Reclaimed Main Extension	Orange County	Project includes construction of pipeline to connect NWRF to the City of Apopka. Specifically, 3,500 LF of 24-inch diameter pipe, which has been completed and two pumps will be constructed. Awaiting OCU interconnect turnout (~2017). Total reclaimed water flow will be up to 3.3 mgd (Year 1 – 1 mgd; Year 2 – 2 mgd; and Year 3 – 2.5 to 3.3 mgd).	Reuse	3.3	0.0	$1.40	N/A	TBD

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
45	--	Orange	SJRWMD	University of Central Florida (UCF) Reclaimed Water and Stormwater Integration	Seminole County, UCF	Reclaimed water service will be extended from Seminole County to locations on the UCF campus to provide reclaimed water to replace potable water for irrigation.	Reuse	2.0	1.5	$0.65	$0.50	TBD
46	--	Orange	SJRWMD	Reclaimed Water System Expansion - Morga to Keene	Apopka	Construct reclaimed water main from Morga Dr. to Keene Road - 4,900 ft of 20-inch diameter RWM. Project was completed and will be removed from the CFWI RWSP WSPOs list.	Reuse	3.0	TBD	$0.59	$0.02	Completed
47	--	Orange	SJRWMD	Reclaimed Water System Expansion - Alston Bay to Harmon	Apopka	Construct 2,500 feet of 36-inch diameter RWM along Ocoee Apopka Road (Alston Bay Blvd. to Harmon Rd). Project is under construction.	Reuse	3.0	TBD	$0.54	$0.02	Construction 2015-16
48	--	Orange	SJRWMD	Reclaimed Water Project System Expansion - WRF to Marden	Apopka	Construct 12,165 ft of 48-inch diameter RWM from Water Reclamation Treatment Facility to Marden Rd/Keene Road intersection. Project is under construction.	Reuse	1.0	TBD	$4.20	$0.48	Construction 2015-16
49	--	Orange	SJRWMD	City of Apopka concrete storage tank	Apopka	No. 4: Concrete Storage tank for reclaimed water from the Sanlando Utilities, Inc. Project is under construction.	Reuse	1.0	Storage	$1.16	$0.14	Construction 2015-16

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
50	--	Orange	SJRWMD	North Service Area Reclaimed Interconnect Project	City of Ocoee	Transmission interconnect to provide RW to North Service Area Phase 1 – Extend RW service to 1,075 homes. – Completed 2014 Phase 2 – Extend RW service to an additional 200 homes. – Under construction Phase 3 – New development with 1,500 homes. -– TBD	Reuse	0.5	0.5	$2.69	$0.62	TBD
51	--	Orange	SJRWMD	Prairie Lake Reclaimed Retrofit Project	City of Ocoee	Project provides reclaimed water to 189 homes in Prairie Creek. RW is from Ocoee WWTF which is supplemented by CONSERV II. Project was completed and will be removed from the CFWI RWSP WSPOs list.	Reuse	0.1	0.06	$0.69	$0.93	Completed
52	--	Orange, Seminole	SJRWMD	Apopka and Winter Garden Reuse Partnership Project	Apopka and Winter Garden	To transport reclaimed water between the city of Apopka and the city of Winter Garden to increase reuse. This project consists of construction of a transmission pipeline and pump station. Winter Garden is currently interconnected with Ocoee and Conserv II. Implementing entity is no longer pursuing this project through the CFWI. Project will be removed from the CFWI RWSP WSPOs list.	N/A	N/A	N/A	N/A	N/A	N/A
53	--	Osceola	SFWMD	12" Reuse Main Extension for Downtown Kissimmee	TWA	Installation of approximately 4,200 feet of 12" reuse main along Martin Street, Clyde Street, and Lakeshore Boulevard to convey reuse water to the Lakeshore Park and Downtown Kissimmee areas.	Reuse	0.1	TBD	$0.47	TBD	2016

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
54	--	Osceola	SFWMD	Goodman Road Reuse Main Extension	TWA	This project will extend a 24" reuse water main approximately 7,000 LF along the Goodman Road right-of-way from Tri-County Road to Happy Trails. This project, in conjunction with the Western Reuse Pump Station project will enable reuse from the SB WRF to be used in the Sandhill service area. The project will also reduce and possibly eliminate the need for the Indian Ridge Reuse Augmentation Facility.	Reuse	4.0	2.4	$3.40	TBD	2015
55	--	Osceola	SFWMD	Sinclair Road Reuse Main Extension	TWA	The project will construct approximately 9,500 LF of 16" reuse main along Sinclair Rd from Tri-county Rd to interconnect S. Bermuda WRF service area to Sand Hill WRF service area. The project may eliminate the need for the Indian Ridge reuse supplemental. This project will be constructed in conjunction with Osceola County's road improvement plans.	Reuse	0.4	0.24	$4.96	TBD	TBD
56	--	Osceola	SFWMD	Sandhill Road WRF Expansion Phase 1	TWA	Construct a 4.5 MG reuse ground storage tank and required appurtenances at the Sandhill Road WRF.	Reuse	4.5	Storage	$7.76	TBD	2020
57	--	Osceola	SFWMD	Western Reuse Pumping Facility and Reuse Mains	TWA	Construct a 4 MG reuse storage tank, pumps, a pump building, and components. Construct 3,800 LF of 36" and 24" low pressure reuse main to be routed from the existing Imperial Pump Station to the proposed Western Reuse Pumping Facility.	Reuse	4.0	TBD	$12.80	TBD	2017

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
58	--	Osceola	SFWMD	Harmony WWTP Expansion	TWA	Construct a reuse/wet weather storage facility in conjunction with the activated sludge plant phase expansion to 0.5 mgd.	Reuse	0.5	Storage	$0.86	TBD	2016
61	--	Osceola	SFWMD	Lake Marion WRF Expansion Phase 1	TWA	Construct a 2.5 MG reuse ground storage tank and reclaimed water pumping system at the Lake Marion WRF.	Reuse	2.5	storage	$4.31	TBD	2018
62	--	Osceola	SFWMD	Cypress West WRF Phase 1B	TWA	Construct a 2.0 MG reuse ground storage tank and reclaimed water pumping system at the Cypress West WRF with the plant expansion to increase capacity from 3.0 mgd to 6.0 mgd.	Reuse	2.0	TBD	$3.45	TBD	2018
63	--	Osceola	SFWMD	Walnut Drive WRF Reuse Storage Facility	TWA	Construct two (2) 7.5 MG pre-stressed concrete reuse storage tanks and necessary appurtenances at the Walnut Dr. WRF.	Reuse	5.0	Storage	$6.40	TBD	TBD
64	--	Polk	SWFWMD	Allred WWTP to Polytechnic Reclaimed Water Storage and Transmission Project (N536)	Auburndale	System Expansion	Reuse	0.7	0.49	$2.70	$1.33	2016

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
65	--	Polk	SWFWMD	Reuse Expan. in Auburndale Allred (South WWTP) 2011-2035, City of Auburndale	Auburndale	Post 2010 RIB Recharge (amount of excess reuse available for recharge)	Reuse	0.3	0.3	$1.96	$1.44	TBD
66	--	Polk	SWFWMD	Reuse Expan. in Auburndale Regional (North WWTP) 2011-2035, City of Auburndale	Auburndale	System Expansion	Reuse	0.7	0.42	$5.39	$1.82	TBD
67	--	Polk	SWFWMD	Reuse Expan. in Auburndale Regional (North WWTP) 2011-2035, City of Auburndale	Auburndale	Post 2010 RIB Recharge (amount of excess reuse available for recharge)	Reuse	0.4	0.4	$2.13	$1.44	TBD
68	--	Polk	SWFWMD	Reuse Expan. in Auburndale Regional & Allred Interconnect 2011-2035, City of Auburndale – Duplicate Option	Auburndale	Duplicate Option Offsets (this option is one of multiple possible, however only enough flow to construct one)	Reuse	TBD	TBD	TBD	TBD	TBD
69	--	Polk	SWFWMD	Reuse TENOROC Expan. in Auburndale Regional (North WWTP) 2011-2035, City of Auburndale	Auburndale	Duplicate Option Offsets (this option is one of multiple possible, however only enough flow to construct one)	Reuse	0.9	0.9	$2.70	$0.87	TBD

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
70	--	Polk	SWFWMD	Reuse Expan. in Auburndale Regional (North WWTP) USF Campus, City of Auburndale	Auburndale	Duplicate Option Offsets (this option is one of multiple possible, however only enough flow to construct one)	Reuse	0.7	0.49	$11.10	$3.43	TBD
71	--	Polk	SWFWMD	Reuse Expan. in Bartow WWTP 2011-2035, City of Bartow (to existing customers)	Bartow	Flow Expansion	Reuse	1.1	1.1	$0.00	$0.30	TBD
72	--	Polk	SWFWMD	Reuse Expan. in Cypress Lakes WWTP 2011-2035, Cypress Lakes Utilities (to existing customers)	Cypress Lakes	Flow Expansion	Reuse	0.1	0.07	$0.00	$0.30	TBD
73	--	Polk	SWFWMD	Reuse Expan. in Davenport WWTP 2011-2035, City of Davenport	Davenport	System Expansion	Reuse	0.2	0.15	$1.38	$1.82	TBD
74	--	Polk	SWFWMD	Davenport Recharge, City of Davenport	Davenport	Duplicate Option Offsets (this option is one of two possible, however only enough flow to construct one)	Reuse	0.3	0.18	$1.44	$1.44	TBD

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
75	--	Polk	SWFWMD	Reuse Expan. in Davenport WWTP 2011-2035, Davenport	Davenport	Post 2010 RIB Recharge (amount of excess reuse available for recharge)	Reuse	0.1	0.1	$0.35	$1.44	TBD
76	--	Polk	SWFWMD	Reuse Expan. in Avon Park Correctional WWTP 2011-2035, FL Dept. of Corrections	Dept of Corrections	Industrial Reuse	Reuse	0.2	0.2	$0.92	$1.44	TBD
77	--	Polk	SWFWMD	Reuse Expan. in Avon Park Correctional WWTP 2011-2035, FL Dept. of Corrections Post 2010 RIB Recharge	Dept of Corrections	Post 2010 RIB Recharge (amount of excess reuse available for recharge)	Reuse	0.1	0.1	$0.40	$1.44	TBD
78	--	Polk	SWFWMD	Reuse Expan. Polk Co. Correctional WWTP 2011-2035, FL. Dept. of Corrections	Dept of Corrections	Industrial Reuse	Reuse	0.1	0.1	$0.90	$2.07	TBD
79	--	Polk	SWFWMD	Reuse Expan. in Frostproof WWTP 2011-2035, City of Frostproof	Frostproof	System Expansion	Reuse	0.1	0.06	$0.15	$1.82	TBD

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
80	--	Polk	SWFWMD	Reuse Expan. in Fort Meade WWTP 2011-2035, City of Ft. Meade (to existing customers)	Ft. Meade	WWTP Expansion	Reuse	0.1	0.07	TBD	$0.30	TBD
81	--	Polk	SWFWMD	Reuse Expan. in Greenelefe Golf WWTP 2011-2035, Greenelefe Utilities	Greenelefe	System Expansion	Reuse	0.1	0.07	$0.62	$1.82	TBD
82	--	Polk	SWFWMD	Reuse Expan. in Haines City WWTP 2011-2035, Haines City	Haines City	System Expansion	Reuse	0.4	0.24	$3.08	$1.82	TBD
83	--	Polk	SWFWMD	Haines City Southern Area Reuse N065, Haines City	Haines City	Southern System Expansion (N065). Project was completed and will be removed from the CFWI RWSP WSPOs list.	Reuse	0.6	0.49	$4.30	$1.71	Completed
84	--	Polk	SWFWMD	Reuse Expan. in Haines City WWTP 2011-2035, Haines City	Haines City	Post 2010 RIB Recharge	Reuse	0.4	0.4	$2.48	$1.44	TBD

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
85	--	Polk	SWFWMD	Reuse Expan. (IND, Power, Other) in Lake Alfred System 2011-2035, Lake Alfred	Lake Alfred	System Expansion	Reuse	0.3	0.3	$2.00	$1.82	TBD
86	--	Polk	SWFWMD	Reuse Expan. in Lake Wales WWTP 2011-2035, City of Lake Wales	Lake Wales	System Expansion	Reuse	0.9	0.54	$6.92	$1.82	TBD
87	--	Polk	SWFWMD	Reuse Expan. Lake Wales to Golf Course (N335)	Lake Wales	Lake Wales Country Club Reuse, District # N335. Project was completed and will be removed from the CFWI RWSP WSPOs list.	Reuse	0.4	0.3	$0.85	$0.78	Completed
88	--	Polk	SWFWMD	Reuse Expan. in Polk City Mt. Olive WWTP 2011-2035, Polk City	Polk City	System Expansion	Reuse	0.2	0.12	$1.54	$1.82	TBD
89	--	Polk	SWFWMD	Reuse Expan. in Polk City Mt. Olive WWTP 2011-2035, Polk City	Polk City	Post 2010 RIB Recharge	Reuse	0.1	0.1	$0.29	$1.44	TBD
90	--	Polk	SWFWMD	Reuse Expan. in Polk Co. NE Reg. K300 , Polk Co. – System Expansion	Polk Co.	System Expansion (District #K300). Project was completed and will be removed from the CFWI RWSP WSPOs list.	Reuse	2.0	1.2	$4.81	$0.77	Completed

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
91	--	Polk	SWFWMD	Reuse Expan. in Polk Co. NE Reg. WWTP 2011-2035, Polk Co. – Duplicate Option	Polk Co.	Duplicate Option Offsets (dependent on new development)	Reuse	1.5	0.9	$11.77	$1.82	TBD
92	--	Polk	SWFWMD	Reuse Expan. in Polk Co. NW Reg. H029, Polk Co. (District H029)	Polk Co.	System Expansion (District #H029). Project was completed and will be removed from the CFWI RWSP WSPOs list.	Reuse	2.0	1.2	$2.70	TBD	Completed
93	--	Polk	SWFWMD	Reuse Expan. in Polk Co. NW Reg. WWTP 2011-2035, Polk Co. – System Expansion	Polk Co.	System Expansion	Reuse	1.2	0.72	$8.92	$1.82	TBD
94	--	Polk	SWFWMD	Reuse Expan. in Polk NW WWTP 2011-2035, Polk Co.	Polk Co.	Post 2010 RIB Recharge	Reuse	0.7	0.7	$3.98	$1.44	TBD
95	--	Polk	SWFWMD	Reuse Expan. in Polk Co. SE Reg. WWTP 2011-2035, Polk Co.	Polk Co.	System Expansion	Reuse	0.2	0.12	$1.69	$1.82	TBD
96	--	Polk	SWFWMD	Reuse Carter Rd SW, Polk Co. (N156)	Polk Co.	Polk Carter Rd Reuse, District # N156. Project was completed and will be removed from the CFWI RWSP WSPOs list.	Reuse	0.2	0.12	$0.78	$1.00	Completed

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
97	--	Polk	SWFWMD	Reuse Expan. in Swiss Golf WWTP 2011-2035, Swiss Utilities	Swiss Golf	System Expansion to Golf Course	Reuse	0.1	0.07	$0.46	$1.82	TBD
98	--	Polk	SWFWMD	Reuse Expan. in Swiss Vill. WWTP 2011-2035, Swiss Vill. Utilities	Swiss Village	System Expansion for landscape irrigation in village.	Reuse	0.1	0.07	$0.15	$1.82	TBD
99	--	Polk	SWFWMD	Lakeland WWTP (Northside & Glendale) Reuse Expan. to TECO 2020 - 2030, City of Lakeland	TECO, Lakeland	FUTURE Industrial Reuse Flow Expansion to TECO	Reuse	7.0	7.0	$53.00	TBD	2025-2030
101	--	Polk	SWFWMD	W. Haven Plant #2 WWTP System Expan/Inter 2011-2030, City of Winter Haven	Winter Haven	System Expansion	Reuse	0.6	0.36	$4.62	$1.82	TBD
102	--	Polk	SWFWMD	W. Haven Plt #2 to #3 WWTP Interconnect, City of Winter Haven	Winter Haven	Post 2010 RIB Recharge (amount of excess reuse available for recharge)	Reuse	0.5	0.5	$3.00	$1.44	TBD
103	--	Polk	SWFWMD	Winter Haven Plant #3 WWTP 2015 Expan./Inter., City of Winter Haven System	Winter Haven	Interconnect and System Expansion, (District #N339)	Reuse	0.3	0.18	$5.50	$3.91	2016

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
104	--	Polk	SWFWMD	W. Haven Plant #3 IND Reuse, City of Winter Haven	Winter Haven	Duplicate Option Offsets (this option is one of two possible, however only enough flow to construct one)	Reuse	2.7	2.7	$20.62	$1.82	TBD
105	--	Polk	SWFWMD	W. Haven Plant #3 Indirect Portable Reuse Recharge, City of Winter Haven	Winter Haven	Duplicate Option Offsets (this option is one of two possible, however only enough flow to construct one)	Reuse	2.7	2.7	$23.70	$3.48	TBD
107	--	Seminole	SJRWMD	Seminole County/ Sanlando Utilities Interconnect with Altamonte Springs Project	Altamonte Springs/ Sanlando	The purpose of this project is to make more reclaimed water available by interconnecting systems and thereby meeting peak flow conditions.	Reuse	3.8	TBD	$6.40	$0.29	TBD
108	--	Seminole	SJRWMD	East Lake Mary Blvd Reclaimed Water Main Extension	City of Sanford	Extend the reclaimed water line from SSWRC, following East Lake Mary Blvd, and tie into the existing reclaimed water main on SR46. Project was completed and will be removed from the CFWI RWSP WSPOs list.	Reuse	0.0	0.0	$1.20	$1.11	Completed
109	--	Seminole	SJRWMD	Reclaimed Water Interconnection with Oviedo	Sanford and Oviedo	Install reclaimed water pipe from Site 10 on the east side of Lake Jesup to Oviedo.	Reuse	3.0	TBD	$8.50	$1.11	TBD

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
110	--	Seminole	SJRWMD	Site 10 Pond Expansion	Sanford	Site 10 storage expansion is needed to address TMDLs issues as this site is located within Lake Jesup basin. This project is proposed to be part of the SR46 Alternative Water Supply Plan to assist with blending and as an alternative water source for Oviedo, Winter Springs, and Casselberry. This project will help support and facilitate the Sanford/Volusia County Reclaimed Water Interconnection too.	Reuse	10.0	Storage	$8.73	$1.11	TBD
111	--	Seminole	SJRWMD	Reclaimed Water Orlando-Sanford International Airport Interconnection	City of Sanford	Expansion west of the existing SSWRC reclaimed water line to connect to the existing 16" reclaimed water line on Victoria Street. Internal irrigation pipelines will be installed within the Airport. The interconnection will also allow to loop around the airport and provide more reliable reclaimed water service to that area and the Airport.	Reuse	1.5	1.12	$7.70	$1.11	TBD
112	--	Seminole	SJRWMD	Lake Mary Reclaimed Water System Retrofit	Sanford and Lake Mary	Retrofit the existing reclaimed water system in subdivisions of Hills of Lake Mary, Tuscany, Manderley, Reserve, Timacuan, and Woodbridge and expand the reclaimed water distribution system of Lake Mary.	Reuse	0.6	0.36	$5.03	$1.11	TBD

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
113	--	Seminole	SJRWMD	Reclaimed Water Interconnection with Winter Springs	Sanford and Winter Springs	Construct reclaimed water pipe from SCC on US 17-92 to SR 419 and connect to a 2.0 MG GST in Winter Springs.	Reuse	1.7	TBD	$5.17	$1.11	TBD
114	--	Seminole	SJRWMD	Reclaimed Water Interconnection with Altamonte Springs	Sanford, Altamonte Springs, and Sanlando Utilities	Construct a 16" pipe along Lake Emma Road, running southward to EE Williams Blvd, then west to the Florida Power easement, and discharging to a proposed GST in Sanlando Utilities Service area. Reclaimed water is supplied to Altamonte Springs through the Sanlando system.	Reuse	2.0	TBD	$4.70	$1.11	TBD
115	--	Seminole	SJRWMD	Mill Creek Pond Expansion	City of Sanford	Increase the Mill Creek pond storage volume by building up the berm.	Storag e	24.0	Storage	$0.35	$1.11	TBD
116	--	Seminole	SJRWMD	Oviedo Reclaimed Water Project	Oviedo	Provide reclaimed water in place of groundwater for commercial and residential irrigation in Kingsbridge West subdivision, Lake Rogers, Big Oak, Twin Rivers, Alafaya Woods, Division Street, Lake Charm Country Estates, and the Meadows. Project was completed and will be removed from the CFWI RWSP WSPOs list.	Reuse	1.5	0.0	$6.50	$0.76	Completed

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
117	--	Seminole	SJRWMD	Timacuan Reclaimed Water Main Upgrade Project	Sanford and Lake Mary	Upgrade the reclaimed water main along Timacuan Blvd. from Rinehart Rd. to Mohegan I from 8" to 16". Project was completed and will be removed from the CFWI RWSP WSPOs list.	Reuse	2.9	0.0	$1.00	$0.05	Completed
118	--	Seminole	SJRWMD	Markham Road Reclaimed Water Transmission Main Project	Seminole County	Transmission main will provide reclaimed water for commercial and residential landscape irrigation along Markham Woods Road.	Reuse	0.3	0.18	$3.10	$0.29	2018
119	--	Seminole	SJRWMD	Seminole County Residential Reclaimed Water Retrofit Project - Phase III	Seminole County	Distribute reclaimed water for landscape irrigation in several Heathrow communities, to directly offset potable water used for irrigation. Project was completed and will be removed from the CFWI RWSP WSPOs list.	Reuse	0.4	0.24	$2.27	$0.76	Completed
120	--	Seminole	SJRWMD	Seminole County Residential Reclaimed Water Retrofit Project - Phase IV	Seminole County	Distribute reclaimed water for landscape irrigation in several Heathrow communities to directly offset potable water used for irrigation. Project is 100% designed, construction pending.	Reuse	0.3	0.18	$2.00	$0.76	2020
121	--	Seminole	SJRWMD	Seminole County Residential Reclaimed Water Retrofit Project - Phase V	Seminole County	Distribute reclaimed water for landscape irrigation in several Heathrow communities, to directly offset potable water used for irrigation. Project is 100% designed, construction pending.	Reuse	0.7	0.42	$4.20	$0.76	2020

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Reclaimed Water (continued)												
122	--	Seminole	SJRWMD	Apopka-Sanlando Reclaimed Transmission line Upsize	Altamonte Springs	Upsize Sanlando transmission line from 16-inches to 24-inches, increase capacity from 3.0 to 8.3 mgd (construction cost to upsize pipe is estimated to be $1.3 million). Implementing entity is no longer pursuing this project through the CFWI. Project will be removed from the CFWI RWSP WSPOs list.	N/A	N/A	N/A	N/A	N/A	N/A
123	--	Seminole	SJRWMD	On-site storage pond (8.0 million gallons)	Altamonte Springs	Construct 8.0 MG pond at WWTP for reclaimed water system expansion outside of Altamonte Springs, which will reduce groundwater use by other utilities. Project will provide 8.4 MG storage and reduce discharges to the Little Wekiva River.	Reuse	8.0	Storage	$3.00	$0.05	TBD
124	--	Seminole, Volusia	SJRWMD	City of Sanford's Reclaimed Water Interconnect with Volusia County Utilities	Sanford and Volusia County	Transfer reclaimed water from Sanford WRF to Volusia County's southwest reuse system. Work includes approx 1600 Lf of 20" DIP, 1000 LF of 24" HDPE HDD under SJR, and 13,000 LF of 18" pipe; to be constructed in two phases - Phase 1 City/County project south of Fort Florida Road, and Phase 2 County project north of Fort Florida Rd. Project is under construction	Reuse	1.5	TBD	$3.96	$0.10	2015-16
Total for Reclaimed Water Projects (Does not include 12 completed projects and 3 projects that are no longer being pursued. These projects will be removed from the WSPOs list in the next updated CFWI RWSP)								**153.2**	**60.02**	**$510.73**		

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Surface Water												
126	**SW1**	Orange	SJRWMD/ SFWMD	St Johns River / Taylor Creek Reservoir	Orange County, OUC, Cocoa, TWA, ECFS	Regional AWS project withdrawing surface water from the Taylor Creek Reservoir and the St. Johns River. Major components include intake structure, reservoir, treatment, storage and transmission facilities.	PS	60.0	54.0	$637.55	$2.89	2025
135	**SW2**	Seminole	SJRWMD	St. Johns River Near SR 46	Orange County, Casselberry, Deltona, Maitland, Oviedo, and Sanford	Project includes an intake for brackish surface water from the St. Johns River, water treatment and concentrate management facilities, point-of-connection ground storage, and a potable water transmission system. Some water might be produced for reuse augmentation.	PS and reuse augmentation	50.0	40.0	$584.28	$4.68	TBD
138a	**SW3**	Seminole	SJRWMD	St. Johns River Near Yankee Lake	Seminole County, SJRWMD	Project that will develop a brackish surface water source and will supply water from a nontraditional source. Project includes expansion of existing Phase I footprint of Yankee Lake Regional Surface Water Treatment Plant for additional treatment, ground storage and concentrate management. Option 1 assumes transmission of 40 mgd of potable water to various end users.	PS	50.0	40.0	$565.8	$4.01	TBD
138b	**SW3**	Seminole	SJRWMD	St. Johns River Near Yankee Lake	Seminole County, SJRWMD	Project that will develop a brackish surface water source and will supply water from a nontraditional source. Project includes expansion of existing Phase I footprint of Yankee Lake Regional Surface Water Treatment Plant for additional treatment, ground storage and concentrate management. Option 2 assumes transmission of 40 mgd of potable water to various end users (different from option 1).	PS	50.0	40.0	$536.66	$3.96	TBD

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Surface Water (continued)												
138c	**SW3**	Seminole	SJRWMD	St. Johns River Near Yankee Lake	Seminole County, SJRWMD	Project that will develop a brackish surface water source and will supply water from a nontraditional source. Project includes expansion of existing Phase I footprint of Yankee Lake Regional Surface Water Treatment Plant for additional treatment, ground storage and concentrate management. Option 1 assumes transmission of 27.6 mgd of potable water to various end users and includes an option to inject 12.4 mgd of finished water into the aquifer near Wekiwa and Rock Springs to address MFLs for springs in this area	PS	50.0	40.0	$501.5	$4.09	TBD
144	**SW4**	Okeechobee\ Indian River	SFWMD\ SJRWMD	Grove Land Reservoir and Stormwater Treatment Area (GLRSTA)	Grove Land Utilities	A reservoir assisted stormwater treatment area (STA) project designed for 75,000 acre feet storage capacity. Will provide surface water augmentation to the St Johns river. Other potential project benefits include groundwater recharge, reduce discharges to estuaries, nutrient removal, MFL compliance, and water management flexibility.	River Augmentation	122.4 raw water	122.4 raw water	$435.43	$0.48	TBD
150	**SW5**	Polk	SWFWMD	Polk County Regional Alafia River Basin	Polk County & TBD	Surface water intake structure on the Alafia River, SW treatment and transmission back into Polk County. North or South Fork of the Alafia River	PS	10.0	10.0	$263.39	$4.33	TBD
125	--	Lake	SJRWMD	Securing Minneola's Alternative Resources for Tomorrow (SMART) Project	Minneola	The project includes an intake for surface water from Lake Apopka, surface water treatment, storage, and a reclaimed water transmission system. It is anticipated that water will be available only when water releases are being made from Lake Apopka.	Reuse Augmentation	5.0	5.0	$26.70	$5.00	TBD

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Surface Water (continued)												
127	--	Orange, Seminole	SJRWMD	Lake Apopka Reuse Augmentation Project	Apopka	The source of water for this project will be surplus surface water from the North Shore Restoration Area (NSRA) of the Lake Apopka Basin. This settlement agreement was approved by SJRWMD's Governing Board in December 2008. The project includes a surface water intake and associated treatment and transmission facilities to produce augmentation water for the city of Apopka's reclaimed water system.	Reuse Augmentation	5.0	5.0	$27.59	$1.22	Construction 2015
129	--	Osceola	SFWMD	Kissimmee River Basin AWS Project	Water Cooperative of Central Florida	Implement a fresh surface water conjunctive use project in the Kissimmee River Basin. The Kissimmee River Basin AWS project has been placed on hold pending the completion of the SFWMD rulemaking for a Kissimmee River Basin water reservation and the corresponding determination of the availability of water in the Kissimmee Chain of Lakes.	PS	TBD	TBD	TBD	TBD	TBD
130	--	Osceola	SFWMD	Shingle Creek Reuse Augmentation	TWA	The Shingle Creek Reuse Augmentation Project consists of increased use of an existing surface water intake structure and pump station along Shingle Creek. Project has a current SFWMD permit #49-01409-W for 4.0 mgd. No additional construction necessary.	Reuse Augmentation	6.0	2.0	$0.00	$0.00	2015

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Surface Water (continued)												
131	--	Polk	SWFWMD	Peace Creek Reservoir	PCU, Bartow	WTF, reservoir, located near Bartow Project determined non-feasible due resource constraints. Implementing agency no longer interested in pursuing this project. Project will be removed from the CFWI RWSP WSPO list.	PS	N/A	N/A	N/A	N/A	N/A
132	--	Polk	SWFWMD	Peace River at Fort Meade Reservoir	PCU, Ft Meade, Bartow, PRMRWSA	WTF, reservoir, and 15 mi of piping from Ft. Meade to Bartow. Conjunctive use with mining operations. Project determined non-feasible due resource constraints. Implementing agency no longer interested in pursuing this project. Project will be removed from the CFWI RWSP WSPO list.	PS	N/A	N/A	N/A	N/A	N/A
133	--	Polk	SWFWMD	Peace River/ Conjunctive Use Joint PRMRWSA Supply	PCU, PRMRWSA	Interconnect from PRMRWSA facility in DeSoto to regional system on Polk.	PS	5.1	0.0	TBD	TBD	TBD
134	--	Polk	SWFWMD	Joint Tampa Bay Water/Polk County Supply	PCU, TBW	Partnership to expand TBW Desal facility or a 2nd Alafia River Reservoir and WTP. Includes 35 mi piping to Lakeland. Implementing agency no longer interested in pursuing this project. Project will be removed from the CFWI RWSP WSPO list.	PS	N/A	N/A	N/A	N/A	N/A
136	--	Seminole	SJRWMD	Sanford SWTP on Lake Monroe	Sanford	This project will develop a brackish surface water source.	PS	4.0	4.0	$17	$1.75	TBD
137	--	Seminole	SJRWMD	Sanford ASR Well for Surface Potable Water Storage	Sanford	Store water withdrawn from a nontraditional source, most likely brackish surface water from the St. Johns River.	PS	1.0	Storage	$4.17	N/A	TBD

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Surface Water (continued)												
139	--	Seminole	SJRWMD	Winter Springs - Lake Jesup Reclaimed Water Augmentation Project	Winter Springs	Project includes surface water withdrawals from Lake Jesup, surface water treatment, tank storage, and transmission lines. The water produced will be for reclaimed water augmentation. Installation of one pump to withdraw from the lake prior was completed in 2013. The project includes 2 phases – Phase A has 3 withdrawal pumps and Phase B has additional 2 pumps. Current estimated is 10 years before any additional pumps would be installed.	Reuse Augmentation	2.2	2.2	$8.50	$2.07	2025
149	--	Polk	SWFWMD	Polk County – Peace River at Desoto Option	Polk County	Surface water intake structure on the Peace River, SW treatment, and transmission back into Polk County or local offset with Mosaic	PS	6.0	6.0	TBD	TBD	TBD
Total for Surface Water Projects (Does not include 3 projects that are no longer being pursued. These projects will be removed from the WSPOs list in the next updated CFWI RWSP)								**204.2** **(326.7 with raw water)**	**168.2** **(290.6 with raw water)**	**$2,134.98** **($2,570.41 with raw water)**		

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Stormwater												
128	**ST1**	Osceola	SFWMD	Judge Farms Reservoir and Impoundment	TWA	Impound stormwater and surface water from Mill Slough and the East City Drainage Ditch for subsequent treatment and distribution for irrigation and/or potable use.	Reuse augmentation	5.0	5.0	$28.30	$0.91	2020
143a	**ST2**	Polk	SWFWMD	Lake Wailes Stormwater Mitigation – Northern Route Direct Input	SWFWMD, Polk County	Surface water withdrawn from Peace Creek, pumped to North Lake Wales and then piped into Lake Wailes	Lake Restoration	1.4	1.4	$13.46	$1.30	TBD
143b	**ST2**	Polk	SWFWMD	Lake Wailes Stormwater Mitigation – Southern Route RIBs Input	SWFWMD, Polk County	Surface water withdrawn from Peace Creek, then pumped to RIBS next to Lake Wailes. May not be feasible as it is more costly and provides only 1/10th of the 143a MFL benefit.	Lake Restoration	1.4	1.4	$20.04	$2.21	TBD
145	**ST3**	Orange	SFWMD	Reedy Creek Stormwater Mitigation /Recharge	Reedy Creek Improvement District (RCID)	Capture base flow in the ditch systems of the Reedy Creek Basin. Use the water as an aquifer recharge product, wetland restoration element, or as an irrigation product.	Aquifer Recharge	4.0	0.0	$1.56	$0.09	TBD
146	--	Polk	SWFWMD	Peace Creek Basin (Sapphire Necklace) – Regional Infrastructure for Managing Water	Winter Haven	Constructed interconnected network of lakes and floodplain wetland storage of up to 9.5 billion gallons of water	Surface water storage	14.0	14.0	$100	TBD	TBD

Table D-1. Updated Summary of CFWI RWSP Planning Area Water Supply Project Options (continued).

RWSP Project #	Solutions Project ID[a]	County	CFWI Sub-Regions	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (mgd)[b]	Est. Water Generated[c] or Water Resource Benefit[d] (mgd)	Total Capital ($M)	Production ($/1,000 gallons)	Estimated Completion Date
Stormwater (continued)												
147	--	Orange	SJRWMD	Conceptual Alternative Water Supply Plan Stormwater Capture & Aquifer Recharge	City of Winter Garden	Capture of Surface Water and Stormwater for Reclaimed Water Use, as well as Aquifer Recharge	Reuse	TBD	TBD	TBD	TBD	TBD
148	--	Orange	SJRWMD	FDOT Reuse projects	FDOT & TBD	Multiple potential FDOT projects for City of Ocoee, City of Riviera Beach, City of Haines City Stormwater	Reuse	TBD	TBD	TBD	TBD	TBD
Total for Stormwater Projects								**24.4**	**20.4**	**$143.32**		
Management Strategies												
140	--	Polk	SWFWMD	Wellfield Sharing	Polk Regional Entity	The sharing of Upper Floridan wells throughout the county to optimize permit vs. actual use and minimize impacts. Cost includes additional Upper Floridan wells and transfer pumping system.	PS & Interconnect	6.0	6.0	$9.72	$0.33	TBD
141	--	Polk	SWFWMD	Regional Water Grid System	Polk Regional Entity	Cost includes 90 miles of transmission main piping, valves and booster pump station, initial planning, permitting and design fees, and infrastructure construction costs including land costs, legal fees and contingencies.	Interconnect	6.0	0.0	$226.30	$7.21	TBD
142	--	Polk	SWFWMD	Joint Toho Water Authority/Polk County Supply	STOPR, PCU	Regional transfer of existing water capacity	Interconnect	5.0	0.0	$60.00	$2.20	TBD
Total for Management Strategy Projects								**17.0**	**6.0**	**$296.02**		
TOTAL								**505.44 (627.84 with raw water)**	**313.6 to 333.6 (466 with raw water)**	**$3,942.92 ($4,378.35 with raw water)**		

Note: This table is organized by water source, provides a project title and description, implementing agency, capitol and production costs, and an estimated implementation date of the project. Project capacity and estimates of water generated by project category are also included.

TBD = to be determined

N/A = not applicable

[a] The Solutions Strategies projects were selected based on established Steering Committee criteria. The projects are multi-jurisdictional, meet minimum capacity criteria, and encourage regional interconnections.

[b] The project capacity is the project's design capacity to deliver water.

[c] The estimated water generated amount evaluates the project's ability to deliver "new" water from project construction. This includes projects constructed to develop a previously unused "new" water source that would add new supplies to the water user. For reclaimed water projects, the water generated column total only includes supplemental "new" water supply. For example, a pipeline constructed to deliver water to a new area would not generate water by itself. Many of the reclaimed water projects fall into this category.

[d] Estimated water resource benefit refers to reclaimed water projects only. Water resource benefits were estimated based upon historical water resource benefit percentages as follows: 60% for projects with a variety of customers, 75% for projects with Golf Course or professionally maintained irrigation, up to 100% for projects supplying industry, recharge, and indirect potable, Actual for projects with known benefits, TBD for projects with unspecified customer bases and Storage for projects that are storage only. Detailed benefit calculation docs are available on the SWFWMD reclaimed water web page at

http://www.swfwmd.state.fl.us/files/database/site_file_sets/118/reclaimed-offset-docs.pdf.

This Page Intentionally Left Blank.

E

Solutions Strategies Modeling

APPLICATION OF THE ECFT GROUNDWATER MODEL TO THE CFWI SOLUTIONS PLANNING PHASE

For the CFWI Solutions Planning Phase, the ECFT groundwater model served as a common tool to simulate groundwater conditions to evaluate the effects of proposed groundwater projects and associated water use changes as well as conceptual strategies to manage the area's water resources.

For the Solutions Strategies document, several improvements to the ECFT groundwater model were made. The CFWI RWSP Reference Condition (2005) and CFWI RWSP 2015 Withdrawal scenarios were updated with revised landscape irrigation (potable and reclaimed) and rapid infiltration basin (RIB) flows, and reclaimed water irrigation values. These updated scenarios are referred to as the Updated 2005 Reference Condition and the Baseline Condition. Improvements included revisions to the simulation of landscape irrigation by refining the mass balance calculation. The Updated Reference Condition (2005) and the Baseline Condition scenario return flows were less than the estimated irrigation values used in the CFWI RWSP for Orange and Seminole counties. Improvements were made in the demand location calculation method by consistently using wells/point withdrawals rather than using areal distribution for agricultural irrigated areas, and by updating domestic self-supply for Polk County. **Volume II**, **Chapter 4** contains additional information on the updates to the ECFT groundwater modeling for the Solutions Strategies.

The ECFT groundwater model outputs of water levels and flows are also important to assess water resource conditions of water bodies with adopted minimum flow and level (MFL) and other non-MFL water bodies. The ECFT model results were provided to the Environmental Evaluation Subteam (EE Subteam) for them to assess the environmental impacts of specific groundwater withdrawal conditions in the CFWI Planning Area. Results of the EE Subteam assessment are presented in **Appendix F**.

Water Use for the Updated 2005 Reference Condition

The total groundwater use in the updated 2005 Reference Condition is 1,002 mgd (**Table E-1**) with 667 mgd occurring within the CFWI Planning Area (**Table E-2**). The difference between the groundwater use for the 2005 Reference Condition and the updated 2005 Reference Condition is summarized below by category type and county.

Table E-1. Water use (mgd) by category type and county for the Updated 2005 Reference Condition-ECFT Model Domain.

County	AG	CII/MD/PG	DSS	PS	LRA	Total
Brevard	28.7	2.0	1.0	16.9	2.6	51.1
Hardee	26.7	2.4	1.2	1.6	0.1	32.0
Highlands	28.0	0.2	0.2	4.8	1.7	34.9
Indian River	58.6	0.00	0.4	0.3	0.0	59.3
Lake	23.8	9.2	6.5	44.3	6.7	90.5
Marion	2.2	0.7	1.4	5.6	0.8	10.6
Okeechobee	24.3	0.1	0.1	0.0	0.0	24.5
Orange	16.5	4.4	10.4	217.4	1.0	249.7
Osceola	49.0	0.2	4.7	34.6	0.0	88.5
Polk	95.5	32.3	3.6	78.8	5.7	215.8
Seminole	4.9	0.0	2.8	64.6	0.6	72.9
St. Lucie	18.5	0.0	0.0	0.0	0.0	18.5
Sumter	1.5	0.0	0.3	5.2	1.3	8.3
Volusia	7.5	0.8	1.7	35.2	0.3	45.5
Total (mgd)	**385.5**	**52.10**	**34.3**	**509.3**	**20.8**	**1,002.0**

AG = Agriculture
CII/MD/PG = Commercial/Mining Dewatering/Power Generation
DSS = Domestic Self-Supply
PS = Public Supply
LRA = Landscape/Recreational/Aesthetic

Table E-2. Water use (mgd) by category type and county for the Updated 2005 Reference Condition-CFWI Planning Area.

CFWI County	AG	CII/MD/PG	DSS	PS	LRA	Total
Lake	11.9	6.4	1.9	16.2	4.1	40.45
Orange	16.5	4.4	10.4	217.4	1.0	249.7
Osceola	49.0	0.2	4.7	34.6	0.0	88.5
Polk	95.5	32.3	3.6	78.8	5.7	215.8
Seminole	4.9	0.00	2.8	64.6	0.6	72.9
Total (mgd)	**177.7**	**43.2**	**23.4**	**411.6**	**11.4**	**667.3**

Landscape Supplemental Irrigation

Landscape Supplemental Irrigation (LSI) occurs generally in the residential/commercial mixed land use areas served by public supply (PS) systems. LSI is an important component of the water balance that uses a portion of the available reclaimed water flow and is included with rainfall, potable water, and other irrigation water sources to satisfy landscape irrigation needs. The combined irrigation water applied to the land satisfies plant water needs. Some of the irrigation water will return to the atmosphere through evapotranspiration, some will usually discharge to surface waters as runoff, and some will travel by infiltration and percolation through the soil to the water table to complete the water cycle. A detailed description of the revised method to calculate LSI and a comparison of the previous LSI method for the CFWI RWSP and the revised LSI method for the Solutions Strategies document are presented in **Appendix E-1**.

As part of the CFWI Solutions Planning Phase, a revised approach to improve the representation of LSI in the ECFT model was developed and applied. Some of the major improvements include using (1) a more rigorous estimation of LSI quantities at the county level, (2) a more comprehensive accounting of the water mass balance (groundwater pumping versus irrigation), (3) variable temporal application rates to represent the climatic and seasonal hydrologic conditions, and (4) different irrigation rates for ridge and plain areas to represent increased irrigation rates in ridge areas. These improvements provided noteworthy changes in LSI quantities for Orange, Seminole, Polk, Brevard, and Osceola counties. Using the revised LSI calculation approach to simulate the updated 2005 Reference Condition, Orange and Seminole counties together received about 45 million gallons per day (mgd) more LSI while Polk and Brevard counties received about 18 mgd and 15 mgd less LSI, respectively. About 5 mgd of additional net LSI was applied to the entire model domain in the updated 2005 Reference Condition simulation. Additionally, based on the updated water use information, the total public supply (PS) pumping was reduced by about 23 mgd from the CFWI RWSP 2005 reference condition. A county-by-county summary of the revised LSI for updated 2005 Reference Condition is presented in **Table E-3**.

Table E-3. Summary of the distribution of Landscape Supplemental Irrigation (LSI) rates for the updated 2005 Reference Condition.

Updated 2005 Reference Condition				
County	**Potable LSI (mgd)**	**Reclaimed LSI (mgd)**	**12-yr avg PS (mgd)**	**Total LSI (mgd)**
Brevard+Cocoa	20.1	16.2	59.2	36.3
Hardee	0.1	0.0	1.6	0.1
Highlands	3.3	0.0	4.8	3.3
Indian River	0.2	0.0	0.3	0.2
Lake	31.5	2.9	44.4	34.4
Marion	3.1	0.0	5.6	3.1
Okeechobee	0.0	0.0	0.0	0.0
Orange+Seminole-Cocoa	114.2	39.6	255.7	153.8
Osceola	17.5	9.8	37.6	27.3
Polk	46.5	3.5	79.0	50.0
St. Lucie	0.0	0.0	0.0	0.0
Sumter	3.2	1.1	5.2	4.3
Volusia	19.3	10.5	35.3	29.8
Total	**259.0**	**83.5**	**528.7**	**342.5**

Landscape Recreational Aesthetic

Landscape Recreational Aesthetic (LRA) water use represents the water used by permittees to irrigate landscaping in and around municipal, transportation, and recreational facilities. For the initial development of the ECFT model there was no well-level record of water use for this category in the SJRWMD portion of the model. The LRA 2005 data were updated using estimates based on historical water use for 2005 and added to the water use information for the updated 2005 Reference Condition. Another modification included the addition of withdrawal locations in Polk County that were not accounted for in the original CFWI RWSP 2005 Reference Condition. Based on work performed by the SJRWMD and the revision by the SWFWMD, a total of 10 mgd of water use was added to the CFWI Planning Area for the updated 2005 Reference Condition. **Table E-4** summarizes the LRA water use by county within the CFWI Planning Area.

Table E-4. Landscape Recreational Aesthetic (LRA) - Changes in water use (mgd) for the Updated 2005 Reference Condition from the original CFWI RWSP 2005 Reference Condition.

CFWI County	Lake	Orange	Osceola	Polk	Seminole	Total
LRA	4.1	1.0	0.0	4.3	0.6	10.0

CII/MD/PG

Commercial Industrial Institutional/Mining Dewatering/Power Generation (CII/MD/PG) updates within the CFWI Planning Area included corrections for Polk County (**Table E-5**). These updates corrected the duplicate withdrawals and classification errors within the database by checking each withdrawal point, water use classification, and permit in the database. In all, the updated 2005 Reference Condition decreased the Polk County value by 1.5 mgd (**Table E-5**). The CII/MD/PG values for the remainder of the CFWI Planning Area were not changed.

Table E-5. Commercial Industrial Institutional/Mining Dewatering/Power Generation (CII/MD/PG) - Changes in water use (mgd) for the Updated 2005 Reference Condition from the original (CFWI RWSP) 2005 Reference Condition.

CFWI County	Lake	Orange	Osceola	Polk	Seminole	Total
CII/MD/PG	0.0	0.0	0.0	-1.5	0.0	-1.5

Public Supply

Public supply (PS) updates within the CFWI Planning Area included corrections to Orange and Polk counties values. These updates corrected the duplicate withdrawals and classification errors within the database by checking each withdrawal point, water use classification, and permit in the database. In all, the updated 2005 Reference Condition decreased groundwater withdrawals by 0.3 mgd (**Table E-6**).

Table E-6. Public Supply (PS) - Changes in water use (mgd) for the Updated 2005 Reference Condition from the original (CFWI RWSP) 2005 Reference Condition.

CFWI County	Lake	Orange	Osceola	Polk	Seminole	Total
PS	0.0	-0.2	0.0	-0.1	0.0	-0.3

Domestic Self-supply

The updates for the 2005 Reference Condition within the CFWI Planning Area included changes to the Domestic Self-Supply (DSS) water use category for Polk County. The CFWI RWSP 2005 Reference Condition has 0.4 mgd for this category and the SWFWMD Estimated Water Use Report for 2005 lists 0.5 mgd of DSS use for Polk County. Because these quantities are much smaller than anticipated, the HAT linearly interpolated a quantity of 3.52 mgd using the amount estimated for 2010 for the Solutions Strategies document projected amounts (**Table E-7**). DSS values for the remainder of the CFWI Planning Area were not changed.

Table E-7. Domestic Self-supply (DSS) - Changes in Water use (mgd) for the Updated 2005 Reference Condition from the original (CFWI RWSP) 2005 Reference Condition.

CFWI County	Lake	Orange	Osceola	Polk	Seminole	Total
DSS	0.0	0.0	0.0	3.2	0.0	3.2

Agriculture

The updates for the 2005 Reference Condition within the CFWI Planning Area included changes to agriculture (AG) water use (**Table E-8**). In the SJRWMD portion of the model, a land use based inventory of irrigated lands based on parcels (**Figure E-1**) was used to apply irrigation amounts rather than using the withdrawal points. In the initial CFWI RWSP model formulation, water withdrawals were assigned to the center of grid cells that intersected the irrigated parcels (**Figure E-2**). Irrigation demands for the areas in the SJRWMD were calculated using AFSIRS estimates as a surrogate for measured water use from the permitted agricultural projects in the model domain.

For the Solutions Strategies document, the locations of agricultural withdrawals were modified where possible from cell-based locations to the actual locations of wells and surface water intakes. No withdrawal rates were changed. The county differences occur due to well location refinement. **Figure E-3** shows the new locations for permitted agricultural wells and the remaining cell-based wells. While this effort did provide actual locations for the majority of agricultural groundwater withdrawals, it was not possible to identify all wells for every assumed irrigated parcel within the areas of the individual permits.

Table E-8. AG - Changes in water use (mgd) for the updated 2005 Reference Condition from the original (CFWI RWSP) 2005 Reference Condition.

CFWI County	Lake	Orange	Osceola	Polk	Seminole	Total
AG	-2.2	-2.2	3.3	0.0	0.0	-1.1

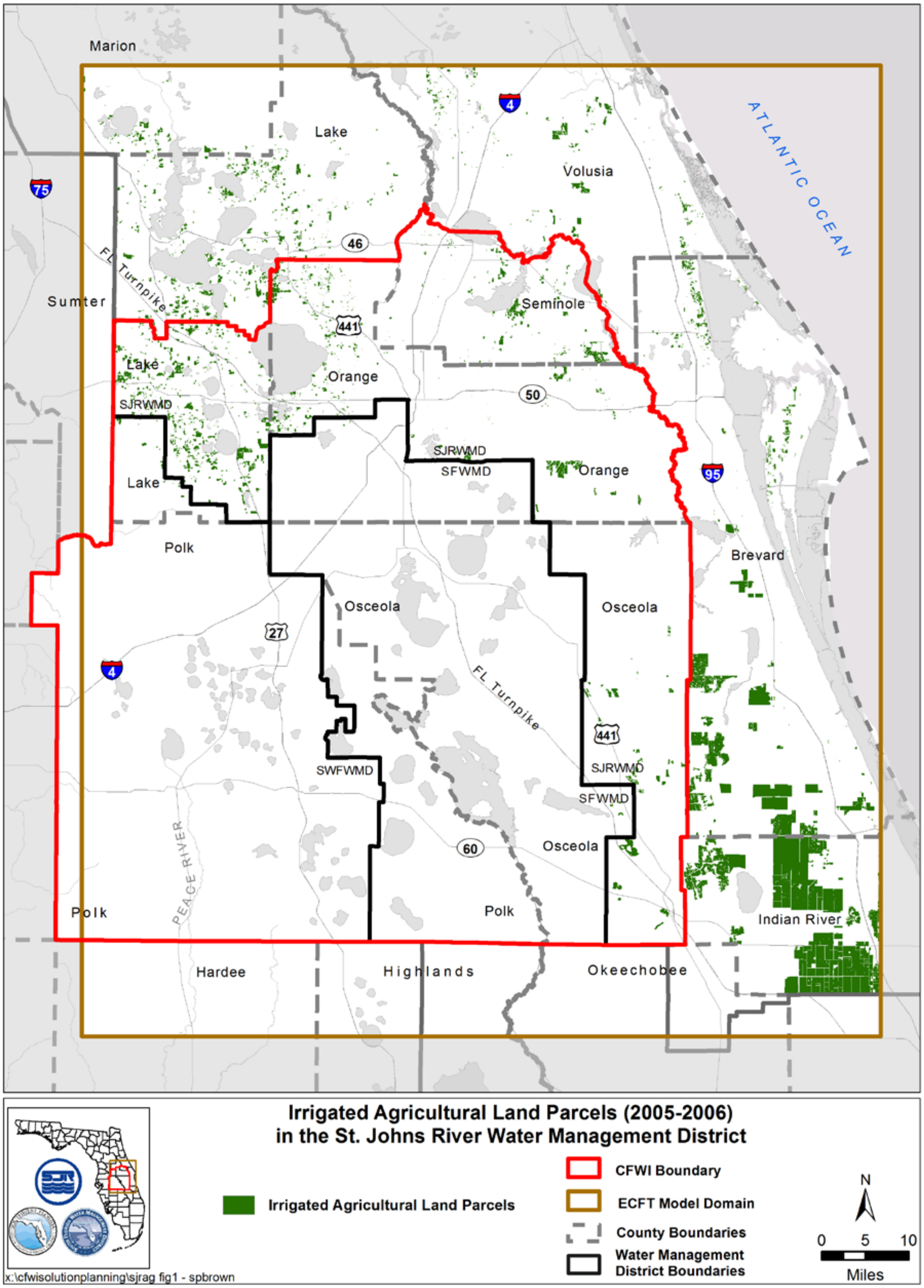


Figure E-1. Map of land use for irrigated agricultural land (2005-2006) for the SJRWMD area.

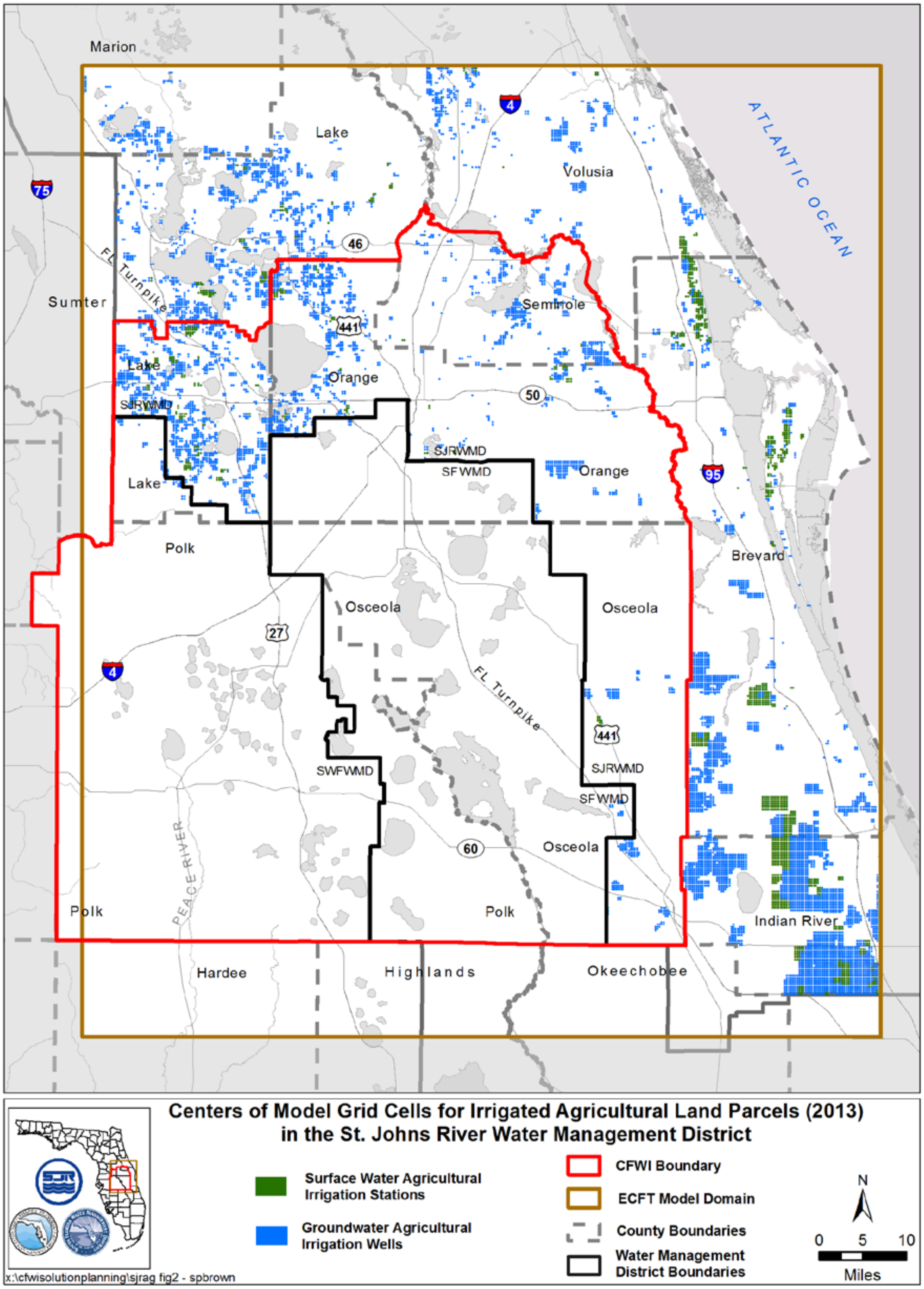


Figure E-2. Map of irrigated parcels in the SJRWMD: Centers of 16,541 model grid cells that intersect irrigated parcels as shown in **Figure E-1**; green grids represent irrigation from surface water sources, blue grids represent irrigation from groundwater sources.

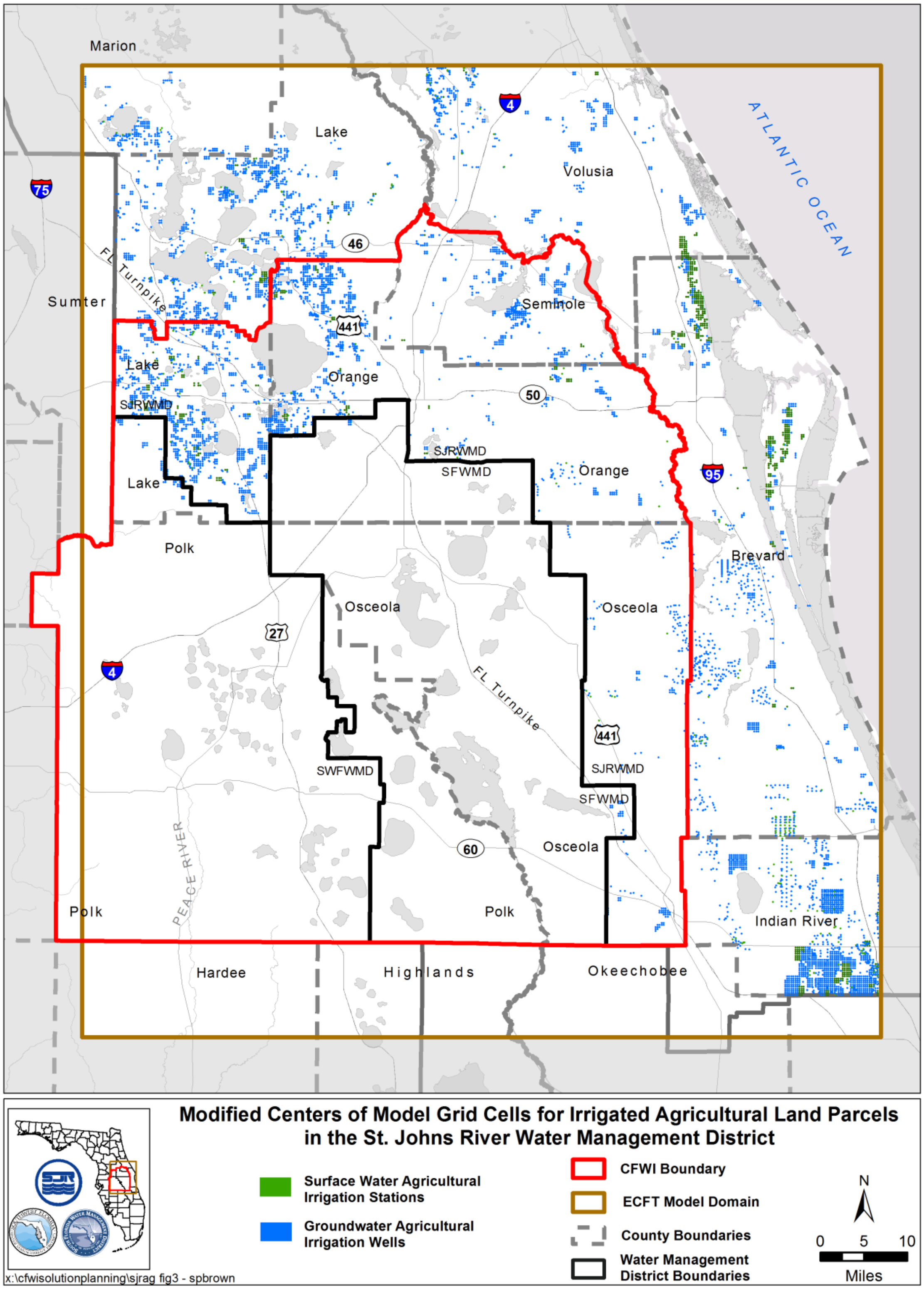


Figure E-3. Map of irrigated parcels in the SJRWMD: Centers of 11,097 model grid cells representing revised withdrawal locations; green cells represent irrigation from surface water sources, blue cells represent irrigation from groundwater sources.

Rapid Infiltration Basins

Rapid infiltration basins (RIBs) are areas where reclaimed water is discharged into specially constructed basins to recharge the surficial aquifer system (SAS) and ultimately indirectly recharge the Upper Floridan aquifer (UFA) in central Florida. In the previous version of the ECFT model, a data collection effort was conducted to identify monthly flows to the major RIB sites within the model domain. Data for the smaller sites were collected and used in the model when the data were easily obtainable; however, if the data were not readily available, it was assumed that the RIB flows were zero for the months at those sites when data were not readily available. Overall, this approach was satisfactory because the contribution from the small sites is minimal to the overall model water budget. However, exclusion of these sites can be evident at a local level thus the overall simulated RIB flows did not adequately match the projected RIB flows identified in the CFWI RWSP. In this Solutions Strategies document, a more comprehensive process was used to fill in the missing data for the smaller RIB sites.

Filling in the missing data was accomplished by first reviewing the CFWI RWSP at the county and utility level to identify inconsistencies between the CFWI RWSP and model data set. After identifying the discrepancies at the utility level, the FDEP reuse records were obtained for each utility. Because the ECFT model simulates a continuous 144-month simulation period of historical flows, FDEP records were reviewed for January 1995 through December 2006. Data for the mid-1990s had flows on an annual basis so assumptions were made regarding the distribution of monthly flow based upon later historical information. The historical record was then used to update the modeled RIB flows. RIBs are simulated in the model as SAS injection wells in the well file. **Figure E-4** provides the location of the RIB sites located within the ECFT model domain.

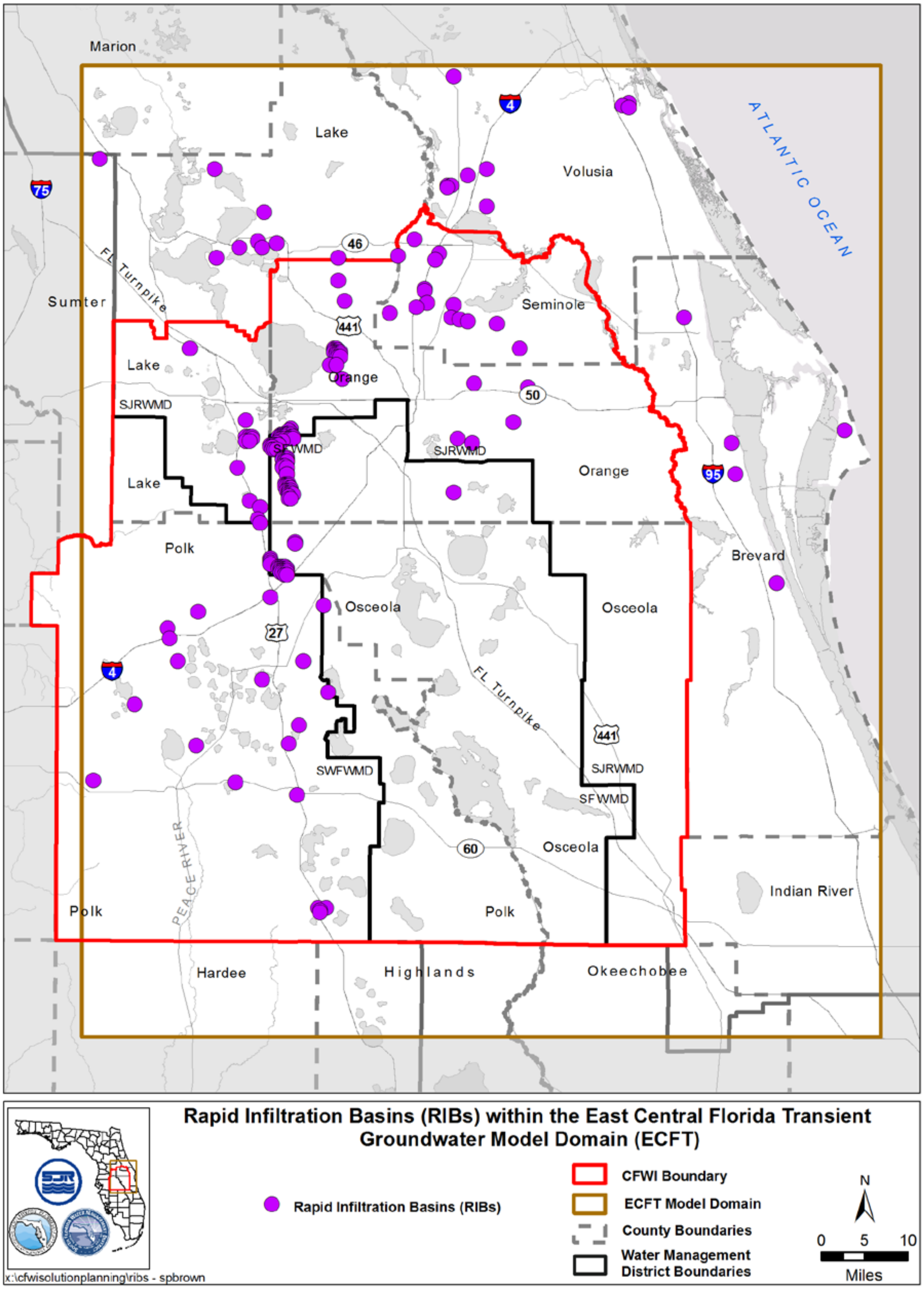


Figure E-4. Location of rapid infiltration basins (RIBs) within the ECFT groundwater model domain.

Other than addition of new RIB flows or modification of flows at the small RIB sites, RIB flows for utilities within the ECFT model domain were unchanged from the previous version of the model. In Seminole and Lake counties, several small utilities had missing data for large portions of the simulation period. These data gaps were filled, which resulted in a net increase in RIB flows for those counties. Polk County was the only area where additional RIB sites were added. RIBs were added to the model in Polk County at Lake Wales, Lakeland, Polk County Utilities, and several other smaller sites. The net increase in RIB flows for Polk County increased from approximately 1.85 mgd in the previous model to 4.75 mgd in the revised model. Overall, RIB flows increased within CFWI Planning Area from approximately 40.7 to 45.5 mgd because of the additional data and RIB sites.

Table E-9 provides a comparison between the previous and revised RIB flows used in the CFWI-ECFT model for the 2005 Reference Condition by county and that were identified in the CFWI RWSP. Since the 2005 Reference Condition represents a continuous 144-month simulation period using historical data, average modeled volumes will not match the CFWI RWSP values because the CFWI RWSP values are based on RIB flows for the year 2010, which were influenced by climatic and demand conditions experienced during that year. Some additional discrepancies may occur between counties when a WWTP supplies a RIB site in an adjacent county. However, in general the revised modeled RIB flows based on the updated 2005 Reference Condition match reasonably well with the CFWI RWSP values.

Table E-9. Average county-wide simulated rapid infiltration basin daily flows for the Updated 2005 Reference Condition, the CFWI RWSP 2005 Reference Condition, and the 2010 flows from the CFWI RWSP.

Rapid Infiltration Basin Loading Volumes – CFWI Planning Area			
County	**Updated 2005 Reference Condition – Revised ECFT Model Version (mgd)**	**CFWI RWSP 2010 data (mgd)**	**2005 Reference Condition – CFWI RWSP ECFT Model Version (mgd)**
Seminole	3.44	2.94	2.41
Orange	27.14	25.55	27.02
Osceola	8.79	11.09	8.79
Lake	1.39	2.31	0.58
Polk	4.75	4.51	1.85
Total within CFWI	**45.50**	**46.40**	**40.67**
Total outside CFWI	1.85	NA	1.85
ECFT model Total	**47.35**	**NA**	**42.52**

Agricultural Reuse

Reclaimed water reuse applied as irrigation to agricultural lands was not included in the previous model simulations for the CFWI RWSP. In this revised version of the ECFT model both edible and non-edible crops using agricultural reuse are now included. Citrus is a typical edible crop that can receive reclaimed water within CFWI Planning Area and pasture is an example of a non-edible crop. Two non-agricultural reuse projects were added to this category for modeling purposes: a mining operation in Lake County and a wetland project near Auburndale in Polk County. These reuse projects return water to the unsaturated and/or saturated aquifer zones either through rock washing (mining operation) or as a form of wetland irrigation in upland areas that indirectly recharges the UFA (wetland project). There are other large regional wetland systems that receive reuse water but they are not simulated in the model and are not included in this discussion because they are located in areas that do not recharge the UFA. Landscape and golf course reuse irrigation is discussed in the LSI section and therefore is not included in this category. Additionally, agricultural reuse outside of CFWI Planning Area was generally not included. Agricultural reuse in the CFWI Planning Area is concentrated in two distinct locations; one along the borders of Lake and Orange counties and the other in Seminole County in the general vicinity of Lake Monroe and Lake Jessup. These two areas receive water from Water Conserv II and Seminole County, respectively, and account for 80 percent of the total agricultural reuse now included in the model. Water Conserv II is the larger and is a joint project between the City of Orlando, Orange County, and the agricultural community. It is the largest reuse facility of its type in the world and provides reuse water to golf courses, residential subdivisions, tree farms and nurseries, pasture lands, over 2,700 acres of citrus, and other uses. **Figure E-5** provides the location of the agricultural reuse sites in the ECFT model domain.

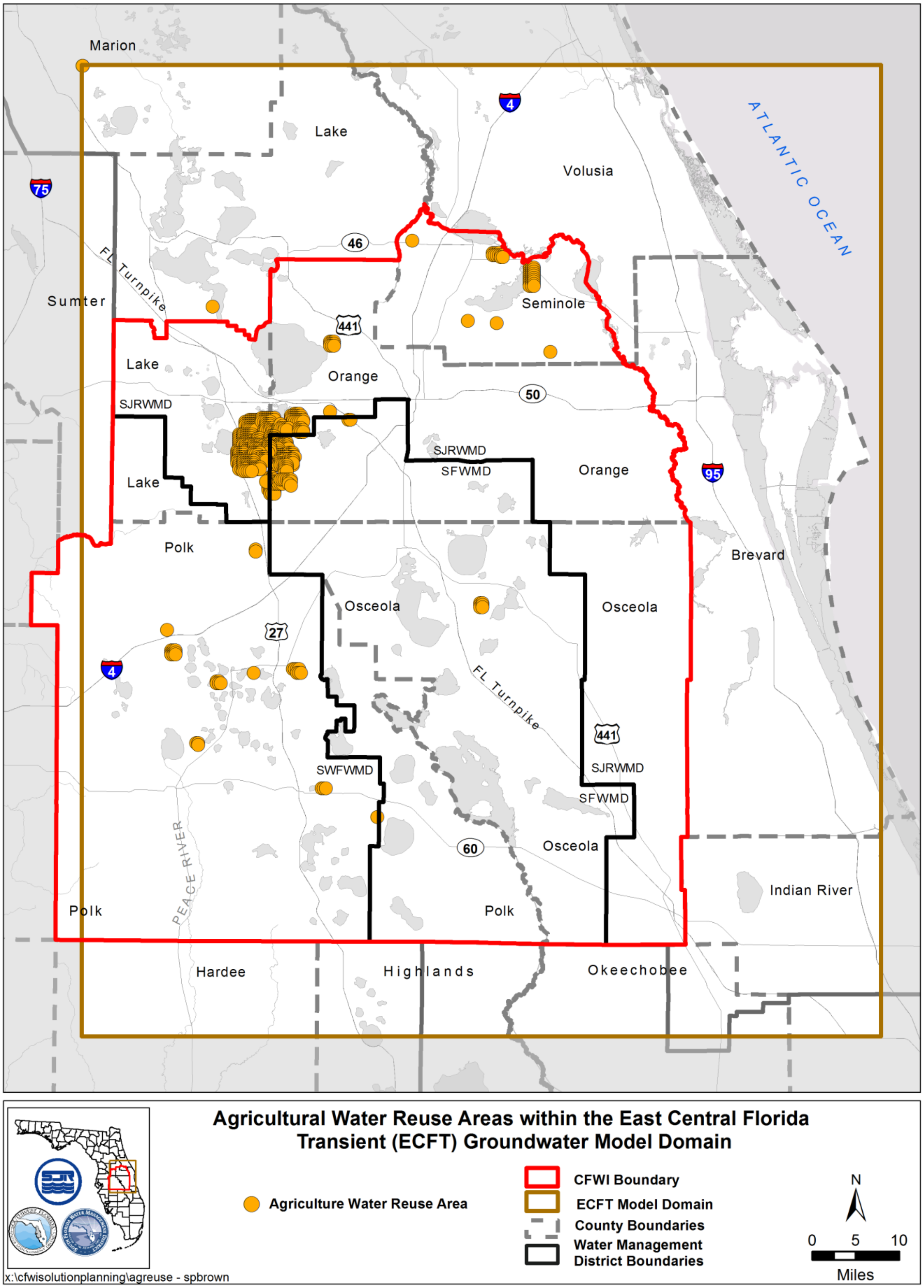


Figure E-5. Location of agricultural reuse application areas within the ECFT groundwater model domain.

Similar to the RIB sites, monthly volumes provided from the WWTPs were obtained from the historical FDEP records. In addition, an extensive monthly database of flows to individual users, and location of individual parcels receiving the agricultural reuse, was provided for Water Conserv II. For the utilities that did not provide the location of the irrigated area, estimated locations were made by reviewing aerial images overlaid with the location of the reuse pipes and identifying parcels that met the demand criteria.

No additional groundwater withdrawals are simulated to meet the agricultural reuse demands above the Public Supply utility demands provided in the CFWI RWSP or identified for a scenario. This is the same approach used for LSI. Agricultural reuse is added to rain amounts and then runoff is processed through the Green-Ampt method (Sepúlveda et al. 2012). Simulating reuse in this manner can reflect excess reuse on a single model cell, and may result in increased runoff that is not seen in the field. After runoff has been accounted for using appropriate checks, reuse enters the ECFT model through the unsaturated zone package (UZF) of MODFLOW, which further disaggregates runoff and recharge. There are 233 model cells receiving reuse for a maximum of 8,300 acres. Ultimately, the model represents the maximum irrigated acreage and not necessarily the total acres receiving reuse.

Table E-10 provides a breakdown of the agricultural reuse by county applied in the model and a comparison with the CFWI RWSP values. An estimated 23.1 mgd on average was used between 1995 and 2006. Of this volume, 16.7 mgd, or 72 percent, is provided by Water Conserv II. A substantial difference exists for Orange and Lake counties between the reuse volumes used in the ECFT model and those reported in the CFWI RWSP. These differences are directly related to flows provided from Water Conserv II. The flows used in the model for Water Conserv II were obtained directly from the utilities that own the project and therefore are considered the most accurate. The 2010 single-year approach used in determining the CFWI RWSP numbers is problematic because these values cannot properly account for climatic variations associated with crop irrigation requirements through a 144-month simulation period, which includes a severe drought period, and a period of high rainfall when four hurricanes passed over the CFWI Planning Area.

Table E-10. Average County-wide Simulated Agricultural Reuse: Average Rates for the Updated 2005 Reference Condition and the 2010 values from the CFWI RWSP.

Agricultural Reuse Application – CFWI		
County	**Updated 2005 Reference Condition (mgd)**	**2010 Values from the CFWI RWSP (mgd)**
Seminole	2.79	2.94
Orange	8.60	4.19
Osceola	0.64	0.61
Lake	8.45	2.60
Polk	2.65	2.02
Total	**23.12**	**12.36**

Note: Agricultural Reuse volume in the CFWI RWSP (previous) version of the ECFT Model was zero.

Water Use Update for the Baseline Condition

The total groundwater use in the Baseline Condition is 1,234.3 mgd (**Table E-11**) with 792.8 mgd occurring within the CFWI Planning Area (**Table E-12**). The updated water use values for the Baseline Condition by water use type and irrigation category and county are summarized below.

Table E-11. Updated water use (mgd) by category type and county for the Baseline Condition - ECFT Model.

County	AG	CII	DSS	PS	LRA	Total
Brevard	35.7	0.1	2.3	19.7	0.8	58.5
Hardee	21.9	3.3	0.8	1.3	0.9	28.1
Highlands	30.3	0.0	0.3	2.5	1.6	34.6
Indian River	124.5	0.3	0.1	0.3	0.0	125.2
Lake	15.7	17.2	11.0	54.6	2.5	100.9
Marion	0.5	3.4	2.0	6.1	0.7	12.7
Okeechobee	24.5	0.1	0.2	0.0	0.0	24.7
Orange	19.3	16.9	2.1	231.1	4.2	273.6
Osceola	85.6	1.8	7.3	57.2	0.0	151.8
Polk	91.5	54.5	7.0	92.2	11.1	256.3
Seminole	4.5	0.0	1.3	68.0	3.1	76.9
St. Lucie	18.5	0.0	0.0	0.0	0.0	18.5
Sumter	4.1	0.5	0.4	11.3	6.3	22.5
Volusia	3.3	1.2	2.8	41.5	.09	49.8
Total (mgd)	**479.8**	**99.3**	**37.5**	**585.7**	**32.0**	**1,234.3**

Table E-12. Updated water use (mgd) by category type and county for the Baseline Condition - CFWI Planning Area.

CFWI County	AG	CII & PG	DSS	PS	LRA	Total
Lake	8.3	0.6	2.9	20.6	1.8	34.3
Orange	19.3	16.9	2.1	231.1	4.2	273.6
Osceola	85.6	1.8	7.3	57.2	0.0	151.7
Polk	91.5	54.5	7.0	92.2	11.1	256.3
Seminole	4.5	0.0	1.3	68.0	3.1	76.9
Total (mgd)	**209.2**	**73.8**	**20.6**	**469.1**	**20.2**	**792.8**

Public Supply

Public supply (PS) updates for Baseline Condition within the CFWI Planning Area included changes to Osceola County (**Table E-13**).

Table E-13. Public Supply (PS) - Changes in water use (mgd) for the Baseline Condition.

County	Lake	Orange	Osceola	Polk	Seminole	Total
PS	0.0	0.0	0.1	0.0	0.0	0.1

Landscape Irrigation

Table E-14 presents the revised values for landscape irrigation (LSI) for the Baseline Condition.

Table E-14. Summary of the distribution of LSI rates included in the ECFT model for the Baseline Condition.

Baseline Condition				
County	**Potable LSI (mgd)**	**Reclaimed LSI (mgd)**	**12-yr avg PS Pumping (mgd)**	**Total LSI (mgd)**
Brevard+Cocoa	20.8	16.7	60.8	37.4
Hardee	0.1	0.0	2.0	0.1
Highlands	3.9	0.0	5.7	3.9
Indian River	0.2	0.0	0.4	0.2
Lake	36.2	3.4	53.3	39.7
Marion	3.4	0.0	6.8	3.4
Okeechobee	0.0	0.0	0.0	0.0
Orange+Seminole-Cocoa	134.7	48.6	313.7	183.3
Osceola	20.3	11.7	45.1	32.0
Polk	54.3	4.1	94.3	58.5
St. Lucie	0.0	0.0	0.0	0.0
Sumter	4.7	1.4	6.2	6.0
Volusia	21.7	12.6	42.4	34.3
Total	**300.3**	**98.5**	**630.6**	**398.8**

Recreation/LRA

The methodology used to update the LRA for the Baseline Condition was based on the changes previously described for the updated 2005 Reference Condition. For Polk County, after including additional withdrawals, the simulated quantity was less than the CFWI RWSP projected amount of 20.1 mgd because the 2012 permitted allocation for LRA was less than the CFWI RWSP projected amount for 2010. The HAT limited the LRA quantity for Polk County to the 2012 permit allocation because the locations for withdrawal quantities beyond the 2012 permitted quantities were not known. This approach increased the LRA quantity without adding hypothetical withdrawal locations. The subsequent changes to the LRA Baseline Condition amounts are presented in **Table E-15**.

Table E-15. Recreation/LRA water use changes (mgd) for the Baseline Condition.

County	Lake	Orange	Osceola	Polk	Seminole	Total
LRA	6.7	1.0	0.0	4.3	0.6	12.6

CII/MD/PG

Updates for the Baseline Condition included changes to the CII/MD/PG water use categories for Polk County (**Table E-16**). Initially, the CFWI RWSP projected 2015 quantity was distributed to withdrawals only within the portion of Polk County inside the ECFT model domain. This resulted in an overestimation of withdrawals within the portion of Polk County within the CFWI because withdrawals that were occurring outside of the ECFT model domain, but within Polk County, were represented as occurring within the ECFT model domain. This was corrected by identifying CII and MD permitted facilities in Polk County and adjusting each withdrawal to the corresponding permitted amount. A ratio was developed by dividing the projected CFWI RWSP 2015 amount by the permitted amount. The product of this ratio was multiplied by the permitted amount for each withdrawal to ensure the average for the 144-month simulation period equals the CFWI RWSP water use projection. There were no adjustments to PG withdrawals since all water use associated with PG occur within the ECFT model domain of Polk County.

Table E-16. CII/MD/PG - Changes in water use (mgd) for the Baseline Condition.

County	Lake	Orange	Osceola	Polk	Seminole	Total
CII/MD/PG	0.0	0.0	0.5	-9.7	0.0	-9.2

Agriculture

The methodology used to update the agriculture withdrawals for the Baseline Condition was based on the changes previously described for the 2005 Reference Condition. **Table E-17** presents the water use change for the agriculture updates for the Baseline Condition within the CFWI Planning Area.

Table E-17. AG - Changes in water use (mgd) for the Baseline Condition.

County	Lake	Orange	Osceola	Polk	Seminole	Total
AG	-1.9	-2.4	3.0	0.0	0.0	-1.3

Domestic Self-supply

The updates for the Baseline Condition within the CFWI Planning Area included changes to the DSS water use category for Polk County (**Table E-18**). The Baseline Condition has 14.1 mgd for DSS and the CFWI RWSP projected amount is 7.2 mgd. The difference between the Baseline Condition and the CFWI RWSP was corrected by scaling back DSS within the SWFWMD portion of Polk County to match the CFWI RWSP projection. DSS for the remainder of the CFWI Planning Area was not changed.

Table E-18. DSS - Changes in water use (mgd) for the Baseline Condition.

County	Lake	Orange	Osceola	Polk	Seminole	Total
DSS	0.0	0.0	0.0	7.0	0.0	7.0

SOLUTIONS STRATEGIES MODELING SCENARIOS

Round 1 Project-based Scenarios

The Groundwater Subteam's Round 1 scenarios are those PS groundwater withdrawal projects presented as Water Supply Project Options (WSPOs) in the CFWI RWSP (Volume I-A, Table F-1), and a groundwater project developed during the Solutions Planning Phase (**Appendix D**). Projects in Round 1 include the Cypress Lake Wellfield (SFWMD Permit 49-02051-W) and the Southeast Polk County Wellfield (SFWMD Permit 53-00293 W), as well as, the South Lake County Wellfield (modeled as centralized or distributed LFA wells) and the Polk County Blended LFA Distributed Wellfield. The Polk County Blended LFA Distributed Wellfield is a proposed series of conceptual supplemental LFA wells at numerous utilities in Polk County to blend LFA water with existing UFA water. Round 1 includes Scenarios 2, 2A, 2B, and 3C. The Round 1 scenarios are directly compared to the Baseline Condition.

Table E-19. Summary of Round 1 project-based scenarios.

Scenario Name	Scenario Number	Scenario Description
Lower Floridan Aquifer Wellfield	2	LFA withdrawals from South Lake County to supply 12.7 mgd (15.9 mgd withdrawal), Cypress Lake to supply 20.5 mgd (25.6 mgd withdrawal), and Southeast Polk County to supply 30 mgd (37.5 mgd withdrawal).
Polk County Blended LFA Distributed Wellfield	3C	LFA withdrawals (6.4 mgd) by utilities blended with existing (60.5 mgd) and increased (3.4 mgd) UFA withdrawals to obtain 9.8 mgd of supply and 20.2 mgd of supply (25.2 mgd withdrawal) from Southeast Polk County wellfield. Scenario also includes Cypress Lake at 20.5 mgd (25.6 mgd withdrawal) and South Lake County at 12.7 mgd (15.9 mgd withdrawal), the same as in Scenario 2.
South Lake County Wellfield – Centralized	2A	LFA withdrawals to supply 12.7 mgd (15.9 mgd withdrawal) from a centralized wellfield in South Lake County area
South Lake County Wellfield – Distributed	2B	LFA withdrawals to supply 12.7 mgd (15.9 mgd withdrawal) from wells owned by municipalities in the South Lake County area

mgd = million gallons per day
LFA = Lower Floridan aquifer
UFA = Upper Floridan aquifer

In the Baseline Condition, the Southeast Polk County Distributed Wellfield was assumed not to be operational based on the implementation schedule for the project but the Cypress Lake Wellfield was assumed to be partially operational at 11.93 mgd raw water and 9.54 mgd treated water supply. The difference between initial raw water withdrawn and the final finished water amounts produced for these projects is due to treatment losses associated with using advanced treatment methods (e.g., membrane treatment) to treat poorer quality water from the LFA to drinking water standards. Approximately 20 percent of the water withdrawn from the LFA is separated as a residual side-stream of poorer quality water during the treatment process; it is unusable and generally disposed of through a deep well injection system located below, and hydraulically and physically separated from the LFA supply zone. The raw water and finished water volumes are required to ensure proper water balance during model execution. The raw water demand is the volume of water that is withdrawn from the model from the specified aquifer. The finished water is then used to determine the volume of LSI reapplied to meet a portion of the simulated landscape irrigation demands. The LSI determination is required because it is implemented in the Scenario 2, 2A, and 2B simulations.

The LSI demands simulated for these scenarios change between simulations depending upon the additional groundwater withdrawn and the county in which the LSI is being reapplied. **Table E-20** provides a summary of the additional LSI being applied in mgd and as a percentage of the additional finished water produced. As shown, the percentage that is being returned as LSI varies by simulation and is based upon historical county-level water, wastewater, and reclaimed water information. In addition, the original pre-processor to apply LSI in the model was programmed to apply LSI to the county where the actual groundwater withdrawals are occurring. This was not changed for the Solutions Planning Phase due to schedule constraints. This explains why additional LSI is not applied in Orange County for Scenario 2 even though the Cypress Lake Wellfield will supply a significant percentage of the total withdrawals to two utilities in Orange County. **Figure E-6** provides a location map of the existing and proposed wellfields simulated in Scenarios 2, 2A, 2B, and 3C that had withdrawals above the Baseline Condition.

Table E-20. Public supply landscape irrigation (LSI) return flow by Round 1 scenario.

County	Additional Simulated LSI Annual Average (mgd)				
	Baseline Condition	Scenario 2	Scenario 2A	Scenario 2B	Scenario 3C
Lake	40.37	9.48	9.48	9.48	0.00
Orange	112.60	0.00	0.00	0.00	0.00
Osceola	42.78	14.51	0.00	0.00	0.00
Polk	57.25	18.61	0.00	0.00	18.61
Seminole	47.49	0.00	0.00	0.00	0.00
Orange-Seminole	160.09	0.00	0.00	0.00	0.00
CFWI Total	**300.49**	**42.60**	**9.48**	**9.48**	**18.61**
Additional PS Finished Water Demand	**0.00**	**63.19**	**12.73**	**12.73**	**30.00**
Percentage		**67%**	**74%**	**74%**	**62%**

Note: LSI is distributed at a county level, Lake County volume represents the entire county.

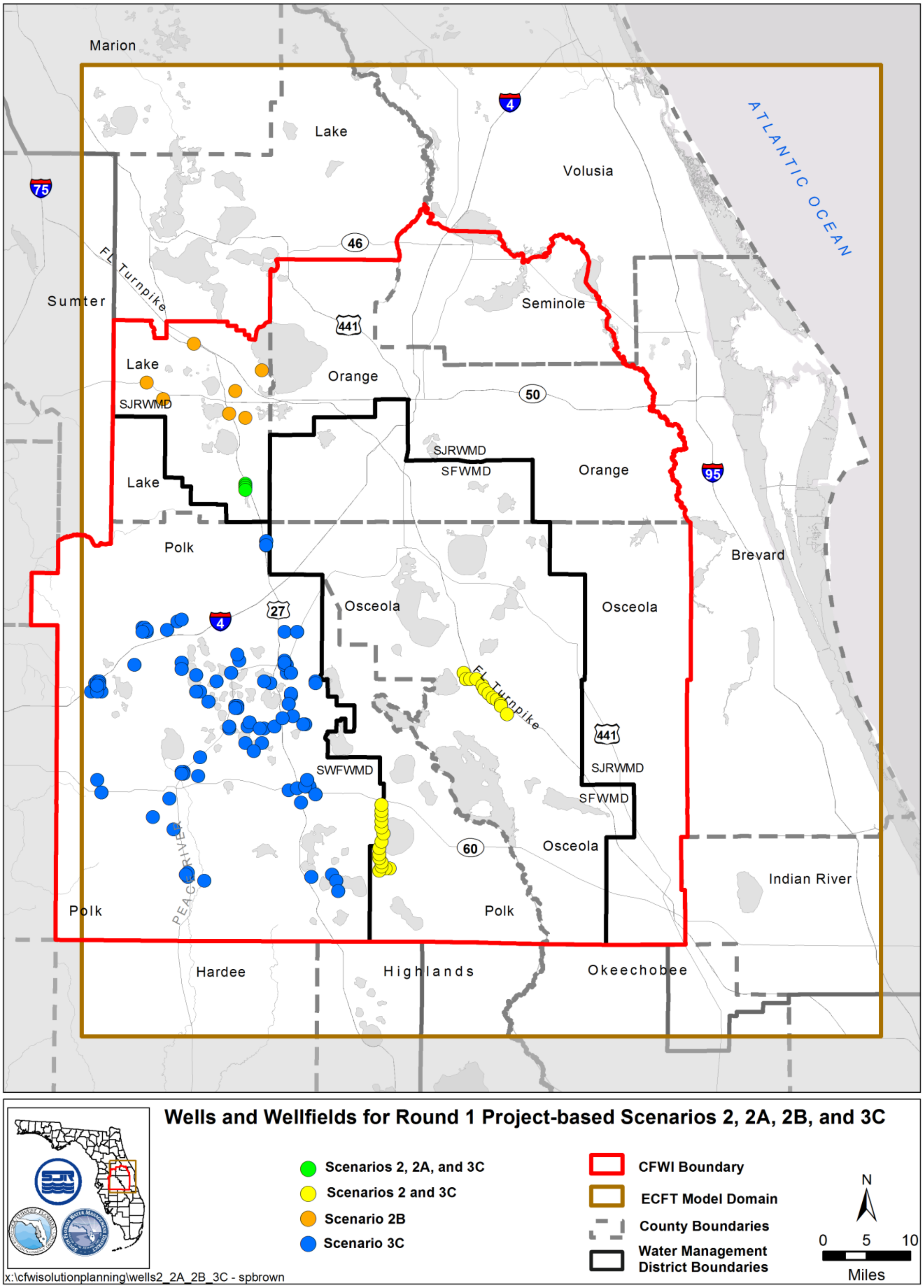


Figure E-6. Locations of wellfields for Round 1 Project-based Scenarios 2, 2A, 2B, and 3C.

Scenario 2

Scenario 2 includes the addition of 78.98 mgd of raw water withdrawn from three separate LFA wellfields: the Cypress Lake, Southeast Polk County, and South Lake County wellfields. Each wellfield is designed to meet a projected demand for their respective service areas. It is assumed there is a 20 percent loss of raw water during the treatment process. **Table E-21** provides a breakdown of the raw and treated demands from each wellfield. The location of the wells for the Cypress Lake and Southeast Polk County wellfields are the same as identified in the permit. The conceptual locations of the South Lake County wells were provided by the utilities' representative. Locations of withdrawals for Scenario 2 are shown in **Figure E-6.**

Table E-21. Round 1: Project-based Scenario 2 additional public supply demand above the Baseline Condition.

Wellfield/Utility	Raw (mgd)	Treated (mgd)
Cypress Lake wellfield	25.57	20.46
Southeast Polk County wellfield	37.50	30.00
South Lake County wellfield	15.91	12.73
Total	**78.98**	**63.19**

Agricultural irrigation, commercial/industrial, RIBS, agricultural reuse, domestic self-supply, and all other demands remain consistent with the Baseline Condition with the exception of LSI. LSI increases from 300.49 mgd in 2015 to 343.09 mgd for Scenario 2 within the CFWI Planning Area and is applied at the same locations as used in the Baseline Condition. The percentage of additional groundwater withdrawals to LSI returned as irrigation is 67 percent in this scenario for the treated water.

Scenarios 2A and 2B

Scenario 2A simulates the proposed South Lake County wellfield. This conceptual wellfield represents a centralized wellfield to provide water to the Cities of Clermont, Minneola, Groveland, and Mascotte, the Town of Montverde, and Lake Utility Services, Inc. This scenario provides an independent evaluation of a proposed wellfield. Similar to Scenario 2, the South Lake County wellfield is simulated at 15.91 mgd raw water and 12.73 mgd treated water demand. Agricultural irrigation, commercial/industrial, RIBS, agricultural reuse, domestic self-supply, and all other demands remain consistent with the Baseline Condition with the exception of LSI. LSI increases from 300.49 mgd in 2015 to 309.97 mgd for both Scenarios 2A and 2B and are applied to the same cells as used in the Baseline Condition. Groundwater withdrawals are from the same location as specified in Scenario 2 for the South Lake County wellfield.

Scenario 2B is a slight variation of Scenario 2A. For this simulation, instead of having a centralized wellfield to provide water to the utilities identified in Scenario 2A, each utility is assumed to construct their own LFA wellfield and blending/treatment facility. Similar to

Scenario 2A, the total demand for the five utilities is simulated at 15.91 mgd raw water and 12.73 mgd treated water demand. Agricultural irrigation, commercial/industrial, RIBS, agricultural reuse, domestic self-supply, and all other demands remain consistent with the Baseline Condition with the exception of LSI. LSI increases from 300.49 mgd in 2015 to 309.97 mgd for Scenario 2B and is applied to the same cells as used in the Baseline Condition. The location of the LFA wells for this scenario is at the existing permitted location of the utilities' primary wellfields. **Table E-22** provides a breakdown of the raw and treated demands by utility for Scenarios 2A and 2B. Additional LSI water for Scenarios 2A and 2B is 9.48 mgd or approximately 74 percent of the additional treated water demands. Locations of withdrawals for these scenarios are shown in **Figure E-6.**

Table E-22. Round 1: Project-based Scenarios 2A and 2B additional public supply demand above the Baseline Condition.

Utility	Scenario 2A (mgd)		Scenario 2B (mgd)	
	Raw	Treated	Raw	Treated
South Lake County WF	15.91	12.73	0.00	0.00
Lake Utility Services Inc.	0.00	0.00	10.03	8.02
City of Clermont	0.00	0.00	2.19	1.75
City of Groveland WF1	0.00	0.00	0.80	0.64
City of Groveland WF2	0.00	0.00	1.08	0.86
City of Minneola	0.00	0.00	1.05	0.84
City of Mascotte	0.00	0.00	0.49	0.39
Town of Montverde	0.00	0.00	0.29	0.23
Total	**15.91**	**12.73**	**15.91**	**12.73**

Scenario 3C

Scenario 3C was developed to evaluate an alternate approach to providing 30 mgd of water supply, as currently planned for the Southeast Polk County Wellfield. Whereas the Southeast Polk County Wellfield includes 37.5 mgd of withdrawals from the LFA to provide 30 mgd of finished water supply, Scenario 3C will provide the same amount of finished water supply from a combination of UFA and LFA withdrawals. This includes reduced withdrawals from the Southeast Polk County Wellfield and increased withdrawals from the UFA and LFA using the infrastructure associated with the 14 local utilities within Polk County (the Polk County Blended LFA Distributed Wellfield). LFA withdrawals associated with the project partners will be treated by blending with existing and new withdrawals from the UFA. The required blending ratio needed to treat the LFA withdrawals was assumed to be 10 (UFA) to 1 (LFA).

As presented in the Solutions Strategies document, the amount of water supply to be obtained from the Polk County Blended LFA Distributed Wellfield was 9.8 mgd and the remaining 20.2 mgd of supply would be obtained from the Southeast Polk County Wellfield. New withdrawals needed to obtain the 9.8 mgd would include 6.4 mgd from the LFA and an increase of 3.4 mgd from the UFA. Approximately 6.0 mgd of LFA withdrawals would be blended with 60.5 mgd of existing (based on projected 2015 demands) UFA withdrawals and the remaining 0.3 mgd of LFA withdrawals would be blended with 3.5 mgd of additional UFA withdrawals. Locations of withdrawals for this scenario are shown in **Figure E-6** and the distribution of modeled withdrawals by utility and model layer are presented in **Table E-23**.

With the exception of the water supply changes involving the Polk County Blended LFA Distributed Wellfield and the Southeast Polk County Wellfield noted above, all other aspects of Scenario 3C were the same as for Scenario 2. This included simulated withdrawals from the Cypress Lake and South Lake County wellfield projects and associated return flows.

Table E-23. Distribution of Polk County Blended LFA Distributed Wellfield project modeled withdrawals by utility and ECFT model layer in Scenario 3C.

Utility	SWFWMD WUP#	WUP Amount (mgd)	ECFT 2015 Withdrawals (mgd)	CFWI RWSP - Proposed Supply (mgd)	Scenario 3C Modeled Quantities	
					Layers 3-5 (UFA) (mgd)	Layer 7 (LFA) (mgd)
Auburndale	7119	7.0	6.1	0.6	6.1	0.6
Bartow	341	7.9	3.5	0.6	3.7	0.4
Davenport	5750	1.0	0.9	0.2	1.0	0.1
Dundee	5893	0.9	0.7	0.1	0.8	0.1
Fort Meade	645	0.8	0.9	0.2	0.9	0.1
Frostproof	5870	0.9	0.8	0.2	0.9	0.1
Haines City	8522	5.9	4.5	0.7	4.7	0.5
Lake Alfred	6624	1.3	1.4	0.2	1.5	0.1
Lake Hamilton	2332	0.4	0.2	0.1	0.2	0.0
Lake Wales	4658	3.9	3.4	0.7	3.7	0.4
Lakeland	4912	35.0	25.6	4.2	27.2	2.7
Mulberry	6124	0.8	0.4	0.1	0.4	0.0
Polk City	8468	0.8	0.7	0.1	0.7	0.1
Winter Haven	4607	14.1	11.5	2.0	12.3	1.2
Total	**--**	**--**	**60.5**	**9.8**	**64.0**	**6.4**

Round 2 Conceptual Management Option Scenarios

Overview

These Round 2 scenarios consist of a series of conceptual management options that were developed to represent types of projects that could be implemented by stakeholders to potentially develop additional groundwater or to achieve an environmental benefit. Potable and reclaimed water Landscape Irrigation (LSI) resulting from the proposed increase in water use simulated as part of the Round 2 scenarios was distributed based on the Baseline Condition flow percentages presented in **Table E-24**.

Table E-24. Round 2: Conceptual Management Scenarios – Landscape Irrigation (LSI) Summary.

County	Finished Water Supply (mgd)	Return Flow Percentage (%)	LSI (mgd)
Lake	10	74.4	7.44
Osceola	10	70.9	7.09
Polk	10	62.0	6.2
Orange + Seminole	20 (10 per county)	58.5	11.69
Total	**50**	**64.8**	**32.42**

The additional LSI generated for each scenario was distributed equally across the same application areas that received LSI in the Baseline Condition. This assumption creates a potential error in the model results because it would generally be expected that a significant portion of projected growth would occur in undeveloped areas in lieu of existing areas of development (except that portion of growth associated with infill). From a groundwater flow modeling perspective, increasing the irrigation application rate across the same spatial distribution could result in areas receiving excessive irrigation, resulting in an artificial increase in stormwater runoff simulated by the model. Because stormwater runoff is removed from the model, the increase in runoff resulting from assuming the same spatial distribution for future irrigation removes water from the model that would be expected to result in increased recharge to the groundwater system.

Scenario 8 was developed to address the potential issue of excessive irrigation application rates. Scenario 8 compares Scenario 5b2 to the Baseline Condition. This comparison evaluates only the effect of the increase in LSI that would occur due to an increase in water use associated with a non-groundwater AWS source (e.g., surface water or stormwater).

Detailed Round 2 Conceptualized Management Scenario Descriptions

The Round 2 scenarios were developed to conceptually represent several types of projects. The specifics of certain aspects of the project types, such as the source of water, the specific stakeholders that would implement the project, and the exact location of the project, have not yet been identified. These details will be developed as part of individual stakeholder planning or permitting efforts. Because the specifics of these potential projects have not yet been identified, new hypothetical wells and recharge projects were added to the ECFT model to represent the Round 2 scenarios. Therefore, the development and results for some of the scenarios should be evaluated differently than the Round 1 scenarios. A brief description of each Round 2 scenario and how each scenario should be evaluated are provided below.

<u>Scenario 4a1</u>: Scenario 4a represents the implementation of a new regional LFA brackish groundwater wellfield in south-central Osceola County, a significant distance from the Orlando-metro area and from areas potentially susceptible to groundwater withdrawals. To simulate this project, twenty-five, hypothetical 2.5 mgd LFA wells were added to the ECFT model in an approximately north-south linear alignment between the Florida Turnpike and State Road 60 (immediately east of Lake Kissimmee) in south-central Osceola County. Based on information available from other projects, it would be anticipated that the groundwater supply source in this area would be brackish and require advanced treatment to meet drinking water standards. A treatment recovery factor of 80 percent was assumed based on similar projects in the region. The assumed recovery factor would result in 50 mgd of finished water supplied to the region (62.5 mgd raw water x 80% recovery = 50 mgd finished water). This scenario should be compared to the Baseline Condition to evaluate the potential effects of this project concept.

<u>Scenario 4a2</u>: Scenario 4a2 represents the same concept as Scenario 4a1, but in lieu of a single 62.5 mgd wellfield located a significant distance from the Orlando metro area, five hypothetical 12.5 mgd wellfields were located in each of the five CFWI counties (all generally in or near the Orlando-metro area). Although near to the Orlando metro area, an attempt was made to locate these five hypothetical wellfields away from water resource constraints such as MFL water bodies. The same number of wells, well capacity, recovery factor, and raw and finished water quantities were assumed for Scenario 4a2 as were assumed for Scenario 4a1. This scenario should be compared to the Baseline Condition to evaluate the potential effects of this project concept. Comparison of the results of Scenarios 4a1 and 4a2 also helps to evaluate the difference between implementing a large regional wellfield versus smaller distributed wellfields with equivalent cumulative withdrawal.

<u>Scenario 4b</u>: Scenario 4b shifts withdrawals from existing UFA wells into new or deepened LFA wells at the same site to evaluate the potential environmental benefit. No specific stakeholders or actual wells were used to evaluate this concept. This project concept evaluated using deeper wells by implementing two groundwater flow model scenarios; the baseline scenario (Scenario 4b1) and a proposed (future) scenario (Scenario 4b2). The baseline scenario (Scenario 4b1) involved adding five hypothetical 2 mgd UFA well (10 mgd finished water supply) to the ECFT model in each of the five CFWI counties for a total finished water supply of 50 mgd. It was assumed groundwater from the UFA would be fresh and require standard groundwater treatment methods with effectively 100 percent treatment recovery. The proposed (future) scenario (Scenario 4b2) involved converting the five 10 mgd UFA wellfields added to the ECFT model for Scenario 4b1 to five 12.5 mgd LFA wellfields. This assumes the LFA groundwater in these areas will be brackish and require advanced treatment with an 80 percent recovery factor to meet drinking water standards and to supply the same quantity of water as Scenario 4b1 (50 mgd of finished

water supply). This may not be the case for each of the five general wellfield locations evaluated, but was assumed for consistency for this conceptual-level evaluation. Note that Scenarios 4b1 and 4b2 should not be evaluated by themselves, nor in comparison to the Baseline Condition. These two scenarios should only be compared to one another to evaluate the potential benefit of shifting well withdrawals from the UFA into the LFA. For example, comparing the results of Scenario 4b1 to the Baseline Condition would provide the results associated with implementing five new 10 mgd UFA wellfields in the Orlando-metro area. This is not the concept or project being proposed by this scenario.

Scenario 5a: The concept Scenario 5a simulates the relocation of existing UFA wells located near areas susceptible to groundwater withdrawals or other water resource constraints to locations further from these susceptible areas. Similar to Scenario 4b, evaluation of this concept required the development of two groundwater flow model scenarios: a baseline scenario (Scenario 5a1) and a proposed (future) scenario (Scenario 5a2). The baseline scenario (Scenario 5a1) involved adding five, hypothetical 2 mgd UFA wells (10 mgd finished water supply) in susceptible areas (near water resource constraints such as MFLs) to the ECFT model. One of the five 10 mgd wellfields is generally located in each of the five CFWI counties (the wellfield for Osceola County is located on the boundary between Polk County and Osceola County in an area referred to as the four-corners region), for a total finished water supply of 50 mgd. The proposed (future) scenario (Scenario 5a2) involved relocating these five, 10 mgd UFA wellfields to new locations further from the susceptible areas. Note that Scenarios 5a1 and 5a2 should not be evaluated by themselves, or in comparison to the Baseline Condition. These two scenarios should only be compared to one another to evaluate the potential benefit of relocating existing UFA wells away from susceptible areas.

Scenario 5b: Scenario 5b was developed to simulate the potential environmental benefit of replacing UFA groundwater withdrawals in susceptible areas with non-groundwater AWS sources such as surface water or stormwater. The baseline scenario, Scenario 5a1, was used as the baseline scenario for Scenario 5b with pumping from five, hypothetical 2 mgd UFA wells (10 mgd finished water supply) in susceptible areas. The non-groundwater AWS (Scenario 5b2) set the pumping from the five new 10 mgd UFA wellfields to 0 mgd. Note that Scenarios 5a1 and 5b2 should not be evaluated by themselves, or in comparison to the Baseline Condition. These two scenarios should only be compared to one another to evaluate the potential benefit of the implementation of non-groundwater AWS supplies to replace UFA groundwater withdrawals.

Scenario 6: Scenario 6 involves increasing aquifer recharge either through injection wells (e.g., direct recharge via injection into the UFA) or RIBs (e.g., indirect recharge via land application) adjacent to 11 MFL water bodies that were predicted to be out of compliance in the Baseline Condition. Development of Scenario 6 is described in **Appendix E-2.** The intent of the concept was to determine the quantity of recharge necessary to bring the MFL water bodies into compliance. This scenario more closely represents a specific project than the other scenarios simulated as part of the Round 2 evaluation; however, the specific sources of the water and the potential project participants have not been identified. Scenario 6 should be compared to the Baseline Condition to evaluate the benefit of the developed aquifer recharge projects.

Scenario 8: Scenario 8 was developed to evaluate the potential environmental benefit of the return flow (e.g., landscape irrigation) associated with implementing non-groundwater AWS projects such as surface water or stormwater. The general concept is that implementing a non-groundwater AWS project to meet projected irrigation demands would not directly affect the groundwater system through the extraction of water, but could indirectly benefit the groundwater system through the return flow or irrigation associated with the implementation of that AWS source. Scenario 8 was also developed to evaluate the effect of varying spatial distributions of LSI. Scenario 5b2 was used as the proposed scenario for this simulation. The evaluation of Scenario 8 should be performed by comparing Scenario 5b2 to the Baseline Condition.

Simulation Results

Scenario 2

The SAS panel on **Figure E-7** shows the difference in median simulated SAS groundwater levels between the Baseline Condition and Scenario 2. The wellfields for this scenario were derived from Water Supply Project Options (WSPOs) presented in the CFWI RWSP (Volume IA, Appendix F) as previously described. Predicted water level changes for the SAS layer were within the range of -1 foot to +1 foot for the model domain. The UFA panel shows the difference in median simulated UFA potentiometric surface levels between the Baseline Condition and Scenario 2. Maximum decreases in the simulated UFA potentiometric surface levels occur east of the Southeast Polk County wellfield and near the Cypress Lake wellfield, and does not extend appreciably into Polk County. The LFA panel shows the difference in median simulated LFA potentiometric surface levels between the Baseline Condition and Scenario 2. Maximum predicted decreases in LFA potentiometric surface levels of greater than 25 feet occur near the Southeast Polk County wellfield, with significant drawdown occurring in Polk, Osceola, and Lake counties. While significant drawdowns are simulated within some portions of the LFA, these drawdowns do not result in significant drawdowns in the UFA or SAS due to confinement between the UFA and LFA. This is a recurring observation for the simulations that include withdrawals from the LFA and will not be repeated for the remainder of this section.

Scenario 2A

The SAS panel of **Figure E-8** shows the difference in median simulated SAS groundwater levels between the Baseline Condition and Scenario 2A. The wellfields for this scenario were derived from WSPOs presented in the CFWI RWSP (Volume IA, Appendix F) as previously described. Predicted water level changes for SAS layer were within the range of -1 foot to +1 foot for the model domain. The UFA panel shows the difference in median simulated UFA potentiometric surface levels between the Baseline Condition and Scenario 2A. Predicted water level changes for the UFA layer were within the range of -1 foot to +1 foot for the model domain. The LFA panel shows the difference in median simulated LFA potentiometric surface levels between the Baseline Condition and Scenario 2A. Maximum predicted decreases in LFA potentiometric surface levels of 3 to 5 feet occur in south Lake County corresponding to the location of the proposed South Lake County wellfield.

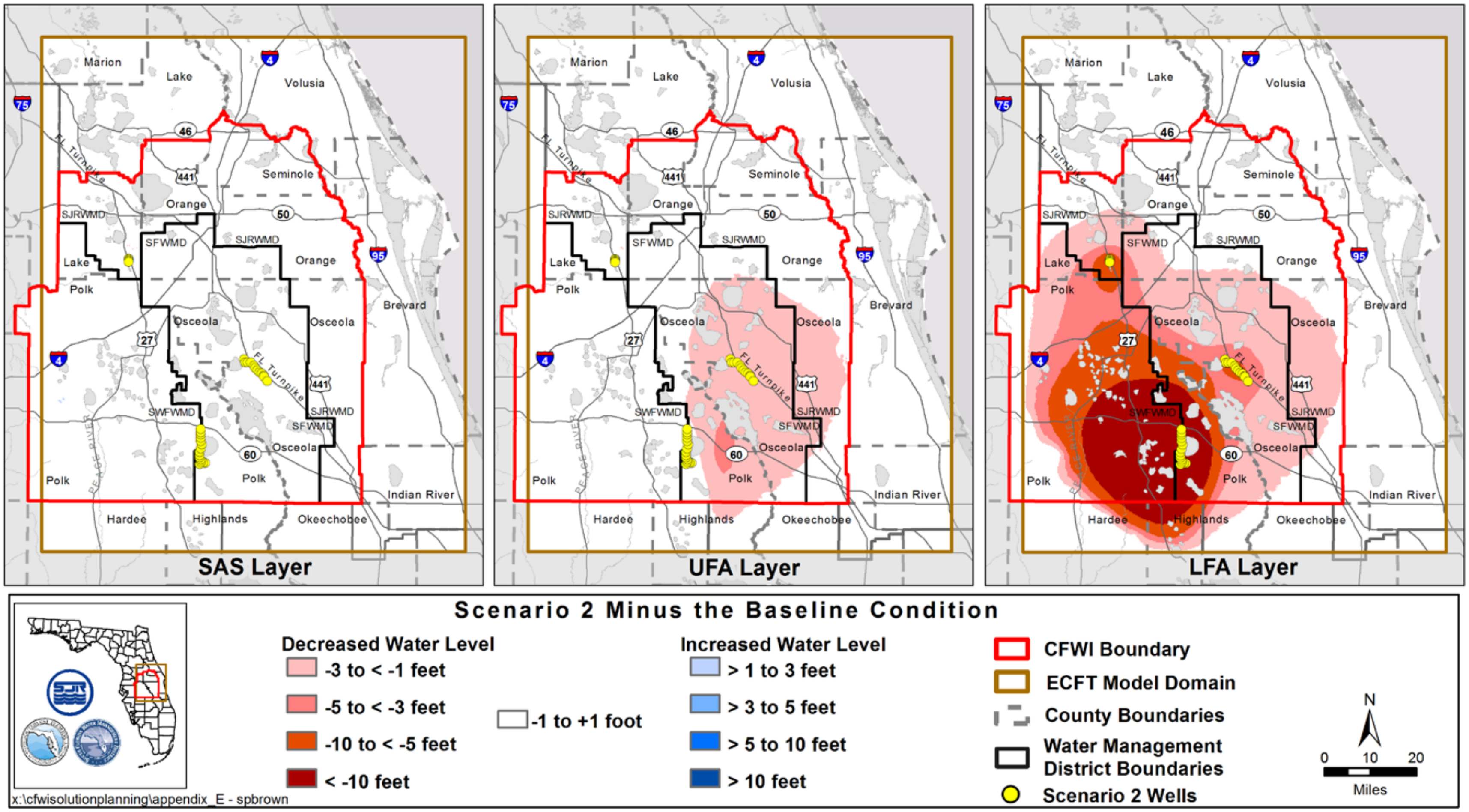


Figure E-7. Scenario 2 minus the Baseline Condition to evaluate the Cypress Lake, Southeast Polk County, and South Lake County LFA Wellfields (selected CFWI RWSP WSPOs). Higher water levels are shown in blue and lower water levels are shown in red. Water level changes between +1 and –1 ft are not shown.

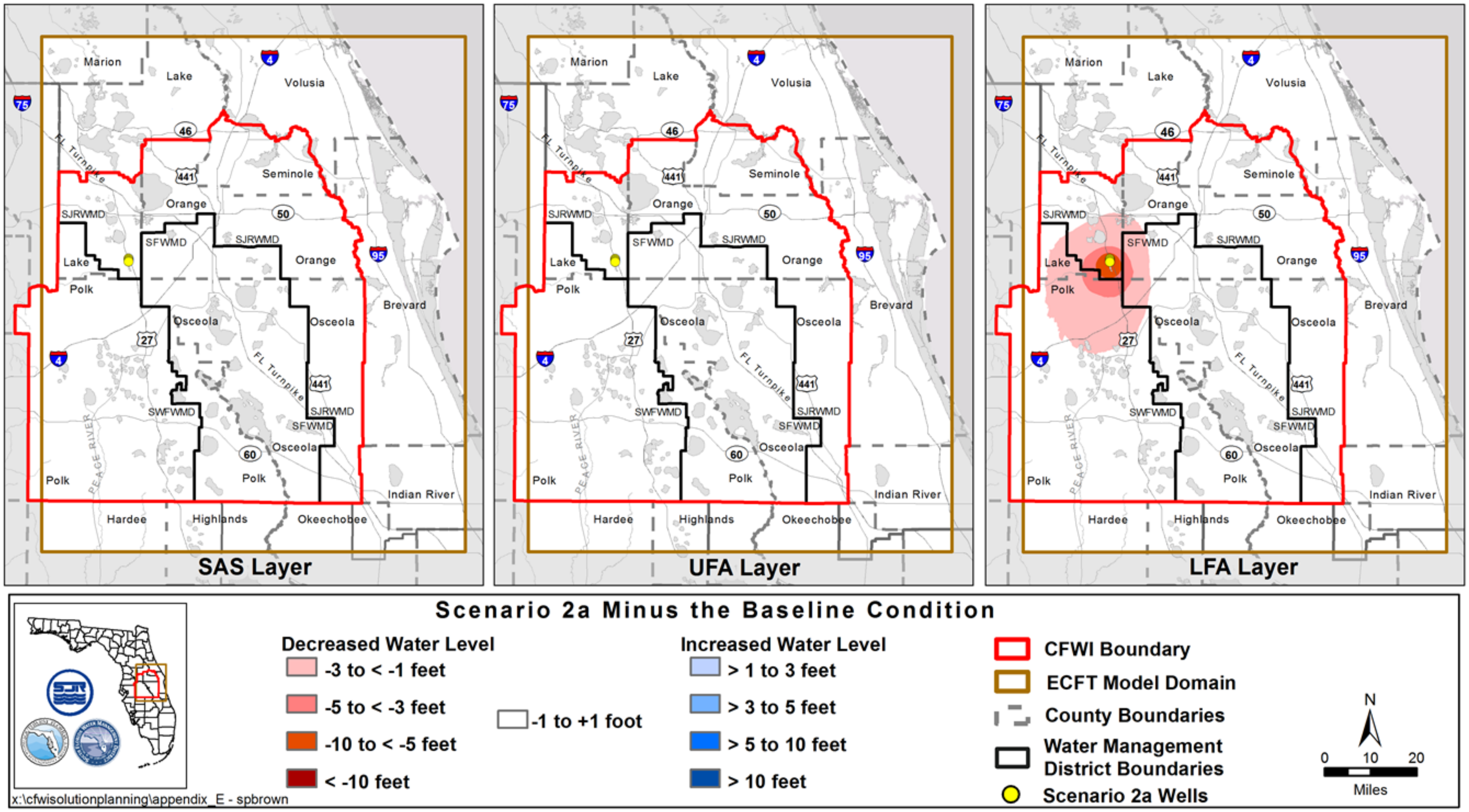


Figure E-8. Scenario 2A minus the Baseline Condition to evaluate centralized South Lake County LFA Wellfield. Higher water levels are shown in blue and lower water levels are shown in red. Water level changes between +1 and –1 ft are not shown.

Scenario 2B

The SAS panel in **Figure E-9** shows the difference in median simulated SAS groundwater levels between the Baseline Condition and Scenario 2B. The wellfields for this scenario were derived from WSPOs presented in the CFWI RWSP (Volume IA, Appendix F) as previously described. Predicted water level changes for the SAS layer were within the range of -1 foot to +1 foot for the model domain. The UFA panel shows the difference in median simulated UFA potentiometric surface levels between the Baseline Condition and Scenario 2B. Predicted water level changes for the UFA layer were within the range of -1 foot to +1 foot for the model domain. The LFA panel shows the difference in median simulated LFA potentiometric surface levels between the Baseline Condition and Scenario 2B. Predicted decreases in LFA potentiometric surface levels of 2 to 3 feet occur near the proposed south Lake County wellfields.

Scenario 3C

The SAS panel of **Figure E-10** shows the difference in median simulated SAS groundwater levels between the Baseline Condition and Scenario 3C. The wellfields for this scenario were derived from WSPOs presented in the CFWI RWSP (Volume IA, Appendix F) and the project concept was refined during the Solutions Planning Phase. Predicted water level changes for the SAS layer were within the range of -1 foot to +1 foot for the model domain. The UFA panel shows the difference in median simulated UFA potentiometric surface levels between the Baseline Condition and Scenario 3C. Maximum predicted decreases in UFA potentiometric surface levels of 1 to 3 feet occur in Osceola County and southeast Polk County east of the Southeast Polk County wellfield. The LFA panel shows the difference in median simulated LFA potentiometric surface levels between the Baseline Condition and Scenario 3C. Maximum predicted decreases in LFA potentiometric surface levels of greater than 10 feet occur in south Polk County.

Scenario 4a1

The SAS panel in **Figure E-11** shows the difference in median simulated SAS groundwater levels between the Baseline Condition and Scenario 4a1. The wellfields for Scenario 4a1 are conceptual. Predicted water level changes for the SAS layer were within the range of -1 foot to +1 foot for the model domain. The UFA panel shows the difference in median simulated UFA potentiometric surface levels between the Baseline Condition and Scenario 4a1. Predicted decreases in UFA potentiometric surface levels of 3 to 5 feet occur in Osceola County but do not extend to Polk or Lake counties. The LFA panel shows the difference in median simulated LFA potentiometric surface levels between the Baseline Condition and Scenario 4a1. Predicted decreases in LFA potentiometric surface levels occur throughout the CFWI Planning Area, with the greatest drawdown (5 to 10 feet) occurring at the conceptual wellfield location.

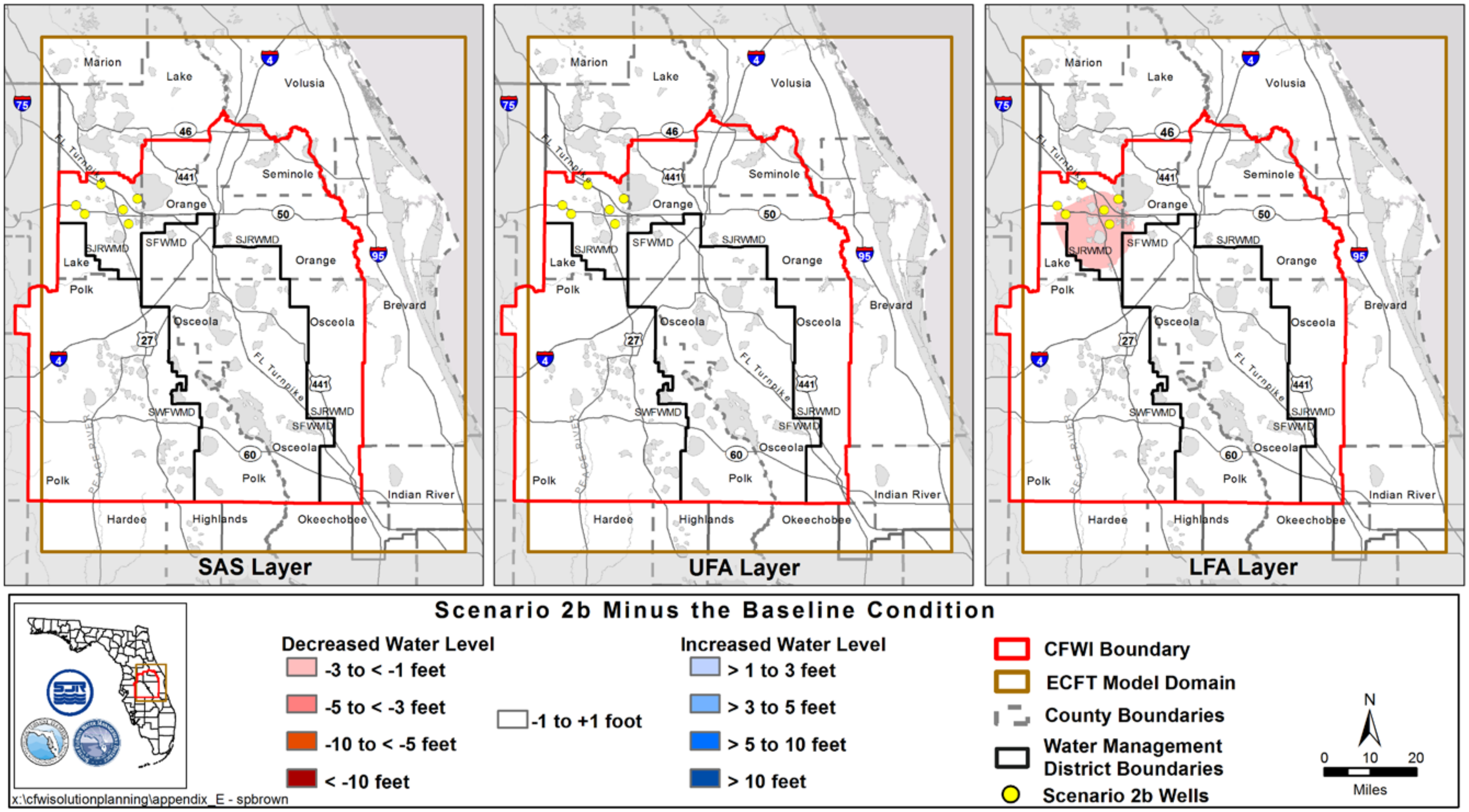


Figure E-9. Scenario 2B minus Baseline Condition to evaluate distributed South Lake County LFA Wellfields. Higher water levels are shown in blue and lower water levels are shown in red. Water level changes between +1 and –1 ft are not shown.

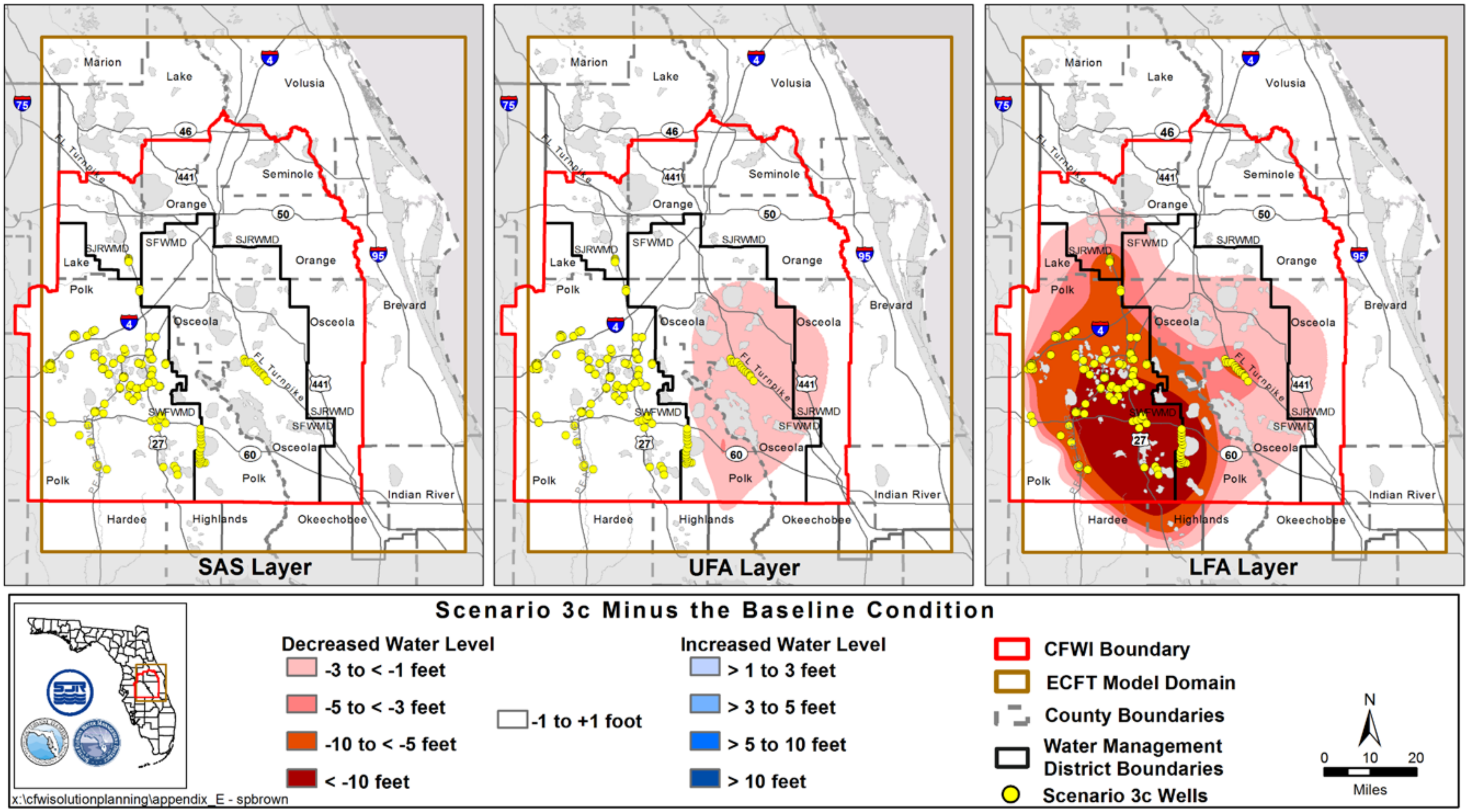


Figure E-10. Scenario 3C minus the Baseline Condition to evaluate distributed and centralized Polk County Blended LFA Wellfields (selected CFWI RWSP WSPOs). Higher water levels are shown in blue and lower water levels are shown in red. Water level changes between +1 and –1 ft are not shown.

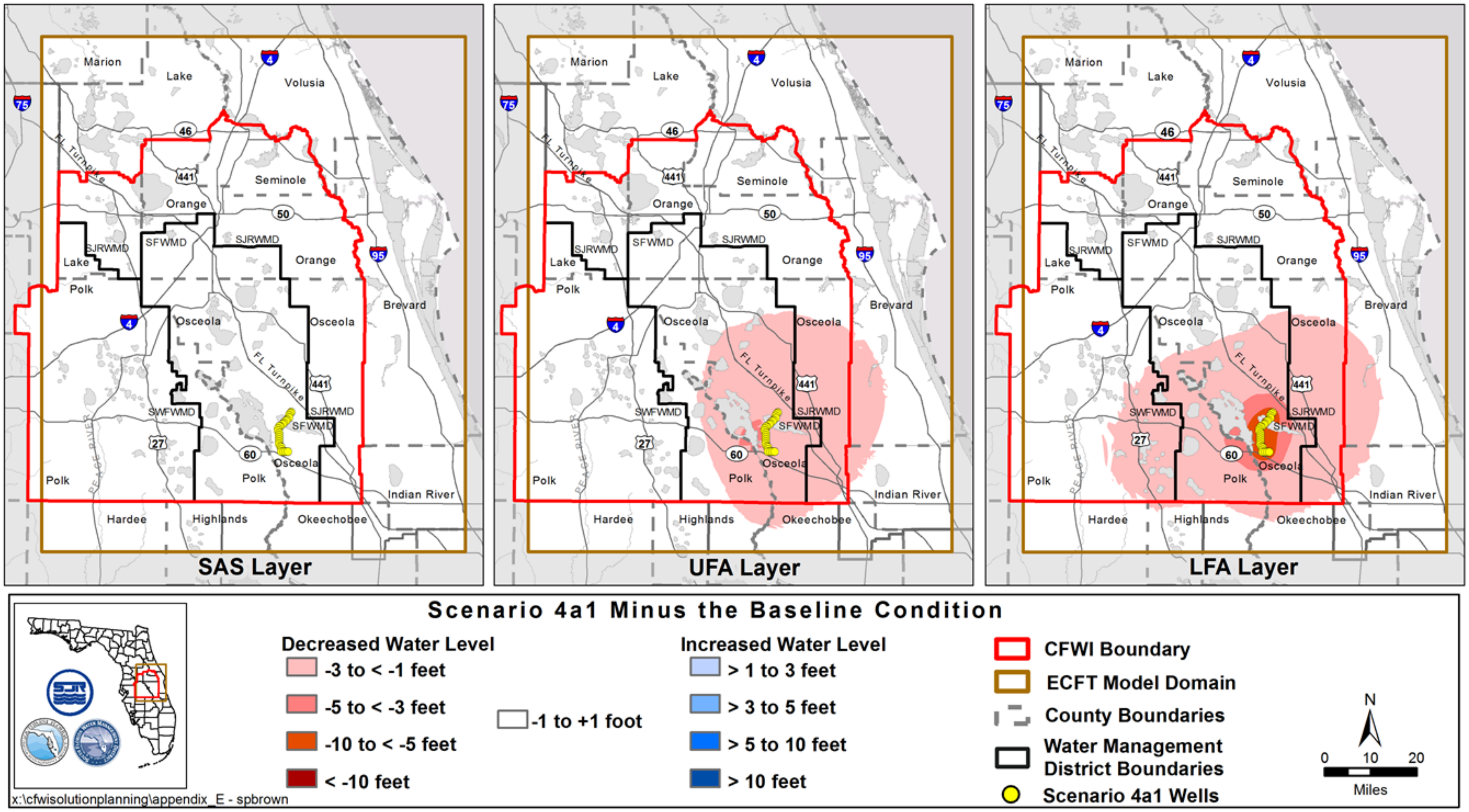


Figure E-11. Scenario 4a1 minus the Baseline Condition to evaluate centralized regional LFA wellfield in south-central Osceola County (conceptual wellfields). Higher water levels are shown in blue and lower water levels are shown in red. Water level changes between +1 and –1 ft are not shown.

Scenario 4a2

The SAS panel in **Figure E-12** shows the difference in median simulated SAS groundwater levels between the Baseline Condition and Scenario 4a2. The wellfields for Scenario 4a2 are conceptual. Predicted water level changes for the SAS Layer were within the range of -1 foot to +1 foot for the model domain. The UFA panel shows the difference in median simulated UFA potentiometric surface levels between the Baseline Condition and Scenario 4a2. Predicted decreases in UFA potentiometric surface levels are greatest (1 to 3 feet) in northern Osceola and south-central Orange counties, but do not extend into Polk County. The LFA panel shows the difference in median simulated LFA potentiometric surface levels between the Baseline Condition and Scenario 4a2. Predicted decreases in LFA potentiometric surface levels are greatest (5 to 10 feet) and broadest in Polk County with noticeable decreases in the vicinity of the conceptual Seminole County wellfield.

Scenario 4b

The SAS panel in **Figure E-13** shows the difference in median simulated SAS groundwater levels between 50 mgd of (Scenario 4b1) additional UFA withdrawals to 62.5 mgd of (Scenario 4b2) additional LFA withdrawals distributed equally among five wellfields at the same locations (i.e., Scenario 4b). The wellfields for these scenarios are conceptual. Predicted increases in SAS groundwater levels of 3 to 5 feet in Polk County were observed. The UFA panel shows the difference in median simulated UFA potentiometric surface levels in Scenario 4b. Predicted increases in UFA potentiometric surface levels of 5 to 10 feet were observed in the vicinity of the Polk County wellfields. The LFA panel shows the difference in median simulated LFA potentiometric surface levels for Scenario 4b. Predicted decreases in LFA potentiometric surface levels of 1 to 3 feet were observed throughout the model domain, and most prominently in Polk County. The maximum predicted water level decreases of 10 to 25 feet were from the conceptual wellfield along US27 south of US17/92.

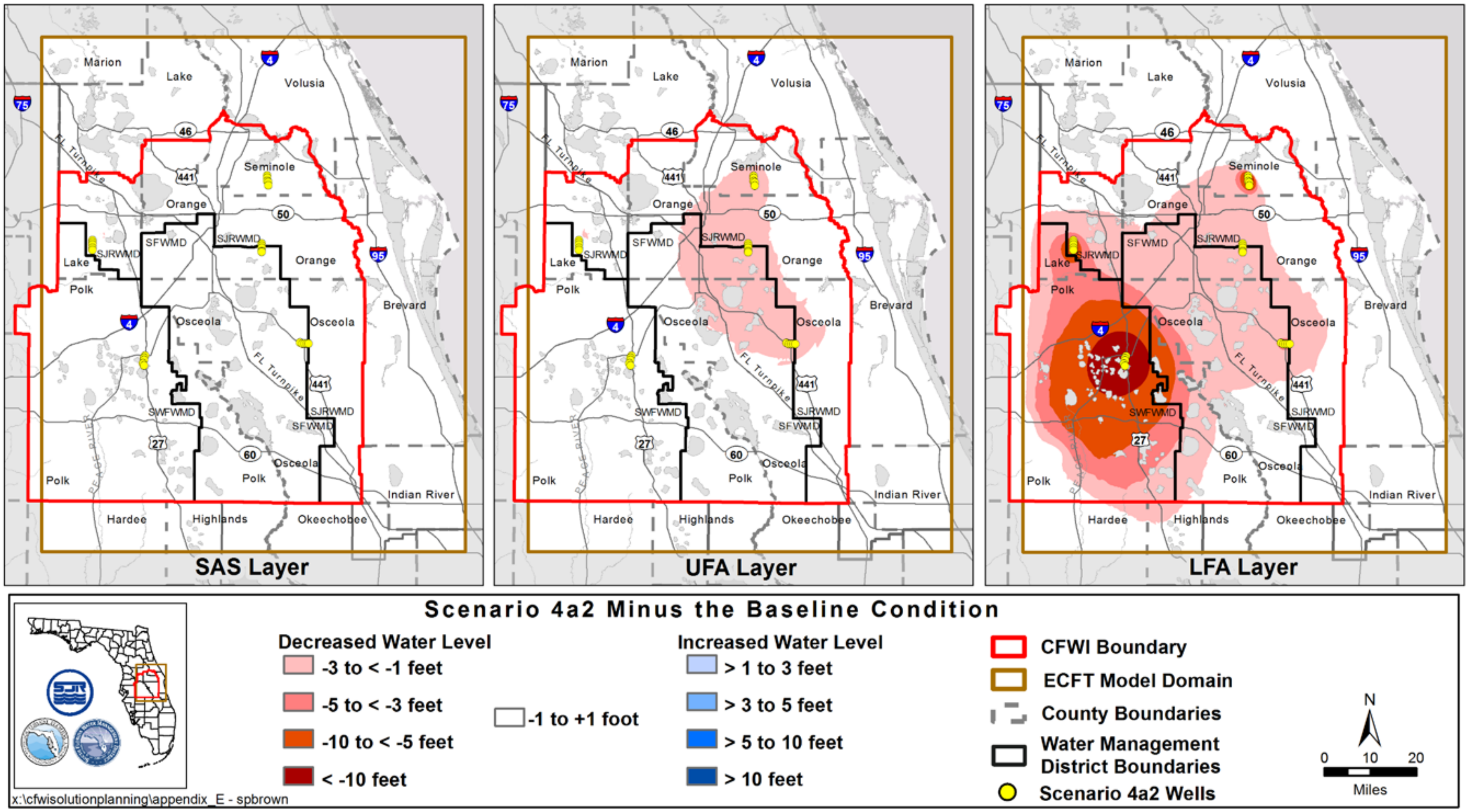


Figure E-12. Scenario 4a2 minus the Baseline Condition to evaluate subregional LFA wellfields in the Five Counties (conceptual wellfields). Higher water levels are shown in blue and lower water levels are shown in red. Water level changes between +1 and –1 ft are not shown.

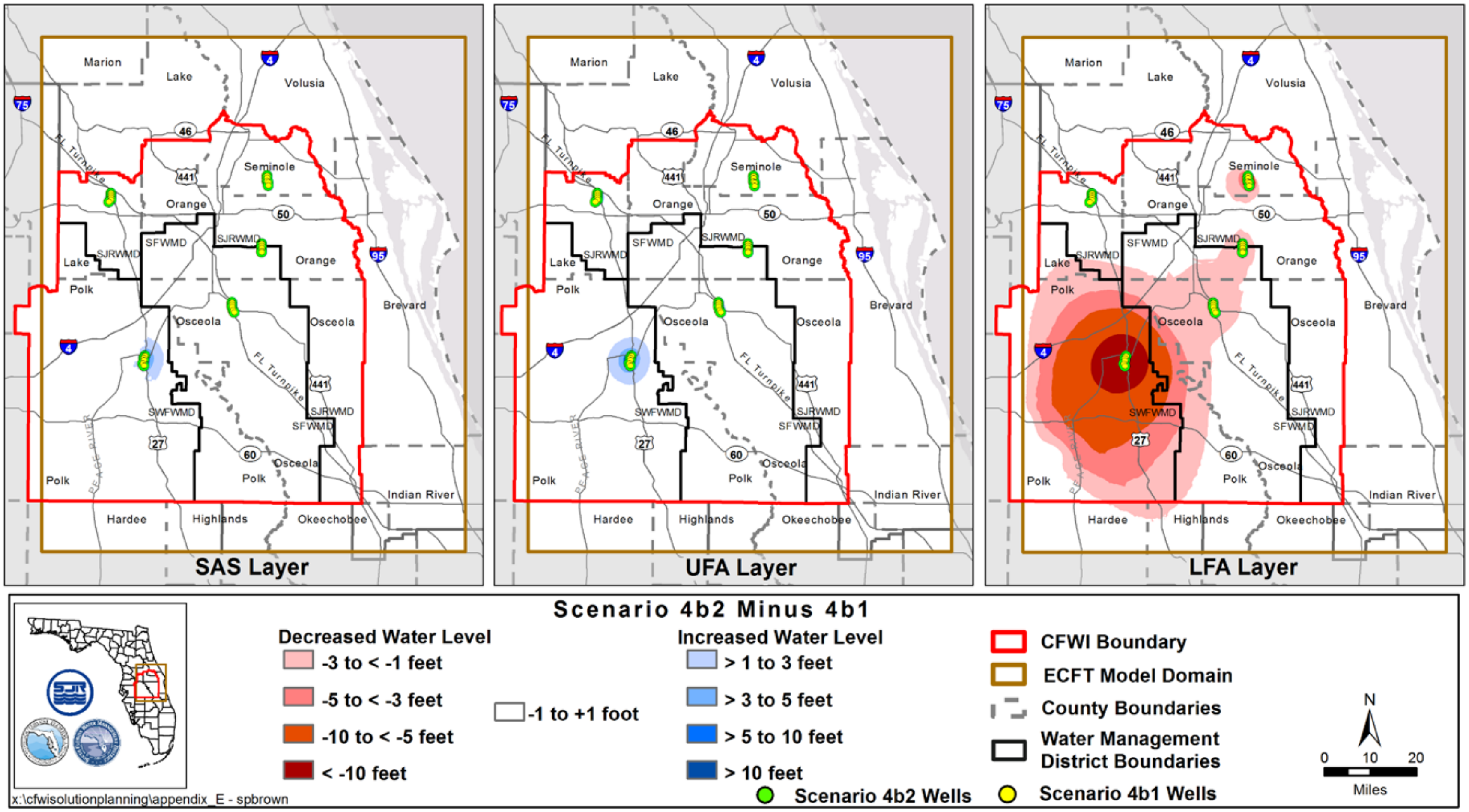


Figure E-13. Scenario 4b2 minus Scenario 4b1 to evaluate centralized subregional UFA and LFA wellfields in the Five Counties (conceptual wellfields). Higher water levels are shown in blue and lower water levels are shown in red. Water level changes between +1 and –1 ft are not shown.

Scenario 5a1

The SAS panel of **Figure E-14** shows the difference in median simulated SAS groundwater levels between a conceptual 50 mgd UFA wellfield near (Scenario 5a1) and then geographically away from (Scenario 5a2) sensitive water bodies including MFL sites. The wellfields for these scenarios are conceptual. Predicted increases in SAS groundwater levels of 1 to 3 feet occur in some areas including south Lake County at the four corners region, and eastern Polk County. Predicted decreases in SAS groundwater levels occur at the conceptual wellfield locations in western Polk and south Lake counties. The UFA panel shows the difference in median simulated UFA potentiometric surface levels between the two scenarios. Predicted increases in UFA potentiometric surface levels of 1 to 3 feet occur predominantly along the Ridge, with predicted decreases in areas away from the Ridge. The LFA panel shows the difference in median simulated LFA potentiometric surface levels between the two scenarios. Predicted decreases in LFA potentiometric surface levels of 1 to 3 feet occur in Osceola and Seminole counties, with predicted increases in Lake County. No change was observed in LFA potentiometric surface levels in Polk County where intra-aquifer leakance values are low.

Scenario 5b2

Figure E-15 shows the difference in median simulated SAS groundwater levels in the scenario where 50 mgd distributed equally among five UFA wellfields are installed (Scenario 5a1) and then removed with the LSI return flow from the 50 mgd of additional supply remaining (Scenario 5b2). This is to simulate the effects of replacing UFA withdrawals with non-groundwater AWS supplies. The wellfields for this scenario are conceptual. Predicted increases in SAS groundwater levels of 1 to 3 feet occur in the vicinity of the five conceptual 10 mgd wellfields, with most occurring in Polk County (3 to 5 feet increase) and the four corners area. The UFA panel shows the difference in median simulated UFA potentiometric surface levels for the comparison. Predicted decreases (increases) in UFA potentiometric surface levels of 1 to 3 feet occur in the vicinity of the five conceptual wellfields, with most occurring in Polk County (3 to 5 feet) and the four corners area. The LFA panel shows the difference in median simulated LFA potentiometric surface levels for the comparison. Predicted increases in LFA potentiometric surface levels of 1 to 3 feet occur in west Orange County.

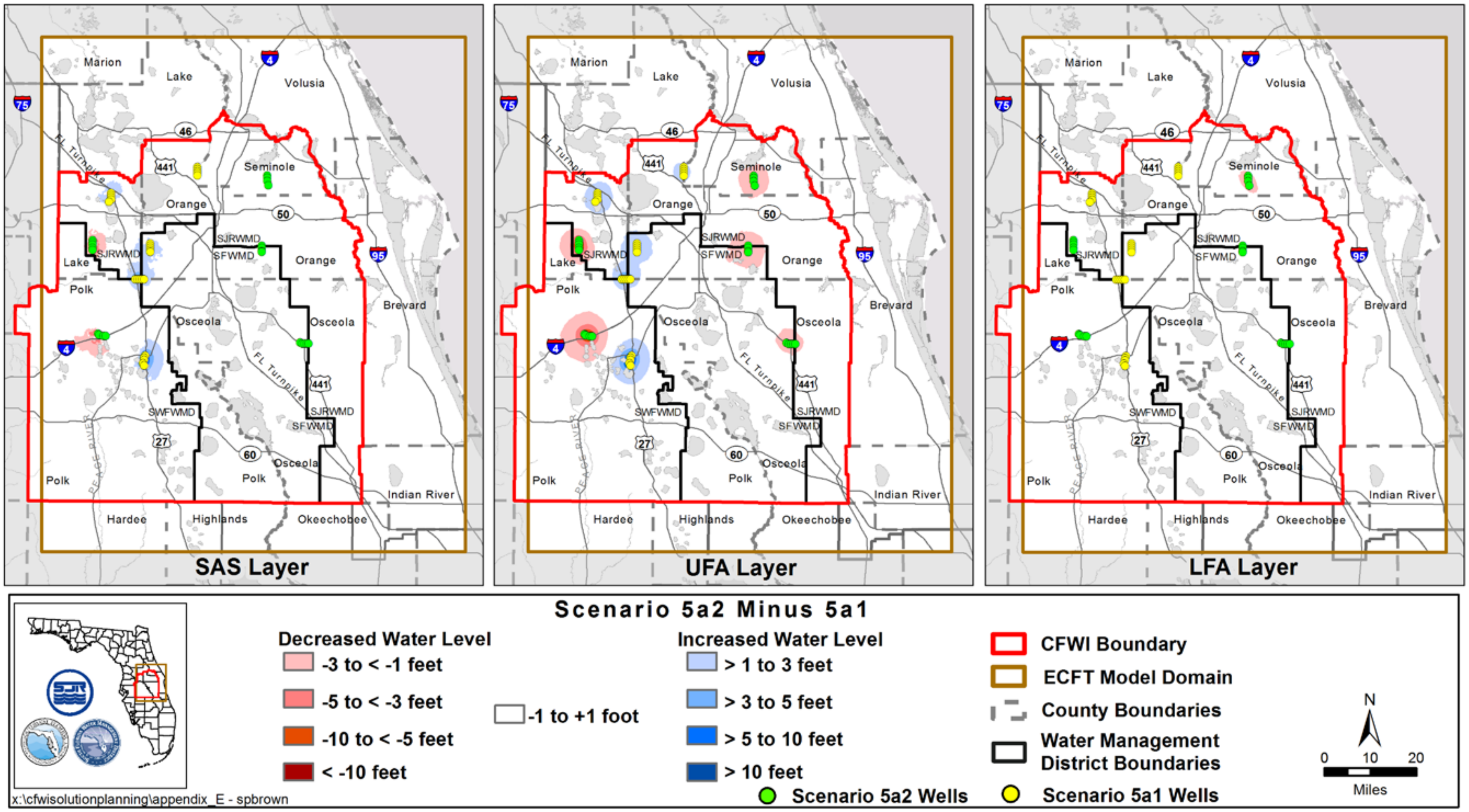


Figure E-14. Scenario 5a2 minus Scenario 5a1 to evaluate Centralized subregional UFA wellfields at locations near susceptible areas and away from susceptible areas in the Five Counties (conceptual wellfields). Higher water levels are shown in blue and lower water levels are shown in red. Water level changes between +1 and –1 ft are not shown.

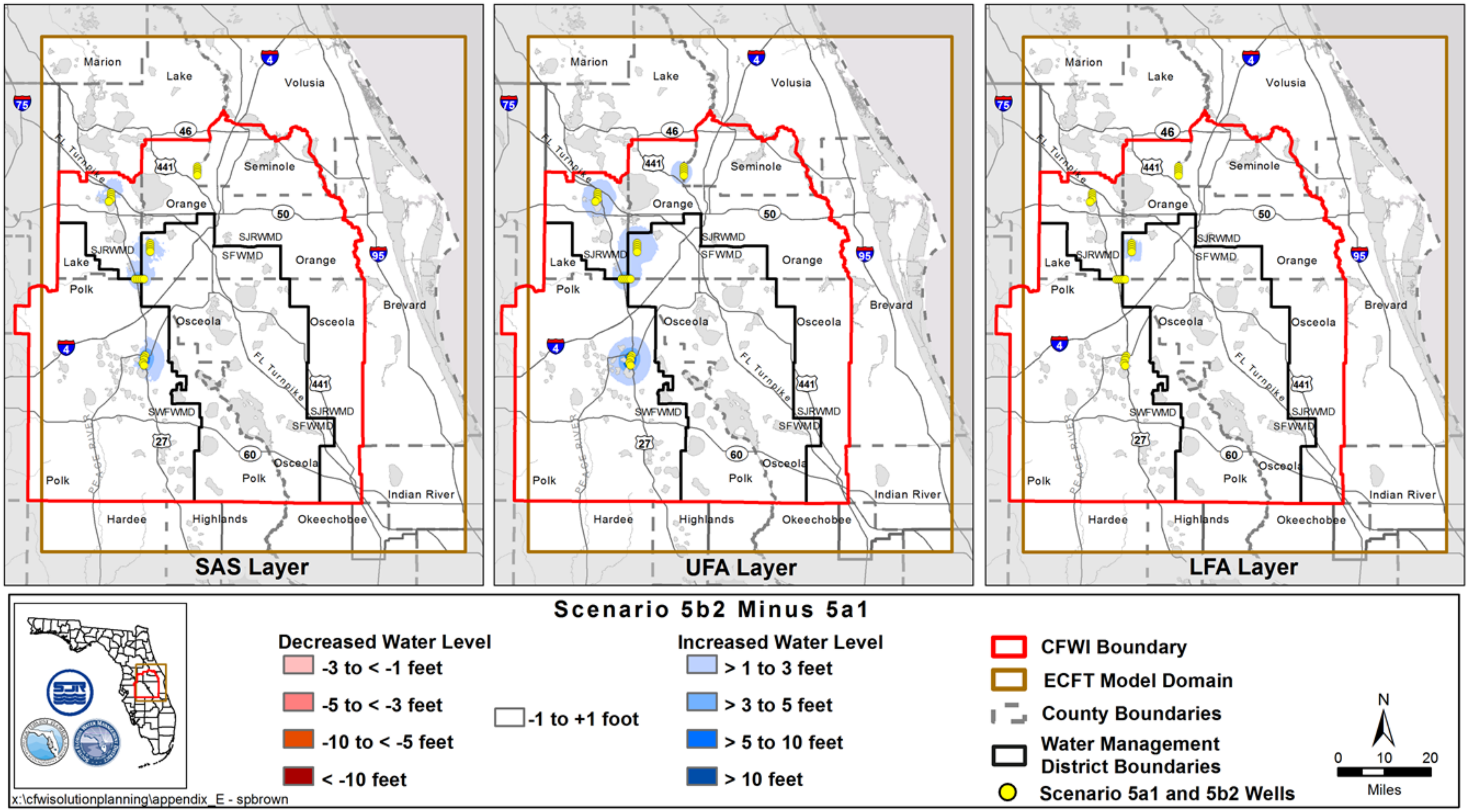


Figure E-15. Scenario 5b2 minus Scenario 5a1 Centralized subregional UFA wellfields were removed from Scenario 5a1 at locations near susceptible areas evaluate effects of non-groundwater AWS (conceptual wellfields). Higher water levels are shown in blue and lower water levels are shown in red. Water level changes between +1 and –1 ft are not shown.

Scenario 6

Two separate simulations, 6A and 6B, were used to evaluate the potential for specific recharge locations to impact MFL bodies of water. In both scenarios, the wellfields, horizontal wells, and RIBs are conceptual. **Figure E-16** shows the difference in median simulated groundwater levels between the Baseline Condition and Scenario 6A. Simulated recharge rates designed to achieve recovery at the MFL water bodies are summarized in **Table E-25** under the Scenario 6A heading. Scenario 6A applies the recharge through RIBs at the MFL lakes and direct Floridan injection in the MFL springs. The SAS panel shows predicted increases in SAS groundwater levels of up to 10 feet occur in the immediate vicinity of the MFL water bodies where simulated recharge is applied in the model. The UFA panel shows the difference in median simulated UFA potentiometric surface levels between the Baseline Condition and Scenario 6A. Predicted increases in UFA potentiometric surface levels of 5 to 10 feet occur in in the vicinity of the MFL water bodies where simulated recharge is applied in the model. The LFA panel shows the difference in median simulated LFA potentiometric surface levels between the Baseline Condition and Scenario 6A. No appreciable increases in LFA potentiometric surface levels were observed from the model output.

Scenario 6B simulates all recharge through direct injection to the UFA Layer. Simulated recharge injection rates are summarized in **Table E-25** under the Scenario 6B heading. **Figure E-17** shows the difference in median simulated groundwater levels between the Baseline Condition and Scenario 6B. The SAS panel shows predicted increases in SAS groundwater levels of up to 3 feet occur in the vicinity of the MFL lakes along the Lake Wales Ridge in Polk County where simulated recharge was applied in the model. The UFA panel shows the predicted increases on UFA potentiometric surface levels of up to 5 feet occur near the MFL lakes along the Lake Wales Ridge in Polk County and up to 3 feet near the MFL water bodies in central Polk County. The LFA panel shows the difference in median simulated LFA potentiometric surface levels between the Baseline Condition and Scenario 6B. No appreciable increases in LFA potentiometric surface levels were observed in Scenario 6B.

Table E-25. Simulated recharge rates to assess MFL recovery or prevention.

MFL Lake or Spring	Scenario 6A				Scenario 6B			
	Application Type	Application Rate (mgd)	Number	Flow per Well/RIB (mgd)	Application Type	Application Rate (mgd)	Number	Flow per Well (mgd)
Lakes Apshawa[a]	RIB	0.25	1	0.25	Injection	0.4	1	0.4
Eagle Lake		0.3	2	0.2		3.3	5	0.7
Lake Starr		0.12	1	0.12		0.8	2	0.4
Crooked Lake		5.8	16	0.4		7.7	5	1.5
Lake Wailes		4.2	12	0.4		4.0	5	0.8
Lake McLeod[b]		0.6	4	0.2		1.0	4	0.3
Rock Springs[c]	Injection	0.5	1	0.5		0.5	1	0.5
Wekiwa Springs		0.5	1	0.5		0.5	1	0.5
Starbuck Spring		0.0	0	-		0.0	0	-
Palm Springs		10.0	1	10.0		10.0	1	10.0
Total		**22.3**				**28.2**		

[a] – Includes both South and North Lake Apshawa.

[b] – Lake McLeod did not have a water budget model or UFA measuring stick. It was included in this analysis because of its proximity to Eagle Lake. It was not included in the summary of MFL sites “not meeting” adopted levels presented in CFWI RWSP Volume IA, Appendix F, Table F-8.

[c] – In general, the list of water bodies selected for evaluation using targeted recharge were water bodies identified in the RWSP as “not meeting” adopted MFLs under 2015 pumping conditions (Baseline Condition for this document). Rock Springs was not meeting the minimum flow for the 2015 scenario performed for the CFWI RWSP; however, it was determined to meet the adopted MFLs following the updated analysis performed as part of the Solutions Planning effort.

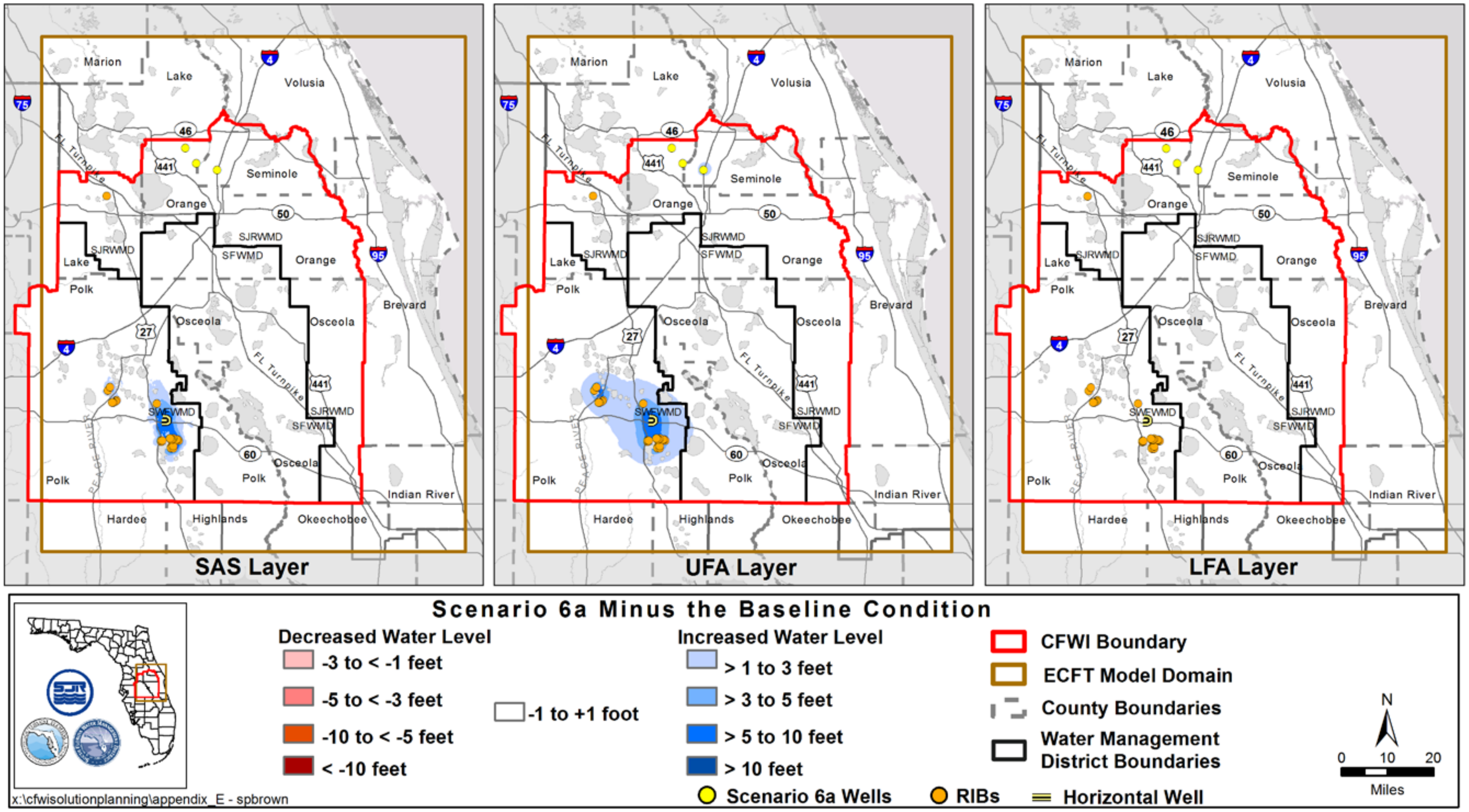


Figure E-16. Scenario 6A Minus the Baseline Condition for conceptual recharge facilities. Higher water levels are shown in blue and lower water levels are shown in red. Water level changes between +1 and –1 ft are not shown.

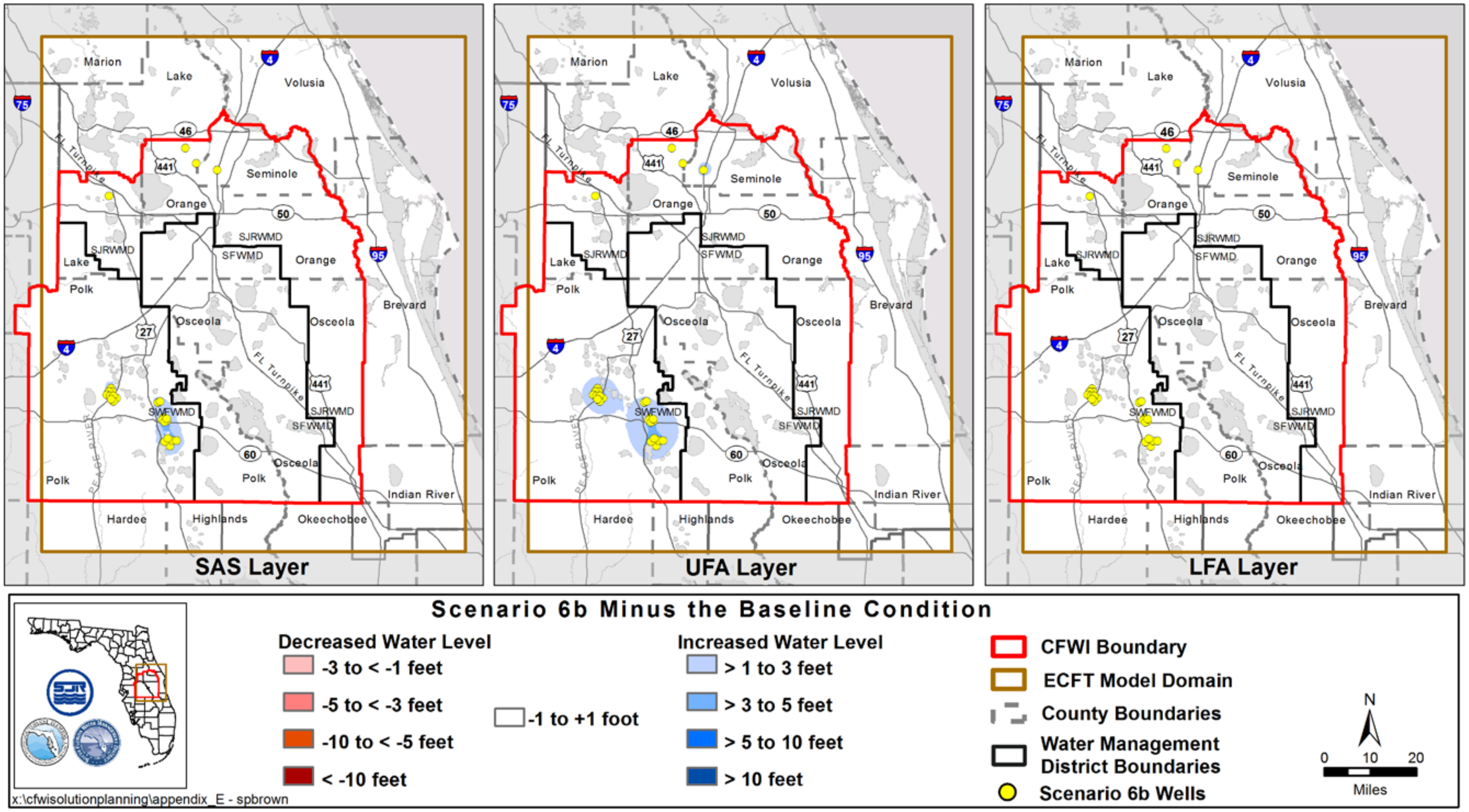


Figure E-17. Scenario 6b Minus the Baseline Condition for conceptual recharge facilities. Higher water levels are shown in blue and lower water levels are shown in red. Water level changes between +1 and –1 ft are not shown.

Scenario 8a1

Figure E-18 shows the difference in median simulated SAS groundwater levels between the Baseline Condition and Scenario 5b2 (Scenario 8a1). The intent of this scenario is to represent the implementation of non-groundwater AWS supplied to meet projected demands. Changes in SAS water levels fall in the range of -1 ft to +1 ft. While these changes are relatively small, they are still large enough to have appreciable predicted effects on non-MFL wetlands. The UFA panel shows the difference in median simulated UFA potentiometric surface levels between the Baseline Condition and Scenario 8a1. No appreciable changes in UFA potentiometric surface levels are observed. **Figure E-18** shows the difference in median simulated LFA potentiometric surface levels between the Baseline Condition and Scenario 8a1. No appreciable changes in LFA potentiometric surface levels are observed.

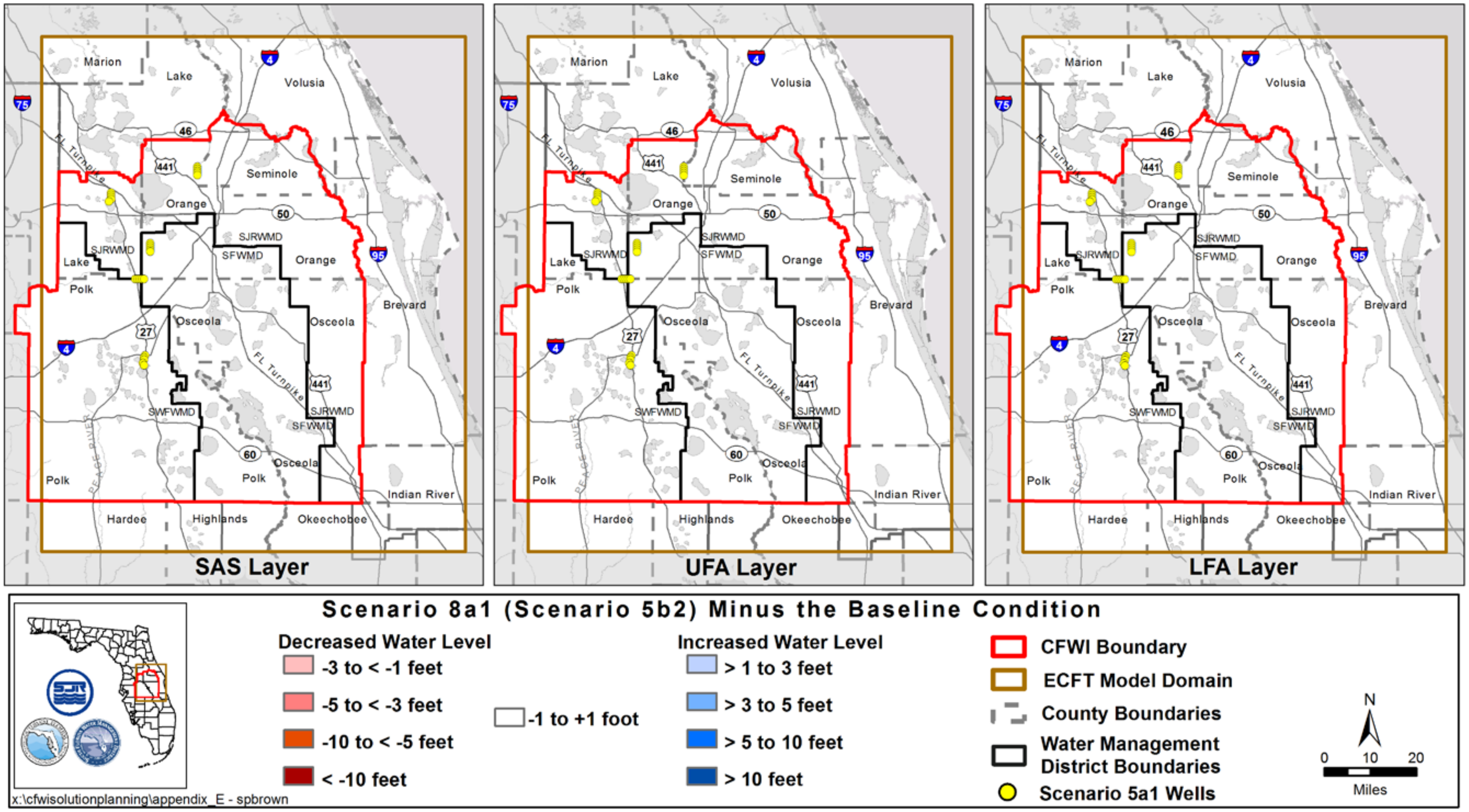


Figure E-18. Scenario 8a1 (Scenario 5b2) Minus Baseline Condition for insight to evaluate effects of non-groundwater AWS (conceptual wellfields). Higher water levels are shown in blue and lower water levels are shown in red. Water level changes between +1 and –1 ft are not shown.

E-1

Revised Landscape Irrigation Approach

For the Central Florida Water Initiative (CFWI) East Central Florida Transient (ECFT) Groundwater Flow Model

prepared by
Uditha Bandara, SFWMD 11/05/2014

OVERVIEW

Landscape irrigation (LSI) occurs generally in the residential/commercial mixed land use areas served by PS systems. LSI is an important component of the water balance that uses a portion of the available reclaimed water flow and is combined with rainfall, potable water, and other irrigation water to satisfy landscape irrigation needs. The combined irrigation water applied to the land satisfies plant water needs. Some of the irrigation water will return to the atmosphere through evapotranspiration, some will usually discharge to surface waters as runoff, and some will travel by infiltration and percolation through the soil to the water table to complete the water cycle.

The CFWI Hydrologic Analysis Team (HAT) determined that the LSI return-flow approach previously used in the ECFT Groundwater Model to support the CFWI RWSP planning phase had several drawbacks. These include inaccurate estimates of LSI quantities in some counties, mass balance errors, and lack of temporal variation in the LSI application to reflect the climatic and seasonal hydrologic conditions. As part of the CFWI Solutions Planning Phase, a revised approach has been developed, which overcomes the drawbacks of the previous method. Some of the major improvements of the revised approach are: (1) a more rigorous estimation of LSI quantities at the county level, (2) a more comprehensive accounting of the water mass balance (groundwater pumping versus irrigation), (3) use of variable temporal application rates to represent the climatic and seasonal hydrologic conditions, and (4) use of different irrigation rates for ridge and plain areas to represent increased irrigation rates in ridge areas. Compared to the previous approach, noteworthy changes in LSI quantities resulted for Orange, Seminole, Polk, Brevard, and Osceola counties. Using the revised LSI approach to simulate the 2005 Reference Condition, Orange and Seminole counties together received about 45 million gallons per day (mgd) more LSI while Polk and Brevard counties received about 18 mgd and 15 mgd less LSI, respectively, than the previous approach. About 5 mgd of additional net LSI was applied to the entire model domain in the revised approach in 2005 Reference Condition simulation. Additionally, the total public water supply pumping was reduced by about 23 mgd from the previous model based on updated water use information.

Method

Public Supply (PS) utility service areas are the areas defined to receive LSI. The services areas are aggregated at the county level because of the complexity of characterizing the distribution of reclaimed water in the utility service areas for all of the utilities in the CFWI Planning Area. There are often instances where utilities' potable water, wastewater, and reclaimed water service areas overlap and other instances where utilities serve potable, wastewater, and reclaimed water outside their service area via agreements between utilities. Adequately capturing these complexities in the timeframe available for this effort was deemed to be infeasible. Therefore, distributing LSI water with a mass balance aggregated at the county-level is considered a reasonable and simplifying assumption to address this issue.

Outdoor use of potable water and reclaimed water are the two primary sources of LSI water associated with PS systems. The portion of the potable water that gets applied as LSI (e.g., outdoor water use) was estimated by subtracting the indoor water use from the total PS pumping. Indoor water use is assumed to be equal to wastewater flow. Only a portion of reclaimed water generated is used for LSI purposes, which was considered in this analysis. Both historical wastewater treatment flows and reclaimed water use data were obtained from the Florida Department of Environmental Protection (FDEP) for the municipal wastewater systems. Historical reclaimed water LSI quantities were extracted from FDEP's data based on the assumptions noted above. These calculations were compiled at the county level for input to the ECFT groundwater flow model.

For the 2005 Reference Condition, LSI rates were estimated as the summation of outdoor potable water use and reclaimed water derived for each county. Then the total applied LSI is expressed as a fraction of the total PS used within each basis group. These ratios are utilized to calculate LSI flows using the projected PS total water demands. This is believed to be a reasonable assumption in estimating future LSI quantities since both outdoor potable and reclaimed water uses are proportional to PS supplies.

Additionally, a comparison of the revised approach with the previous approach is discussed and LSI applied in 2005 Reference Condition and Baseline Condition simulations are summarized herein. A flow chart showing how LSI gets applied in the ECFT model is shown in **Attachment E-A**. A step-by-step procedure to estimate the LSI quantities and derivation of the LSI application rates for model cells is described in the **Attachment E-B**.

Estimation of historical percent irrigation from PS

Historically applied LSI as a percentage of PS was estimated for 2005, which is used as the Reference Condition for CFWI simulations. **Table E-1-1** shows the calculated distribution of irrigation flows for the 2005 Reference Condition. Total LSI calculated in column "f" is the 12-year average annual daily flow.

Table E-1-1. Percent Return and Irrigation Flows for the 2005 Reference Condition.

(a) County	(b) Total PS Supplies (mgd)	(c) Indoor water use (Wastewater Flow) (mgd)	Outdoor water use (mgd)			(g) Total irrigation from PS (percent) (f/b*100)
			(d) LSI from potable water (b-c)	(e) LSI from reclaimed water	(f) Total LSI (d+e)	
Brevard+Cocoa[A]	59.4	39.1	20.3	16.3	36.6	61.6
Hardee	1.6	1.5	0.1	0	0.1	6.7
Highlands	4.7	1.5	3.2	0	3.2	68.6
Indian River[C]	0.3	0.2	0.2	0	0.2	50.0
Lake	40.4	12.9	27.5	2.6	30.1	74.5
Marion[C]	5.2	2.6	2.6	0	2.6	50.0
Okeechobee	0.0	0.0	0.0	0	0.0	0.0
Orange + Seminole –Cocoa[B]	247.9	141.5	106.4	38.4	144.8	58.4
Osceola	36.5	20.1	16.4	9.5	25.9	71.0
Polk	76.8	32.5	44.2	3.4	47.6	62.1
St. Lucie	0.0	0.0	0.0	0	0.0	0.0
Sumter	7.9	2.0	5.9	1.7	7.6	96.1
Volusia	32.9	16.0	16.9	9.8	26.7	81.0
Total PS-2005	**513.4**	**269.8**	**243.6**	**81.7**	**325.3**	**63.4**

[A] PS in Brevard County plus the City of Cocoa's pumping (26.86 mgd). The City of Cocoa's water supply facilities are located in Orange County, and the City's service area is wholly within Brevard County, outside of the CFWI Planning Area.

[B] PS in Orange and Seminole counties minus the City of Cocoa's pumping.

[C] Percentages are assumed as not enough data were available to estimate.

Comparison of the revised approach with the previous approach

Compared to the previous approach to calculate LSI in the CFWI RWSP, the revised approach resulted in higher LSI flows in Orange, Seminole, Osceola, Hardee, and Sumter counties, and lower LSI flows in Polk, Lake, Brevard, Highlands, Indian River, and Marion counties. The most significant change occurred in Orange and Seminole counties, where an additional 45.3 mgd was applied using the revised approach. In Brevard, Highlands, Indian River, Lake, Marion, Polk, and Volusia counties, less LSI resulted from the revised approach compared to the previous approach. The most significant reduction in LSI was observed in Polk and Brevard counties where the reductions are about 17.6 and 14.9 mgd respectively. The results are summarized in **Table E-1-2**.

Table E-1-2. Simulated Percent Irrigation comparing the previous and the revised LSI approach using the 2005 Reference Condition (RC).

Basis Group	Previous LSI Approach			Revised LSI Approach			Difference (Revised-Previous)
	PS	LSI	LSI/PS (%)	PS	LSI	LSI/PS (%)	
Brevard+Cocoa	32.3	51.4	159.1	59.4	36.6	61.6	-14.9
Hardee	1.6	0.0	0.0	1.6	0.1	6.7	0.1
Highlands	4.8	6.4	132.8	4.7	3.2	68.6	-3.2
Indian River	0.3	1.1	380.0	0.3	0.2	50.0	-1.0
Lake	44.4	34.9	78.5	40.4	30.1	74.5	-4.8
Marion	5.6	5.1	90.2	5.2	2.6	50.0	-2.5
Okeechobee	0.0	0.4	0.0	0.0	0.0	0.0	-0.4
Orange+Seminole -Cocoa[A]	282.5	99.4	35.2	247.9	144.8	58.4	45.3
Osceola	37.6	19.8	52.7	36.5	25.9	71.0	6.1
Polk	79.0	65.2	82.6	76.8	47.6	62.1	-17.6
St. Lucie	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sumter	5.2	1.9	36.5	7.9	7.6	96.1	5.7
Volusia	35.3	34.3	97.2	32.9	26.7	81.0	-7.6
Total	**528.7**	**319.9**	**60.5**	**513.4**	**325.3**	**63.4**	**5.3**

[A] PS in Orange and Seminole counties minus the City of Cocoa's pumping.

The simulated water level differences between the Reference Condition with the revised LSI approach and the Reference Condition with the previous LSI approach for the SAS layer and the UFA layer are shown in **Figures E-1-1** and **E-1-2**, respectively. Higher water levels in the revised LSI approach are shown in blue and lower water levels are shown in red. This is consistent with the changes of LSI application rates given in **Tables E-1-3 and E-1-4**. The highest increase simulated in SAS groundwater levels was in Orange and Seminole counties, which is approximately 5 feet where LSI rates increased. The highest decrease in simulated SAS groundwater levels was in Brevard and Polk counties, which is approximately 2 feet where the LSI rates decreased. In the LFA layer the highest increase in simulated groundwater levels is about 0.5 foot in Orange and Seminole counties, while the greatest decrease in simulated groundwater levels is about 0.5 foot in Polk, Brevard, and Highland counties.

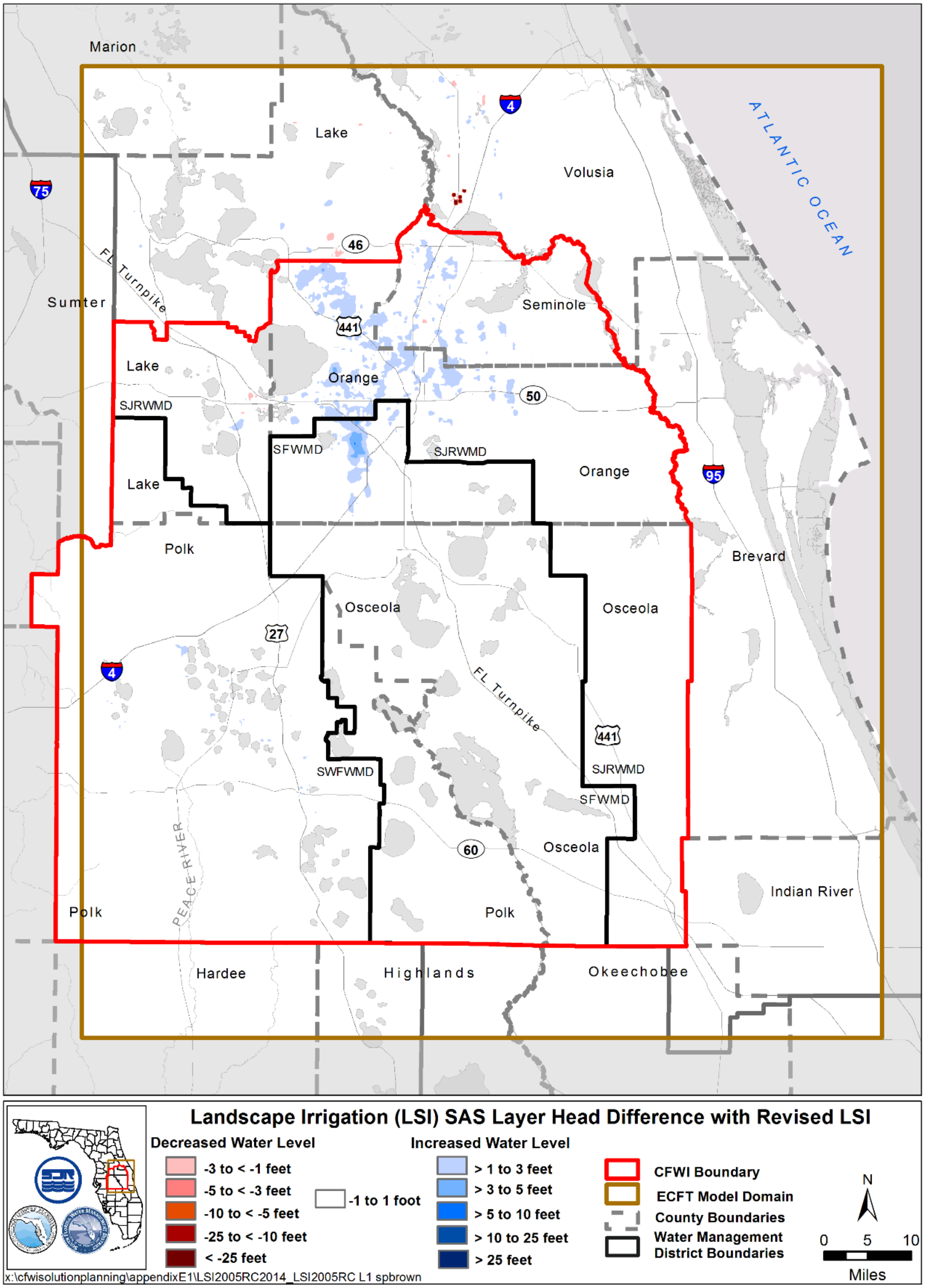


Figure E-1-1. Head difference for the SAS Layer between the 2005 Reference Condition from irrigation using the revised LSI approach and the 2005 Reference Condition from irrigation using the previous LSI approach. Higher water levels are shown in blue and lower water levels are shown in red. Water level changes between +1 and –1 ft are not shown.

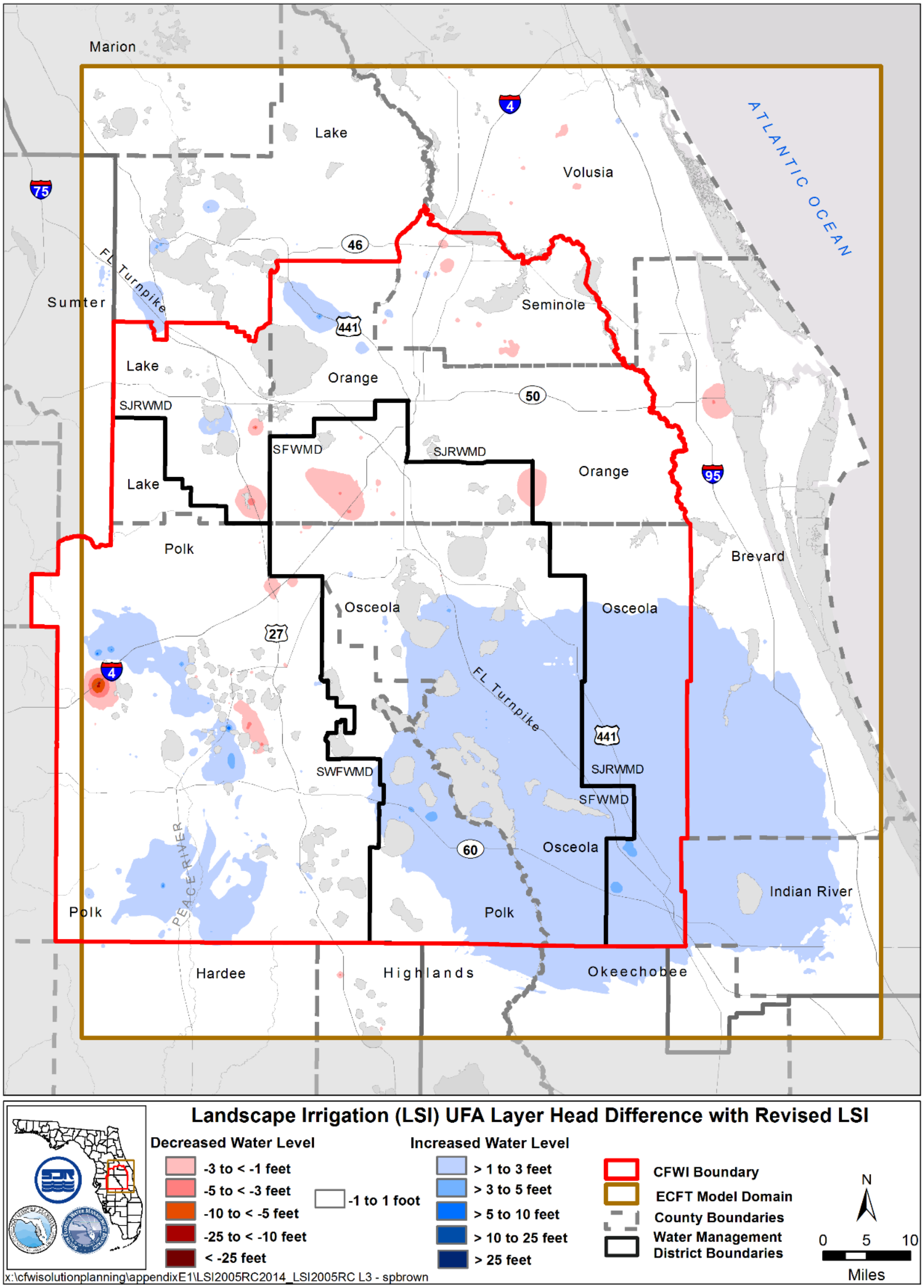


Figure E-1-2. Water level difference for the UFA Layer between the 2005 Reference Condition from irrigation using the revised LSI approach and from irrigation using the 2005 Reference Condition using the previous LSI approach. Higher water levels are shown in blue and lower water levels are shown in red. Water level changes between +1 and –1 ft are not shown.

Table E-1-3. Summary of the distribution of 2005 Reference Condition LSI rates simulated in the Revised LSI model.

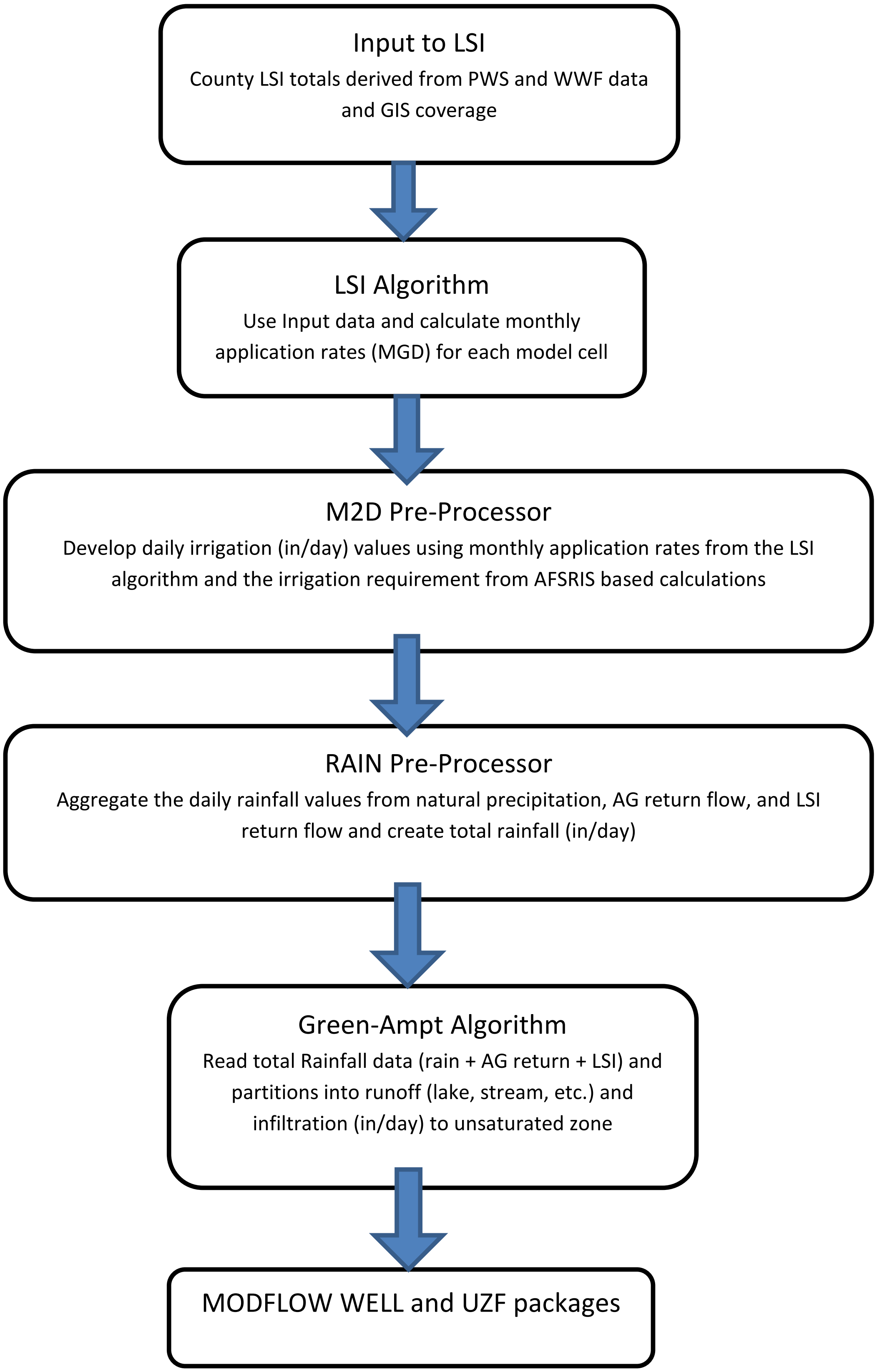
2005 Reference Condition				
County	**Potable LSI (mgd)**	**Reclaimed LSI (mgd)**	**12-yr avg PS (mgd)**	**Total LSI (mgd)**
Brevard+Cocoa	20.1	16.2	59.2	36.3
Hardee	0.1	0.0	1.6	0.1
Highlands	3.3	0.0	4.8	3.3
Indian River	0.2	0.0	0.3	0.2
Lake	31.5	2.9	44.4	34.4
Marion	3.1	0.0	5.6	3.1
Okeechobee	0.0	0.0	0.0	0.0
Orange+Seminole-Cocoa	114.2	39.6	255.7	153.8
Osceola	17.5	9.8	37.6	27.2
Polk	46.5	3.5	79.0	50.0
St. Lucie	0.0	0.0	0.0	0.0
Sumter	3.2	1.1	5.2	4.3
Volusia	19.3	10.5	35.3	29.8
Total	**259.0**	**83.5**	**528.7**	**342.5**

Table E-1-4. Summary of the distribution of LSI rates for the Baseline Condition simulated in the Revised LSI model.

Baseline Condition				
County	**Potable LSI (mgd)**	**Reclaimed LSI (mgd)**	**12-yr avg PS (mgd)**	**Total LSI (mgd)**
Brevard+Cocoa	20.8	16.7	60.8	37.4
Hardee	0.1	0.0	2.0	0.1
Highlands	3.9	0.0	5.7	3.9
Indian River	0.2	0.0	0.4	0.2
Lake	36.2	3.4	53.3	39.7
Marion	3.4	0.0	6.8	3.4
Okeechobee	0.0	0.0	0.0	0.0
Orange+Seminole-Cocoa	134.7	48.6	313.7	183.3
Osceola	20.3	11.7	45.1	32.0
Polk	54.3	4.1	94.3	58.5
St. Lucie	0.0	0.0	0.0	0.0
Sumter	4.7	1.4	6.2	6.0
Volusia	21.7	12.6	42.4	34.3
Total	**300.3**	**98.5**	**630.6**	**398.8**

Attachment E-A

LSI flow chart



Attachment E-B

1. Identify LSI locations and calculate flow rates

a. **Identify landscape Irrigation locations**

   i. Delineate developed areas in geographical information systems (GIS) land use coverage (2004 map).
   ii. Overlay utility service area (potable and reclaimed water) map and identify different application regions belonging to each county.
   iii. Overlay wetland/water features coverage developed by the CFWI Environmental Measures Team (EMT) and percent impervious coverage developed by the CFWI Groundwater Availability Team (GAT) to delineate pervious areas within each cell within each irrigation application area.
   iv. Overlay the geographical region (e.g., physiographic province) map used in EMT analysis (Brooks 1981) and classify cells as ridge or plain.

b. **Calculate monthly application rates**

   i. Using the map produced in step "a", calculate the percentage pervious areas in each cell located in developed areas in each irrigation application area in a given county.
   ii. Normalize the pervious area calculated for each cell by the total pervious area within the respective irrigation application area in a given county.
   iii. Multiply the total irrigation given in Column **(f)** in **Table E-1-1** by the normalized percent pervious area for each cell to calculate the flow rate for each cell. Column **(f)** in **Table E-1-1** is the average annual daily flow; therefore the calculated LSI is the average annual daily LSI flow.

c. **Develop the temporal variation curve for LSI**

   i. Peaking factors are derived from the outdoor portion of the average pumping of all utilities in a given county (flow weighted average). Utilities with larger pumping have more influence on the peaking factors than utilities with smaller pumping. The following steps describe the derivation of peaking factors and temporal variation curve for LSI.
   ii. Locate utilities that provide service within a given county.
   iii. Calculate the total pumping for each of 144 stress periods from all wells/ utilities for each county.
   iv. Obtain the outdoor portion of the total pumping used for LSI for each 144 stress period by subtracting the indoor water use in column (c) in **Table E-1-1** from values obtained in step (iii).
   v. The array of peaking factors for each county are obtained by dividing the outdoor potable LSI county array obtained in step (iv) by total outdoor potion of the water use given in column **(d)** of **Table E-1-1.**
   vi. Calculate the temporal variation of LSI in each cell by multiplying the average annual daily flow obtained in step "**b"** by peaking factors obtain in step c.v.

vii. Sum up all the LSI in each cell for 144 stress periods and calculate the average to check the correct distribution of LSI within the irrigable area in each county.

d. **Increase the ridge area application rate by 20 percent**

i. It has been observed that the ridge area LSI application rates are higher than the plain area application rates due to the fact the depth to the water table is typically greater in ridge area than in plain areas and the permeability of the soil is typically in ridge areas than in plain areas. The factor of 20 percent was based on professional judgment of various members of the HAT.

ii. Calculate the total ridge and plain areas and LSI volumes applied to ridge and plain areas within each county.

iii. Calculate application rates for ridge and plain areas by dividing the LSI volumes by the respective area. Note that at this stage, ridge and plain application rates are the same since the same normalization is applied within the county.

iv. Increase the ridge area application rate by 20 percent and calculate the new ridge LSI volume within the region by multiplying by the ridge area.

v. Calculate the LSI volume in plain areas by subtracting the ridge LSI volume from total LSI volume within the region. Back calculate the application rates in plain areas.

vi. Recalculate the LSI rate to each cell based on ridge-plain weighted LSI volumes. This is intended to maintain the applied irrigation water equal to the available LSI water.

vii. Sum up the LSI in each cell for 144 stress periods and calculate the average to check for the correct distribution of LSI within each application area.

e. **Identify and calculate the daily irrigation rates**

i. During the previous LSI approach, LSI demands were calculated using the Agricultural Field Scale Irrigation Requirements Simulation (AFSIRS) irrigation demand model.

ii. Using AFSIRS-generated irrigation demand curves, identify the days in which irrigation is required.

iii. In the case of a new cell that was not included in the previous approach, an average irrigation demand curve for the county where the cell is located.

iv. Daily application rates were determined by multiplying the monthly average by the number of days in a given month and dividing by the number of days that actual irrigation occurs (AFSIRS calculated). Then irrigation was applied in the AFSIRS calculated days in a given month.

v. In the model irrigation is applied to each cell as an irrigation depth, which is obtained by dividing the irrigation rates by the model cell area (1,250 x 1,250 sq. miles).

vi. Daily irrigation depths were added to the total rainfall array that is run through the Green-Ampt preprocessor to partition rainfall plus irrigation into runoff and the infiltration applied in the ECFT model.

2. Projection of future LSI

a. Multiply the historical (2005 reference condition) ratios of LSI flow rates to PWS (Column **(g)** in **Table E-1-1**) by the projected PWS demand to obtain the projected LSI rates.
b. Distribute the total LSI similar to the reference condition as described in **1b-1e.**
c. For LSI for planning solution simulations, use the 2004 land use map because it is the most current land use map over the model domain.

This Page Intentionally Left Blank.

E-2

Scenario 6 Simulation Development

SCENARIO 6

Introduction

Based on the modeled effects of projected 2015 demands for groundwater, it is estimated that up to 11 lakes and springs (**Table E-2-1**) with MFLs are or could be categorized as in recovery or prevention. The MFL lakes are North and South Apshawa, Crooked, Eagle, McLeod, Starr, and Wailes; the springs are Rock, Wekiwa, Starbuck, and Palm.

A significant aspect of determining the long-term sustainable quantity of groundwater that can be developed is that projected adverse effects on sensitive water bodies can be mitigated. The purpose of the simulations performed for Scenario 6 is to demonstrate the potential to use recharge to mitigate these effects and, where appropriate, achieve compliance with adopted MFLs. It is also recognized that there are secondary benefits of recharge projects that are developed to address specific water bodies. That is, overlapping effects of nearby recharge projects can create a benefit to other water bodies. Finally, it should be noted that these simulations are designed to estimate the quantities of water needed to ameliorate the projected MFL status of these water bodies and are conceptual recharge projects without identifying the source of the recharge water.

Approach

Scenario 6 investigated the potential effects of recharge on lake levels and Upper Floridan Aquifer (UFA) levels as a result of the application of water through Rapid Infiltration Basins (RIBs) and/or direct recharge into the UFA. RIB performance was evaluated based on the impact they had on surficial aquifer and lake water levels as opposed to UFA water levels. As such, RIBs were expected to require less water than injection wells into the UFA due to the effects of the RIBs on the SAS water levels near the lake. Also, treatment requirements are less stringent for application of water to appropriately-located RIBs than direct recharge applications.

An alternative to RIBs that was evaluated was horizontal wells or French drain systems. This approach was used for Lake Wailes. This lake is highly developed, with few opportunities for RIB development. However, the lake requires relatively significant inflow to maintain water levels at or above the MFL. To accomplish this, a horizontal well was simulated by applying water to the model in a line of model cells on the north, south, and east sides of the lake. This approach allows for augmentation of lake levels with reclaimed water without the vast areas of land required for the RIBs. Other lakes, such as Crooked Lake, may benefit from this type of approach even though they were simulated with individual RIB sites in Scenario 6.

The distribution of flow in the RIBs was based on maintaining a water level recovery that was small enough to avoid potential flooding issues, but extensive enough to impact the lakes to the degree required by their MFL shortfalls. The horizontal well extending through

12 model cells for Lake Wailes predominantly follows a small road/trail near the edge of the lake. This horizontal well does not require a great deal of space to operate. The 16 RIBs at Crooked Lake represent actual RIBs occupying a 1,250 feet by 1,250 feet area each. Using this amount of the lake's northern shore for RIBs may not be practical, and a horizontal well may also make more sense at this location.

The applied flow to each RIB and the horizontal well was simulated to vary through time. It was assumed that water availability fluctuations to the hypothetical RIBs in this scenario would be similar to the water availability fluctuations observed in existing RIBs at Water Conserv II. To determine the mean flow rate required to each RIB, a steady-state version of the ECFT model (ECFSS) was used to simulate the application scenarios. The flow fluctuations at the existing RIBs facilities were scaled appropriately to maintain the peaking factors, but at the required mean flow rate. The transient ECFT model was used to evaluate the fluctuating RIBs which allowed a better determination of the number of RIBs required per lake and the distribution of RIBs around the lake.

The direct recharge wells are much easier to site, requiring only a small open area to allow for construction and operation. They could also be constructed adjacent to the lake shore, minimizing the impacts of the natural flow gradient. Treatment requirements for direct recharge applications make this option difficult to implement.

In general, the wells were distributed in the model in a way to keep each well's flow rate below 2 mgd and to spatially cover as much of each lake as possible. A notable exception is the single cell used to simulate direct recharge at Palm Springs. Each model cell is large enough that 2 or 3 wells could be represented by one cell, but in other areas the goal was to represent each cell as a unique well. The Palm Springs area requires a flow of approximately 10 mgd, but was simulated with a single cell because there was insufficient space to use additional wells. Additional investigation of this area may be required to determine whether a flow of 10 mgd is truly required for this single spring, or if there are other locations available to place additional wells to better distribute the injected flow.

Flow to the direct recharge wells was held constant throughout the simulation. Unlike the RIBs and horizontal well, the direct recharge wells will require the water to at least meet potable water standards. For the water to be recharged, the source, seasonal availability, its quality, and treatment requirements are currently not identified. Due to these uncertainties, it was deemed to be inappropriate to add complexity with a detail such as supply fluctuations that was so unknown.

Table E-2-1 displays the mean flow rates simulated at each lake and spring, the number of RIBs, horizontal wells, or direct recharge wells, and the flow rate per RIB or well.

A consideration in development of the flow rates for both Scenarios 6A and 6B was the combined influence of nearby wells. This was particularly notable for Lake Wailes and Crooked Lake. The recharge flow rates for each of these lakes are relatively high, and groundwater recovery extends far beyond each of these lakes. This recovery is large enough to influence the required flow rate at other lakes. This cumulative effect made it important to consider the change that would occur at nearby lakes when the flow rate was modified at another lake.

Table E-2-1. RIB and Recharge Well Set-Up for Scenario 6.

MFL Lake or Spring	Scenario 6A				Scenario 6B			
	Application Type	Application Rate (mgd)	Number	Flow per Well/RIB (mgd)	Application Type	Application Rate (mgd)	Number	Flow per Well (mgd)
Lakes Apshawa[a]	RIB	0.25	1	0.25	Recharge	0.4	1	0.4
Eagle Lake		0.3	2	0.2		3.3	5	0.7
Lake Starr		0.12	1	0.12		0.8	2	0.4
Crooked Lake		5.8	16	0.4		7.7	5	1.5
Lake Wales		4.2	12	0.4		4.0	5	0.8
Lake McLeod[b]		0.6	4	0.2		1.0	4	0.3
Rock Springs	Recharge	0.5	1	0.5		0.5	1	0.5
Wekiwa Springs[c]		0.5	1	0.5		0.5	1	0.5
Starbuck Spring		0.0	0	-		0.0	0	-
Palm Springs		10.0	1	10.0		10.0	1	10.0
Total		**22.3**				**28.2**		

a – Includes both South and North Lake Apshawa.

b – Lake McLeod did not have a water budget model or UFA measuring stick. It was included in this analysis because of its proximity to Eagle Lake. It was not included in the summary of MFL sites "not meeting" adopted levels presented in CFWI RWSP (2015b) Appendix F, Table F-8.

c – In general, the list of water bodies selected for evaluation using targeted recharge were water bodies identified in the RWSP as "not meeting" adopted MFLs under 2015 pumping conditions (Baseline Condition for this document). Rock Springs was not meeting the minimum flow for the 2015 scenario performed for the CFWI RWSP (CFWI 2015b); however, it was determined to meet the adopted MFLs following the updated analysis performed as part of the Solutions Planning effort.

Summary

Scenario 6 consists of two scenarios: A and B. Scenario 6A simulated a combination of RIBs, a horizontal well, and direct UFA recharge wells. Scenario 6B exclusively simulated direct UFA recharge wells. Scenario 6A required a total flow rate of approximately 22 mgd to maintain the lakes and springs at or near their MFL levels. Scenario 6B required a total flow rate of approximately 28 mgd to accomplish the same goal.

These results indicate that it may be possible to mitigate the impacts of groundwater withdrawals with strategically placed recharge sites. As withdrawals increase, the applied recharge will have to correspondingly increase, but these results show it is possible to mitigate the negative impacts of wellfield withdrawals on sensitive water bodies such as MFL sites.

This Page Intentionally Left Blank.

F

Solutions Strategies Environmental Evaluation

OVERVIEW

To identify environmental impact limits that could be used to develop planning-level estimates of groundwater availability supporting solutions planning, potential impacts of cumulative water use on the environment and groundwater resources were evaluated using the East Central Florida Transient (ECFT) groundwater model and water resource constraints or considerations called "measuring sticks." Measuring sticks associated with minimum flows and levels (MFL) included MFL constraints and considerations as discussed in more detail in **Volume II**, **Chapter 4**, in **Volume I**, **Chapters 3** and **4**, and in **Volume IA**, **Appendix B** of the CFWI RWSP.

Two rounds of Solutions Planning Phase modeling, comprised of ten scenarios, were conducted as part of the CFWI Solutions Planning Phase (**Tables F-1** and **F-2**). The first four scenarios consisted of permitted and proposed projects. The remaining six scenarios were conceptual in nature, generally simulating management options often intended to minimize environmental concerns. All of these scenarios were evaluated for impacts to MFL constraints and considerations based on the approach used for the CFWI RWSP. The locations of adopted and proposed MFLs and reservations are presented in **Figure F-1**. Detailed results of the MFL water body evaluations are presented in **Tables F-3** through **F-10**.

Application of the ECFT Groundwater Model to the CFWI Solutions Planning Phase

For the CFWI Solutions Planning Phase, the ECFT model served as a common tool to simulate groundwater conditions to evaluate the effects of proposed groundwater projects and associated water use changes as well as conceptual strategies of the area's water resources.

To do this, model outputs of water levels and flows were delivered to the Environmental Evaluation Subteam (EE Subteam) for them to assess water resource conditions of water bodies with adopted minimum flow and level (MFL), other non-MFL water bodies, and the risk-based statistical method developed to evaluate the status of non-MFL wetlands in the CFWI Planning Area.

The benchmarks used to assess the sustainable limit of groundwater supplies are unacceptably stressed ecological conditions of wetlands and lakes, reduced groundwater levels that are insufficient to limit unacceptable saltwater intrusion, and unacceptable reductions in river and spring flows directly attributable to reduced aquifer water levels (drawdowns) from modeled projected increases in groundwater withdrawals with comparisons to observed conditions. The ECFT model was used to calculate changes in water levels and spring flows by comparing the simulation results of various proposed projects and concepts. Assessments of the relationships between water levels and changes to wetland and lake conditions and spring flows were performed by the EE Subteam and are evaluated in subsequent sections of this appendix.

MFL WATER BODY EVALUATION

Table F-1. Summary of Round 1 Project-based scenarios.

Scenario Name	Model Run Number	Scenario Description
Lower Floridan Aquifer Wellfield Scenario	2	LFA withdrawals from South Lake County to supply 12.7 mgd (15.9 mgd withdrawal), Cypress Lake at 20.5 mgd (25.6 mgd) and Southeast Polk County at 30 mgd (37.5 mgd).
South Lake County Wellfield – Centralized Scenario	2A	LFA withdrawals to supply 12.7 mgd (15.9 mgd withdrawal) from a centralized wellfield in South Lake County area
South Lake County Wellfield – Distributed Scenario	2B	LFA withdrawals to supply 12.7 mgd (15.9 mgd withdrawal) from wells owned by municipalities in the South Lake County area
Polk County Blended LFA Distributed Wellfield Scenario	3C	LFA withdrawals (6.4 mgd) by utilities blended with existing (60.5 mgd) and increased (3.4 mgd) UFA withdrawals to obtain 9.8 mgd of supply and 20.2 mgd (25.2 mgd) of supply from Southeast Polk County wellfield. Scenario also includes Cypress Lake at 20.5 mgd (25.6 mgd) and South Lake County at 12.7 mgd (15.9 mgd), the same as in Scenario 2.

Table F-2. Summary of Round 2 Conceptual Management Options.

Scenario Name	Model Run Number	Description
Conceptual LFA Centralized Wellfield	4a1	Baseline Condition with a hypothetical 62.5 mgd (50 mgd finished water) LFA wellfield in south-central Osceola County.
Conceptual LFA Distributed Wellfield	4a2	Baseline Condition with five hypothetical 12.5 mgd (10 mgd finished water) LFA wellfields (one wellfield in each of the five CFWI counties).
Shift Withdrawals from UFA to LFA	4b	BaselineCondition with five hypothetical 10 mgd UFA wellfields (Senario 4b1) converted to five 12.5 mgd LFA wellfields (Scenario 4b2)
Move UFA Withdrawals away from Susceptible Areas	5a	Baseline Condition condition with five hypothetical 10 mgd UFA wellfields moved from locations potentially susceptible to groundwater withdrawals (Scenario 5a1) to locations potentially not as susceptible to groundwater withdrawals (Scenario 5a2)
Replace UFA Withdrawals with Non-groundwater AWS	5b	5a baseline scenario (Scenario 5a1) with the pumping at the five hypothetical UFA wellfields set to 0 mgd (Scenario 5b2).
Targeted Recharge for MFL Waterbodies	6	Baseline Condition with recharge applied via injection wells or RIBs at quantities required to bring MFL water bodies currently not meeting or projected to not meet adopted MFLs into compliance.
Landscape Irrigation with Non-groundwater AWS	8	Evaluates only the effect of the increase in LSI that would occur in the same areas that received LSI in the Baseline Condition simulation due to an increase in water use associated with a non-groundwater AWS source (e.g., surface water or stormwater).

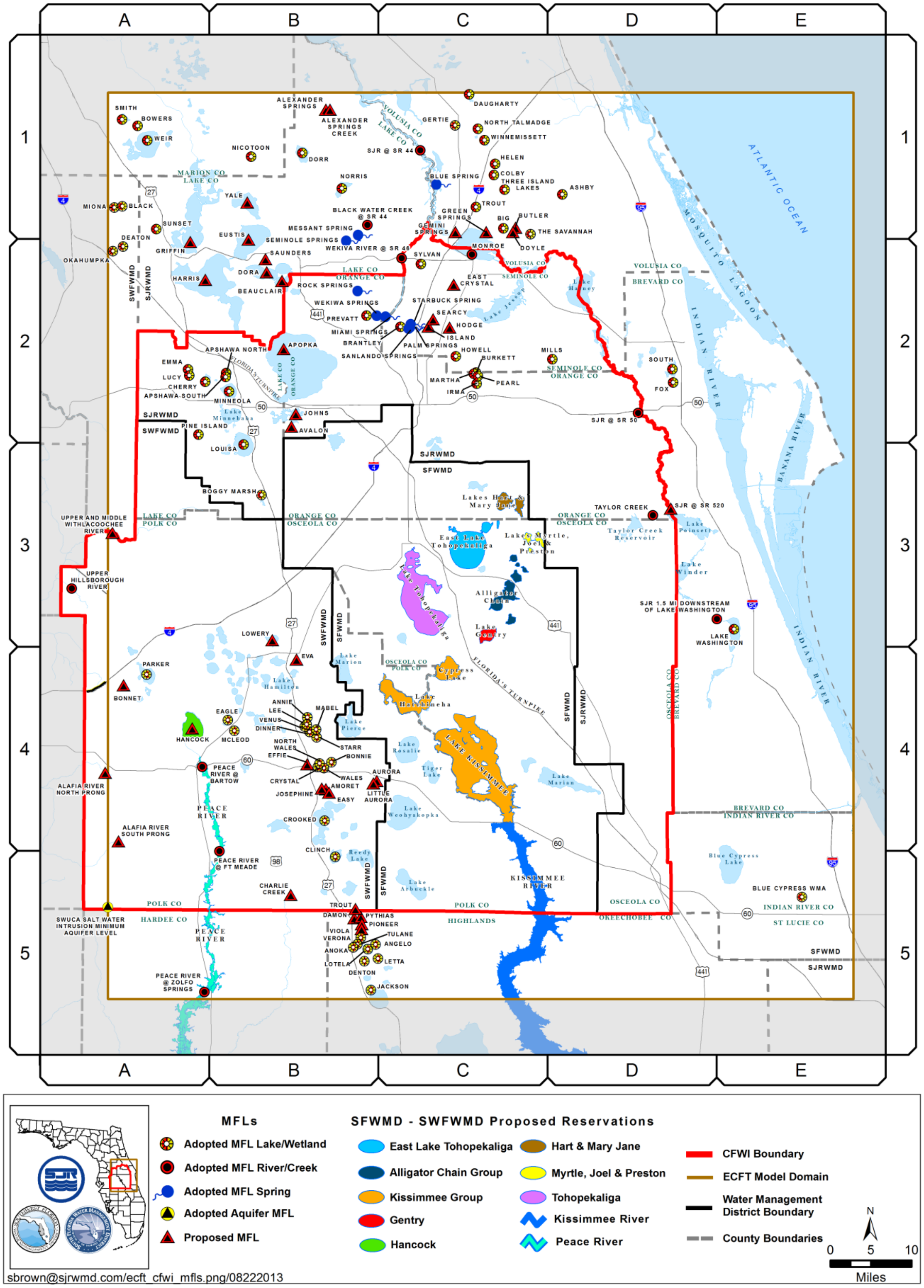


Figure F-1. Locations of adopted and proposed MFLs and reservations in the CFWI Planning Area and the ECFT model domain.

Table F-3. Remaining freeboard (RFB) for MFL constraints and other considerations evaluated for the Updated 2005 Reference Condition (RC), Baseline Condition, 2, 2A, 2B, and 3C withdrawal scenarios. Highlighted cells identify constraints and considerations not met based on RFB values, which are expressed as water level change in feet within the Upper Floridan aquifer (lakes, wetlands, wells) or change in surface water flow in cubic feet per second and parenthetically, the percentage of remaining freeboard of the minimum flow regime (springs and rivers). Positive RFB values represent favorable conditions.

Map Grid	Water Body / Site Name	County	Updated 2005 Reference Condition RFB [a]	Baseline Condition RFB	2 RFB	2A RFB	2B RFB	3C RFB
MFL Constraints								
Adopted Lake and Wetland MFLs within the CFWI Planning Area								
B-3	Boggy Marsh	Lake	2.1	3.5	3.2	3.2	3.4	3.1
A-2	Cherry Lake	Lake	1.5	1.1	0.7	0.8	0.5	0.7
B-4	Crooked Lake	Polk	-3.2	-3.6	-3.8	-3.6	-3.6	-3.9
B-4	Eagle Lake	Polk	-4.0	-5.2	-5.1	-5.2	-5.2	-5.5
B-4	Lake Annie	Polk	2.5	2.3	2.1	2.3	2.3	2.0
C-2	Lake Brantley	Seminole	2.2	0.8	0.6	0.7	0.7	0.6
C-2	Lake Burkett	Orange	MAC	MAC	MAC	MAC	MAC	MAC
B-5	Lake Clinch	Polk	1.0	0.5	0.2	0.5	0.5	0.2
A-2	Lake Emma	Lake	3.0	2.5	2.2	2.3	2.0	2.2
C-2	Lake Howell	Seminole	MAC	MAC	MAC	MAC	MAC	MAC
C-2	Lake Irma	Orange	MAC	MAC	MAC	MAC	MAC	MAC
B-2	Lake Louisa	Lake	2.0	1.6	0.8	0.8	1.0	0.7
A-2	Lake Lucy	Lake	3.0	2.6	2.3	2.3	2.1	2.3
C-2	Lake Martha	Orange	MAC	MAC	MAC	MAC	MAC	MAC
B-2	Lake Minneola	Lake	2.1	1.5	1.0	1.1	0.8	1.0
A-4	Lake Parker	Polk	MAC	MAC	MAC	MAC	MAC	MAC
C-2	Lake Pearl	Orange	MAC	MAC	MAC	MAC	MAC	MAC
B-4	Lake Starr	Polk	-1.6	-1.7	-1.8	-1.7	-1.7	-2.0
B-4	Lake Wailes	Polk	-4.9	-5.0	-5.0	-5.0	-5.0	-5.2

Table F-3. Remaining freeboard (RFB) for MFL constraints and other considerations evaluated for the Updated 2005 Reference Condition (RC), Baseline Condition, 2, 2A, 2B, and 3C withdrawal scenarios (continued).

Map Grid	Water Body / Site Name	County	Updated 2005 Reference Condition RFB [a]	Baseline Condition RFB	2 RFB	2A RFB	2B RFB	3C RFB
MFL Constraints (Continued)								
Adopted Lake and Wetland MFLs within the CFWI Planning Area (Continued)								
D-2	Mills Lake	Seminole	2.3	1.9	1.7	1.9	1.9	1.7
B-2	North Lake Apshawa [b]	Lake	0.4	-0.1	-0.5	-0.4	-0.7	-0.5
A-2	Pine Island Lake	Lake	1.5	1.1	0.5	0.6	0.5	0.5
B-2	Prevatt Lake [b]	Orange	1.1	0.5	0.4	0.5	0.4	0.4
B-2	South Lake Apshawa [b]	Lake	0.4	-0.1	-0.5	-0.4	-0.7	-0.5
C-2	Sylvan Lake [b]	Seminole	1.1	0.9	0.9	0.9	0.9	0.9
Adopted Spring MFLs within the CFWI Planning Area								
C-2	Miami Springs	Seminole	1.0	0.6 (15%)	0.6 (15%)	0.6 (15%)	0.6 (15%)	0.5 (12.5%)
C-2	Palm Springs	Seminole	-1.8	-2.1 (-30%)	-2.2 (-31%)	-2.1 (-30%)	-2.1 (-30%)	-2.2 (-31%)
B-2	Rock Springs	Orange	2.4	0.2 (0.4%)	-0.3 (-0.6%)	0.0 (0.0%)	-0.1 (-0.2%)	-0.3 (-0.6%)
C-2	Sanlando Springs	Seminole	4.0	2.4 (16%)	2.0 (13%)	2.3 (15%)	2.3 (15%)	2.0 (13%)
C-2	Starbuck Spring	Seminole	0.1	-0.8 (-6.2%)	-1.0 (-7.7%)	-0.9 (-6.9%)	-0.8 (-6.2%)	-1.0 (-7.7%)
B-2	Wekiwa Springs	Orange	2.3	-0.1 (-0.2%)	-0.5 (-0.8%)	-0.3 (-0.5%)	-0.3 (-0.5%)	-0.5 (-0.8%)
Other Considerations								
Proposed, Revised Lake MFLs within the CFWI Planning Area (Reevaluation MFLs)								
B-2	North Lake Apshawa [f]	Lake	0.8	0.3	-0.1	0.0	-0.3	-0.1
B-2	Prevatt Lake [f]	Orange	1.4	0.8	0.7	0.8	0.7	0.7
B-2	South Lake Apshawa [f]	Lake	0.6	0.1	-0.3	-0.2	-0.5	-0.3
C-2	Sylvan Lake [f]	Seminole	2.1	1.9	1.9	1.9	1.9	1.9
Proposed Lake MFLs within the CFWI Planning Area								
B-2	Johns Lake [f]	Orange	1.5	1.1	0.3	0.5	0.5	0.3
B-2	Lake Avalon [f]	Orange	2.0	1.4	0.6	0.7	0.8	0.6

Table F-3. Remaining freeboard (RFB) for MFL constraints and other considerations evaluated for the Updated 2005 Reference Condition (RC), Baseline Condition, 2, 2A, 2B, and 3C withdrawal scenarios (continued).

Map Grid	Water Body / Site Name	County	Updated 2005 RC RFB [a]	Baseline Condition (BC) RFB	2 RFB	2A RFB	2B RFB	3C RFB
Other Considerations (Continued)								
Adopted River MFLs								
A-4	Peace River at Bartow [b f g]	Polk	ND	ND	ND	ND	ND	ND
B-5	Peace River at Ft. Meade [b f g]	Polk	ND	ND	ND	ND	ND	ND
B-1	Wekiva River at State Road 46 [f]	Orange	8.0	0.2 (0.1%)	-1.4 (-0.6%)	-0.4 (-0.2%)	-0.4 (-0.2%)	-1.5 (-0.6%)
A-3	Upper Hillsborough River [c f]	Polk	ND	ND	ND	ND	ND	ND
Proposed River MFLs								
A-3	Upper and Middle Withlacoochee River (Green Swamp) [d f]	Polk	ND	ND	ND	ND	ND	ND
Adopted Aquifer MFLs and Regulatory Wells								
A-5	SWUCA Salt Water Intrusion Minimum Aquifer Level [e f g]	Polk	ND	ND	ND	ND	ND	ND
na	Upper Peace River Wells [f]	Polk	1.5	1.2 to 1.0	1.2 to 1.0	1.2 to 1.0	1.2 to 1.0	1.2 to 0.9
na	Lake Wales Ridge Wells [f]	Polk	0.4	0.0 to -0.1	-0.1 to -0.3	0.0 to -0.1	0.0 to -0.1	-0.2 to -0.3

Notes: Map Grid refers refers to **Figure F-1**; na = Wells not identified in **Figure F-1**; MAC = Minimal aquifer connection (i.e., minimal connection between surficial and Upper Floridan aquifers); and ND = Not determined.

a Updated Reference 2005 Condition remaining freeboard for MFL sites in the SJRWMD determined using site-specific surface water models and for MFLs sites in the SWFMWD using ECFT groundwater model output and site-specific surface water models.

b Adopted MFLs scheduled for reevaluation.

c Gage site associated with adopted MFLs for the Upper Hillsborough River is outside of the CFWI Planning Area and ECFT groundwater model domain; the river segment extends into the CFWI Planning Area, but not into the ECFT groundwater model domain.

d Gage site associated with proposed MFLs for the Upper and Middle segments of the Withlacoochee River are outside of the CFWI Planning Area and ECFT groundwater model domain; the river extends into both.

e Well sites associated with the adopted SWUCA (Southern Water Use Caution Area) Salt Water Intrusion Minimum Aquifer Level are outside of the CFWI Planning Area and ECFT groundwater model domain, but groundwater withdrawals within both the CFWI Planning Area and the ECFT groundwater domain may affect water levels in the wells.

f Other considerations included in the subset identified by the GAT to support the assessment of groundwater availability in the CFWI Planning Area.

g "Not Met" shading indicative of recent MFLs status assessment and lack of improvement for project-based and/or conceptual scenarios.

Table F-4. Remaining freeboard (RFB) for MFL constraints and other considerations evaluated for the Baseline Condition and water level change in feet within the Upper Florida aquifer (lakes, wetlands, wells) or surface water flow change in cubic feet per second (rivers and springs) for Scenarios 2, 2A, 2B, and 3C relative to the Baseline Condition RFB and for Scenario 3C relative to Scenario 2. Highlighted cells identify constraints and considerations not met based on Revised 2015 withdrawal scenario RFB values. Positive RFB values represent favorable conditions. Negative values of water level or flow change represent improved conditions relative to the Revised 2015 withdrawal scenario or relative to Scenario 2.

Map Grid	Water Body / Site Name	County	Baseline Condition RFB	Water Level or Flow Change from Baseline Condition Minus 2	Water Level or Flow Change from Baseline Condition Minus 2A	Water Level or Flow Change from Baseline Condition Minus 2B	Water Level or Flow Change from Baseline Condition Minus 3C	Water Level or Flow Change from 2 Minus 3C
MFL Constraints								
Adopted Lake and Wetland MFLs within the CFWI Planning Area								
B-3	Boggy Marsh	Lake	3.5	0.3	0.3	0.1	0.4	0.1
A-2	Cherry Lake	Lake	1.1	0.4	0.3	0.6	0.4	0.0
B-4	Crooked Lake	Polk	-3.6	0.2	0.0	0.0	0.3	0.1
B-4	Eagle Lake	Polk	-5.2	-0.1	0.0	0.0	0.2	0.3
B-4	Lake Annie	Polk	2.3	0.2	0.0	0.0	0.3	0.1
C-2	Lake Brantley	Seminole	0.8	0.2	0.1	0.1	0.2	0.0
C-2	Lake Burkett	Orange	MAC	MAC	MAC	MAC	MAC	MAC
B-5	Lake Clinch	Polk	0.5	0.3	0.0	0.0	0.3	0.0
A-2	Lake Emma	Lake	2.5	0.3	0.2	0.5	0.3	0.0
C-2	Lake Howell	Seminole	MAC	MAC	MAC	MAC	MAC	MAC
C-2	Lake Irma	Orange	MAC	MAC	MAC	MAC	MAC	MAC
B-2	Lake Louisa	Lake	1.6	0.8	0.8	0.6	0.9	0.1
A-2	Lake Lucy	Lake	2.6	0.3	0.3	0.5	0.3	0.0
C-2	Lake Martha	Orange	MAC	MAC	MAC	MAC	MAC	MAC
B-2	Lake Minneola	Lake	1.5	0.5	0.4	0.7	0.5	0.0
A-4	Lake Parker	Polk	MAC	MAC	MAC	MAC	MAC	MAC
C-2	Lake Pearl	Orange	MAC	MAC	MAC	MAC	MAC	MAC

Table F-4. Remaining freeboard (RFB) for MFL constraints and other considerations evaluated for the Baseline Condition and water level change in feet within the Upper Florida aquifer (lakes, wetlands, wells) or surface water flow change in cubic feet per second (rivers and springs) for Scenarios 2, 2A, 2B, and 3C relative to the Baseline Condition RFB and for Scenario 3C relative to Scenario 2 (continued).

Map Grid	Water Body / Site Name	County	Baseline Condition RFB	Water Level or Flow Change from Baseline Condition Minus 2	Water Level or Flow Change from Baseline Condition Minus 2A	Water Level or Flow Change from Baseline Condition Minus 2B	Water Level or Flow Change from Baseline Condition Minus 3C	Water Level or Flow Change from 2 Minus 3C
MFL Constraints (Continued)								
Adopted Lake and Wetland MFLs within the CFWI Planning Area (Continued)								
B-4	Lake Starr	Polk	-1.7	0.2	0.0	0.0	0.3	0.1
B-4	Lake Wailes	Polk	-5.0	0.1	0.0	0.0	0.3	0.2
D-2	Mills Lake	Seminole	1.9	0.2	0.0	0.0	0.2	0.0
B-2	North Lake Apshawa [a]	Lake	-0.1	0.4	0.3	0.6	0.4	0.0
A-2	Pine Island Lake	Lake	1.1	0.6	0.5	0.6	0.6	0.0
B-2	Prevatt Lake [a]	Orange	0.5	0.1	0.0	0.1	0.1	0.0
B-2	South Lake Apshawa [a]	Lake	-0.1	0.4	0.3	0.6	0.4	0.0
C-2	Sylvan Lake [a]	Seminole	0.9	0.0	0.0	0.0	0.0	0.0
Adopted Spring MFLs within the CFWI Planning Area								
C-2	Miami Springs	Seminole	0.6 (15%)	0.0	0.0	0.0	0.1	0.1
C-2	Palm Springs	Seminole	-2.1 (-30%)	0.1	0.0	0.0	0.1	0.0
B-2	Rock Springs	Orange	0.2 (0.4%)	0.5	0.2	0.3	0.5	0.0
C-2	Sanlando Springs	Seminole	2.4 (16%)	0.4	0.1	0.1	0.4	0.0
C-2	Starbuck Spring	Seminole	-0.8 (-6.2%)	0.2	0.1	0.0	0.2	0.0
B-2	Wekiwa Springs	Orange	-0.1 (-0.2%)	0.4	0.2	0.2	0.4	0.0

Table F-4. Remaining freeboard (RFB) for MFL constraints and other considerations evaluated for the Baseline Condition and water level change in feet within the Upper Florida aquifer (lakes, wetlands, wells) or surface water flow change in cubic feet per second (rivers and springs) for Scenarios 2, 2A, 2B, and 3C relative to the Baseline Condition RFB and for Scenario 3C relative to Scenario 2 (continued).

Map Grid	Water Body / Site Name	County	Baseline Condition RFB	Water Level or Flow Change from Baseline Condition Minus 2	Water Level or Flow Change from Baseline Condition Minus 2A	Water Level or Flow Change from Baseline Condition Minus 2B	Water Level or Flow Change from Baseline Condition Minus 3C	Water Level or Flow Change from 2 Minus 3C
Other Considerations (Continued)								
Proposed Lake MFLs within the CFWI Planning Area								
B-2	North Lake Apshawa [e]	Lake	0.3	0.4	0.3	0.6	0.4	0.0
B-2	Prevatt Lake [e]	Orange	0.8	0.1	0.0	0.1	0.1	0.0
B-2	South Lake Apshawa [e]	Lake	0.1	0.4	0.3	0.6	0.4	0.0
C-2	Sylvan Lake [e]	Seminole	1.9	0.0	0.0	0.0	0.0	0.0
B-2	Johns Lake [e]	Orange	1.1	0.8	0.6	0.6	0.8	0.0
B-2	Lake Avalon [e]	Orange	1.4	0.8	0.7	0.6	0.8	0.0
Adopted River MFLs								
A-4	Peace River at Bartow [a e f]	Polk	ND	ND	ND	ND	ND	ND
B-5	Peace River at Ft. Meade [a e f]	Polk	ND	ND	ND	ND	ND	ND
B-1	Wekiva River at State Road 46 [e]	Orange	0.2 (0.1%)	1.6	0.6	0.6	1.7	0.1
A-3	Upper Hillsborough River [b e]	Polk	ND	ND	ND	ND	ND	ND
Proposed River MFLs								
A-3	Upper and Middle Withlacoochee River (Green Swamp) [c e]	Polk	ND	ND	ND	ND	ND	ND

Table F-4. Remaining freeboard (RFB) for MFL constraints and other considerations evaluated for the Baseline Condition and water level change in feet within the Upper Florida aquifer (lakes, wetlands, wells) or surface water flow change in cubic feet per second (rivers and springs) for Scenarios 2, 2A, 2B, and 3C relative to the Baseline Condition RFB and for Scenario 3C relative to Scenario 2 (continued).

Map Grid	Water Body / Site Name	County	Baseline Condition RFB	Water Level or Flow Change from Baseline Condition Minus 2	Water Level or Flow Change from Baseline Condition Minus 2A	Water Level or Flow Change from Baseline Condition Minus 2B	Water Level or Flow Change from Baseline Condition Minus 3C	Water Level or Flow Change from 2 Minus 3C
Adopted Aquifer MFLs and Regulatory Wells								
A-5	SWUCA Salt Water Intrusion Minimum Aquifer Level [d e f]	Polk	ND	ND	ND	ND	ND	ND
na	Upper Peace River Wells [e]	Polk	1.2 to 1.0	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	0.0 to 0.1	0.0 to 0.1
na	Lake Wales Ridge Wells [e]	Polk	0.0 to -0.1	0.1 to 0.2	0.0 to 0.0	0.0 to 0.0	0.2 to 0.2	0.1 to 0.0

Notes: Map Grid refers to **Figure F-1**; na = Wells not identified in **Figure F-1**; MAC = Minimal aquifer connection (i.e., minimal connection between surficial and Upper Floridan aquifers); and ND = Not determined.

a Adopted MFLs scheduled for reevaluation.

b Gage site associated with adopted MFLs for the Upper Hillsborough River is outside of the CFWI Planning Area and ECFT groundwater model domain; the river segment extends into the CFWI Planning Area, but not the ECFT groundwater model domain.

c Gage site associated with proposed MFLs for the Upper and Middle segments of the Withlacoochee River are outside of the CFWI Planning Area and ECFT groundwater model domain; the river extends into both.

d Well sites associated with the adopted SWUCA (Southern Water Use Caution Area) Salt Water Intrusion Minimum Aquifer Level are outside of the CFWI Planning Area and ECFT groundwater model domain, but groundwater withdrawals within both the CFWI Planning Area and the ECFT groundwater model domain may affect water levels in the wells.

e Other considerations included in the subset identified by the GAT to support the assessment of groundwater availability in the CFWI Planning Area.

f "Not Met" shading indicative of recent MFLs status assessment and lack of improvement for project-based and/or conceptual scenarios.

Table F-5. Remaining freeboard (RFB) for MFL constraints and other considerations evaluated for the modeled Updated 2005 Reference Condition, Baseline Condition, 4A1, and 4A2 withdrawal scenarios. Highlighted cells identify constraints and considerations not met based on RFB values, which are expressed as water level change in feet within the Upper Floridan aquifer (lakes, wetlands, wells) or change in surface water flow in cubic feet per second and parenthetically, the percentage of remaining freeboard of the minimum flow regime (springs and rivers). Positive RFB values represent favorable conditions.

Map Grid	Water Body / Site Name	County	Updated 2005 Reference Condition RFB [a]	Baseline Condition RFB	4A1 RFB	4A2 RFB
MFL Constraints						
Adopted Lake and Wetland MFLs within the CFWI Planning Area						
B-3	Boggy Marsh	Lake	2.1	3.5	3.5	3.3
A-2	Cherry Lake	Lake	1.5	1.1	1.1	0.6
B-4	Crooked Lake	Polk	-3.2	-3.6	-3.7	-3.6
B-4	Eagle Lake	Polk	-4.0	-5.2	-5.2	-5.2
B-4	Lake Annie	Polk	2.5	2.3	2.2	2.2
C-2	Lake Brantley	Seminole	2.2	0.8	0.8	0.3
C-2	Lake Burkett	Orange	MAC	MAC	MAC	MAC
B-5	Lake Clinch	Polk	1.0	0.5	0.4	0.5
A-2	Lake Emma	Lake	3.0	2.5	2.5	2.1
C-2	Lake Howell	Seminole	MAC	MAC	MAC	MAC
C-2	Lake Irma	Orange	MAC	MAC	MAC	MAC
B-2	Lake Louisa	Lake	2.0	1.6	1.6	0.9
A-2	Lake Lucy	Lake	3.0	2.6	2.6	2.2
C-2	Lake Martha	Orange	MAC	MAC	MAC	MAC
B-2	Lake Minneola	Lake	2.1	1.5	1.5	0.9
A-4	Lake Parker	Polk	MAC	MAC	MAC	MAC
C-2	Lake Pearl	Orange	MAC	MAC	MAC	MAC
B-4	Lake Starr	Polk	-1.6	-1.7	-1.8	-1.7
B-4	Lake Wailes	Polk	-4.9	-5.0	-5.0	-5.0

Table F-5. Remaining freeboard (RFB) for MFL constraints and other considerations evaluated for the modeled Updated 2005 Reference Condition, Baseline Condition, 4A1, and 4A2 withdrawal scenarios (continued).

Map Grid	Water Body / Site Name	County	Updated 2005 Reference Condition RFB [a]	Baseline Condition RFB	4A1 RFB	4A2 RFB
MFL Constraints (Continued)						
Adopted Lake and Wetland MFLs within the CFWI Planning Area (Continued)						
D-2	Mills Lake	Seminole	2.3	1.9	1.8	1.3
B-2	North Lake Apshawa [b]	Lake	0.4	-0.1	-0.1	-0.6
A-2	Pine Island Lake	Lake	1.5	1.1	1.1	0.2
B-2	Prevatt Lake [b]	Orange	1.1	0.5	0.5	0.3
B-2	South Lake Apshawa [b]	Lake	0.4	-0.1	-0.1	-0.6
C-2	Sylvan Lake [b]	Seminole	1.1	0.9	0.9	0.8
Adopted Spring MFLs within the CFWI Planning Area						
C-2	Miami Springs	Seminole	1.0	0.6 (15%)	0.6 (15%)	0.5 (13%)
C-2	Palm Springs	Seminole	-1.8	-2.1 (-30%)	-2.1 (-30%)	-2.3 (-33%)
B-2	Rock Springs	Orange	2.4	0.2 (0.4%)	0.2 (0.4%)	-0.6 (-1.1%)
C-2	Sanlando Springs	Seminole	4.0	2.4 (16%)	2.3 (15%)	1.5 (10%)
C-2	Starbuck Spring	Seminole	0.1	-0.8 (-6.2%)	-0.8 (-6.2%)	-1.2 (-9.2%)
B-2	Wekiwa Springs	Orange	2.3	-0.1 (-0.2%)	-0.1 (-0.2%)	-0.8 (-1.3%)
Other Considerations						
Proposed, Revised Lake MFLs within the CFWI Planning Area (Reevaluation MFLs)						
B-2	North Lake Apshawa [f]	Lake	0.8	0.3	0.3	-0.2
B-2	Prevatt Lake [f]	Orange	1.4	0.8	0.8	0.6
B-2	South Lake Apshawa [f]	Lake	0.6	0.1	0.1	-0.4
C-2	Sylvan Lake [f]	Seminole	2.1	1.9	1.9	1.8

Table F-5. Remaining freeboard (RFB) for MFL constraints and other considerations evaluated for the modeled Updated 2005 Reference Condition, Baseline Condition, 4A1, and 4A2 withdrawal scenarios (continued).

Map Grid	Water Body / Site Name	County	Updated 2005 Reference Condition RFB [a]	Baseline Condition RFB	4A1 RFB	4A2 RFB
Other Considerations (Continued)						
Proposed Lake MFLs within the CFWI Planning Area						
B-2	Johns Lake [f]	Orange	1.5	1.1	1.1	0.5
B-2	Lake Avalon [f]	Orange	2.0	1.4	1.4	0.8
Adopted River MFLs						
A-4	Peace River at Bartow [b e f]	Polk	ND	ND	ND	ND
B-5	Peace River at Ft. Meade [b e f]	Polk	ND	ND	ND	ND
B-1	Wekiva River at State Road 46 [e]	Orange	8.0	0.2 (0.1%)	0.1 (0%)	-2.9 (-1.2%)
A-3	Upper Hillsborough River [c f]	Polk	ND	ND	ND	ND
Proposed River MFLs						
A-3	Upper and Middle Withlacoochee River (Green Swamp) [d f]	Polk	ND	ND	ND	ND
Adopted Aquifer MFLs and Regulatory Wells						
A-5	SWUCA Salt Water Intrusion Minimum Aquifer Level [e f]	Polk	ND	ND	ND	ND
na	Upper Peace River Wells [f]	Polk	1.5	1.2 to 1.0	1.2 to 1.0	1.2 to 1.0
na	Lake Wales Ridge Wells [f]	Polk	0.4	0.0 to -0.1	0.0 to -0.2	0.0 to -0.1

Notes: Map Grid refers to **Figure F-1**; na = Wells not identified in **Figure F-1**; MAC = Minimal aquifer connection (i.e., minimal connection between surficial and Upper Floridan aquifers); and ND = Not determined.

a Adopted MFLs scheduled for reevaluation.

b Gage site associated with adopted MFLs for the Upper Hillsborough River is outside of the CFWI Planning Area and ECFT groundwater model domain; the river segment extends into the CFWI Planning Area, but not the ECFT groundwater model domain.

c Gage site associated with proposed MFLs for the Upper and Middle segments of the Withlacoochee River are outside of the CFWI Planning Area and ECFT groundwater model domain; the river extends into both.

d Well sites associated with the adopted SWUCA (Southern Water Use Caution Area) Salt Water Intrusion Minimum Aquifer Level are outside of the CFWI Planning Area and ECFT groundwater model domain, but groundwater withdrawals within both the CFWI Planning Area and the ECFT groundwater model domain may affect water levels in the wells.

e Other considerations included in the subset identified by the GAT to support the assessment of groundwater availability in the CFWI Planning Area.

f "Not Met" shading indicative of recent MFLs status assessment and assumed lack of improvement for project-based and/or conceptual scenarios.

Table F-6. Remaining freeboard (RFB) for MFL constraints and other considerations evaluated for the modeled Baseline Condition withdrawal scenario and water level change in feet within the Upper Floridan aquifer (lakes, wetlands, wells) or surface water flow change in cubic feet per second (rivers and springs) for scenarios 4A1 and 4A2 relative to the Baseline Condition and each other. Highlighted cells identify constraints and considerations not met based on Baseline Condition values. Positive RFB values represent favorable conditions. Negative values of water level or flow change represent improved conditions relative to the Baseline Condition or relative to scenario 4A1.

Map Grid	Water Body / Site Name	County	Baseline Condition RFB	Water Level or Flow Change from Baseline Condition Minus 4A1	Water Level or Flow Change from Baseline Condition Minus 4A2	Water Level or Flow Change from 4A1 Minus 4A2
MFL Constraints						
Adopted Lake and Wetland MFLs within the CFWI Planning Area						
B-3	Boggy Marsh	Lake	3.5	0.0	0.2	0.2
A-2	Cherry Lake	Lake	1.1	0.0	0.5	0.5
B-4	Crooked Lake	Polk	-3.6	0.1	0.0	-0.1
B-4	Eagle Lake	Polk	-5.2	0.0	0.0	0.0
B-4	Lake Annie	Polk	2.3	0.1	0.1	0.0
C-2	Lake Brantley	Seminole	0.8	0.0	0.5	0.5
C-2	Lake Burkett	Orange	MAC	MAC	MAC	MAC
B-5	Lake Clinch	Polk	0.5	0.1	0.0	-0.1
A-2	Lake Emma	Lake	2.5	0.0	0.4	0.4
C-2	Lake Howell	Seminole	MAC	MAC	MAC	MAC
C-2	Lake Irma	Orange	MAC	MAC	MAC	MAC
B-2	Lake Louisa	Lake	1.6	0.0	0.7	0.7
A-2	Lake Lucy	Lake	2.6	0.0	0.4	0.4
C-2	Lake Martha	Orange	MAC	MAC	MAC	MAC
B-2	Lake Minneola	Lake	1.5	0.0	0.6	0.6
A-4	Lake Parker	Polk	MAC	MAC	MAC	MAC
C-2	Lake Pearl	Orange	MAC	MAC	MAC	MAC
B-4	Lake Starr	Polk	-1.7	0.1	0.1	0.0

Table F-6. Scenarios 4A1 and 4A2 relative to the Baseline Condition and each other (Continued).

Map Grid	Water Body / Site Name	County	Baseline Condition RFB	Water Level or Flow Change from Baseline Condition Minus 4A1	Water Level or Flow Change from Baseline Condition Minus 4A2	Water Level or Flow Change from 4A1 Minus 4A2
MFL Constraints (Continued)						
Adopted Lake and Wetland MFLs within the CFWI Planning Area (Continued)						
B-4	Lake Wailes	Polk	-5.0	0.1	0.0	-0.1
D-2	Mills Lake	Seminole	1.9	0.1	0.6	0.5
B-2	North Lake Apshawa [a]	Lake	-0.1	0.0	0.5	0.5
A-2	Pine Island Lake	Lake	1.1	0.0	0.9	0.9
B-2	Prevatt Lake [a]	Orange	0.5	0.0	0.2	0.2
B-2	South Lake Apshawa [a]	Lake	-0.1	0.0	0.5	0.5
C-2	Sylvan Lake [a]	Seminole	0.9	0.0	0.1	0.1
Adopted Spring MFLs within the CFWI Planning Area						
C-2	Miami Springs	Seminole	0.6 (15%)	0.0	0.1	0.1
C-2	Palm Springs	Seminole	-2.1 (-30%)	0.0	0.2	0.2
B-2	Rock Springs	Orange	0.2 (0.4%)	0.0	0.8	0.8
C-2	Sanlando Springs	Seminole	2.4 (16%)	0.1	0.9	0.8
C-2	Starbuck Spring	Seminole	-0.8 (-6.2%)	0.0	0.4	0.4
B-2	Wekiwa Springs	Orange	-0.1 (-0.2%)	0.0	0.7	0.7
Other Considerations						
Proposed, Revised Lake MFLs within the CFWI Planning Area (Reevaluation MFLs)						
B-2	North Lake Apshawa [e]	Lake	0.3	0.0	0.5	0.5
B-2	Prevatt Lake [e]	Orange	0.8	0.0	0.2	0.2
B-2	South Lake Apshawa [e]	Lake	0.1	0.0	0.5	0.5
C-2	Sylvan Lake [e]	Seminole	1.9	0.0	0.1	0.1

Table F-6. Scenarios 4A1 and 4A2 relative to the Baseline Condition and each other (continued).

Map Grid	Water Body / Site Name	County	Baseline Condition RFB	Water Level or Flow Change from Baseline Condition Minus 4A1	Water Level or Flow Change from Baseline Condition Minus 4A2	Water Level or Flow Change from 4A1 Minus 4A2
Other Considerations (Continued)						
Proposed Lake MFLs within the CFWI Planning Area						
B-2	Johns Lake [e]	Orange	1.1	0.0	0.6	0.6
B-2	Lake Avalon [e]	Orange	1.4	0.0	0.6	0.6
Adopted River MFLs						
A-4	Peace River at Bartow [a e f]	Polk	ND	ND	ND	ND
B-5	Peace River at Ft. Meade [a e f]	Polk	ND	ND	ND	ND
B-1	Wekiva River at State Road 46 [e]	Orange	0.2 (0.1%)	0.1	3.1	3.0
A-3	Upper Hillsborough River [b e]	Polk	ND	ND	ND	ND
Proposed River MFLs						
A-3	Upper and Middle Withlacoochee River (Green Swamp) [c e]	Polk	ND	ND	ND	ND
Adopted Aquifer MFLs and Regulatory Wells						
A-5	SWUCA Salt Water Intrusion Minimum Aquifer Level [d e f]	Polk	ND	ND	ND	ND
na	Upper Peace River Wells [e]	Polk	1.2 to 1.0	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0
na	Lake Wales Ridge Wells [e]	Polk	0.0 to -0.1	0.1 to 0.1	0.0 to 0.0	0.1 to 0.1

Notes: Map Grid refers to **Figure F-1**; na = Wells not identified in **Figure F-1**; MAC = Minimal aquifer connection (i.e., minimal connection between surficial and Upper Floridan aquifers); and ND = Not determined.

a Adopted MFLs scheduled for reevaluation.

b Gage site associated with adopted MFLs for the Upper Hillsborough River is outside of the CFWI Planning Area and ECFT groundwater model domain; the river segment extends into the CFWI Planning Area, but not the ECFT groundwater model domain.

c Gage site associated with proposed MFLs for the Upper and Middle segments of the Withlacoochee River are outside of the CFWI Planning Area and ECFT groundwater model domain; the river extends into both.

d Well sites associated with the adopted SWUCA (Southern Water Use Caution Area) Salt Water Intrusion Minimum Aquifer Level are outside of the CFWI Planning Area and ECFT groundwater model domain, but groundwater withdrawals within both the CFWI Planning Area and the ECFT groundwater model domain may affect water levels in the wells.

e Other considerations included in the subset identified by the GAT to support the assessment of groundwater availability in the CFWI Planning Area.

f "Not Met" shading indicative of recent MFLs status assessment and assumed lack of improvement for project-based and/or conceptual scenarios

Table F-7. Remaining freeboard (RFB) for MFL constraints and other considerations evaluated for the Baseline Condition and water level change in feet within the Upper Floridan aquifer (lakes, wetlands, wells) or surface flow change in cubic feet per second (rivers and springs) for scenarios 4B1 and 4B2, 5A1 and 5A2, 5A1 and 5B2, and the Baseline Condition and 5B2 (a.k.a. scenario 8A1). Highlighted cells identify constraints and considerations not met based on Revised 2015 withdrawal scenario RFB values. Positive RFB values represent favorable conditions. Negative values of water level or flow change represent improved conditions for 4B2 relative to 4B1, for 5A2 relative to 5A1, for 5B2 relative to 5A1, and for 5B2 relative to the Baseline Condition.

	Water Body / Site Name	County	Baseline Condition RFB	Water Level or Flow Change from 4B1 Minus 4B2	Water Level or Flow Change from 5A1 Minus 5A2	Water Level or Flow Change from 5A1 Minus 5B2	Water Level or Flow Change from Baseline Minus 5B2 (a.k.a. 8A1)
MFL Constraints							
Adopted Lake and Wetland MFLs within the CFWI Planning Area							
B-3	Boggy Marsh	Lake	3.5	0.1	-1.0	-1.1	0.0
A-2	Cherry Lake	Lake	1.1	-0.4	-1.1	-1.2	0.0
B-4	Crooked Lake	Polk	-3.6	0.0	0.0	0.0	0.0
B-4	Eagle Lake	Polk	-5.2	-0.1	0.0	-0.2	-0.1
B-4	Lake Annie	Polk	2.3	-0.6	-0.6	-0.7	-0.1
C-2	Lake Brantley	Seminole	0.8	0.2	-0.3	-0.6	0.0
C-2	Lake Burkett	Orange	MAC	MAC	MAC	MAC	MAC
B-5	Lake Clinch	Polk	0.5	0.0	0.0	0.0	0.0
A-2	Lake Emma	Lake	2.5	0.1	-0.5	-0.6	0.0
C-2	Lake Howell	Seminole	MAC	MAC	MAC	MAC	MAC
C-2	Lake Irma	Orange	MAC	MAC	MAC	MAC	MAC
B-2	Lake Louisa	Lake	1.6	0.2	-0.2	-0.7	-0.1
A-2	Lake Lucy	Lake	2.6	0.0	-0.5	-0.6	0.0
C-2	Lake Martha	Orange	MAC	MAC	MAC	MAC	MAC
B-2	Lake Minneola	Lake	1.5	-1.0	-1.7	-2.0	-0.1
A-4	Lake Parker	Polk	MAC	MAC	MAC	MAC	MAC
C-2	Lake Pearl	Orange	MAC	MAC	MAC	MAC	MAC

Table F-7. Scenarios 4B1 and 4B2, 5A1 and 5A2, 5A1 and 5B2, and the Baseline Condition and 5B2 (a.k.a. scenario 8A1) (continued).

Map Grid	Water Body / Site Name	County	Baseline Condition RFB	Water Level or Flow Change from 4B1 Minus 4B2	Water Level or Flow Change from 5A1 Minus 5A2	Water Level or Flow Change from 5A1 Minus 5B2	Water Level or Flow Change from Baseline Minus 5B2 (a.k.a. 8A1)
MFL Constraints (Continued)							
Adopted Lake and Wetland MFLs within the CFWI Planning Area (Continued)							
B-4	Lake Starr	Polk	-1.7	-0.3	-0.4	-0.5	-0.1
B-4	Lake Wailes	Polk	-5.0	-0.1	-0.1	-0.1	0.0
D-2	Mills Lake	Seminole	1.9	0.1	0.6	0.0	0.0
B-2	North Lake Apshawa [a]	Lake	-0.1	-2.0	-2.7	-2.9	-0.1
A-2	Pine Island Lake	Lake	1.1	0.2	1.6	-0.4	0.0
B-2	Prevatt Lake [a]	Orange	0.5	0.1	-0.9	-1.0	0.0
B-2	South Lake Apshawa [a]	Lake	-0.1	-2.1	-2.9	-3.1	-0.1
C-2	Sylvan Lake [a]	Seminole	0.9	0.1	0.0	0.0	0.0
Adopted Spring MFLs within the CFWI Planning Area							
C-2	Miami Springs	Seminole	0.6 (15%)	0.0	-0.4	-0.4	0.0
C-2	Palm Springs	Seminole	-2.1 (-30%)	0.0	0.0	-0.1	0.0
B-2	Rock Springs	Orange	0.2 (0.4%)	0.5	-1.1	-1.5	-0.1
C-2	Sanlando Springs	Seminole	2.4 (16%)	0.4	0.1	-0.6	-0.1
C-2	Starbuck Spring	Seminole	-0.8 (-6.2%)	0.2	0.1	-0.2	0.0
B-2	Wekiwa Springs	Orange	-0.1 (-0.2%)	0.4	-4.7	-5.1	-0.1
Other Considerations							
Proposed, Revised Lake MFLs within the CFWI Planning Area (Reevaluation MFLs)							
B-2	North Lake Apshawa [e]	Lake	0.3	-2.0	-2.7	-2.9	-0.1
B-2	Prevatt Lake [e]	Orange	0.8	0.1	-0.9	-1.0	0.0
B-2	South Lake Apshawa [e]	Lake	0.1	-2.1	-2.9	-3.1	-0.1
C-2	Sylvan Lake [e]	Seminole	1.9	0.1	0.0	0.0	0.0

Table F-7. Scenarios 4B1 and 4B2, 5A1 and 5A2, 5A1 and 5B2, and the Baseline Condition and 5B2 (a.k.a. scenario 8A1) (continued).

Map Grid	Water Body / Site Name	County	Baseline Condition RFB	Water Level or Flow Change from 4B1 Minus 4B2	Water Level or Flow Change from 5A1 Minus 5A2	Water Level or Flow Change from 5A1 Minus 5B2	Water Level or Flow Change from Baseline Condition Minus 5B2 (a.k.a. S8A1)
Other Considerations (Continued)							
Proposed Lake MFLs within the CFWI Planning Area							
B-2	Johns Lake [e]	Orange	1.1	0.2	-0.6	-0.8	0.0
B-2	Lake Avalon [e]	Orange	1.4	0.3	-0.8	-1.0	0.0
Adopted River MFLs							
A-4	Peace River at Bartow [a e f]	Polk	ND	ND	ND	ND	ND
B-5	Peace River at Ft. Meade [a e f]	Polk	ND	ND	ND	ND	ND
B-1	Wekiva River at State Road 46 [e]	Orange	0.2 (0.1%)	1.5	-6.0	-7.9	-0.3
A-3	Upper Hillsborough River [b e]	Polk	ND	ND	ND	ND	ND
Proposed River MFLs							
A-3	Upper and Middle Withlacoochee River (Green Swamp) [c e]	Polk	ND	ND	ND	ND	ND
Adopted Aquifer MFLs and Regulatory Wells							
A-5	SWUCA Salt Water Intrusion Minimum Aquifer Level [d e f]	Polk	ND	ND	ND	ND	ND
na	Upper Peace River Wells [e]	Polk	1.2 to 1.0	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0
na	Lake Wales Ridge Wells [e]	Polk	0.0 to -0.1	-0.3 to -0.3	-0.1 to -0.1	-0.1 to -0.2	0.0 to 0.0

Notes: Map Grid refers to **Figure F-1**; na = Wells not identified in **Figure F-1**; MAC = Minimal aquifer connection (i.e., minimal connection between surficial and Upper Floridan aquifers); and ND = Not determined.

a Adopted MFLs scheduled for reevaluation.

b Gage site associated with adopted MFLs for the Upper Hillsborough River is outside of the CFWI Planning Area and ECFT groundwater model domain; the river segment extends into the CFWI Planning Area, but not the ECFT groundwater model domain.

c Gage site associated with proposed MFLs for the Upper and Middle segments of the Withlacoochee River are outside of the CFWI Planning Area and ECFT groundwater model domain; the river extends into both.

d Well sites associated with the adopted SWUCA (Southern Water Use Caution Area) Salt Water Intrusion Minimum Aquifer Level are outside of the CFWI Planning Area and ECFT groundwater model domain, but groundwater withdrawals within both the CFWI Planning Area and the ECFT groundwater model domain may affect water levels in the wells.

e Other considerations included in the subset identified by the GAT to support the assessment of groundwater availability in the CFWI Planning Area.

f "Not Met" shading indicative of recent MFLs status assessment and assumed lack of improvement for project-based and/or conceptual scenarios.

Table F-8. Remaining freeboard (RFB) for MFL constraints and other considerations evaluated for the modeled Baseline Condition and Scenario 6 withdrawal scenarios and water level change in feet within the Upper Floridan aquifer (lakes, wetlands, wells) or surface flow change in cubic feet per second (rivers and springs) for Scenario 6 relative to the Baseline Condition. Highlighted cells identify constraints and considerations not met based on RFB values for the Baseline Condition. Positive values of RFB represent favorable conditions. Negative values of water level or flow rate change represent improved conditions relative to the Baseline Condition.

Map Grid	Water Body / Site Name	County	Baseline Condition RFB	Scenario 6 RFB	Water Level or Flow Change from Baseline Minus Scenario 6
MFL Constraints					
Adopted Lake and Wetland MFLs within the CFWI Planning Area					
B-3	Boggy Marsh	Lake	3.5	3.5	0.0
A-2	Cherry Lake	Lake	1.1	1.2	-0.1
B-4	Crooked Lake	Polk	-3.6	1.4	-5.0
B-4	Eagle Lake	Polk	-5.2	1.1	-6.3
B-4	Lake Annie	Polk	2.3	3.0	-0.7
C-2	Lake Brantley	Seminole	0.8	1.6	-0.8
C-2	Lake Burkett	Orange	MAC	MAC	MAC
B-5	Lake Clinch	Polk	0.5	1.0	-0.4
A-2	Lake Emma	Lake	2.5	2.5	0.0
C-2	Lake Howell	Seminole	MAC	MAC	MAC
C-2	Lake Irma	Orange	MAC	MAC	MAC
B-2	Lake Louisa	Lake	1.6	1.6	0.0
A-2	Lake Lucy	Lake	2.6	2.6	0.0
C-2	Lake Martha	Orange	MAC	MAC	MAC
B-2	Lake Minneola	Lake	1.5	1.6	-0.1
A-4	Lake Parker	Polk	MAC	MAC	MAC
C-2	Lake Pearl	Orange	MAC	MAC	MAC
B-4	Lake Starr	Polk	-1.7	0.0	-1.6

Table F-8. Scenario 6 relative to the Baseline Condition (continued).

Map Grid	Water Body / Site Name	County	Baseline Condition RFP	Scenario 6 RFB	Water Level or Flow Change from Baseline Minus Scenario 6
MFL Constraints (Continued)					
Adopted Lake and Wetland MFLs within the CFWI Planning Area (Continued)					
B-4	Lake Wailes	Polk	-5.0	0.1	-5.1
D-2	Mills Lake	Seminole	1.9	2.0	-0.1
B-2	North Lake Apshawa [a]	Lake	-0.1	0.2	-0.3
A-2	Pine Island Lake	Lake	1.1	1.1	0.0
B-2	Prevatt Lake [a]	Orange	0.5	0.7	-0.2
B-2	South Lake Apshawa [a]	Lake	-0.1	0.2	-0.3
C-2	Sylvan Lake [a]	Seminole	0.9	0.9	0.0
Adopted Spring MFLs within the CFWI Planning Area					
C-2	Miami Springs	Seminole	0.6 (15%)	0.7 (18%)	-0.1
C-2	Palm Springs	Seminole	-2.1 (-30%)	0.0 (0%)	-2.1
B-2	Rock Springs	Orange	0.2 (0.4%)	1.0 (1.9%)	-0.8
C-2	Sanlando Springs	Seminole	2.4 (16%)	5.2 (35%)	-2.8
C-2	Starbuck Spring	Seminole	-0.8 (-6.2%)	1.1 (8.5%)	-1.9
B-2	Wekiwa Springs	Orange	-0.1 (-0.2%)	0.8 (1.3%)	-0.9
Other Considerations					
Proposed, Revised Lake MFLs within the CFWI Planning Area (Reevaluation MFLs)					
B-2	North Lake Apshawa [e]	Lake	0.3	0.6	-0.3
B-2	Prevatt Lake [e]	Orange	0.8	1.0	-0.2
B-2	South Lake Apshawa [e]	Lake	0.1	0.4	-0.3
C-2	Sylvan Lake [e]	Seminole	1.9	1.9	0.0
Proposed Lake MFLs within the CFWI Planning Area					
B-2	Johns Lake [e]	Orange	1.1	1.1	0.0
B-2	Lake Avalon [e]	Orange	1.4	1.4	0.0

Table F-8. Scenario 6 relative to the Baseline Condition (continued).

Map Grid	Water Body / Site Name	County	Baseline Condition RFB	Scenario 6 RFB	Water Level or Flow Change from Baseline Condition Minus Senario 6
Other Considerations (Continued)					
Adopted River MFLs					
A-4	Peace River at Bartow [a e g]	Polk	ND[f]	ND	ND
B-5	Peace River at Ft. Meade [a e g]	Polk	ND[f]	ND	ND
B-1	Wekiva River at State Road 46 [e]	Orange	0.2 (0.1%)	8.8 (3.5%)	-8.6
A-3	Upper Hillsborough River [b e]	Polk	ND	ND	ND
Proposed River MFLs					
A-3	Upper and Middle Withlacoochee River (Green Swamp) [c e]	Polk	ND	ND	ND
Adopted Aquifer MFLs and Regulatory Wells					
A-5	SWUCA Salt Water Intrusion Minimum Aquifer Level [d e g]	Polk	ND[f]	ND	ND
na	Upper Peace River Wells [e]	Polk	1.2 to 1.0	1.3 to 1.1	-0.1 to -0.1
na	Lake Wales Ridge Wells [e]	Polk	0.0 to -0.1	0.5 to 0.5	-0.5 to -0.6

Notes: Map Grid refers to **Figure F-1**; na = Wells not identified in **Figure F-1**; MAC = Minimal aquifer connection (i.e., minimal connection between surficial and Upper Floridan aquifers); and ND = Not determined.

a Adopted MFLs scheduled for reevaluation.

b Gage site associated with adopted MFLs for the Upper Hillsborough River is outside of the CFWI Planning Area and ECFT groundwater model domain; the river segment extends into the CFWI Planning Area, but not the ECFT groundwater model domain.

c Gage site associated with proposed MFLs for the Upper and Middle segments of the Withlacoochee River are outside of the CFWI Planning Area and ECFT groundwater model domain; the river extends into both.

d Well sites associated with the adopted SWUCA (Southern Water Use Caution Area) Salt Water Intrusion Minimum Aquifer Level are outside of the CFWI Planning Area and ECFT groundwater model domain, but groundwater withdrawals within both the CFWI Planning Area and the ECFT groundwater model domain may affect water levels in the wells.

e Other considerations included in the subset identified by the GAT to support the assessment of groundwater availability in the CFWI Planning Area.

f The Scenario 6 withdrawal scenario was not designed to address the “not met” status for adopted Peace River MFLs and the SWUCA Saltwater Intrusion Minimum Aquifer Level. Recovery of these MFLs is expected to be achieved through implementation of surface-water projects that will enhance river flows and through other ongoing activities of the SWUCA Recovery Strategy.

g “Not Met” shading indicative of recent MFLs status assessment and assumed lack of improvement for project-based and/or conceptual scenarios.

Table F-9. Summary status counts of MFL constraints and other considerations evaluated for the modeled Updated 2005 Reference Condition, Baseline Condition, S2, S2A, S2B and S3 withdrawal scenarios.

MFL Constraint and Other Considerations Status	ECFT groundwater model Withdrawal Scenario					
	Updated 2005 Reference Condition	Baseline Condition	Scenario 2	Scenario 2A	Scenario 2B	Scenario 3C
MFL Constraints						
Number Met	26	22	21	22	21	21
Number Not Met	5	9	10	9	10	10
Other Considerations						
Number Met	11	10	7	8	7	7
Number Not Met	2	3	6	5	6	6
Combined Constratints and Other Considerations						
Number Met	37	32	28	30	28	28
Number Not Met	7	12	16	14	16	16

Table F-10. Summary status counts of MFL constraints and other considerations evaluated for the modeled Updated 2005 Reference Condition, Baseline Condition, S4A1 and S4A2 withdrawal scenarios.

MFL Constraint and Other Considerations Status	ECFT groundwater model Withdrawal Scenario			
	Updated 2005 Reference Condition	Revised 2015	Scenario 4A1	Scenario 4A2
MFL Constraints				
Number Met	26	22	22	21
Number Not Met	5	9	9	10
Other Considerations				
Number Met	11	10	10	7
Number Not Met	2	3	3	6
Combined Constratints and Other Considerations				
Number Met	37	32	32	28
Number Not Met	7	12	12	16

NON-MFL ISOLATED WETLAND EVALUATION

The analysis presented represents acres of non-MFL hydrologically isolated wetlands. The data analysis is defined as a statistical predictor of probable change in acres of stressed wetlands as a function of change in water level.

The Updated 2005 Reference Condition is the basis for the equations used to calculate probable stressed wetlands acres, based upon data representing observed conditions prior to 2005. The Updated 2005 Reference Condition is simulated by the ECFT model and presented in the results as the 2005 RC. Model run comparisons of change in stressed acres are relative to the Updated 2005 Reference Condition.

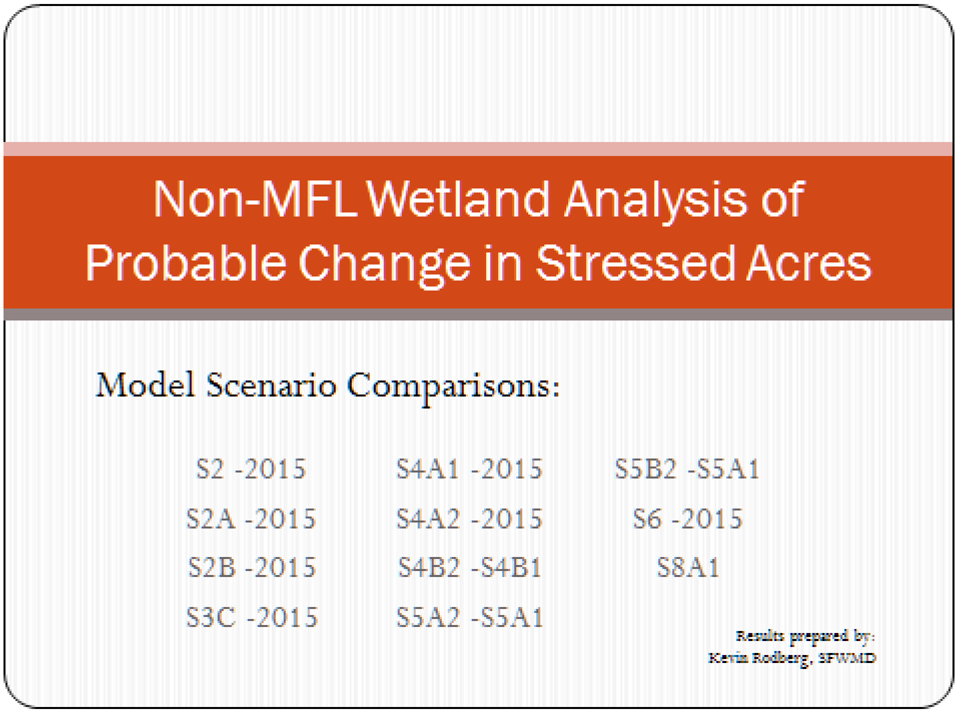
Model comparisons are relative to P80 head differences from the Updated 2005 Reference Condition run. The P80 heads represent cell-by-cell levels of groundwater head that are exceeded 80% of the time. These water levels are characteristic of the wetland response during low rainfall conditions. The heads for each cell are sorted highest to lowest and in the case of 144 stress periods, the 116th ranked head is the P80 head.

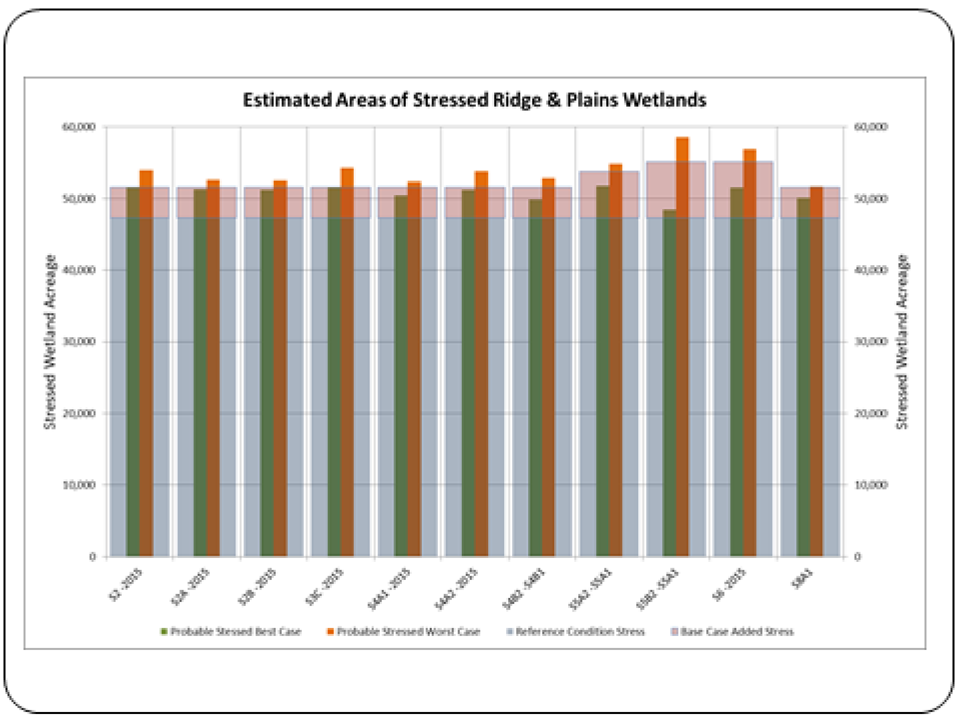
$$[116 = ((144+1)*.80)]$$

A computer program was developed to post process multiple model runs and calculate the probable change in stressed acres. The calculations are run for Layer 1 representing the SAS and Layer 3 for the UFA. The initial step for the program is to calculate a difference in P80 heads for the Updated 2005 Reference Condition and a scenario run. This represents a change the in water levels for the statistical comparison. Next, the change in head is used on a cell-by-cell basis to calculate four probabilities from separate higher order polynomial equations that were fitted to the statistical response function for computational efficiency because it is derived from an equation that must be integrated numerically. These represent probabilities of change for Ridge and Plains non-MFL wetlands and determine either beneficial change as in conversion from stressed to non-stressed conditions or adverse change, reflecting conversion from non-stressed to stressed conditions.

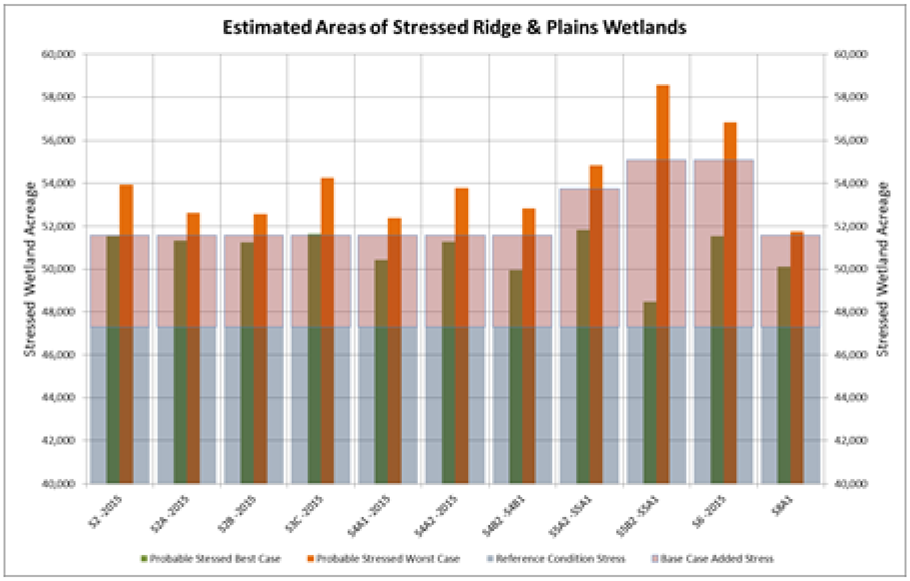
Some cells are filtered from the totals. If the cells have been determined to be significantly hydrologically altered (SHA) or reflect cells modeled as poorly calibrated lake cells they are not included in the totals. Plains wetland summaries are based on the modeled SAS heads because the water levels in the plains physiographic province are generally fairly uniform across broad areas, and not strongly influenced by local karstic features. Ridge wetland summaries are presented as a range of values (Best Case to Worst Case) and based upon results calculated from UFA and SAS. The use of head data from both the SAS and UFA is necessary because the leakance of the confining unit throughout much of the ridge physiographic province is highly variable due to the influence of karst sinkhole features. It is impossible to calibrate the model to represent all these features individually, and the SAS water levels in model represent the response based on average leakance rates in and near the model cell. Changes of wetland water levels in the leakiest sinkhole areas are expected to be similar to those in the UFA, while changes of wetland water levels in less leaky areas are expected to conform more to the modeled SAS response. Therefore, calculating change of stressed wetland area based on SAS and UFA water levels is thought to bracket the most likely result with "best case" and "worst case" bounds.

Non-MFL Wetland Analysis of Probable Change in Stressed Areas





Y axis Scale Adjusted to Focus on Relative Changes



Wetland Class	Aquifer	Physio	Initial Stressed Acres	Delta Stressed Acres	% Change	Probable Stressed Acres
2005 RC - 2015						
Class 1	SAS	Plains	451	204	45.2%	655
	UFA	Ridge	6,643	157	2.4%	6,800
	SAS	Ridge	6,643	23	0.4%	6,666
Class 2	SAS	Plains	133	10	7.5%	143
	UFA	Ridge	1,234	190	15.4%	1,424
	SAS	Ridge	1,234	48	3.9%	1,282
Class 3	SAS	Plains	13,903	734	5.3%	14,637
	UFA	Ridge	24,932	4,534	18.2%	29,466
	SAS	Ridge	24,932	1,711	6.9%	26,643
SAS Plains Avg(SAS&UFA) Ridges			47,296	4,279	9.0%	51,576

Wetland Class	Aquifer	Physio	Initial Stressed Acres	Delta Stressed Acres	% Change	Probable Stressed Acres
S2 -2015						
Class 1	SAS	Plains	655	(408)	-62.2%	247
	UFA	Ridge	6,800	496	7.3%	7,296
	SAS	Ridge	6,666	49	0.7%	6,715
Class 2	SAS	Plains	143	6	4.0%	149
	UFA	Ridge	1,424	200	14.1%	1,625
	SAS	Ridge	1,282	93	7.3%	1,375
Class 3	SAS	Plains	14,637	184	1.3%	14,821
	UFA	Ridge	29,466	1,842	6.3%	31,308
	SAS	Ridge	26,643	34	0.1%	26,677
SAS Plains Avg(SAS+UFA) Ridges			51,576	1,139	2.2%	52,715

Wetland Class	Aquifer	Physio	Initial Stressed Acres	Delta Stressed Acres	% Change	Probable Stressed Acres
S2A -2015						
Class 1	SAS	Plains	655	(412)	-62.9%	243
	UFA	Ridge	6,800	399	5.9%	7,198
	SAS	Ridge	6,666	46	0.7%	6,713
Class 2	SAS	Plains	143	1	0.6%	144
	UFA	Ridge	1,424	117	8.2%	1,541
	SAS	Ridge	1,282	68	5.3%	1,350
Class 3	SAS	Plains	14,637	62	0.4%	14,699
	UFA	Ridge	29,466	627	2.1%	30,093
	SAS	Ridge	26,643	(10)	0.0%	26,633
SAS Plains Avg(SAS+UFA) Ridges			51,576	274	0.5%	51,849

Wetland Class	Aquifer	Physio	Initial Stressed Acres	Delta Stressed Acres	% Change	Probable Stressed Acres
S2B -2015						
Class 1	SAS	Plains	655	(429)	-65.5%	226
	UFA	Ridge	6,800	353	5.2%	7,153
	SAS	Ridge	6,666	24	0.4%	6,690
Class 2	SAS	Plains	143	0	0.3%	143
	UFA	Ridge	1,424	74	5.2%	1,499
	SAS	Ridge	1,282	28	2.1%	1,310
Class 3	SAS	Plains	14,637	50	0.3%	14,687
	UFA	Ridge	29,466	594	2.0%	30,060
	SAS	Ridge	26,643	(15)	-0.1%	26,627
SAS Plains Avg(SAS+UFA) Ridges			51,576	150	0.3%	51,725

Wetland Class	Aquifer	Physio	Initial Stressed Acres	Delta Stressed Acres	% Change	Probable Stressed Acres
S3C -2015						
Class 1	SAS	Plains	655	(407)	-62.1%	248
	UFA	Ridge	6,800	507	7.4%	7,306
	SAS	Ridge	6,666	52	0.8%	6,718
Class 2	SAS	Plains	143	6	3.9%	148
	UFA	Ridge	1,424	195	13.7%	1,619
	SAS	Ridge	1,282	93	7.3%	1,375
Class 3	SAS	Plains	14,637	208	1.4%	14,845
	UFA	Ridge	29,466	2,246	7.6%	31,712
	SAS	Ridge	26,643	126	0.5%	26,769
SAS Plains Avg(SAS+UFA) Ridges			51,576	1,415	2.7%	52,991

Wetland Class	Aquifer	Physio	Initial Stressed Acres	Delta Stressed Acres	% Change	Probable Stressed Acres
S4A1 -2015						
Class 1	SAS	Plains	655	(440)	-67.2%	215
	UFA	Ridge	6,800	(3)	0.0%	6,797
	SAS	Ridge	6,666	(25)	-0.4%	6,642
Class 2	SAS	Plains	143	(5)	-3.4%	138
	UFA	Ridge	1,424	22	1.5%	1,446
	SAS	Ridge	1,282	(16)	-1.3%	1,266
Class 3	SAS	Plains	14,637	(75)	-0.5%	14,562
	UFA	Ridge	29,466	162	0.6%	29,628
	SAS	Ridge	26,643	(576)	-2.2%	26,066
SAS Plains Avg(SAS+UFA) Ridges			51,576	(738)	-1.4%	50,838

Wetland Class	Aquifer	Physio	Initial Stressed Acres	Delta Stressed Acres	% Change	Probable Stressed Acres
S4A2 -2015						
Class 1	SAS	Plains	655	(422)	-64.4%	233
	UFA	Ridge	6,800	365	5.4%	7,165
	SAS	Ridge	6,666	31	0.5%	6,697
Class 2	SAS	Plains	143	10	6.8%	153
	UFA	Ridge	1,424	144	10.1%	1,569
	SAS	Ridge	1,282	42	3.3%	1,324
Class 3	SAS	Plains	14,637	105	0.7%	14,742
	UFA	Ridge	29,466	1,697	5.8%	31,163
	SAS	Ridge	26,643	(74)	-0.3%	26,569
SAS Plains Avg(SAS+UFA) Ridges			51,576	795	1.5%	52,371

Wetland Class	Aquifer	Physio	Initial Stressed Acres	Delta Stressed Acres	% Change	Probable Stressed Acres
S4B2 -S4B1						
Class 1	SAS	Plains	220	8	3.6%	228
	UFA	Ridge	7,069	84	1.2%	7,152
	SAS	Ridge	6,674	10	0.2%	6,685
Class 2	SAS	Plains	150	5	3.6%	156
	UFA	Ridge	1,520	67	4.4%	1,587
	SAS	Ridge	1,294	32	2.5%	1,326
Class 3	SAS	Plains	14,811	(3)	0.0%	14,808
	UFA	Ridge	33,260	(1,686)	-5.1%	31,574
	SAS	Ridge	27,288	(530)	-1.9%	26,758
SAS Plains Avg(SAS+UFA) Ridges			53,735	(1,001)	-1.9%	52,734

Wetland Class	Aquifer	Physio	Initial Stressed Acres	Delta Stressed Acres	% Change	Probable Stressed Acres
S5A2 -S5A1						
Class 1	SAS	Plains	414	(188)	-45.4%	226
	UFA	Ridge	7,417	(299)	-4.0%	7,118
	SAS	Ridge	6,724	(29)	-0.4%	6,695
Class 2	SAS	Plains	139	9	6.6%	148
	UFA	Ridge	1,791	(309)	-17.3%	1,482
	SAS	Ridge	1,533	(252)	-16.4%	1,282
Class 3	SAS	Plains	14,949	627	4.2%	15,576
	UFA	Ridge	33,756	(1,756)	-5.2%	32,000
	SAS	Ridge	27,959	(970)	-3.5%	26,989
SAS Plains Avg(SAS+UFA) Ridges			55,092	(1,359)	-2.5%	53,733

Wetland Class	Aquifer	Physio	Initial Stressed Acres	Delta Stressed Acres	% Change	Probable Stressed Acres
S5B2 -S5A1						
Class 1	SAS	Plains	414	(200)	-48.3%	214
	UFA	Ridge	7,417	(646)	-8.7%	6,771
	SAS	Ridge	6,724	(86)	-1.3%	6,638
Class 2	SAS	Plains	139	(4)	-3.1%	135
	UFA	Ridge	1,791	(383)	-21.4%	1,408
	SAS	Ridge	1,533	(278)	-18.1%	1,255
Class 3	SAS	Plains	14,949	(517)	-3.5%	14,432
	UFA	Ridge	33,756	(4,877)	-14.4%	28,879
	SAS	Ridge	27,959	(2,064)	-7.4%	25,895
SAS Plains Avg(SAS+UFA) Ridges			55,092	(4,888)	-8.9%	50,204

Wetland Class	Aquifer	Physio	Initial Stressed Acres	Delta Stressed Acres	% Change	Probable Stressed Acres
S6 -2015						
Class 1	SAS	Plains	655	(432)	-65.9%	223
	UFA	Ridge	6,800	(366)	-5.4%	6,434
	SAS	Ridge	6,666	(67)	-1.0%	6,599
Class 2	SAS	Plains	143	(8)	-5.5%	135
	UFA	Ridge	1,424	(66)	-4.6%	1,358
	SAS	Ridge	1,282	(23)	-1.8%	1,259
Class 3	SAS	Plains	14,637	(201)	-1.4%	14,436
	UFA	Ridge	29,466	(2,481)	-8.4%	26,985
	SAS	Ridge	26,643	(1,058)	-4.0%	25,584
SAS Plains Avg(SAS+UFA) Ridges			51,576	(2,671)	-5.2%	48,904

Wetland Class	Aquifer	Physio	Initial Stressed Acres	Delta Stressed Acres	% Change	Probable Stressed Acres
S8A1						
Class 1	SAS	Plains	655	(441)	-67.3%	214
	UFA	Ridge	6,800	(29)	-0.4%	6,771
	SAS	Ridge	6,666	(28)	-0.4%	6,638
Class 2	SAS	Plains	143	(8)	-5.8%	135
	UFA	Ridge	1,424	(16)	-1.1%	1,408
	SAS	Ridge	1,282	(27)	-2.1%	1,255
Class 3	SAS	Plains	14,637	(206)	-1.4%	14,432
	UFA	Ridge	29,466	(587)	-2.0%	28,879
	SAS	Ridge	26,643	(747)	-2.8%	25,895
SAS Plains Avg(SAS+UFA) Ridges			51,576	(1,372)	-2.7%	50,204

This Page Intentionally Left Blank.

G

Regulatory

SECTION 1: PER CAPITA AND POPULATION CALCULATION METHODS

Table G-1. Per Capita Methods.

Program Area	Per Capita Method Used				
	NWFWMD	SFWMD	SJRWMD	SRWMD	SWFWMD
District Water Supply Assessments	Uniform gross per capita water use aggregated at county level	N/A	Uniform Gross Per Capita (5-Year Average) & Uniform Residential Per Capita (5-Year Average)	Gross Per Capita	Unadjusted Gross Per Capita (Most recent 5-year average)
Annual Water Use Reports (for Districts that prepare them)	N/A	N/A	Uniform Gross Per Capita & Uniform Residential Per Capita	N/A	Unadjusted Gross, Adjusted Gross (Gross Use – Commercial and Golf Course Use) and Compliance Per Capita (Gross Use – (Commercial + Golf Course) – (Env. Mitigation + Stormwater + Reclaimed Water) / Functional Population
Consolidated Annual Reports	Uniform gross per capita water use	N/A	Uniform Gross Per Capita & Uniform Residential Per Capita	N/A	Unadjusted Gross Per Capita
Strategic Plan Updates (Annual)	Uniform gross per capita water use	N/A	Uniform Gross Per Capita & Uniform Residential Per Capita	N/A	Unadjusted Gross Per Capita (most recent 5-year average)
Regional Water Supply Plans	Uniform gross per capita water use aggregated at county level	Annual finished water (from MORS) divided by population to calculate planning per capita. Significant seasonal variations may be taken into account.	Uniform Gross Per Capita (5-Year Average) & Uniform Residential Per Capita (5-Year Average)	N/A	Unadjusted Gross Per Capita (most recent 5-year average)

Table G-1. Per Capita Methods (continued).

Program Area	Per Capita Method Used				
	NWFWMD	**SFWMD**	**SJRWMD**	**SRWMD**	**SWFWMD**
Conserve Florida Guide	N/A	Uniform Gross Per Capita and Uniform Residential Per Capita	Uniform Gross Per Capita & Uniform Residential Per Capita	DEP March 3, 2008 Guidance	Compliance Per Capita (Gross Use – (Commercial + Golf Course) – (Env. Mitigation + Stormwater + Reclaimed Water) / Functional Population
District Water Management Plans	N/A	N/A	Uniform Gross Per Capita (Five-Year Average) & Uniform Residential Per Capita (Five-Year Average)	N/A	Unadjusted Gross Per Capita (Most recent 5-year average)
Water Use Permitting	Uniform Residential Per Capita (Single year; multi-year average if data available)	Uniform Residential Per Capita (5-year average)	Uniform Gross Per Capita (Five-Year Average) & Uniform Residential Per Capita (5-Year Average)	DEP March 3, 2008 Guidance	Compliance Per Capita (Gross Use – (Commercial + Golf Course) – (Env. Mitigation + Stormwater + Reclaimed Water) / Functional Population / Most recent 5-year average

Table G-2. Population Calculation Method.

Program Area	Population Calculation Method Used				
	NWFWMD	SFWMD	SJRWMD	SRWMD	SWFWMD
District Water Supply Assessments	BEBR population	N/A	For historical average per capita calculation: Residential units served multiplied by respective BEBR county PPH. For future population projections at five-year increments: parcel based GIS model, permanent population.	BEBR	Functional Population (Permanent, Seasonal +Tourist + positive Net Commuter Populations) at five-year increments calculated using GIS model, US Census block level PPH delineated by public supply service area.
Annual Water Use Reports (for Districts that prepare them)	N/A	N/A	Residential units served multiplied by respective BEBR county PPH.	N/A	Residential Un its x US Census block level PPH delineated by public supply service area. Residential Units include conversions of master meter connections to residential dwelling units; Final functional population = sum of permanent, seasonal residential, group quarters, tourist and net commuter populations.
Consolidated Annual Reports	Utility service population estimates [Service connections from FDEP basic facility reports X county-wide PPH (BEBR/ U.S. Census)]	N/A	Residential units served multiplied by respective BEBR county PPH.	N/A	Functional Population (Permanent, Seasonal +Tourist + positive Net Commuter Populations) at five-year increments calculated using GIS model, US Census block level PPH delineated by public supply service area.

Table G-2. Population Calculation Method (continued).

Program Area	Population Calculation Method Used				
	NWFWMD	SFWMD	SJRWMD	SRWMD	SWFWMD
Strategic Plan Updates (Annual)	Utility service population estimates [Service connections from FDEP basic facility reports × county-wide PPH (BEBR/ U.S. Census)]	Update/develop current area served and future service area maps. Distribute population into service areas by using most current of census blocks or TAZs. DEO approval for higher than medium BEBR is taken into account.	Residential units served multiplied by respective BEBR county PPH.	N/A	Functional Population (Permanent, Seasonal +Tourist + positive Net Commuter Populations) at five-year increments calculated using GIS model, US Census block level PPH delineated by public supply service area.
Regional Water Supply Plans	BEBR population	Update/develop current area served and future service area maps. Distribute population into service areas by using most current of census blocks or TAZs. DEO approval for higher than medium BEBR is taken into account. Significant seasonal may be taken into account.	For historical average per capita calculation: Residential units served multiplied by respective BEBR county PPH. For future population projections at five-year increments: parcel based GIS model, permanent population.	N/A	Functional Population (Permanent, Seasonal +Tourist + positive Net Commuter Populations) at five-year increments calculated using GIS model, US Census block level PPH delineated by public supply service area.
Conserve Florida Guide	N/A	Residential units served (by utility) multiplied by respective BEBR county PPH (if data available)	Residential units served multiplied by respective BEBR county PPH.	BEBR	Functional Population (Permanent, Seasonal +Tourist + positive Net Commuter Populations) at 5-year increments calculated using GIS model, US Census block level PPH delineated by public supply service area.

Table G-2. Population Calculation Method (continued).

Program Area	Population Calculation Method Used				
	NWFWMD	SFWMD	SJRWMD	SRWMD	SWFWMD
District Water Management Plans	N/A	N/A	For historical average per capita calculation: Residential units served multiplied by respective BEBR county PPH. For future population projections at five-year increments: parcel based GIS model, permanent population.	N/A	Functional Population (Permanent, Seasonal +Tourist + positive Net Commuter Populations) at 5-year increments calculated using GIS model, US Census block level PPH delineated by public supply service area.
Water Use Permitting	# residential connections X BEBR county-wide PPH	Update /develop current area served and-future service area maps. Distribute population into service areas by using most current of census blocks or TAZs. DEO approval for higher than medium BEBR and seasonal populations are taken into account.	For historical average per capita calculation: Residential units served multiplied by respective BEBR county PPH. For future population projections at yearly increments: parcel based GIS model, permanent population.	BEBR	Functional Population (Permanent, Seasonal +Tourist + positive Net Commuter Populations) at 5-year increments calculated using GIS model, US Census block level PPH delineated by public supply service area.

SECTION 2: WATER SHORTAGE

Table G-3. Comparison of Water Shortage Criteria by CFWI District.

PROGRAM COMPONENTS	WATER MANAGEMENT DISTRICT
Policy and Purpose • Protect resource from serious harm • Equitable distribution of available water • Minimize economic impact • Provide advance knowledge of apportionments	SFWMD 40E-21.011 • Protect water from serious harm • Avoid undue hardship • Ensure equitable distribution of water resources • Knowledge of how water will be apportioned • Promote WUP permittee security
	SJRWMD 40C-21.001 • Protect resource from serious harm • Equitable distribution of available water • Minimize economic impact • Provide advance knowledge of apportionments • Minimize adverse economic, social and health related impacts • Promote greater security for water use permittees
	SWFWMD 40D-21.011 • Protect water from serious harm • Avoid undue hardship • Ensure equitable distribution of water resources • Knowledge of how water will be apportioned • Promote WUP permittee security

Table G-3. Comparison of Water Shortage Criteria by CFWI District (continued).

PROGRAM COMPONENTS	WATER MANAGEMENT DISTRICT
Condition Evaluation • Real time monitoring • Surface and ground water • Present and anticipated supply • Present and anticipated user demands • Comparison of demands to impact on resource and if serious harm may occur • Minimum flows / levels exceedance	SFWMD 40E-21.221 Evaluating Conditions • Monitoring supply and demand conditions at least monthly • Determination of shortage phase depends upon current / projected status • Comprehensive District real-time monitoring of water resource conditions and modeled projections (monthly or bi-monthly basis) assess water supply availability and water user demands • MFL status for surface and ground water bodies is assessed throughout system • C & SF Project features and regulation schedules are considered • See also: 40E-21.401 in Monitoring section
	SJRWMD 40C-21.221 • Resource monitoring • Demand monitoring • Comparison of current to historical data to estimate present and anticipated user demands • Estimate present and anticipated available water supply • Current and anticipated flows and levels
	SWFWMD 40D-21, Part II 40D-21.211 and Table 21-1, Monitoring • Drought indicators (12-month and 24-month rainfall, 8 – week and 7-day streamflow, aquifer levels) • Additional considerations (lake levels, NOAA precipitation outlooks, public supply status, etc.) 40D-21.221, Evaluation • Monitoring conditions at least monthly • Determination of shortage depending upon current/ projected status

Table G-3. Comparison of Water Shortage Criteria by CFWI District (continued).

PROGRAM COMPONENTS	WATER MANAGEMENT DISTRICT
Water Shortage Declaration • Standard to declare (insufficient water available) • Source affected (surface / ground) • Geographic area affected • Use class • Restrictions on withdrawals • 4 phases, escalating in severity of restrictions	SFWMD 40E-21.231 Declaring a Water Shortage • Declared according to Source Class in 40E-21.631 (groundwater by water table and confined / semi-confined due to surface and rainfall recharge and surface waters by identified basin and generally related to C & SF Project) • Applied to geographic area affected by shortage (impacted sources and users that use them) 40E-21.631 Source Classes defined 40E-21.651 Use Classes divided into four major groupings: essential / domestic / utility / commercial; agricultural; nursery / urban irrigation / recreation; and miscellaneous with numerous sub-groups 40E-21.671 Method of withdrawal classifications (surface water, pump, gravity flow, artesian well, pumped well, infiltration gallery) 40E-21.271, 40E-21.521 - .551 state both general and specific water shortage restrictions by use classification. The Governing Board has discretion to modify the restrictions stated in rule to adapt restrictions to resource conditions.
	SJRWMD 40C-21.231 • May declare water shortage warning when increased likelihood of insufficient water or to protect water resources from serious harm • May call for voluntary/reduction in demand • May declare water shortage when insufficient water • May declare water shortage within all or part of WMD • Will coordinate with other water management districts and Georgia to extent practicable when boundaries of affected sources extend beyond district boundaries

Table G-3. Comparison of Water Shortage Criteria by CFWI District (continued).

PROGRAM COMPONENTS	WATER MANAGEMENT DISTRICT
Water Shortage Declaration (continued)	**SWFWMD** **40D-21.231** • Declared according to Source Class in 40D-21.531 (groundwater, aquifers, surface waters, streams/lakes) • Applied to geographic area affected by shortage (impacted sources and users that use them) **40D-21.531, Source Classifications** – groundwater, aquifer levels, surface water, streams/lakes **40D-21.451, Use Classifications** indoor, essential, commercial/industrial, ag, and landscape uses (with sub-classifications for lawn/landscape, cemeteries, golf courses, driving ranges, other athletic play areas) **40D-21.571, Withdrawal Classifications** – surface water, pump, gravity flow, groundwater, artesian wells, pumped wells **40D-21.621, Phase I, Moderate Water Shortage** • At least one drought indicator has moderately abnormal value • Alert local governments, others to prepare for possible worsening of conditions • Continue to follow year-round measures (watering 2x/week, 12a-10a or 4p-11:59p) • Uses voluntarily reduced • WUP Conditions, BMPs • No restrictions on car washing, aesthetic features, or pressure washing **40D-21.631, Phase II, Severe Water Shortage** • Multiple drought indicators have moderately abnormal values or one drought indicator has a several abnormal value • Conditions warrant prudent action to ensure reasonable uses only • Watering hours restricted to 12:00a-8a or 6p-11:59a; Dec-Feb 1x/week, Mar-Nov 2x/week • Reduce off-site discharge, recycle water, reduce clean-up activities, maximize use of least restricted Source Class • Car washing restricted to appropriate watering day • Aesthetic water features –8 hours/day; some exemptions • Pressure washing only as necessary and annual aesthetics • Restrictions on HOA enforcement of activities requiring water use (even if use itself is otherwise allowed) • Accelerate conservation/enforcement efforts

Table G-3. Comparison of Water Shortage Criteria by CFWI District (continued).

PROGRAM COMPONENTS	WATER MANAGEMENT DISTRICT
Water Shortage Declaration (continued)	**SWFWMD (continued)** **40D-21.641, Phase III, Extreme Water Shortage** • Multiple drought indicators have severely abnormal values, or one drought indicator has an extremely abnormal value • Conditions warrant minimization of nonessential water use, preparation for supply augmentation • Watering 12:00a-8a or 6p-11:59p; 1x/week only • Microirrigation and handwatering only during allowable irrigation hours • Eliminate off-site discharge, recycle water, reduce clean-up activities, maximize use of least restricted Source Class • Golf course irrigation further restricted • Car washing on allowed watering day • Aesthetic water features – 4 hours/day, with exemptions • Pressure washing only as necessary, but not for annual aesthetic purposes • Restricts HOA enforcement for activities requiring water use (even if use itself is otherwise allowed) **40D-21.651, Phase IV, Critical Water Shortage** • Multiple drought indicators have extremely abnormal values, or one drought indicator has a critically abnormal value • Conditions warrant temporary suspension of nonessential use/initiation of supply augmentation • Watering days – 1x/week from 12a-4a only (irrigation systems) and handwatering from 4a-8a or 6p-10p only • If conditions warrant, District may ban all irrigation except microirrigation and handwatering • Car washing prohibited • Aesthetic water features prohibited, with exemptions • Pressure washing only allowed for necessary purpose if professional- grade is used • Restricts HOA enforcement for activities requiring water use (even if use itself is otherwise allowed)

Table G-3. Comparison of Water Shortage Criteria by CFWI District (continued).

PROGRAM COMPONENTS	WATER MANAGEMENT DISTRICT
Water Shortage Phases	SFWMD 40E-21.251 Water Shortage Phases: moderate, severe, extreme critical with escalating severity of restrictions from 15% – 60%
	SJRWMD 40C-21.251 Establishes 4 plans as a function of estimated reduction in demand needed to meet estimated and anticipated available water supply
	SWFWMD 40D-21.251, 4 phases – moderate, severe, extreme critical

Table G-3. Comparison of Water Shortage Criteria by CFWI District (continued).

PROGRAM COMPONENTS	WATER MANAGEMENT DISTRICT
Restrictions: General • Voluntary user agreements • Metering and reporting (CUP condition linkage) • MFL linkage • Shifting to unrestricted source • Monitoring levels and chloride • Restrictions on total withdrawal amount, timing of use, pumping / diversion rates	SFWMD 40E-21.271 • Provides broad latitude for Board ordering restrictions, in addition to or in lieu of the specific restrictions stated in the rule, affecting any geographic area, use class or source class. Additional restrictions that may be considered include: voluntary agreements, metering and reporting of all water used, diverted, etc. • Linked to MFL program as stated in both 40E-8 and 40E-22, the regional water shortage plans • Allowing users to shift to unrestricted sources • Providing for monitoring water levels and chlorides CUP limiting conditions may also be triggered and require increased monitoring and reporting. 40E-21.501 Upon declaration of a shortage, use of water in a manner inconsistent with restrictions is prohibited and subject to enforcement. Wasteful and unnecessary water use is prohibited, regardless of phase and includes allowing water to be dispersed without purpose, or in a grossly inefficient manner, or for a purpose which is unnecessary or which can be accomplished through alternative methods without water use.
	SJRWMD 40C-21.271 • Voluntary user agreements • Metering and reporting of all water used, diverted, impounded or withdrawn • MFL linkage • Shifting to unrestricted source • Monitoring levels and chloride

Table G-3. Comparison of Water Shortage Criteria by CFWI District (continued).

PROGRAM COMPONENTS	WATER MANAGEMENT DISTRICT
Restrictions: General (continued)	SWFWMD 40D-21.601(4) prohibits three general kinds of wasteful/unnecessary water use (in addition to specific kinds in 40D-22.201(2) Linkage to CUP conditions and shifting to least restricted source is provided in each phase (and for irrigation, through 40D-22.201) 40D-22.201, Year-Round Conservation Measures • Applicable to all users • Prohibits five specific wasteful/ unnecessary use practices • General irrigation uses – prohibited from 10a to 4p; low volume methods, hand watering/spot treatment not restricted; exception for establishment of new plant material; no restriction on reclaimed, requests voluntary conservation between 10a and 4p; provides application rates • Additional criterial applicable to certain types of use • Golf Course and Agriculture uses must maintain compliance with all CUP/WUP terms/ conditions or follow specific measures in the rule (see Restrictions: Specific)

Table G-3. Comparison of Water Shortage Criteria by CFWI District (continued).

PROGRAM COMPONENTS	WATER MANAGEMENT DISTRICT
Restrictions: Specific • Use classes • Time of day • Hours of use • Extensive details (balancing factors e.g.: economic impact, efficiency of use, nature of use, public health / safety, etc.)	SFWMD 40E-21.521 – Phase I Moderate • Essential/Domestic/ Utility/Commercial • Agriculture • Nursery/Landscape Irrigation/Recreation • Miscellaneous Restrictions stated by use class and, generally, restrict hours and times of day (balancing factors e.g., economic impact, efficiency of use, nature of use, public health/ safety, etc.) No phase 1 or 2 restrictions for efficient ag uses 40E-21.531 – Severe • Use classes • Time of day • Hours of use • Extensive details (balancing factors e.g., economic impact, efficiency of use, nature of use, public health/ safety, etc.) 40E-21.541 – Extreme (As above, with increased restrictions) 40E-21.551 – Critical (As above, with increased restrictions)

Table G-3. Comparison of Water Shortage Criteria by CFWI District (continued).

PROGRAM COMPONENTS	WATER MANAGEMENT DISTRICT
Restrictions: Specific (continued)	SJRWMD 40C-21.371 40C-21.551, Use Classes • Essential/Domestic/ Utility/Commercial • Agriculture • Nursery/Landscape Irrigation/Recreation • Miscellaneous 40C-21.621, Moderate Water Shortage • Use classes • Time of day • Hours of use • Extensive details (balancing factors e.g., economic impact, efficiency of use, nature of use, public health /safety, etc.) 40C-21.631, Severe Water Shortage • Use classes • Time of day • Hours of use • Extensive details (balancing factors e.g., economic impact, efficiency of use, nature of use, public health/ safety, etc.) 40C-21.641, Extreme Water Shortage • Use classes • Time of day • Hours of use • Extensive details (balancing factors e.g., economic impact, efficiency of use, nature of use, public health/safety, etc.) 40C-21.651, Critical Water Shortage • Use classes • Time of day • Hours of use • Extensive details (balancing factors e.g., economic impact, efficiency of use, nature of use, public health/safety, etc.)

Table G-3. Comparison of Water Shortage Criteria by CFWI District (continued).

PROGRAM COMPONENTS	WATER MANAGEMENT DISTRICT
Restrictions: Specific (continued)	SWFWMD 40D-22.201(4), Lawn and Landscape Use • M/Th for even addresses • W/Sa for odd addresses • T/F for common areas, rights of way, properties w/o discernible address • Cemeteries or other properties > 2 acres may water ½ on even days, ½ on odd days • Automated irrigation systems must have properly operated/maintained rain sensors, moisture sensors or other technology to prevent unneeded irrigation 40D-22.201(5), Golf Courses • Follow IFAS irrigation BMPs • Fairways/roughs/driving ranges irrigated no more than 2x/week • Tees/greens irrigated no more than 3x/week, with exceptions for plant protection (frost/freeze or heat stress) 40D-22.201(6), Athletic Play Areas • Allows wetting of clay fields immediately prior to play to ensure athlete/animal safety, sports standards, dust control • Allows one extra irrigation after heavy league play for baseball, softball, football, soccer, polo, other turfgrass fields to encourage turf repair and maintain safe play conditions • ½ irrigated on M/T and T/F

Table G-3. Comparison of Water Shortage Criteria by CFWI District (continued).

PROGRAM COMPONENTS	WATER MANAGEMENT DISTRICT
Region Specific Water Shortage Plan • Linked to minimum flows / levels • Triggers for Board to consider when evaluating water shortage declaration by phase (I – IV)	SFWMD 40E-21.221(3)(d) • Evaluation shall consider MFLs and associated rules regarding water shortage and MFLs (40E-8 and 40E-22). MFLs shall be implemented allowing for shared adversity between CUP and water resources consistent with 373 and above chapters Chapter 40E-22 • Trigger levels for Board consideration as to several surface water bodies, especially Lake Okeechobee, are stated by phase. 40E-8.421 • Conceptual model identifying the relationships between water resource protection requirements of 373 (harm, significant harm, serious harm, and reservations) is stated, in addition to MFL recovery and prevention strategies and the District's over-arching program is explained. 40E-8.441 • Details regarding integration of the District's MFL program with the Water Shortage Plan are stated and include, in summary: (1) shortage restrictions will be imposed, per rules, if an MFL exceedance is occurring during conditions more severe than a 1 in 10 year drought to the extent consumptive uses contribute to such exceedance; (2) shortage restrictions will not be used in placed of an approved recovery plan to provide hydrologic benefits that are to be provided by recovery strategy; (3) MFL criteria will not be utilized to trigger shortage restrictions during conditions less severe than a 1 in 10 drought; (4) restrictions will be implemented considering factors in 40E-21 and the Board shall consider 6 stated factors; Phase 3 restrictions shall be implemented allowing for a shared adversity between continuing use and resource needs
	SJRWMD 40C-21.231 • Board will consider effect of local responses, anticipated available supply, and jurisdictional boundaries 40C-21.271 • Linked to minimum flows / levels 40C-21.401 • Monitoring • Evaluation of drought indicators 40C-21.221 • Seasonal influences • Ability to implement phased restrictions • Potential for serious harm to natural systems

Table G-3. Comparison of Water Shortage Criteria by CFWI District (continued).

PROGRAM COMPONENTS	WATER MANAGEMENT DISTRICT
Region Specific Water Shortage Plan (continued)	SWFWMD 40D-21.231 • Board will consider effect of local responses, anticipated available supply, and jurisdictional boundaries 40D-21.251 • Evaluation of drought indicators • Seasonal influences • Availability of AWS • Ability to implement phased restrictions • Potential for serious harm to natural systems • Geography • Effectiveness of current restrictions • Adverse impacts of restrictions to public health, safety, or welfare
Linked to Federal Project Operations • C & SF Project • Seminole Tribe	SFWMD • 40E-22 • Various C & SF Project regulation schedules • Water Rights Compact
	SJRWMD N/A
	SWFWMD N/A

Table G-3. Comparison of Water Shortage Criteria by CFWI District (continued).

PROGRAM COMPONENTS	WATER MANAGEMENT DISTRICT
Component of MFL Program • Circumstances for imposition of restrictions addressed • Equitable distribution of water to prevent serious harm with phased cutbacks • Not use shortage restrictions in place of recovery strategy • Specific factors to consider when declaring shortage to protect MFL water body defined	SFWMD 40E-21.221(3)(d), evaluation of water conditions shall consider MFLs and the provisions of Chapters. 40E-8 and 40E-22 summarized above. MFLs shall be implemented allowing for a shared adversity between consumptive uses and water resources. 40E-21.271(3)(d) General Restrictions allows for additional restrictions to be considered in light of MFLs Ch. 40E-22, see especially: 40E-22.332 (Summarized above) 40E-8.421, 40E-8.431, 40E-8.441 (Summarized above)
	SJRWMD 40C-21.221 • Circumstances for imposition of restrictions addressed 40C-21.271 • Circumstances for imposition of restrictions addressed • Provisions designed to maintain minimum flows and minimum levels, established pursuant to Section 373.042, F.S 40C-21.651 • Circumstances for imposition of restrictions addressed
	SWFWMD 40D-21.251, Water Shortage Phases See also 40D-2 and 40D-80
Variances	SFWMD 40E-21.275 Variances from Water Shortage rules may be requested, conditions for issuance are stated as are limiting conditions. Generally, the minimum necessary variance to alleviate the circumstance eligible for the variance is allowed. Application contents and procedures are stated and provide for Executive Director action
	SJRWMD 40C-1.1004, Variances from Water Shortage Rules requesting relief from provisions of 40C-21, F.A.C.
	SWFWMD 40D-22.303, Variances – file petition for variance/waiver in accordance w/Section 120.542, F.S., and Chapter 28-104, F.S.

Table G-3. Comparison of Water Shortage Criteria by CFWI District (continued).

PROGRAM COMPONENTS	WATER MANAGEMENT DISTRICT
Monitoring	SFWMD 40E-21.401 (by District, regarding both resource and demands, sources may include data from permittees and local, state, federal govt.) CUP limiting conditions may also require additional monitoring and / or more frequent reporting
	SJRWMD 40C-21.401 • Data collection and analysis • Impacts on fish and wildlife 40C-21.231 • Protect against salt water intrusion or other deterioration 40C-21.271 • Protect against salt water intrusion or other deterioration
	SWFWMD 40D-21.211, Monitoring • Drought indicators (rainfall, streamflow, aquifer levels) • Regional lake levels • US Drought Monitor • Precipitation outlooks (NOAA) • Public supply status – reporting specific to each phase • WUP Condition Reporting

Table G-3. Comparison of Water Shortage Criteria by CFWI District (continued).

PROGRAM COMPONENTS	WATER MANAGEMENT DISTRICT
Enforcement	SFWMD 40E-21.421 • Cooperation and assistance of the State, county and municipal governmental officials, law enforcement officials • Encourages adoption of local ordinances • Enforcement as provided in Section 373.603 and 373.609, F.S., as to 'partnership' with local enforcement entities
	SJRWMD 40C-21.421 • Cooperation and assistance of the State, county and municipal governmental officials, law enforcement officials • Encourages adoption of local ordinances • Enforcement as provided in Section 373.603, F.S.
	SWFWMD 40D-21.421, Water Shortage Declaration • Cooperation with local enforcement entities pursuant to Section 373.609, F.S. • Encourages adoption of local ordinances • District enforcement with focus on WUP permittee • Enforcement as provided in Section 373.603, F.S. 40D-21.421, Year-Round Conservation Measures • Partnerships with local enforcement entities pursuant to Section 373.609, F.S. • Allows local governments to enact more restrictive criteria • Allows District staff to initiate enforcement pursuant to 373.603 • Allows Executive Director to take action pursuant to Sections 373.119, 373.175(4), 373.246(7), and 120.69, F.S.

Table G-3. Comparison of Water Shortage Criteria by CFWI District (continued).

PROGRAM COMPONENTS	WATER MANAGEMENT DISTRICT
Not applicable to treated effluent or seawater	SFWMD 40E-21.011 Applicable if blended with another traditional water source
	SJRWMD 40C-21.001
	SWMWMD Applicable if blended with another traditional water source
Statutory Authorities **§§ 373.175,** **373.246,** **373.171,** **373.042,** **373.0421,** **373.219,** **373.086**	

This Page Intentionally Left Blank.

SECTION 3: AQUIFER RECHARGE AND IMPACT OFFSETS

This Page Intentionally Left Blank.

Table G-4. Examples of Aquifer Recharge/Impact Offset Projects and Programs by District.

No.	Program/Project	Description	SWFWMD Examples	SFWMD Examples	SJRWMD Examples
1a.	Aquifer Recharge Projects – Reclaimed Water	One or more reclaimed water providers construct project, which directly or indirectly recharges the Floridan aquifer. The recharge offsets the impact of groundwater withdrawals on water resource constraints.	Incorporates by reference Rule 62-40.416(7), F.A.C. For reuse water quality, Chapters 62-4, 62-302, 62-303, 62-304, 62-520, 62-521, 62-528, 62-550, 62-600, 62-610, 62-620, 62-621, 62-625 and 62-650, F.A.C.	Incorporates by reference Rule 62-40.416(7), F.A.C. For reuse water quality, Chapters 62-4, 62-302, 62-303, 62-304, 62-520, 62-521, 62-528, 62-550, 62-600, 62-610, 62-620, 62-621, 62-625 and 62-650, F.A.C.	Incorporates by reference Rule 62-40.416(7), F.A.C. For reuse water quality, Chapters 62-4, 62-302, 62-303, 62-304, 62-520, 62-521, 62-528, 62-550, 62-600, 62-610, 62-620, 62-621, 62-625 and 62-650, F.A.C. OUC Permit CUP 3159 or OCU CUP 3317.
1b.	Aquifer Recharge Projects – User Non-Reclaimed Water	One or more water users construct project, which directly or indirectly recharges the Floridan aquifer using storm water or surface water. The recharge offsets the impact of groundwater withdrawals on water resource constraints.	SWUCA – Net Benefit – Mitigation Plus Recovery. A.H. 3.9.2.6.2.2.4(A)(2)	LEC – AH 3.2.1.E(5)(b) or LOSA – AH 3.2.1.G	OUC Permit CUP 3159 or OCU Permit CUP 3317
1c.	Aquifer Recharge Projects – DEP/WMD Non-Reclaimed Water	DEP or water management districts construct restoration project that directly or indirectly recharges the Floridan aquifer using storm water or surface water. The recharge offsets the impact of ground- water withdrawals on water resource constraints.	SWUCA – Net Benefit – Quantities Created by District. A.H. 3.9.2.6.2.2.4(B)	LEC – AH 3.2.1.E(5)(a) or LOSA – AH 3.2.1.G(3)(c)(i)	None

Table G-4 Examples of Aquifer Recharge/Impact Offset Projects and Programs by District (continued).

No.	Program/Project	Description	SWFWMD Examples	SFWMD Examples	SJRWMD Examples
2a.	Non-Recharge Offset Projects – Reclaimed Water	One or more reclaimed water providers construct project that offset impact of groundwater withdrawals on water resource constraints by augmenting lakes or wetlands.	Incorporates by reference Rule 62-40.416(7), F.A.C. For reuse water quality, Chapters 62-4, 62-302, 62-303, 62-304, 62-520, 62-521, 62-528, 62-550, 62-600, 62-610, 62-620, 62-621, 62-625 and 62-650, F.A.C.	Incorporates by reference Rule 62-40.416(7), F.A.C. For reuse water quality, Chapters 62-4, 62-302, 62-303, 62-304, 62-520, 62-521, 62-528, 62-550, 62-600, 62-610, 62-620, 62-621, 62-625 and 62-650, F.A.C.	Incorporates by reference Rule 62-40.416(7), F.A.C. For reuse water quality, Chapters 62-4, 62-302, 62-303, 62-304, 62-520, 62-521, 62-528, 62-550, 62-600, 62-610, 62-620, 62-621, 62-625 and 62-650,
2b.	Non-Recharge Offset Projects – User Non-Reclaimed Water	One or more water users construct project that offsets impact of groundwater withdrawals on water resource constraints by augmenting lakes or wetlands with ground, surface, or storm water or enhancing or creating wetlands or restoring/preserving impacted environmental features.	SWUCA – Net Benefit – Other Offset A.H. 3.9.2.6.2.2.4(A)(3) or SWUCA Augmentation – A.H. 3.9.2.7.1.	LEC – AH 3.2.1.E(5)(b). STOPR CUPs 48-00134-W, 53-00126-W, 48-0009-W, 49-00084-W and 49-0002-W	OUC CUP 3159
2c.	Non-Recharge Offset Projects – User Other Mitigation	One or more water users take action to offset impact of groundwater withdrawals on water resource constraints by purchasing credits from a mitigation bank or making monetary contributions to regional restoration projects.	None	STOPR CUPs 48-01134-W, 53-00126-W, 48-0009-W, 49-00084-W and 49-0002-W	None
2d.	Non-Recharge Offset Projects – DEP/WMD Non-Reclaimed Water	DEP or water management districts construct project that offsets impact of groundwater withdrawals on water resource constraints by augmenting lakes or wetlands with ground, surface, or storm water or enhancing or creating wetlands or restoring/preserving impacted environmental features.	SWUCA – Net Benefit – Quantities Created by District. A.H. 3.9.2.6.2.2.4(B).	LEC – AH 3.2.1.E(5)(a) or LOSA – AH 3.2.1.G(3)(c)(i).	None

SECTION 4: RESOURCE REDISTRIBUTION

This Page Intentionally Left Blank.

Table G-5. Examples of Resource Redistribution Projects and Programs by District.

No.	Program/Project	Description	SWFWMD Examples	SFWMD Examples	SJRWMD Examples
1.	Land Use Transition	Permitted groundwater use terminates without renewal or is renewed at a reduced quantity in certain specific geographic areas as a result of land use transitions. For example, agricultural lands are converted to urban development or mining terminates due to exhaustion of local ore reserves.	SWUCA – Net Benefit-Land Use Transitions. A.H. 3.9.2.6.2.2.4(A)(1).	Palm Beach County WUP 50-00135-W (Application 010803-1) (3/2/2003)	None
2a.	Termination or Reduction of Permitted Water Use Due to Reclaimed Water	Individual permitted groundwater uses are terminated or reduced because reclaimed water is substituted for existing permitted groundwater use.	Incorporates by reference Rule 62-40.416(8), F.A.C. For reuse water quality, Chapters 62-4, 62-302, 62-303, 62-304, 62-520, 62-521, 62-528, 62-550, 62-600, 62-610, 62-621, 62-62 and 62-650, F.A.C.	Incorporates by reference Rule 62-40.416(8), F.A.C. For reuse water quality, Chapters 62-4, 62-302, 62-303, 62-304, 62-520, 62-521, 62-528, 62-550, 62-600, 62-610, 62-621, 62-62 and 62-650, F.A.C.	Incorporates by reference Rule 62-40.416(8), F.A.C. For reuse water quality, Chapters 62-4, 62-302, 62-303, 62-304, 62-520, 62-521, 62-528, 62-550, 62-600, 62-610, 62-621, 62-62 and 62-650, F.A.C.
2b.	Termination or Reduction of Permitted Water Use for Reasons Other Than Reclaimed Water Availability.	Individual permitted groundwater uses are terminated or reduced for reasons other than groundwater availability such as conversion to surface water or stormwater use, purchase of water user's property, voluntary revocation of permit by water user or other limitations are placed on water use.	SWUCA – Net Benefit – Mitigation Plus Recovery. A.H. 3.9.2.6.2.2.4(A)(1)	LEC – AH 3.2.1.E(5)(d) or LOSA – AH 3.2.1.G(3)(c)(iv)	None

Table G-5. Examples of Resource Redistribution Projects and Programs by District (continued).

No.	Program/Project	Description	SWFWMD Examples	SFWMD Examples	SJRWMD Examples
3.	Regional Redistribution Projects – Conventional Groundwater Optimization	Several groundwater users collaborate to optimize water use. Groundwater uses with greatest impact on water resource constraints reduce permitted use to allow more groundwater use in areas with less overall impacts on water resource constraints. The decreasing water users' needs are met using water made available by the increasing water users. Costs incurred by decreasing water users such as debt service on existing production facilities and new transmission lines are partially paid by increasing water users.	Tampa Bay Water Central System Wellfields - Optimization Plan – Rule 40D-80.073(2)(g), F.A.C.	None	None
4.	Regional Redistribution – AWS/Groundwater Replacement Credit	Several groundwater users collaborate to develop an AWS source and reduce their permitted use to allow other groundwater users to increase their groundwater use so as to reduce overall adverse impacts to the Floridan aquifer. Costs incurred by the decreasing water use are partially paid by the increasing water users. This would allow water users to participate in development of AWS sources without having to physically take AWS waters through expensive transmission lines.	SWUCA – Net Benefit – Groundwater Replacement Credit. A.H. 3.9.2.6.2.2.4(C).	None	None

SECTION 5: CAUTION AREAS IN THE CFWI PLANNING AREA

Table G-6. Central Florida Coordination Area (CFCA).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	SWFWMD CITATIONS
Water Supply Mission Components	The Central Florida Coordination Area (CFCA) is the predecessor to the Central Florida Water Initiative. In 2006, the three Water Management Districts (Districts) concluded that the availability of sustainable quantities of groundwater in central Florida are insufficient to meet future public supply demands, and that alternative water supply sources must be developed to meet increased demands in central Florida beyond 2013. These rules specifically applicable to CFCA expired on 12/31/2012.	
Goals • Resource (e.g., salt intrusion, potentiometric surface, MFLs, Domestic wells, Freeze protection use, and resource impacts, MALs) • Existing legal user protection • Future water resource development project water availability	Regulatory: Avoid competition and prevent harm to the water resources in the CFCA. Permitting of Public Supply (PS) should result in a consistent and equitable outcome and create incentives for the expedited development of required alternative water supplies (AWSs). Planning: Identify AWS development projects and implement strategies that will ensure the availability of sustainable water supplies to meet public supply needs in a timely manner through 2025 in the CFCA. Computer Modeling and Tools: Ensure that the best available hydrologic modeling, statistical, and analytical tools are available for use to quantify sustainable groundwater and surface water availability in the CFCA in support of regulatory actions, regional water supply planning, and implementation of alternative water source projects; and assist in developing a data-sharing strategy to ensure these tools will be updated in a consistent manner.	Recommended Action Plan for the CFCA

Table G-6. Central Florida Coordination Area (CFCA) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	SWFWMD CITATIONS
Linkage to regional water supply plan • Limited water availability demonstrated • Causal relationships documented • Analysis of alternatives and comparative performance of options • Strategy (long-term) developed considering scientific and socio-economic issues • Water supply development and water resource development projects linkage • Funding • Others	• Field investigations to assess the status of environmental systems in the area were conducted and analyzed to determine whether existing levels of pumping are causing adverse impacts. • The Districts also prepared groundwater modeling assessments to determine whether projected levels of future pumping are sustainable. Results of these analyses were to be used to provide the technical basis for development of a long-term water resources management plan for the CFCA. • Recommended AWS development projects are to be included in Districts' regional water supply plans. • Such projects will then be eligible for potential funding from appropriate districts. • Water supply development in the SWFWMD portion of the CFCA will rely on continued enhancement of conservation efforts, land use transitions, and implementation of reclaimed water and other alternative water source projects. SWFWMD's Regional Water Supply Plan includes a list of identified AWS projects. • SWFWMD offers funding assistance to local governments through its Cooperative Funding Initiative. The program typically funds up to 50 percent of project capital costs from planning through construction.	CFCA Planning Work Group Final Report Recommended Action Plan for the CFCA 2010 Regional Water Supply Plan, Heartland Region
Related to minimum flow / level recovery strategy	Although the entirety of Polk County is included in the CFCA for water supply planning purposes, the CFCA rules only applies to the portion of the county not included within the SWUCA, in recognition that the SWUCA rules are as protective of water resources as those established for the CFCA and to avoid confusion as to which rules apply.	Rule 40D-2.801, F.A.C. Subsection (3)(c)2
Geographic Area	Located within three Districts, and includes Polk, Orange, and Seminole counties, and southern Lake County.	Rule 40D-2.801, F.A.C. Subsection (3)(c)
Monitoring Program • Hydrologic • Biologic • Linkage to recovery strategy • Linkage to water shortage trigger • Compliance with goal • Methodology	A long-term objective of the CFCA action plan was to inventory and develop data, models and tools to improve decision-making.	Recommended Action Plan for the CFCA

Table G-6. Central Florida Coordination Area (CFCA) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	SWFWMD CITATIONS
Regulatory Program Components	Interim rules were adopted by all three Districts in 2008 and expired at the end of 2012.	Rule 40D-2.801, F.A.C. Subsection (3)(c)
Source restricted ("capped") • Surface water • Ground water • Method to cap defined	All additional fresh groundwater withdrawals for all uses are limited to what is necessary to meet 2013 demands. This limitation does not apply to groundwater withdrawals from: • aquifer storage and recovery wells that receive only surface water, stormwater or water that is reused when drawdown does not exceed injection; • the surficial aquifer immediately below or adjacent to a stormwater management system or surface water reservoir where any drawdown is offset by recharge; • an injection/recovery wellfield that injects surface water, stormwater or reused water through wells for storage within an aquifer zone and subsequently recovered through wells in the same zone and same wellfield; • a recharge/recovery project that receives only surface water, stormwater or reused water when the volume recovered does not exceed the volume recharged and the drawdown due to recovery of water from the Floridan aquifer will be offset in the surficial aquifer and the Floridan aquifer by the project.	WUP Information Manual, Part B, Basis of Review[1] Section 3.6
Existing legal user (ELU) rights • Renewal and modification programs • New program(s) and ELU • Offset projects for ELU	If a permittee lacks sufficient "supplemental water supply" to offset demand that exceeds the 2013 demand, permittee is allocated a temporary amount of groundwater to meet increased demand, if it has exercised due diligence to meet all schedule requirements in its permit for developing and using "supplemental water supply." Temporary allocations cease when water from the "supplemental water supply" is available. • Permit conditions require a plan to monitor hydrology, ecology and water quality with annual data reporting and analysis. • Permit conditions require measures to mitigate or avoid harm that would otherwise occur as a result of permitted allocation. • Permit conditions require mitigation or avoidance actions to address unanticipated harm. • 5-year compliance reports	WUP Information Manual, Part B, Basis of Review Sections 3.6 and 6.2

[1] SWFWMD's Water Use Permit Information Manual, Part B, Basis of Review, dated January 2013, has been replaced by the Water Use Permit, Applicant's Handbook Part B, dated May 19, 2014.

Table G-6. Central Florida Coordination Area (CFCA) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	SWFWMD CITATIONS
New allocations of water • Including re-allocation strategy (aka resource redistribution or terminated base condition water) • Threshold limit • Modeling criteria	Same as ELUs – groundwater quantities are capped at the 2013 demand level. "Supplemental water supply" projects are required to offset demand that exceeds the 2013 levels.	
Conservation • Relationship to ELU • Drought credit system • Plan required, with progress reporting • Use class specific • Detailed requirements	All applicants must demonstrate that environmentally, technically and economically feasible water conservation measures applicable to the proposed use have been or will be used. Conservation measures and requirements appropriate for each Use Type are described within the section 3.3 (Agriculture), section 3.4 (Industrial or Commercial), section 3.5 (Mining or Dewatering), section 3.6 (Public Supply-Applicant Consideration), section 3.7 (Recreation or Aesthetic). Water conserving credits within SWUCA.	WUP Information Manual, Part B, Basis of Review Section 3.1
Supplemental irrigation allocation • Allocation and actual usage • Metering • Crop reporting • Frost / freeze and market conditions	Supplemental crop requirement is the amount of water needed for a particular crop beyond the amount of water provided by effective rainfall. Determined either by: (1) Using the agricultural water use calculation (described in Part C of Manual); or (2) Basing the requirement on information from sources, such as UF IFAS reports, USGS Benchmark Farms data, District Agricultural Irrigation Monitoring Data, AFSIRS method. Irrigation for agricultural crops during periods of rainfall that is less than that which the permitted allocation is derived shall be allowed, subject to any water shortage orders in effect and provided that the quantity used is demonstrated to be no greater than the supplemental quantity needed based on the rainfall amount received and all other rule criteria are met. Crop reporting requirements within SWUCA.	WUP Information Manual, Part B, Basis of Review Section 3.3
Competition		
Redistribution of existing allocations		

Table G-6. Central Florida Coordination Area (CFCA) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	SWFWMD CITATIONS
Alternative water supply program	"Supplemental Water Supply" can be used to meet project water demand that exceeds 2013 level. Special permit condition requires development and use of "Supplemental Water Supply" to meet water demands.	WUP Information Manual, Part B, Basis of Review Sections 3.6 and 4.11
	All applicants for permits with 100,000 gpd or greater quantities on a standard annual average basis are required to evaluate the technical, economic and environmental feasibility of using AWS.	WUP Information Manual, Part B, Basis of Review Section 3.1
Permit duration	Permit durations may be limited to 2013, or a longer duration permit will be limited to those fresh groundwater withdrawals documented as the applicant's demonstrated 2013 demand, unless there is a commitment to develop alternative water supplies.	Rule 40D-2.321, F.A.C. Rule 40D-2.801, F.A.C. Subsection (3)
Prohibited use class(es) identified • e.g., Aesthetic	Irrigation for unimproved pasture will not be approved.	WUP Information Manual, Part B, Basis of Review Sections 3.6
Program adopted as a "package" • "Self-destruct" clause	This first set of rules were considered to be temporary in nature and expired on 12/31/2012.	Rule 40D-2.801, F.A.C. Subsection (3)(c)

Table G-7. Dover Plant City Water Use Caution Area (DPC).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	SWFWMD CITATIONS
Water Supply Mission Components	For more than 40 years, farmers in the Dover/Plant City area have pumped groundwater to protect crops during freeze events. During an 11-day freeze event in January 2010, area farmers pumped large quantities of groundwater to protect their crops. This combined pumping dropped the aquifer level 60 feet, which impacted approximately 750 residential wells, and contributed to more than 140 sinkholes being reported. Significant freeze events resulting in well failures and sinkholes have occurred three times over the past 10 years.	
Goals • Resource (e.g. salt intrusion, potentiometric surface, MFLs, domestic wells, freeze protection use and resource impacts, MALs) • Existing legal user protection • Future water resource development project water availability	Dover/Plant City Freeze Management Plan New rules for existing and future water use permit (WUP) holders with crops that require frost/freeze protection within the Dover/Plant City WUCA to ensure impacts from groundwater withdrawals do not worsen. Objective is to reduce groundwater withdrawals for frost/freeze protection by 20% by January 2020. Recovery strategy to meet Minimum Aquifer Level (MAL). Expand FARMS Program to increase incentives for alternative frost/freeze protection methods. Enhanced data collection. Investigation of crop protection withdrawal-related well complaints by permittees. Expand area where special well construction standards apply to prevent impacts to water wells from periodic high water use.	Dover/Plant City Freeze Management Plan Chapter40D-2, F.A.C. Applicants Handbook Part B, Rule 40D-80.075, F.A.C. Chapter 40D-26, F.A.C. Applicants Handbook Part B Section 3.9.4.3.3 Applicants Handbook Part B Section 3.9.4.4 Applicants Handbook Part B Section 3.9.4.5 Rule 40D-3.600, F.A.C.

Table G-7. Dover Plant City Water Use Caution Area (DPC) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	SWFWMD CITATIONS
Linkage to regional water supply plan • Limited water availability demonstrated • Causal relationships documented • Analysis of alternatives and comparative performance of options • Strategy (long-term) developed considering scientific and socio-economic issues • Water supply development and water resource development projects linkage • Funding • Others	SWFWMD's current regional water supply plan, dated 2010, pre-dates the establishment of the Dover/Plant City WUCA. The 2015 updated regional water supply plan will address the Dover/Plant City WUCA. FARMS program encourages alternatives to crop protection, such as tailwater recovery systems, stormwater systems, tunnels, covers, foam and heaters (and others supported by IFAS documentation); cost share for projects that reduce groundwater withdrawals for frost/freeze protection in Dover/Plant City WUCA increased from 50% to 75%.	Section 373.0363, F.S. Subsection (4)(b) Chapter 40D-26, F.A.C. Applicants Handbook Part B Section 3.9.4.3.3
Related to minimum flow / level recovery strategy	MAL is the 10 ft potentiometric surface elevation (NGVD 1929) at District Well DV-1 Suwannee. This is the level at which further withdrawals will cause significant harm. Minimum Aquifer Level Protection Zone (MALPZ) is the area within the 30 ft drawdown contour that resulted from the January 2010 frost/freeze event. It is the most impacted area where the greatest concentration of withdrawal impacts have occurred (i.e., well complaints and sinkholes). Notice of Recovery Strategy is required in all WUPs	Rule 40D-8.626, F.A.C. Applicants Handbook Part B Section 3.9.4.7.1
Geographic area	256 square miles within the Dover / Plant City area in Hillsborough County. Portions of the area also lie in Northern Tampa Bay WUCA and/or SWUCA.	Rule 40D-2.801, F.A.C. Subsection (3)(d) Applicants Handbook Part B Section 3.9.4

Table G-7. Dover Plant City Water Use Caution Area (DPC) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	SWFWMD CITATIONS
Monitoring Program • Hydrologic • Biologic • Linkage to recovery strategy • Linkage to water shortage trigger • Compliance with goal • Methodology	WUP rules enhance data collection by requiring as a permit condition flow meters and automated meter reading devices on all withdrawal points for permits -- • with crops that utilize frost/freeze protection quantities; and • for groundwater quantities to provide supplemental irrigation for a use that typically requires crop protection and where such protection could be achieved through groundwater withdrawals, but alternative protection methods are proposed. Flow Meter Reimbursement Program provides cost share reimbursement for flow meter equipment and installation, if the meters would not be required but for the new WUP rules. Flow meter equipment is then equipped with SWFWMD-funded automated meter reading telemetry that reports real-time water use, which enables improved monitoring of groundwater pumping for frost/freeze irrigation. Permit holders are responsible for maintenance and replacement of meters. SWFWMD is expanding its data collection network by drilling additional monitoring wells to more accurately track the cone of depression associated with withdrawals during crop establishment and frost/freeze events.	Applicants Handbook Part B Applicants Handbook Part B Well Construction and Aquifer Performance Testing for the Dover-Plant City Dover/Plant City Freeze Management Plan

Table G-7. Dover Plant City Water Use Caution Area (DPC) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	SWFWMD CITATIONS
Regulatory Program Components		
Source restricted ("capped") • Surface water • Ground water • Method to cap defined	"Restricted allocation area" – identifies Dover/Plant City WUCA as having additional requirements and restrictions per Section 3.9 of A.H. Part B.	Applicants Handbook Part B Section 3.2.1.C
Existing legal user (ELU) rights • Renewal and modification programs • New program(s) and ELU • Offset projects for ELU	If no increase in permitted crop protection quantities or change in "use type" associated with crop protection, renewals/modifications are evaluated to determine compliance with conditions set forth in 40D-2.301 and A.H.; Existing impacts for crop protection are evaluated the same as new quantities. However, existing impacts to MALPZ and MAL will not be the basis for permit denial. Existing and new permittees within Dover/Plant City WUCA must investigate and resolve crop protection-related well complaints. New well construction standards apply within Dover/Plant City WUCA. Mitigation process for impacts to ELU (e.g., if well pump no longer operates) caused by permittee withdrawing ground water for crop establishment or protection.	Applicants Handbook Part B Section 3.9.4.2.2 Applicants Handbook Part B Sections 3.9.4.5 & 3.9.4.6 Rule 40D-3.600, F.A.C. Applicants Handbook Part B Section 3.9.4.8

Table G-7. Dover Plant City Water Use Caution Area (DPC) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	SWFWMD CITATIONS
New allocations of water • Including re-allocation strategy (aka resource redistribution or terminated base condition water) • Threshold limit • Modeling criteria	"New quantities" in Dover/Plant City WUCA means groundwater for crop protection that is not currently authorized to be used by the applicant or not currently authorized to be used for the intended use, including modifications of existing permits to increase quantities, and/or change the Permit Use Type. New quantities for crop protection are evaluated for design event of 21 hrs of irrigation, followed by 6 hrs of non-irrigation, 13 hrs of irrigation, 11 hrs of non-irrigation, and 14 hrs of irrigation. Drawdown shall not exceed 0.0 ft within or at boundary of MALPZ, in addition to requirement in Rule 40D-2.301. If there is an impact to MAPLZ, option to mitigate impact through "Net Benefit" (i.e., offset predicted impact of proposed withdrawal, plus provide an additional positive effect within MAPLZ equal to or greater than 20% of predicted negative impact). Two options: (1) Mitigation Plus Recovery (retiring from use the historically used groundwater quantity) or (2) Groundwater Replacement Credit (offset groundwater withdrawals with alternative water supplies). For permits in effect as of June 16, 2011, new permit condition requires investigation of well complaints.	Rule 40D-2.021, F.A.C. Subsection (9) Applicants Handbook Part B Section 3.9.4.2.1 Applicants Handbook Part B Section 3.9.4.2.6 Applicants Handbook Part B Section 3.9.4.6
Conservation • Relationship to ELU • Drought credit system • Plan required, with progress reporting • Use class specific • Detailed requirements	WUP applicants for annual average quantities of 100,000 gpd or greater for agriculture water use are required to submit a conservation plan that insures efficiency of use and provides for increasing efficiencies through water conservation practices. Individual WUPs for less than 100,000 gpd annual average quantities are required to implement certain water conservation measures (e.g., limit daytime irrigation, leak detection and repair program, schedule improvements) All WUP applicants for 100,000 gpd annual average quantities or greater that include crop protection, or have groundwater withdrawal with potential to impact MAPLZ are required to investigate alternatives to groundwater for crop protection. Use of alternatives is required if technically, economically, and environmentally feasible.	Applicants Handbook Part B Section 2.4.3.2.1 Applicants Handbook Part B Section 2.4.3.2.1.4 Applicants Handbook Part B Section 3.9.4.3.3.

Table G-7. Dover Plant City Water Use Caution Area (DPC) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	SWFWMD CITATIONS
Supplemental irrigation allocation • Allocation and actual usage • Metering • Crop reporting • Frost / freeze and market conditions	New and existing permittees within the Dover/Plant City WUCA that have WUP for – • use of groundwater for crop protection; or • 100,000 gpd annual average quantities or greater from groundwater; or • groundwater quantities to provide crop protection quantities to be used or withdrawn from any combination of sources, which if withdrawn from groundwater alone, would have a potential impact to MAPLZ; or • groundwater quantities to provide supplemental irrigation for a use that typically requires crop protection and where such protection could be achieved through groundwater withdrawals, but alternative protection methods are proposed are required to meter withdrawal quantities from each facility, including backup and standby facilities, and provide meter readings through automated meter reading devices provided by SWFWMD.	Applicants Handbook Part B Section 3.9.4.4 Applicants Handbook Part B Section 3.9.4.4.2
Competition		
Redistribution of existing allocations	A permittee with existing permitted impacts in the MAPLZ as of June 16, 2011, may modify WUP to relocate to a different property all or a portion of the used and unused reasonable-beneficial permitted quantity.	Applicants Handbook Part B Section 3.9.4.2.3
Alternative water supply program	Applicants for WUPs with 100,000 gpd or more are required to evaluate use of alternative water supply (AWS). If applicant in Dover/Plant City WUCA, demonstrates that AWS are vulnerable to being insufficient or unavailable, the WUP will put non-AWS on standby status. AWS can be used to demonstrate "Net Benefit" through Groundwater Replacement Credit	Applicants Handbook Part B Sections 2.1.1 & 2.1.1.4 Applicants Handbook Part B Section 3.9.4.2.6
Permit duration	Generally 20 years, unless pre-existing adverse impacts are being addressed through a minimum flow and recovery strategy that must be eliminated by the 10th year.	Rule 40D-2.321, F.A.C. Applicants Handbook Part B Section 1.5
Prohibited use class(es) identified • e.g., Aesthetic	Irrigation for unimproved pasture will not be approved.	Applicants Handbook Part B Section 2.4.3.1.11
Program adopted as a "package" • "Self-destruct" clause		

Table G-8. Lower East Coast (LEC) Restricted Allocation Area.

PROGRAM COMPONENTS	SFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
Water Supply Mission Components		
Goals • Overarching goal: sustainability of environment, economy, and social well-being of region • Resource (e.g., salt intrusion, potentiometric surface, MFLs, MFL recovery strategy) • Existing legal user protection • Future water resource development project water availability	Sustainability goal established CUP criteria adopted as the regulatory portion of MFL recovery strategies for Everglades and Loxahatchee River CUP criteria assure water needed for restoration projects is not allocated for consumptive use Additional programs, projects, and rules provide for water shortage and substantial variety of project and operational components Relationship of MFL strategies to CUP and water shortage programs defined (inseparable components, phased implementation of MFL strategies, projects orderly implementation to replace / enhance existing sources for all existing and projected R-B uses, assurances to ELU stated in .1501 and s.601(h)(4)(A) , shortage program not to replace strategy)	The Governor's Commission for a Sustainable South Florida • Cover Letter http://www.sfrestore.org/crogee/ra3/ra3.html • A Conceptual Plan for the C&SF Project Restudy http://www.sfrestore.org/crogee/ra6/ra6.html WRDA 1996 at Pub. L. 104-303, §528(b)(1)(A)(ii)(II) (1996) http://www.gpo.gov/fdsys/pkg/PLAW-104publ303/content-detail.html Comprehensive Everglades Restoration Project (CERP) and Everglades Program http://www.evergladesplan.org/pub/restudy_eis.aspx §§ 373.1501, 373.4592(4)(b), F.S. http://www.leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&URL=0300-0399/0373/0373ContentsIndex.html&StatuteYear=2014&Title=%2D%3E2014%2D%3EChapter%20373 WRDA 2000 at Pub. L. 106-541, §601 (2001) http://www.gpo.gov/fdsys/pkg/PLAW-106publ541/content-detail.html §§373.1501, 373.4592, F.S. http://www.leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&URL=0300-0399/0373/0373ContentsIndex.html&StatuteYear=2014&Title=%2D%3E2014%2D%3EChapter%20373 2000 LEC Regional Water Supply Plan http://www.sfwmd.gov/portal/pls/portal/portal_apps.repository_lib_pkg.repository_browse?p_keywords=lecwatersupplyplandocs&p_thumbnails=no

Table G-8. Lower East Coast (LEC) Restricted Allocation Area (continued).

PROGRAM COMPONENTS	SFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
Goals (continued)		Multiple MFL Tech. Pubs http://www.sfwmd.gov/portal/page/portal/xweb%20protecting%20and%20restoring/minimum%20flows%20and%20levels%20%28everglades%29 Chapter 40E-8, F.A.C. https://www.flrules.org/gateway/ChapterHome.asp?Chapter=40e-8 AH 3.2.1.E. (See e.g. 2nd paragraph re: objectives) http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/wu_applicants_handbook.pdf President and Governor's Agreement http://www.evergladesplan.org/pm/progr_regs_pres_gov_agreement.aspx
Linkage to regional water supply plan • Limited water availability demonstrated • Causal relationships documented • Analysis of alternatives and comparative performance of options • Strategy (long-term) developed considering scientific and socio-economic issues • Water supply development and water resource development projects linkage • Funding • Others	Water resource protection standards from Ch. 373, to meet the goals (i.e., harm, significant harm, serious harm) Performance measures for modelling assessment (level, duration, frequency) of existing / base condition and alternative solutions Water demands for environmental (MFL and restoration) and human needs were identified for 20 years Problem identification and effective solution alternatives assessed and selected Recovery / prevention strategies developed, including water resource and water supply development projects, and provision of sufficient water for existing and projected reasonable-beneficial uses Extensive restoration and water resource development projects. No water available for allocation until operation and "certification" of water available for allocation Substantial state and federal funding	Central and Southern Florida Comprehensive Review Study Final Integrated Feasibility Report and Programmatic Environmental Impact Statement (1999) (aka "CERP Yellow Book" or "Restudy") See e.g.: 1-1 – 1-9 and 5-19 – 5-25 regarding C& SF Project effects and goals http://www.evergladesplan.org/pub/restudy_eis.aspx 2000 LEC Regional Water Supply Plan and Appendices (See, e.g. pp. 25 – 32 of Plan re: goals and causation and pp. 38 – 40) and Appendix D for Model Performance Measures. Note parallel to: Ch. 373 requirements, CUP criteria, and water shortage criteria) http://www.sfwmd.gov/portal/pls/portal/portal_apps.repository_lib_pkg.repository_browse?p_keywords=lecwatersupplyplandocs&p_thumbnails=no LEC Plan, Chapter 4 Re: alternatives analysis http://www.sfwmd.gov/portal/pls/portal/portal_apps.repository_lib_pkg.repository_browse?p_keywords=lecwatersupplyplandocs&p_thumbnails=no

Table G-8. Lower East Coast (LEC) Restricted Allocation Area (continued).

PROGRAM COMPONENTS	SFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
Related to minimum flow / level recovery strategy	Yes. Criteria adopted as a component of recovery strategies for MFLs for Everglades and Loxahatchee River and assists in implementing restoration objectives by assuring water needed for restoration is not allocated	AH 3.2.1.E. 2nd paragraph http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/wu_applicants_handbook.pdf
Geographic area	Northern Palm Beach County Service Area and Lower East Coast Service Areas 1, 2, and 3	AH Figure 3-1 http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/wu_applicants_handbook.pdf
Monitoring Program • Hydrologic • Biologic • Linkage to recovery strategy • Linkage to water shortage trigger • Compliance with goal • Methodology	Extensive adaptive assessment and monitoring program. Dual focus on biological (including water quality) and hydrological objectives in natural systems as well as the water supply and flood protection objectives of urban and agricultural regions Adaptive assessment process to evaluate how well the phases achieve plan objectives and integrate into future plan refinements via evaluation of pre-determined set of targets and ecological changes that constitute improvements No additional regulatory monitoring	See e.g., "Yellow Book" at Section 9.5 http://www.evergladesplan.org/pub/restudy_eis.aspx

Table G-8. Lower East Coast (LEC) Restricted Allocation Area (continued).

PROGRAM COMPONENTS	SFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
Regulatory Program Components		
Source restricted ("capped") • Surface water • Ground water • Method to cap defined	Surface and ground water are both "capped" Withdrawals "capped" at the "base condition water use." BCWU calculation varies by use class, but in no case may the withdrawal exceed that permitted to the applicant as of April 1, 2006. Some variables accounted for when calculating BCWU include: adjustments for treatment system conversion, projects not constructed but are authorized by CUP and ERP, and adjustments due to timeframe not reflecting normal operations (e.g., climatic extremes or equipment failure). Also, BCWU includes water made available via offsets, AWS, or terminated / reduced BCWU, see last paragraph of 3.2.1.E.3.	AH 3.1.2.E. 3rd paragraph http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/wu_applicants_handbook.pdf
Existing legal user (ELU) rights • Renewal and modification programs • New program(s) and ELU • Offset projects for ELU	LEC RAA criteria are applicable to applications for new, modified, or renewed uses.	AH Criterion 3.2.1.E.1. http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/wu_applicants_handbook.pdf Chapter 40E-8, F.A.C. https://www.flrules.org/gateway/ChapterHome.asp?Chapter=40e-8

Table G-8. Lower East Coast (LEC) Restricted Allocation Area (continued).

<table>
<tr><th>PROGRAM COMPONENTS</th><th>SFWMD PROGRAM COMPONENT SUMMARY</th><th>CITATIONS</th></tr>
<tr><td>New / Increased allocations of water

• Including re-allocation strategy (aka resource redistribution or terminated base condition water)
• Threshold limit
• Modeling criteria</td><td>Applicants must demonstrate requested allocation: “…will not cause a net increase in the volume or cause a change in timing on a monthly basis of surface and ground water withdrawn from the LEC Everglades Waterbodies or the North Palm Beach County / Loxahatchee River Watershed Waterbodies over that resulting from the base condition water use.” (3.2.1.E.2.)

Applicants shall conduct a preliminary evaluation (basic analytic impact assessment) to determine if the proposed use has the potential for increasing the withdrawal of water over the BCWU. If the proposed use has the potential for increasing the withdrawal of water from the Waterbodies, then two evaluations must be compared to identify any changes in location, timing, and volume of withdrawals from the Waterbodies. The evaluations are: quantification of the withdrawal of surface and ground water from the Waterbodies under: (a) the BCWU and (b) the requested allocation If the comparison shows an increase in volume or change in timing, then applicant to use certified project water, offsets, AWS, terminated / reduced BCWU, available wet season water. (3.2.1.E.4. and 5.)
Allocation of additional water, over BCWU, may be from:
a. certified project water,
b. offsets
c. temporary allocation of water from restricted source (aka “borrowing”)
d. water made available through implementation of offsets or termination or reduction of BCWU, or
e. available wet season water. (3.2.1.E.6.)</td><td>AH 3.2.1.E.2.
http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/wu_applicants_handbook.pdf</td></tr>
</table>

Table G-8. Lower East Coast (LEC) Restricted Allocation Area (continued).

PROGRAM COMPONENTS	SFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
Conservation • Relationship to ELU • Drought credit system • Plan required, with progress reporting • Use class specific • Detailed requirements	No additional conservation requirements imposed Conservation plans and reporting required, by use class in accordance with CUPcon's AH No drought credit system No FARMS program	
Supplemental irrigation allocation • Allocation and actual usage • Metering • Crop reporting • Frost / freeze and market conditions	No change to standard supplemental irrigation allocation criteria Calculation of BCWU and modeling evaluation, if any, provide for unique considerations associated with irrigation uses – e.g. BCWU not representative of normal operations due to extreme climatic conditions and resource efficiency due to return flow	
Competition	LEC RAA is a regulatory component of an overall program to achieve sustainability and avoid competition for water between users and / or with environmental demands. (See Goal statements, above) Non-regulatory components include water resource and water supply development projects, financial, and regulatory incentives to develop AWS	Key regulatory provisions include the LEC RAA and permit duration criteria at AH 3.2.1.E. and 1.5.2.B.2., 1.5.2.D., respectively http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/wu_applicants_handbook.pdf
Redistribution of existing allocations	Terminated or reduced BCWU can be re-allocated; applicant must demonstrate (1) the water is available and (2) the allocation will not cause an increase in volume or change in timing of withdrawals from the Waterbodies over the BCWU	AH 3.2.1.E.5.d. (as to analysis) and 3.2.1.E.6.c. (as to allocation) http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/wu_applicants_handbook.pdf

Table G-8. Lower East Coast (LEC) Restricted Allocation Area (continued).

PROGRAM COMPONENTS	SFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
Alternative water supply program	Non-regulatory program components include: water becoming available for allocation from resource development via "certified" project water, AWS funding Regulatory program components include: allocation of water via terminated BCWU and substitution credits and permit duration incentives	**Non-regulatory**: CERP projects, see citations above Section 373.707, F.S. – Alternative water supply development (includes Water Protection and Sustainability Program) http://www.leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&URL=0300-0399/0373/0373ContentsIndex.html&StatuteYear=2014&Title=%2D%3E2014%2D%3EChapter%20373 **Regulatory:** AH 3.2.1.E.5. and 6 (water available for allocation) and 1.5.2.C. and D. (longer permit duration) http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/wu_applicants_handbook.pdf

Table G-8. Lower East Coast (LEC) Restricted Allocation Area (continued).

PROGRAM COMPONENTS	SFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
Permit duration	**Designation of source of limited availability for:** • LEC water supply planning area Biscayne / Surficial Aquifer System to the extent withdrawals result in induced seepage from the C & SF Project, except when stormwater discharge or wet season discharge occurs; • Lake Okeechobee, • C & SF Project, • Caloosahatchee River / Canal; and the • St. Lucie River / Canal **Renewal applications**: 20 years if conditions for issuance satisfied for duration and the quantity of water to be allocated for 20 year duration (1) for PS, shall not exceed that quantity necessary to meet the demands of the population existing at the time of permit renewal at the per capita rate approved under the AH; (2) for irrigation users, shall not exceed that quantity of water necessary to irrigate historically irrigated acreage, as determined by AH; or (3) other use classes, shall not exceed that quantity approved under 40E-2 and shall not exceed the allocation in the permit being renewed. **Renewals with request for allocation in excess of renewed volume, permit modifications, or initial permit applications**: 5 year baseline or as otherwise provided with factors to be considered and balanced in determining permit duration (e.g., longer if implementing innovative water conserving measures, offsets, or other mitigative actions).	Section 373.236, F.S. http://www.leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&URL=0300-0399/0373/0373ContentsIndex.html&StatuteYear=2014&Title=%2D%3E2014%2D%3EChapter%20373 AH 1.5.2.B.2., 1.5.2.C.3., and D. http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/wu_applicants_handbook.pdf
Prohibited use class(es) identified • **e.g., Aesthetic**	None	

Table G-8. Lower East Coast (LEC) Restricted Allocation Area (continued).

PROGRAM COMPONENTS	SFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
Temporary Increase over BCWU	Applicants may request a temporary allocation of water required to meet demands while implementing AWSW or an offset. Permit conditions will set dates and milestones for project development and will require the allocation be reduced when the AWS is available.	AH 3.2.1.E.6. http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/wu_applicants_handbook.pdf
Program adopted as a "package" • "Self-destruct" clause	Recovery and prevention strategies, CUP permitting conditions for issuance MFL criteria, and water shortage plan(s) are defined to be inseparable components of the MFLs. The District would not have adopted the MFLs without simultaneously adopting their related implementation rules. If the rules are found invalid, then the MFL shall not be adopted or if in effect, shall not continue to be applied until the District amends the subject rules, as necessary to address the invalidity.	40E-8.011(4), F.A.C. https://www.flrules.org/gateway/ChapterHome.asp?Chapter=40e-8

Table G-9. Northern Tampa Bay Water Use Caution Area (NTB).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
<u>Water Supply Mission Components</u>	Initially established in 1989 and expanded in 2007 to address adverse impacts to water resources from groundwater withdrawals associated with rapid growth and development pressures in the region. The majority of groundwater use in the Northern Tampa Bay (NTB) Water Use Caution Area (WUCA) is for public supply. As a result, most of the water resource impacts are located in areas surrounding the major public supply wellfields. Tampa Bay Water (TBW) and its member governments[2] entered into an agreement with SWFWMD in 1998 (referred to as the Partnership Agreement) to significantly reduce groundwater withdrawals from its regional wellfields and work toward recovery in areas where water resources had been impacted. As part of the Partnership Agreement, SWFWMD combined all the permits for TBW's central system wellfields into one permit (Water Use Permit No. 20011771), known as the "consolidated permit."	

[2] TBW is a regional wholesale water supplier that provides water to Hillsborough, Pasco and Pinellas counties, as well as the cities of New Port Richey, St. Petersburg and Tampa. Other cities in the three-county area receive at least some of their water from these six public supply systems.

Table G-9. Northern Tampa Bay Water Use Caution Area (NTB) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
Goals • Resource (e.g., salt intrusion, potentiometric surface, MFLs, Domestic wells, Freeze protection use and resource impacts, MALs) • Existing legal user protection • Future water resource development project water availability	The original consolidated permit was issued for 158 million gallons per day (mgd) with planned reductions of 121 mgd by 2003 and 90 mgd by 2008. Reductions were achieved through the development of the alternative water supplies. In 2010, SWFWMD's Governing Board adopted the second phase of the recovery strategy. SWFWMD's goal is to continue evaluating the amount of environmental recovery that can be achieved over the next 10 years while withdrawals remain at 90 mgd. SWFWMD established MFLs for the lower Hillsborough River in 2007 along with a recovery strategy for bringing flows up to the minimums within a decade. SWFWMD entered into a joint funding agreement with the City of Tampa to implement a number of projects to divert water from various sources to meet the minimum flows. Models have generally confirmed the localized nature of saltwater intrusion in the NTB area. Specific Objectives: • Recover minimum flows for 2 segments of the Hillsborough River, and minimum levels at 33 lakes and 27 wetlands; • By 2018, complete an assessment to determine whether TBW's reduction to 90 mgd of groundwater withdrawal from the Central Wellfield System provides necessary recovery for impacted rivers, lakes and wetlands; • Complete permitting, final design and construction of Blue Sink and Morris Bridge Sink projects for the Lower Hillsborough River recovery; • Conduct a 5-year assessment of adopted MFL for the Lower Hillsborough River.	2010 Regional Water Supply Plan, Tampa Bay Region Water Use Permit No. 20011771.001 (Available at page 116 of SWFWMD Governing Board Notebook dated 01-25-11) Special Condition No. 2 (Withdrawal Limitations) and No. 9 (Phase 1 Mitigation Plan)

Table G-9. Northern Tampa Bay Water Use Caution Area (NTB) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
Linkage to regional water supply plan • Limited water availability demonstrated • Causal relationships documented • Analysis of alternatives and comparative performance of options • Strategy (long-term) developed considering scientific and socio-economic issues • Water supply development and water resource development projects linkage • Funding • Others	A 1998 water supply assessment quantified water supply needs through the year 2020 and identified areas where future demand could not be met with traditional groundwater sources. In 2001, SWFMWD published its first Regional Water Supply Plan (RWSP), which quantified water supply demands through the year 2020 and identified water supply options for developing alternative sources (sources other than fresh groundwater). The RWSP was updated in 2006 and the planning period extended to 2025. It also concluded that a regional approach to meeting future water demands was required because some areas have limited access to alternative water supplies. The recovery strategy for lakes and wetlands in the NTB WUCA is primarily to reduce withdrawals from TBW's central system wellfields to 90 mgd on a 12-month running average basis as required in the water use permit. The consolidated permit requires an extensive water resource monitoring network around the individual wellfields, along with many other data reporting and planning requirements. It is anticipated that TBW's monitoring network will address most of the data collection needs in and around major withdrawal centers, while the District's efforts will focus on the areas between and beyond TBW's withdrawal centers. In the late 80s, SWFWMD initiated detailed water resource assessment projects (WRAPs) of the Eastern Tampa Bay (ETB) and NTB areas to determine causes of water level declines and to address water supply availability. Resource concerns in these areas included lowered lake and wetland levels in the NTB area and saltwater intrusion in the Upper Floridan aquifer in the ETB area.	2010 Regional Water Supply Plan, Tampa Bay Region Section 373.0363, F.S. Subsection (4)(b) Applicants Handbook Part B Section 3.9.4.3.3

Table G-9. Northern Tampa Bay Water Use Caution Area (NTB) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
Linkage to regional water supply plan (continued)	As part of the Partnership Agreement, SWFWMD provided partial funding for the development of alternative water supplies to offset the reduction in groundwater withdrawals and to meet growing demands, including a seawater desalination facility in Hillsborough County on Tampa Bay. In 2008, the desalinization facility produced an average of 20 mgd for the regional system. In 2009, TBW began to operate the facility at its full capacity of 25 mgd as part of a four-month performance test to qualify for final payment of SWFWMD funds. SWFWMD provided funding assistance for a major interconnect between the regional system and the Starkey wellfield, which serves areas of western Pasco County and the City of New Port Richey, which provides additional operational flexibility for TBW that will help reduce the environmental impacts of groundwater withdrawals in the Starkey wellfield. SWFWMD provided funding assistance for TBW's System Configuration II project that is expected to increase TBW's enhanced surface water system by 25 mgd. SWFWMD provided funding for the cities of Tarpon Springs, Oldsmar and Clearwater to augment water supplies by developing brackish groundwater wellfields and reverse osmosis membrane treatment facilities.	

Table G-9. Northern Tampa Bay Water Use Caution Area (NTB) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
Related to minimum flow / level recovery strategy	Established MFLs in the NTB area for cypress wetlands, lakes, rivers, springs and the Upper Floridan aquifer Phase One (approved in 1999) required that new withdrawals not violate established MFLs, unless the withdrawal was part of the NTB WUCA Recovery Strategy. Phase Two was approved in 2009 for implementation through 2020. Major components of the rule include: (1) TBW's consolidated permit is to be renewed for 90 mgd for 10 years; (2) TBW will continue to conduct withdrawals pursuant to the Operations Plan; (3) TBW will continue expansive environmental data collection and analysis; (4) TBW will continue to evaluate and implement environmental mitigation; (5) TBW's member governments will continue water conservation activities; (6) further impacts caused by other water use permittees will continue to be limited; and (7) the creation of a "reservoir renovation exception period" that would allow a temporary exceedance of the 90 mgd permit limit during the period when the C.W. Bill Young Regional Reservoir will be repaired, if there is a significant drought and other sources are unable to replace the temporarily lost reservoir storage. SWFWMD has committed to collect additional data to support the refinement and improvement of its MFLs' methodologies and to study the benefits of using other management methods, such as augmentation, to achieve adopted MFLs. To facilitate this data collection, the District established the Northern Tampa Bay Phase II Local Technical Peer Review Group (LTPRG) to coordinate with local governments, agencies and other stakeholders to review hydrologic, biologic and geologic studies being performed in the NTB WUCA.	Section 373.042, F.S. Rule 40D-8.041, F.A.C. (Minimum Flows) Rule 40D-8.626, F.A.C. (Minimum Aquifer Level) Comprehensive Environmental Resources Recovery Plan for the Northern Tampa Bay Water Use Caution Area, and the Hillsborough River Strategy Rule 40D-80.073, F.A.C. Water Use Permit No. 20011771.001 (Available at page 116 of SWFWMD Governing Board Notebook dated 01-25-11)
Geographic area	All of Pinellas and Pasco Counties, and the majority of Hillsborough County (north of Highway 60).	Rule 40D-2.801, F.A.C. Subsection (3)(a)

Table G-9. Northern Tampa Bay Water Use Caution Area (NTB) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
Monitoring Program • Hydrologic • Biologic • Linkage to recovery strategy • Linkage to water shortage trigger • Compliance with goal • Methodology	TBW is required to monitor and assess environmental systems based on the Environmental Management Plan for the TBW Central System Wellfields. TBW is required to prepare a Permit Recovery Assessment Plan. TBW is required to adhere to standards for the consistent and accurate collection of field data linked to the recovery strategy. Specifies: • Hydrologic data collection procedures • Water quality data collection procedures • Wetland assessment data collection procedures • Production flow metering • Surveying standards • Data storage and reporting • Data correction procedures • Data submittal	Water Use Permit No. 20011771.001 (Available at page 116 of SWFWMD Governing Board Notebook dated 01-25-11) Special Condition No. 8 and Exhibit C Special Condition No. 11 and Exhibit E Special Condition No. 14 and Exhibit F
Regulatory Program Components	The consolidated water use permit (WUP No. 20022771) incorporates requirements contained in the Recovery Strategy for the NTB WUCA	
Source restricted ("capped") • Surface water • Ground water • Method to cap defined	Central Wellfield System shall not exceed 90 mgd on annual average, with some limited exceptions contained in the permit while the C.W. Bill Young Regional Reservoir is renovated. Permit details requirements TBW must comply with in order to exceed the 90 mgd.	Water Use Permit No. 20011771.001 (Available at page 116 of SWFWMD Governing Board Notebook dated 01-25-11) Special Condition No. 2.

Table G-9. Northern Tampa Bay Water Use Caution Area (NTB) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
Existing legal user (ELU) rights • Renewal and modification programs • New program(s) and ELU • Offset projects for ELU	Existing uses that affect water bodies for which MFLs have been adopted where the actual flow is at or above the MFL (including TBW Central System Facilities) are evaluated pursuant to Section 3.9.3.1.1.1A (same criteria used for new quantities).	Applicants Handbook Part B Section 3.9.3.1.2.1
	If permitted quantity would cause actual flow or level to fall below the Baseline Quantity, new quantity may be permitted if applicant: • demonstrates no reasonable means to modify the proposed withdrawal to meet this condition (including the use of alternative supplies to reduce or replace the amount of requested quantity that exceeds the Baseline Quantity); • provides reasonable assurance that significant harm will be prevented to wetlands and water bodies that could be affected by proposed withdrawals (this requires submitting an Environmental Management Plan); • demonstrates that any measures used to provide the reasonable assurances above will not cause a violation of any criteria listed in Rules 40D-2.301, 40D-3.01 or 40D-3.02, F.A.C.	Applicants Handbook Part B Section 3.9.3.1.1.1
	For water bodies affected by an existing permitted withdrawal, where actual flow or level is below its MFL:	Applicants Handbook Part B Section 3.9.3.1.2.2
	A. TBW Central System Facilities – compliance with established MFLs for water bodies adversely impacted by TBW Central System Facilities shall be addressed.	Applicants Handbook Part B Section 3.9.3.1.2.2A Rule 40D-80.073, F.A.C.
	B. Other existing permittees - compliance with established MFLs will be addressed as specified in Rule 40D-80.073.	Applicants Handbook Part B Section 3.9.3.1.2.2B Rule 40D-80.073, F.A.C.
	Existing permitted surface water withdrawals from stressed lakes shall be abandoned or replaced with an alternate source within 3 years of the stressed lake designation.	Applicants Handbook Part B Section 3.9.3.4.1.2
	TBW is required to investigate water withdrawal complaints within a "Well Complaint Mitigation Area" to determine if TBW's withdrawals are causing a problem to other legal users.	Water Use Permit No. 20011771.001 (Available at page 116 of SWFWMD Governing Board Notebook dated 01-25-11) Special Condition No. 15

Table G-9. Northern Tampa Bay Water Use Caution Area (NTB) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
New allocations of water • Including re-allocation strategy (aka resource redistribution or terminated base condition water) • Threshold limit • Modeling criteria	"New quantities" are withdrawals proposed after August 3, 2000. Withdrawals for new quantities that impact a water body that is above the MFL may be permitted as long as it does not cause the actual flow or level to fall below the MFL on a long-term average basis ("Baseline Quantity"). If permitted quantity would cause actual flow or level to fall below the "Baseline Quantity," the quantity may be permitted if applicant: • demonstrates no reasonable means to modify the proposed withdrawal to meet this condition (including the use of alternative supplies to reduce or replace the amount of requested quantity that exceeds the Baseline Quantity; • provides reasonable assurance that significant harm will be prevented to wetlands and water bodies that could be affected by proposed withdrawals (this requires submitting an Environmental Management Plan); • demonstrates that any measures used to provide the reasonable assurances above will not cause a violation of any criteria listed in Rules 40D-2.301, 40D-3.01 or 40D-3.02, F.A.C. Withdrawals for new quantities that are projected to impact a water body that is below its MFL shall not be approved, unless the new quantities are solely for furthering an objective set forth in the Comprehensive Plan in Rule 40D-80.073, F.A.C.	Applicants Handbook Part B Section 3.9.3.1.1.1 Applicants Handbook Part B Section 3.9.3.1.1.2 Rule 40D-80.073, F.A.C. Subsection (6)

Table G-9. Northern Tampa Bay Water Use Caution Area (NTB) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
Conservation • Relationship to ELU • Drought credit system • Plan required, with progress reporting • Use class specific • Detailed requirements	Wholesale Public Supply Permits are required to be obtained by public supply utilities that receive all water from other public supply permittees (which the utility then distributes to its own customers). Wholesale public supply utilities that receive more than 100,000 gpd or more annual average quantities are required to obtain a separate permit to effectuate conservation requirements. Permittees that are wholesale water suppliers must provide SWFWMD with a written agreement from those that purchase less than 100,000 gpd on an annual average basis from the wholesale supplier to abide by the water conservation conditions of the wholesale supplier's permit and to provide water demand and water use data needed for the wholesale provider to comply with reporting conditions. Standard water conservation plan or a goal-based water conservation plan. Until Wholesale Water Use Permits are obtained by the Member Governments of permittees of 90 mgd facilities, as required by Chapter 40D-2, F.A.C., each permittee of 90 mgd facilities, including TBW, shall report on the permittees', as applicable, and the Member Governments' per capita rates, water losses, reclaimed water use, residential water use and the following measures to reduce water demand (including an evaluation of the below-listed measures, the findings and conclusions and the schedule for implementing selected measures) 1. Toilet rebate/replacement; 2. Fixture retrofit; 3. Clothes washer rebate/replacement; 4. Dishwasher rebate/replacement; 5. Irrigation and landscape evaluation; 6. Irrigation/landscape rebate; 7. Cisterns/rain water harvesting rebate; 8. Industrial/commercial/institutional audits and repair; 9. Florida-Friendly landscape principles; 10. Water Conservation Education; 11. Water-conserving rate structures and drought rates; 12. Multi-family residential metering. Because the wholesale permits have been issued, TBW is no longer required to submit the data on behalf of the Member Governments.	Applicants Handbook Part B Section 2.4.8.5 Applicants Handbook Part B Section 2.4.8.6 Rule 40D-80.073, F.A.C. Subsection (2)(i) Water Use Permit No. 20011771.001 (Available at page 116 of SWFWMD Governing Board Notebook dated 01-25-11) Special Condition No. 13

Table G-9. Northern Tampa Bay Water Use Caution Area (NTB) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	CITATIONS
Supplemental irrigation allocation • Allocation and actual usage • Metering • Crop reporting • Frost / freeze and market conditions	SWFMWD uses Management Periods to evaluate future efficiency standards and goals as part of the recovery strategy for the NTB WUCA. Crop reports are required. Metering is required for individual WUPs of 100,000 gpd or greater annual average with one or more facilities in the NTB WUCA	Applicants Handbook Part B Section 3.9.3.2 Applicants Handbook Part B Section 3.9.3.2.2 Applicants Handbook Part B Section 4.1.1
Competition		
Redistribution of existing allocations		
Alternative water supply program	Applicants for WUPs with 100,000 gpd or more are required to evaluate use of alternative water supply (AWS). Alternative supplies must be considered if a permittee attempts to demonstrate there is no reasonable means to modify the proposed withdrawal to avoid causing actual flow or level to fall below the Baseline Quantity.	Applicants Handbook Part B Section 2.1.1 Applicants Handbook Part B Section 3.9.3.1.1.1
Permit duration	Generally 20 years, unless pre-existing adverse impacts are being addressed through a minimum flow and recovery strategy that must be eliminated by the 10th year. The current consolidated permit expires on January 25, 2021.	Rule 40D-2.321, F.A.C. Applicants Handbook Part B Section 1.5 Water Use Permit No. 20011771.001 (Available at page 116 of SWFWMD Governing Board Notebook dated 01-25-11)
Prohibited use class(es) identified • e.g., Aesthetic	Irrigation for unimproved pasture will not be approved. Augmentation for purely aesthetic purposes (e.g., creating and maintaining water levels in constructed ponds) shall not be permitted. New use from stressed lakes or new groundwater withdrawals that adversely impact stressed lakes shall not be permitted.	Applicants Handbook Part B Section 2.4.3.1.11 Applicants Handbook Part B Section 3.9.3.3 Applicants Handbook Part B Section 3.9.3.4.1.2 Section 3.9.3.4.1.3
Program adopted as a "package" • "Self-destruct" clause	The rules for the NTB WUCA were adopted as part of the Recovery Strategy Comprehensive Plan and the Consolidated Permit.	Rule 40D-80.073, F.A.C.

Table G-10. Southern Water Use Caution Area (SWUCA).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	MOST IMPACTED AREA	CITATIONS
Water Supply Mission Components	The Southern Water Use Caution Area (SWUCA) was designated in 1992 to address declines in aquifer levels occurring throughout the groundwater basin. Due to growing demands from public supply, agriculture, mining, power generation, and recreational users, groundwater withdrawals in the SWUCA have steadily increased for nearly a century before peaking in the mid-1970s. These withdrawals resulted in declines in aquifer levels throughout the groundwater basin, which in some areas exceeded 50 feet. While groundwater withdrawals have since stabilized as a result of management efforts, depressed aquifer levels continue to result in saltwater intrusion, reduced flows in the Upper Peace River, and lowered lake levels for some lakes in the Lake Wales Ridge areas of Polk and Highlands counties.	Drawdowns in aquifer levels in the SWUCA, due primarily to groundwater withdrawals, affect the rate of saltwater intrusion into the Upper Floridan aquifer along the coast, especially in the Most Impacted Area (MIA).	Section 373.0363, F.S. 2010 Regional Water Supply Plan, Southern Planning Region Chapter 2, Part A, pp.17-18. SWUCA Recovery Strategy, March 2006 SWUCA Recovery Strategy Five-Year Assessment for FY2007-2011

Table G-10. Southern Water Use Caution Area (SWUCA) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	MOST IMPACTED AREA	CITATIONS
Goals • Resource (e.g., salt intrusion, potentiometric surface, MFLs, Domestic wells, Freeze protection use and resource impacts, MALs) • Existing legal user protection • Future water resource development project water availability	Meet the minimum flow requirements for the Upper Peace River. Slow the rate of saltwater intrusion. Provide for improved lake levels and water quality along the Lake Wales Ridge. Ensure sufficient water supplies for all existing and projected reasonable and beneficial uses. The Recovery Strategy: • significantly restricts future groundwater development within the SWUCA; • requires a plan to primarily utilize alternative water sources instead of groundwater. MFLs have been adopted for 41 water bodies within the SWUCA.	The saltwater intrusion minimum aquifer level (SWIMAL) recognizes the long-term nature of the problem, and is designed to maintain the rate of movement at the "current" rate over the next 50 years, such that a minimum number of wells are at risk of water quality degradation. Long-term goal is to reduce annual average groundwater withdrawals. Short term measures include well back-plugging and providing alternative sources such as surface or reclaimed water to wells that experience water quality degradation. Until the SWIMAL is met, the Recovery Strategy: • prohibits new development in the MIA; • requires water level improvement (environmental net benefit) to the MIA before any groundwater development can occur within the SWUCA. MFL water bodies include 11 river segments and two springs, and 27 lakes and the Upper Floridan aquifer within the MIA.	SWUCA Recovery Strategy, March 2006 SWUCA Recovery Strategy Five-Year Assessment for FY2007-2011 Rule 40D-80.074(2), F.A.C. SWUCA Recovery Strategy Five-Year Assessment for FY2007-2011 Section II, p. 6.

Table G-10. Southern Water Use Caution Area (SWUCA) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	MOST IMPACTED AREA	CITATIONS
Linkage to regional water supply plan • Limited water availability demonstrated • Causal relationships documented • Analysis of alternatives and comparative performance of options • Strategy (long-term) developed considering scientific and socio-economic issues • Water supply development and water resource development projects linkage • Funding • Others	Regional water supply planning has been a primary tool to ensure water resource sustainability within the SWUCA. Financial incentives for conservation and development of alternative water supplies: - Cooperative Funding - Water Supply and Resource Development Initiatives SWFWMD entered into an agreement with the Peace River Manasota Regional Water Supply Authority (PRMRWSA) in 2003 to co-fund a major expansion of the PRMRWSA's facilities in DeSoto County, which are critical components to promoting the use of alternative water supplies to meet growing public supply demands in coastal communities while reserving limited groundwater supplies for agriculture and other inland users. The Facilitating Agricultural Resource Management Systems (FARMS) cost share program is designed to serve as an incentive to the agricultural community to install and maintain irrigation BMPs that will promote surface water and groundwater resource sustainability on private farmland. One of the goals of the FARMS program is to offset 40 million gallons per day of groundwater within the SWUCA by 2025 through production-scale agricultural BMP projects that reduce water use, improve water quality, and/or conserve, restore or augment the area's water resources and ecology.	Because brackish groundwater withdrawals from the Upper Floridan aquifer in the SWUCA have the potential to exacerbate saltwater intrusion, requests for brackish groundwater will be evaluated similarly to requests for fresh groundwater withdrawals. Proposed withdrawals, either fresh or brackish, cannot impact Upper Floridan aquifer water levels in the MIA. Requests for withdrawals of groundwater from the Upper Floridan aquifer for new uses will be considered only if the requested use is reasonable and beneficial, incorporates maximum use of conservation and there are no available alternative sources of water. If all these conditions are met and the withdrawals are projected to impact water levels in the MIA, it will be necessary for those impacts to be offset through Net Benefit (described below) prior to issuance of a water use permit.	2010 Regional Water Supply Plan, Southern Planning Region Chapter 8, Part B, pp. 149-50. 2010 Regional Water Supply Plan, Tampa Bay Region 2010 Regional Water Supply Plan, Heartland Region SWUCA Recovery Strategy, March 2006 SWUCA Recovery Strategy Five-Year Assessment for FY2007-2011 Section 373.0363, F.S. Chapter 40D-26, F.A.C. 2010 Regional Water Supply Plan, Southern Planning Region Chapter 8, Part B, pp. 149-50.

Table G-10. Southern Water Use Caution Area (SWUCA) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	MOST IMPACTED AREA	CITATIONS
Linkage to regional water supply plan (continued)	The Quality of Water Improvement Program (QWIP) and Back-Plugging Funding Assistance Initiative are designed to serve as an incentive to landowners to properly abandon and back-plug poor water quality wells. Plugging abandoned artesian wells eliminates the waste of water at the surface and the degradation of groundwater from inter-aquifer contamination.		
Related to minimum flow / level recovery strategy	The 2006 Recovery Strategy estimated that long-term average annual withdrawals from the Upper Florida needed to be reduced by 50 mgd in the SWUCA to meet SWIMAL. The Recovery Strategy has four major goals to achieve by the year 2025: 1. Restore minimum levels to priority lakes in the Ridge area; 2. Restore minimum flows to the upper Peace River; 3. Reduce the rate of saltwater intrusion in coastal Hillsborough, Manatee and Sarasota counties by achieving the proposed minimum aquifer level for saltwater intrusion. Once achieved, future efforts should seek further reductions in the rate of saltwater intrusion and the ultimate stabilization of the saltwater-freshwater interface; and 4. Ensure that there are sufficient water supplies for all existing and projected reasonable-beneficial uses. Introduced the “Net Benefit” concept to provide additional flexibility in achieving recovery goals.	As of Jan. 1, 2007, SWFWMD established a Salt Water Intrusion Minimum Aquifer Level (SWIMAL) within the MIA. Reductions within the MIA have much more of a positive effect, than reductions outside the MIA. Therefore, if reductions to average annual withdrawals occur within or near the MIA, the SWIMAL could likely be met with less than 50 mgd in reductions. Cumulative impact analysis evaluates changes in permitted groundwater quantities and water resource development projects benefitting the Upper Floridan aquifer in and around the MIA. Cumulative recovery strategy efforts appear to have generally stabilized aquifer levels in MIA, but the recovery of impacted levels is still necessary. It is estimated that between 10 mgd and 50 mgd in further reductions to groundwater withdrawals or similar quantities of aquifer recharge may be necessary to achieve recovery in the SWIMAL.	Section 373.0363, F.S. Section 373.042, F.S. SWUCA Recovery Strategy, March 2006 Section 1, p. 5 and Section 5, p. 54. Rule 40D-8.041, F.A.C. (Minimum Flows) Rule 40D-8.626, F.A.C. (Minimum Aquifer Level) Rule 40D-80.074, F.A.C. SWUCA Recovery Strategy Five-Year Assessment for FY2007-2011 Section III, p. 8.

Table G-10. Southern Water Use Caution Area (SWUCA) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	MOST IMPACTED AREA	CITATIONS
Related to minimum flow / level recovery strategy (continued)	The MFL for the upper Peace River is a minimum "low" flow, which focuses on returning perennial conditions to the upper Peace River. Specifically, the MFL is based on maintaining the higher of the water elevations needed for fish passage. MFLs for "Category 3" lakes (i.e., lakes that do not have contiguous cypress-dominated wetlands) in the Ridge area in Polk and Highlands Counties are generally based on levels determined to be necessary to meet the following parameters (unless other public health, safety or welfare, or adverse environmental impact considerations override these parameters): (1) lake mixing and susceptibility to sediment re-suspension, (2) water depth associated with docks, (3) basin connectivity, (4) species richness, (5) coverage of herbaceous wetland vegetation, (6) coverage of aquatic macrophytes, and (7) non-consumptive uses.		
Geographic area	Approximately 5,100 square miles, including all of DeSoto, Hardee, Manatee, and Sarasota counties, and parts of Charlotte, Highlands, Hillsborough, and Polk counties.	708 square miles located along the coast of southern Hillsborough, Manatee, and northwestern Sarasota counties.	Rule 40D-2.801, F.A.C. subsection (3)(b)

Table G-10. Southern Water Use Caution Area (SWUCA) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	MOST IMPACTED AREA	CITATIONS
Monitoring Program • Hydrologic • Biologic • Linkage to recovery strategy • Linkage to water shortage trigger • Compliance with goal • Methodology	SWFWMD uses its extensive hydrologic monitoring network to monitor resource conditions to measure progress toward recovery. Primary resource monitoring includes: • long-term groundwater levels and surface water levels and flows; • coastal groundwater quality; • estimated and permitted groundwater use; • status of MFL water bodies; Six sentinel long-term Upper Floridan aquifer monitoring wells enable observation of recovery progress through a comparison of recent to historical water level trends.		SWUCA Recovery Strategy, March 2006 Section 3, p. 36. SWUCA Recovery Strategy Five-Year Assessment for FY2007-2011
Regulatory Program Components	In 1992, SWFWMD modified WUP rules to better manage water resources within the SWUCA. The recovery strategy was adopted in 2006, which included the following primary objectives: (1) slow the rate of saltwater intrusion into the confined Upper Floridan aquifer along the coast; (2) stabilize lake levels in Polk and Highland counties; (3) limit regulatory impacts on the region's economy and existing legal users. The primary intent of the rules was to establish MAL and allow renewal of existing permits, while gradually reducing permitted quantities as a means to recover aquifer levels to the established minimum.	No general WUP by rule for withdrawals of water that do not meet or exceed any permitting threshold within the MIA.	Rule 40D-2.041, F.A.C. Subsection (3)(a)5
Source restricted ("capped") • Surface water • Ground water • Method to cap defined			

Table G-10. Southern Water Use Caution Area (SWUCA) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	MOST IMPACTED AREA	CITATIONS
Existing legal user (ELU) rights • Renewal and modification programs • New program(s) and ELU • Offset projects for ELU	Renewal or modification of a WUP with no proposed increase in quantities or change in Use Type that affects a water body that is below the MFL is evaluated to determine compliance with Rule 40D-2.301. When evaluating beneficial use of water, emphasis is given to reasonable water need, water conservation and use of AWS. SWFWMD uses reasonable-beneficial use requirement to evaluate permits. No WUPs for surface water withdrawals from streams or lakes where MFLS are not achieved, unless applicant demonstrates that: • withdrawal will not adversely affect MFL; and • a "Net Benefit" can be implemented.	In addition to the generally applicable thresholds for WUP requirements (paragraphs (4)(a)-(d)), a WUP is required within the MIA when withdrawal is from wells having a cumulative outside diameter greater than 6 inches at the surface (applies to wells constructed after 04/11/94). For example, two 3-inch wells within the MIA requires a WUP, but would not necessarily require a WUP outside the MIA.	Applicants Handbook Part B Section 3.9.2.6.2.1 Rule 40D-2.041, F.A.C. Subsection (4)(e) Rule 40D-2.381, F.A.C. Applicants Handbook Part B Section 2.4 Applicants Handbook Part B Section 3.9.2.6.2.2.5.

Table G-10. Southern Water Use Caution Area (SWUCA) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	MOST IMPACTED AREA	CITATIONS
New allocations of water • Including re-allocation strategy (aka resource redistribution or terminated base condition water) • Threshold limit • Modeling criteria	"New quantities" within the SWUCA means groundwater that is not authorized to be withdrawn by the applicant or used for the intended use by the applicant as of Jan. 1, 2007.	Since 1990, there have been no increases in permitted groundwater withdrawals from the Floridan aquifer in the MIA in order to stabilize groundwater levels.	Rule 40D-2.021, F.A.C. Subsection (9)
	For water bodies that are predicted to be impacted by the proposed use where the actual flow/level is at or above the MFL, new quantities are limited to that quantity that does not cause the actual flow/level to fall below the MFL on a Long-Term average basis.	Requests for new quantities outside the MIA will be granted only if the withdrawals have no effect on groundwater levels in the Upper Floridan aquifer in the MIA.	Applicants Handbook Part B Section 3.9.2.6.2.1
	For water bodies that are predicted to be impacted by the proposed use where the actual flow/level is below the MFL, new quantities of groundwater are evaluated to determine compliance with Chapter 40D-2. If proposed withdrawal will negatively impact the SWIMAL, the Upper Peace River, or Ridge Lakes (or any water body with an established MFL), Applicant can propose to implement Net Benefit. • For the Upper Peace River – no cumulative impact if current 10-yr moving average monthly water level in the area is above 53.3 ft NGVD, within the initial median for the 10-yr moving avg monthly water level of available info during 1990-1999. • For Ridge Lakes - no cumulative impact if current 10-yr moving average monthly water level in the area is above 91.5 ft NGVD, within the initial median for the 10-yr moving avg monthly water level of available info during 1990-1999.	Cumulative assessment is based upon best available information.	Applicants Handbook Part B Section 3.9.2.6.2.2.3 Applicants Handbook Part B Section 3.9.2.6.2.2.4

Table G-10. Southern Water Use Caution Area (SWUCA) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	MOST IMPACTED AREA	CITATIONS
New allocations of water (continued)	Net Benefit will offset predicted impact of proposed withdrawal, plus provide an additional positive effect on the water body equal to or greater than 10% of predicted negative impact. Three forms of Net Benefit: A. Mitigation Plus Recovery (1) permanently retire from use the historically used quantity associated with one or more WUPs (or may be a portion of a WUP) within the SWUCA that impacts the same MFL water body; (2) recharging the aquifer and withdrawing water such that there remains a net positive impact on the Floridan aquifer potentiometric surface at least 10% or greater than the impact of the proposed withdrawal; (3) undertaking other actions to offset the proposed impact plus 10%. B. Use of Quantities Created by District Water Resource Development Projects as a Net Benefit. New quantities from water resource development projects that are not reserved or otherwise designated for recovery are available to use by a permit applicant, if the applicant has contributed to the project and demonstrates that: • the proposed withdrawal affects the same MFL water body source associated with the project; • the quantity developed in excess of the of the quantity reserved or otherwise designated for the MFL has been determined; • the proposed Net Benefit quantities will not interfere with quantities reserved or otherwise designated by SWFWMD for water resource development.		

Table G-10. Southern Water Use Caution Area (SWUCA) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	MOST IMPACTED AREA	CITATIONS
New allocations of water (continued)	C. Groundwater Replacement Credit in SWUCA. Offset groundwater withdrawals with alternative water supplies.		
Conservation • Relationship to ELU • Drought credit system • Plan required, with progress reporting • Use class specific • Detailed requirements	Permittees with a WUP within the SWUCA for irrigation may earn Water-Conserving Credits to withdraw additional quantities of groundwater for use at the site where the credits are earned and for the source for which they were earned. Water-Conserving Credits are earned if less than the allowable amount of groundwater is applied to actual planted acreage as set forth in the WUP Applicant's Handbook Part B Chapter 3. Withdrawals under the Water-Conserving Credits shall meet the Conditions for Issuance set forth in Rule 40D-2.301, F.A.C. Standard water conservation plan or a goal-based water conservation plan.		Rule 40D-2.621, F.A.C. Applicants Handbook Part B Section 2.4.8.5 Applicants Handbook Part B Section 2.4.8.6 Applicants Handbook Part B Section 3.9.2.4
Supplemental irrigation allocation • Allocation and actual usage • Metering • Crop reporting • Frost / freeze and market conditions	The standard annual average quantity is a statistical irrigation quantity that is the maximum annual irrigation amount permitted by SWFWMD over 365 days. Assumes effective rainfall. For pasture, SWFWMD uses a 60% statistical rainfall probability to calculate the drought annual average quantities. For plastic mulched seasonal crops, SWFWMD calculates the drought annual average quantities assuming zero effective rainfall. For crops other than pasture that can utilize effective rainfall, SWFWMD uses a 2-in-10 (i.e., 20%) chance that there will be less rainfall to calculate drought annual average quantities. This quantity does not include crop protection.		Applicants Handbook Part B Section 3.9.2.1

Table G-10. Southern Water Use Caution Area (SWUCA) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	MOST IMPACTED AREA	CITATIONS
Supplemental irrigation allocation (continued)	Drought annual average quantities is equivalent to annual average quantities outside SWUCA.		
	For crops that can utilize effective rainfall, SWFWMD uses a 5-in-10 (i.e., 50%) chance that there will be less rainfall to calculate standard annual average quantities. This does not include crop protection.		
	Rainfall bases set forth in Table 3-1 are used to determine Water Use Allocation.		Applicants Handbook Part B Section 3.9.2.2
	For improved pastures, authorization is based on the three driest months of the year, if applicant documents an operable irrigation system exists or is proposed and is capable of delivering the requested amount.		Applicants Handbook Part B Section 3.9.2.3
	Metering is required for individual WUPs of 100,000 gpd or greater annual average with one or more facilities in the SWUCA.		Applicants Handbook Part B Section 4.1.1
	As of January 1, 2003, facilities not previously required to be metered within SWUCA, required metering. Once metering is required, metering will always be required.		Applicants Handbook Part B Section 4.1.1.2
	Irrigation crop reports are required within SWUCA. If permittee exceeds allocated quantities, a report is required that explains why there was an exceedance, measures taken to attempt to meet allocated quantities, and a plan for bringing permit into compliance.		Applicants Handbook Part B Section 4.4.1 Applicants Handbook Part B Section 4.4.2
	Reporting requirements for permittees with 100,000 gpd annual average quantities or greater for Landscape/ Recreation Use		Applicants Handbook Part B Section 4.4.13

Table G-10. Southern Water Use Caution Area (SWUCA) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	MOST IMPACTED AREA	CITATIONS
Competition			
Redistribution of existing allocations	Self-Relocation is available. This is a permit modification that authorizes a permittee to move all or a portion of its withdrawal located within the SWUCA to a new location or locations owned or controlled by the permittee within the SWUCA, with no change in ownership, control, or Use Type, and no increase in quantities. Self-Relocation does not include changes in withdrawal location or Use Type that are authorized by the terms of the existing permit.		Applicants Handbook Part B Section 3.9.2.6.2.2.2 Rule 40D-2.021, F.A.C. Subsection (12)
Alternative water supply program	Applicants for WUPs with 100,000 gpd or more are required to evaluate use of alternative water supply (AWS). If applicant in SWUCA, demonstrates that AWS are vulnerable to being insufficient or unavailable, the WUP will put non-AWS on standby status. AWS can be used to demonstrate "Net Benefit" through Groundwater Replacement Credit.		Applicants Handbook Part B Section 2.1.1 Applicants Handbook Part B Section 2.1.1.4. Applicants Handbook Part B Section 3.9.2.6.2.2.4
Permit duration	Generally 20 years, unless pre-existing adverse impacts are being addressed through a minimum flow and recovery strategy that must be eliminated by the 10th year.		Rule 40D-2.321, F.A.C. Applicants Handbook Part B Section 1.5

Table G-10. Southern Water Use Caution Area (SWUCA) (continued).

PROGRAM COMPONENTS	SWFWMD PROGRAM COMPONENT SUMMARY	MOST IMPACTED AREA	CITATIONS
Prohibited use class(es) identified • e.g., Aesthetic	Irrigation for unimproved pasture will not be approved. Augmentation for purely aesthetic purposes (e.g., creating and maintaining water levels in constructed ponds) shall not be permitted. Existing permits that include aesthetic augmentation may be renewed if criteria in section 2.4.9.2.b though .g are implemented.		Applicants Handbook Part B Section 2.4.3.1.11 Applicants Handbook Part B Section 3.9.2.7.1
Program adopted as a "package" • "Self-destruct" clause			

SECTION 6: INTERDISTRICT TRANSFERS

Overview of Transfers of Water across District Boundaries

- **Types of Transfers**
  - Interdistrict transfers of groundwater
  - Same county transfer of groundwater across district boundaries
  - Transfer of surface water across district boundaries
  - Local sources first (transfers across county boundaries)

- **Interdistrict transfer and use of groundwater**
  - §373.2295, F.S., defines term, process, and test
  - Generally, a withdrawal of groundwater and transfer of that groundwater across WMD **and** county boundaries for use
    - Public Interest Test defined and source of CUP application information identified (Subsection 373.2295(4), F.S.)
      - "…if the needs of the area where the use will occur and the specific area from which the groundwater will be withdrawn can be satisfied, the permit … shall be issued."
      - "…the projected populations, as contained in the future land use elements of the comprehensive plans… [for both withdrawal and use areas] … together with other evidence presented on future needs of those areas."
  - Procedural requirements:
    - File application with district where water will be withdrawn and provide a copy to district where water will be used
    - Comments by district where water will be used must be attached to notice of agency action
    - If requested, Department reviews intended agency action and issues final order
  - Additional provisions regarding procedures for associated local government approvals

- **Same county transfer of groundwater across district boundaries**
  - Same public interest test and application information, but standard application procedures
  - Same additional provisions re: associated local government approvals

- **Transfer of surface water across district boundaries**
  - Rule 62-40.422, F.A.C., lists factors to consider when deciding if the transfer is consistent with the public interest

- **Additional statutory provisions:** §§373.016(4) and 373.223(2) and (3), F.S.

SECTION 7: PUBLIC INTEREST

Table G-11. Summary Table of Public Interest Statutes.

Regulatory Context	Overall Water Supply Management Context	Miscellaneous
Section 373.019(16), F.S. (Definition of "R-B use")	Section 373.016, F.S. (Water resource policies)	Section 373.026(9)(b), F.S. (DEP seeking federal funding)
Section 373.223, F.S. (CUP "3 prong test")	Section 373.036, F.S. (District water management plan)	Section 373.046, F.S. (Interagency agreements)
Section 373.2234, F.S. (Preferred sources)	Section 373.0363, F.S. (SWUCA recovery strategy)	Sections 373.175 and 373.246 F.S. (Water Shortage)
Section 373.227, F.S. (Water Conservation)	Section 373.1501, F.S. (Local sponsor and CERP)	Section 373.185, F.S. (FL Friendly Landscaping)
Section 373.228, F.S. (Landscape irrigation design)	Section 373.171, F.S. (Rulemaking authorization)	Section 373.250, F.S. (Reuse of reclaimed water)
Section 373.2295, F.S. (Interdistrict transfers of groundwater)	Section 373.701, F.S. (Declaration of policy)	Section 373.713, F.S. (Regional water supply authorities)
Section 373.233, F.S. (Competing applications)	Section 373.705, F.S. (Water Resource Development and Water Supply Development)	
	Section 373.707, F.S. (Alternative water supply development)	
	Section 373.709, F.S. (Regional water supply planning)	

Excerpts RE: Public Interest for Consumptive Use Permitting and Water Supply Management

Statutory References and Authority

- **Section 373.016, F.S. (Water resource policies)**
  - Declares the legislative policy on the state's water resources and sets forth the purposes of Chapter 373, F.S.

- **Section 373.019(16), F.S. (Definition of "R-B use")**
  - Defines "reasonable-beneficial use" as "the use of water in such quantity as is necessary for economic and efficient utilization **for a purpose and in a manner which is both reasonable and consistent with the public interest**."

- **Section 373.026(9)(b), F.S. (DEP seeking federal funding)**
  - Provides a "public interest" criterion for the Department of Environmental Protection (DEP) to select projects in the state's program of public works for which the state seeks federal funding.

- **Section 373.036, F.S. (District water management plan)**
  - (2) In the formulation of the district water management plan, the Board shall consider:
    - attainment of maximum reasonable-beneficial use of water resources
    - maximum economic development of such resources consistent with other uses
    - management of water resources for such purposes as environmental protection, drainage, flood control, and water storage
    - the quantity of water available for application to a reasonable-beneficial uses
    - prevention of wasteful, uneconomical, impractical, or unreasonable uses of water resources
    - presently exercised domestic use and permit rights
    - preservation and enhancement of the water quality of the state
    - the state water resources policy as expressed by Chapter 373
  - (3) requires consideration of public recreation and protection of fish and wildlife and authorizes DEP / Districts to prohibit or restrict future uses on designated water bodies that may be inconsistent with these objectives
  - (4) authorizes the Board to designate "undesirable uses" relating to a particular supply source (based on "the nature of the activity or the amount of water required"), for which the Board may deny a CUP

- (5) authorizes the Board to designate preferred uses of a supply source that' enhance or improve the area's water resources, because of the nature of the activity or the amount of water required

- **Section 373.0363, F.S. (SWUCA recovery strategy)**
  - (2) contains numerous Legislative findings regarding the status of the water resource, availability of water supplies, and implementation of SWUCA recovery strategy to address identified resource issues and ensure sufficient supplies for existing and projected uses
  - (2)(f)Declares that implementing "components of the Southern Water Use Caution Area [SWUCA] Recovery Strategy . . . is for the benefit of the public health, safety, and welfare and is in the public interest."
  - (3) directs implementation of the West-Central Florida Water Restoration Action Plan, and
  - (4) identifies the Plan's components

- **Section 373.046,F.S. (Interagency agreements)**
  - (1) provides for interagency agreements for various purposes, including "…relationships as may be deemed beneficial to the public interest."

- **Section 373.1501, F.S. (Local sponsor and CERP)**
  - (2) Legislature finds CERP is important for restoring the Everglades ecosystem, sustaining the environment, economy, and social well-being of South Florida. … Further intend CERP components to be … consistent with the balanced policies and purposes of 373.016
  - (3) declares various restoration projects are "in the public interest, for a public purpose, and necessary for the public health and welfare."
  - (5) (a) – (f) In developing project components, SFWMD shall: analyze and evaluate all needs to be met comprehensively and consider all water resource issues; determine project components are feasible and consistent with law and permittable; consistent with Chapter 373, provide reasonable assurances that the quantity of water available to existing legal users shall not be diminished by implementation of project components as to adversely impact existing legal users and that water management adapt to the needs of the restored environment; ensure implementation of project components is coordinated with existing utilities and public infrastructure and that impacts to same are minimized.

- **Section 373.171, F.S. (Rulemaking authorization)**
  - (1) "In order to obtain the most beneficial use of the water resources of the state and protect public health, safety, and welfare and interests of the water users affected, governing boards …, may: (a) adopt rules … affecting the use of water, as conditions warrant, and forbidding the construction of new diversion facilities or wells, the initiation of new water uses or the modification of any existing uses …; (b) regulate the use of water within the affected area by apportioning, limiting, or rotating uses of water or by preventing those uses which the governing board finds have ceased to be reasonable and beneficial."

- (2) "In adopting rules and issuing orders under this law, the governing board shall act with a view to full protection of existing rights to water in this state insofar as is consistent with the purpose of this law."
- (3) "No rule or order shall require any modification of existing use or disposition of water in the district unless it is shown that the use … is detrimental to other water users or to the water resources of the state."
- See also Section 373.243, F.S.

- **Sections 373.175 and 373.246, F.S. (Water Shortage)**
  - Authorizes districts to declare water shortage and issue emergency orders temporarily reducing water use to protect resources from serious harm

- **Section 373.185(3)(a), F.S. (FL-Friendly Landscaping)**
  - Finds use of Florida-friendly landscaping and other use and pollution prevention measures serves a compelling public interest

- **Section 373.223, F.S. (CUP 3 – prong test)**
  - **(1)** States the "3 prong test" for CUP applications:
    - Reasonable-beneficial test
      - "Reasonable-beneficial use" means the use of water in such quantity as is necessary for economic and efficient utilization for a purpose and in a manner which is both reasonable and <u>consistent with the public interest</u>.
    - Consistent with the public interest test
  - **(2)** authorizes Districts to permit use of ground or surface water across county boundaries or outside the watershed (but within district boundaries) if consistent with the public interest (aka "local sources first")
  - **(3)** Seven factors must be considered in making public interest decision
  - **(4)** provides for reservation of water for protection of fish and wildlife and states all presently existing legal uses shall be protected so long as such use is not contrary to the public interest
  - **(5)** provides a presumption that an alternative water supply (AWS) project proposed by a CUP applicant is consistent with the public interest in defined circumstances

- **Section 373.2234, F.S. (Preferred sources)**
  - Authorizes rules identifying **preferred water supply sources** that will provide a substantial new supply while sustaining existing water resources and natural systems.

- Applicant proposing to use a preferred source must meet the 3 prong test, but in determining whether the use is consistent with the public interest, the board must take into account the proposed source is preferred.

- **Section 373.227 (Water Conservation)**
  - Legislative findings regarding conservation as a means of achieving economical and efficient use of water necessary to be reasonable-beneficial use, reduction of wasteful water use, and utility flexibility to tailor conservation measures, etc.

- **Section 373.228 (Landscape irrigation design)**
  - Legislative findings regarding water resource caution areas and that conservation is a way to meet future demand; Florida-friendly landscaping designs offer potential; agencies and others to develop landscape irrigation system design standards for new construction
  - In evaluating CUP applications from PS, Districts shall consider if local governments have adopted landscape irrigation (FL-friendly) ordinances

- **Section 373.2295, F.S. (Interdistrict transfers of groundwater)**
  - **(4)** requires consideration of evidence of future need for water in the withdrawal areas and in the proposed use areas, when a board determines whether an application for an interdistrict transfer and use of water is consistent with the public interest under section 373.223.

- **Section 373.233, F.S. (Competing applications)**
  - **(1)** When considering competing applications, the WMD has the right to approve or modify the one that best serves the public interest

- **Section 373.250, F.S. (Reuse of reclaimed water)**
  - **(1)(a)** Declares: “[t]he encouragement and promotion of water conservation and reuse of reclaimed water . . . are state objectives and considered to be in the public interest.”
  - **(1)(b)** Recognizes the interest of the state to sustain water resources through use of reclaimed water must be balanced with the need of reuse utilities to manage systems in accordance with a range of circumstances.

- **Section 373.701, F.S. (Declaration of policy)**
  - Broad Legislative policies are stated, similar to s. 373.016

- **Section 373.705, F.S. (Water Resource Development; Water Supply Development)**
  - Legislative intent expressed regarding sufficient water being available for all reasonable-beneficial uses, natural systems, and avoiding competition
  - Roles of Districts and water supply providers stated
    - Districts to take the lead in identifying and implementing water resource development projects and be responsible for funding regionally significant WRDs
    - Water supply development projects that are consistent with regional water supply plans and meet one or more of defined criteria shall receive priority consideration for state / WMD funding assistance; first consideration is given to projects that replace existing sources to help implement a MFL

- **Section 373.707, F.S. (Alternative water supply development)**
  - **(1)** Legislative intent to encourage AWS development
    - Need to develop AWS to sustain economic growth / viability and natural resources
    - Cooperative efforts are mandatory to meet water needs that will supply adequate and dependable supplies without resulting in adverse effects on withdrawal areas
    - AWS must receive priority funding to increase supplies and benefit natural system
    - **(1)(f)** finds it is in the public interest for water users, the Department, and Districts to "cooperate and work together in the development of alternative water supplies to avoid the adverse effects of competition for limited supplies of water"
    - Water Protection and Sustainability Program details ensue

- **Section 373.709, F.S. (Regional water supply planning)**
  - Regional water supply plan requirement and components defined
  - **(2)(e)** requires plan "[c]onsideration of how the [water supply development] project options … serve the public interest or save costs overall by preventing the loss of natural resources or avoiding greater future expenditures for water resource development or water supply development."

- **Section 373.713, F.S. (Regional water supply authorities)**
  - **(1)** provides for creation of regional water supply authorities by interlocal agreement if approved by the Secretary of the Department of Environmental Protection "to ensure that [the] agreement will be in the public interest and complies with the intent and purposes of this act."

<u>WMD Rule Provisions Re: Public Interest</u>

- **Rule 40C-2.301(2):**
  - In order to provide reasonable assurances that the consumptive use is reasonable-beneficial an applicant shall demonstrate that the consumptive use is: … (b) Is for a purpose and occurs in a manner that is both reasonable and consistent with the public interest.

- **Section 1.3.7.3**:
  - For purposes of this section [1.3.7.3: Criteria for Evaluation of Proposed Uses] and Section 3.10, "public interest" means those **rights and claims on behalf of people in general**. In determining the public interest in consumptive use permitting decisions, the Board will consider whether an existing or proposed use is **beneficial or detrimental to the overall collective well-being of the people <u>or</u> to the water resource** in the area, the District and the State (emphasis added).

SECTION 8: PERMITTING THRESHOLDS / DOMESTIC SELF-SUPPLY

Table G-12. Summary Table of Domestic Self-supply Permitting Conditions.

Exemptions	General Permit By Rule	Noticed General Permit	Individual Permit
No permit shall be required for domestic consumption of water by individual users per 373.219, F.S. Water Management Districts have adopted rules allowing for other exemptions to be granted.	This permit is issued upon rule adoption for each user within the District that is below the established thresholds and meets the criteria for issuance. No notice or application would be required to be given to the District and no water use reporting would be required.	SFWMD ONLY. This permit is issued upon an applicant's self-certification that the proposed use meets all of the established criteria, is within the applicable thresholds, and receives a presumption of compliance with the criteria for issuance. It requires the applicant to provide information about the withdrawal point including well size, depth, and capacity. Information regarding the estimated use would also be required such as use type, acreage irrigated, consumers served, etc. These permits have standard conditions and have a standard duration of 20 years.	This permit is issued to consumptive uses that meet any of the criteria given below or otherwise do not meet the criteria of a lower permitting category.

Table G-13. Summary Table of Domestic Self-supply Permitting Information by District.

Domestic Self-supply Criteria	District	Exemptions	General Permit By Rule	Noticed General Permit (SFWMD Only)	Individual Permit
Well Diameter	SFWMD	NA	NA	Less than 8 inches	Single well of 8 inches or greater
	SWFWMD	NA	Less than 6 Inches	NA	Diameter 6 inches or greater MIA: Cumulative Well Diameter at least 6 inches
	SJRWMD	NA	Less than 6 Inches	NA	Single well of 6 inches or greater
	SRWMD	NA	Less than 8 inches	NA	Single well of 8 inches or greater
	NWFWMD	NA	Less than 8 Inches	NA	Single well of 8 inches or greater
Cumulative Diameter of Intake Pipes for Surface Water	SFWMD	NA	NA	Cumulative Diameter less than 6 inches	Cumulative Diameter 6 inches or greater
	SWFWMD	NA	Cumulative Diameter less than 4 inches	NA	Single Facility or Cumulative Diameter 4 inches or greater
	SJRWMD	NA	Cumulative Diameter less than 6 inches	NA	Cumulative Diameter 6 inches or greater
	SRWMD	NA	Cumulative Diameter less than 6 inches	NA	Cumulative Diameter 6 inches or greater
	NWFWMD	NA	Cumulative Diameter less than 6 inches	NA	Cumulative Diameter 6 inches or greater
Average Daily Use	SFWMD	NA	Varies by use class	Less than 100,000 Gallons Per Day	Greater than or equal to 100,000 Gallons Per Day
	SWFWMD	NA	Less than 100,000 Gallons Per Day	NA	Greater than or equal to 100,000 Gallons Per Day
	SJRWMD	NA	Less than 100,000 gpd	NA	Greater than or equal to 100,000 Gallons Per Day
	SRWMD	NA	Less than 100,000 gpd	NA	Greater than or equal to 100,000 Gallons Per Day
	NWFWMD	NA	Less than 100,000 gpd	NA	Greater than or equal to 100,000 Gallons Per Day

Table G-13. Summary Table of Domestic Self-supply Permitting Information by District (continued).

Domestic Self-supply Criteria	District	Exemptions	General Permit By Rule	Noticed General Permit (SFWMD Only)	Individual Permit
Maximum Daily Withdrawal Capacity (gallons per day – gpd)	SFWMD	NA	NA	Less than 1,000,000 gpd	Greater than or equal to 1,000,000 gpd
	SWFWMD	NA	Less than 1,000,000 gpd	NA	Greater than or equal to 1,000,000 gpd
	SJRWMD	NA	Less than 1,000,000 gpd	NA	Greater than or equal to 1,000,000 gpd
	SRWMD	NA	Less than 1,000,000 gpd	NA	Greater than or equal to 1,000,000 gpd
	NWFWMD	NA	Less than 1,000,000 gpd	NA	Greater than or equal to 1,000,000 gpd
Other Restrictions	SFWMD	Domestic use at a single family/duplex dwelling or fire-fighting per 40E-2.051, F.A.C.	Landscape irrigation at a single family/duplex dwelling, short-term dewatering, or closed-loop systems per 40E-2.061, F.A.C.	Meets criteria for reduced threshold areas.	NA
	SWFWMD	Domestic consumption of water by individual users and certified uses defined in Chapter 62-17, F.A.C.	Not located within MIA of SWUCA	NA	Evidence indicates the withdrawal is likely to cause adverse impacts to existing water or land uses or the water resources or the use is within an area that is experiencing or is projected to experience withdrawal-related adverse water resource or environmental impacts.

Table G-13. Summary Table of Domestic Self-supply Permitting Information by District (continued).

Domestic Self-supply Criteria	District	Exemptions	General Permit By Rule	Noticed General Permit (SFWMD Only)	Individual Permit
Other Restrictions (continued)	SJRWMD	No permit is required under section 40C-2.051, F.A.C., for water used strictly for domestic use which occurs in a private residence, water withdrawn for contamination removal, uses for which a certification obtained pursuant to Power Plant Siting Act, water for APTs less than 30-days, withdrawals solely for flood protection, construction dewatering, fire protection, and seawater.	NA	NA	NA
	SRWMD	Domestic use defined in Section 373.019(6), F.S., firefighting, dewatering less than 180 consecutive days, artificial retention structures, groundwater remediation authorized by FDEP.	NA	NA	Bottled water uses
	NWFWMD	No permit is required under section 40A-2.041, F.A.C., for water used strictly for domestic use which occurs in a private residence, and includes no more than one rental residence or no more than four non-rental residences served by one well.	Not located within a WRCA, and consistent with requirements of any applicable mandatory reuse zones	NA	NA

Table G-13. Summary Table of Domestic Self-supply Permitting Information by District (continued).

Domestic Self-supply Criteria	District	Exemptions	General Permit By Rule	Noticed General Permit (SFWMD Only)	Individual Permit
Approval Authority	SFWMD	NA	NA	Supervisor	● Supervisor: Less than 3,000,000 Gallons in a Maximum Month ● Bureau Chief: At least 3,000,000 Gallons in a Maximum Month ● Executive Office: At least 15,000,000 Gallons in a Maximum Month
	SWFWMD	NA	NA	NA	Director, Bureau Chief, other as approved by AED (WUP Evaluation Manager) - Individual permit less than 100,000 gallons per day. Director, Bureau Chief - All other individual permits (with exceptions below). Governing Board –the following Individual permits: ● Renewal or formal modification of an existing permit that authorizes a combined annual average demand of 10,000,000 gpd or greater. ● Application for new individual permits 500,000 gpd or greater ● Renewal or modification of an existing individual permit with annual average quantities of 500,000 gpd or greater that increases the annual average quantity, or allows a change in use of 100,000 gpd or more, or more than 10% of the permitted annual average quantity, whichever is less. ● The application is to authorize environmental augmentation in the Northern Tampa Bay Water Use Caution Area

Table G-13. Summary Table of Domestic Self-supply Permitting Information by District (continued).

Domestic Self-supply Criteria	District	Exemptions	General Permit By Rule	Noticed General Permit (SFWMD Only)	Individual Permit
Approval Authority (continued)	SJRWMD	NA	NA	NA	● All CUPs ≥ 500,000 gpd - Governing Board ● All CUPs < 500,000 gpd - Executive Director or designee (designee: Division Director, Bureau Chief, Service Center Directors) ● CUP Transfers: Division Director, Bureau Chief, Service Center Directors ● Letter Modifications - All CUPs - Division Director, Bureau Chief, Service Center Directors
	SRWMD	NA	NA	NA	● All CUPs ≥ 1,000,000 gpd or bottled water uses - Governing Board ● All CUPs < 1,000,000 gpd - Executive Director
	NWFWMD	NA	NA	NA	Applications under 1,000,000 ADR issued by Executive Director. (373.083, F.S.)

SECTION 9: FDEP GUIDANCE MEMO ON INTERIM CONSUMPTIVE USE PERMITTING WITH THE CFWI PLANNING AREA

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

MARJORY STONEMAN DOUGLAS BUILDING
3900 COMMONWEALTH BOULEVARD
TALLAHASSEE, FLORIDA 32399-3000

RICK SCOTT
GOVERNOR

HERSCHEL T. VINYARD JR.
SECRETARY

TO: John A. Miklos, Chair, SJRWMD
Hans G. Tanzler III, Executive Director, SJRWMD
Carlos Beruff, Chair, SWFWMD
Robert Beltran, Executive Director, SWFWMD
Daniel O'Keefe, Chair, SFWMD
Blake Guillory, Executive Director, SFWMD

FROM: Drew Bartlett
Deputy Secretary, Water Policy and Ecosystem Restoration

SUBJECT: Guidance Memo re: Interim Consumptive Use Permitting (CUP) within the Central Florida Water Initiative Area.

DATE: December 13, 2013

The Central Florida Water Initiative (CFWI) has made significant progress in our collaborative effort to plan for the future water supply needs of Central Florida while sustaining our natural resources. The completion of the regional groundwater model, the determination of the sustainable yield of water supply from the upper Florida aquifer, and the release of the draft of the first joint Regional Water Supply Plan for the CFWI area are significant milestones in achieving the goals of the Initiative. As summarized in the draft regional water supply plan, an additional 250 MGD of water will be needed by 2035 to meet demand and protect natural resources.

By the end of 2014, the CFWI Solutions Team will use the work accomplished to date as the foundation to select specific projects and develop strategies to provide the additional water needed for users and for resource recovery. In the interim, the water management districts must continue to perform their statutory responsibility to review and process consumptive use permit applications under applicable statutory and rule provisions. The purpose of this memo is to provide guidance to the districts in implementing the CUP program during this interim time period. This guidance is effective immediately.

Coordination on Pending Applications

There is an immediate need for coordination and the three water management districts are directed to closely coordinate agency action on consumptive use permit applications within the Central Florida Area, and provide transparency in the application process for water users and other stakeholders in the region. The WMDs should generate monthly reports of consumptive use program data for consideration by the CFWI Regulatory Team, and to make this information available to the public on the CFWI website (www.cfwiwater.com). The reports should include information on pending applications and anticipated renewal applications, including location and requested withdrawal quantities and permit terms.

December 13, 2013
Page 2

Permit Duration

As part of the CFWI, substantial technical work has been generated concerning groundwater availability in the Central Florida region. This information represents the best available technical information concerning current and projected water resource conditions. Of particular interest in this regard and as documented through field work, adverse impacts to wetlands and other water resources are currently occurring in several areas in the CFWI. Some impacts are the result of multiple factors, including groundwater withdrawals.

The districts are expected to utilize this information during review of applications for consumptive use permits and pay particular attention to the reasonable assurances provided that the conditions for permit issuance will be met for the duration of the permit in accordance with Section 373.236, F.S. While Section 373.236, F. S. indicates permits shall be granted for 20 years, this statute also indicates the potential for shorter permit durations which reflect the period for which reasonable assurances can be provided. Given the circumstances existing in the CFWI, a case by case analysis of whether or not a shorter permit duration should be issued is warranted, and this decision should be carefully analyzed by the district.

Water Conservation

While significant achievements have been made in water conservation and the use of reclaimed water in the CFWI area, continued improvement is required, particularly given that use is approaching, or in some areas, has exceeded, the sustainable yield of the upper Floridan aquifer. The districts should continue to require applicants to demonstrate, through careful compliance with existing district rules for water use efficiency and conservation plans, that the proposed use is reasonable-beneficial.

In addition, the districts are directed to:

(1) Work with other CFWI participants to prepare a "menu" of water conservation options to be posted on the CFWI website and made available to permit applicants;
(2) Work with the top 5-10 largest utility customers for the purpose of assessing current water use and identifying opportunities to enhance conservation programs and use efficiency, and
(3) Annually perform a random survey of citizens in the CFWI area for the purpose of determining awareness of water supply issues and the need for conservation in the region in order to measure the success of the Districts' water conservation education program.

To further promote public education and awareness related to the need for water conservation, the Districts shall include the water conservation Limiting Condition provided in the section below on permits issued in the CFWI area.

The Districts shall report the status and progress of the above actions to the Department by June 1 and December 1, 2014.

Permit Application Documentation and Permit Conditions

It is important for applicants who receive permits during this interim period to be put on notice that they are located within the CFWI area and that the solutions and strategies that are developed may

December 13, 2013
Page 3

affect permitted water users in the future. Therefore, the districts should include the following language in the staff documentation (technical staff report or abstract) prepared for each application, and include the following Limiting Conditions on permits issued:

<u>Staff Report or Abstract Language:</u>

This application satisfies existing conditions for permit issuance because (*insert reasoning regarding: water resources, existing legal users, demand, etc.)*

The recommended permit duration is commensurate with the applicant's ability to satisfy conditions of permit issuance. *(Insert explanation as needed.)*

The proposed water use is located within the area of the Central Florida Water Initiative (CFWI). The CFWI is a collaborative regional water supply endeavor to protect, conserve, and restore water resources in the area by working to accomplish the goals presented in the Central Florida Water Initiative Guidance Document. These goals include crafting long-term water supply solutions for the Central Florida region. The CFWI effort may also result in specific regulatory requirements. While the scope and content of these regulatory requirements are unknown at this time, it is possible they may include requirements that are related to the permittee's relative contribution to the water resource impact being addressed, the timing of permit issuance compared to other existing legal users, and/or include other considerations identified by the CFWI Solutions Planning and Regulatory Teams. Therefore, this permit includes Limiting Condition ## that provides specific notification that the permit may be modified during the term of the permit to address unanticipated harm or impacts to existing legal users that is occurring or is projected to occur from the permittee's authorized withdrawal over the permit duration.

Since this application is located within the CFWI area, it is necessary for the applicant to consider implementing the heightened water conservation requirements defined in Limiting Condition ##.

The applicant is advised to carefully consider its infrastructure investments in light of the on-going Central Florida Water Initiative.

<u>Permit Limiting Conditions:</u>

##. Notice included in new permits; modifications with increases in allocation or duration, except permit duration extensions associated with conservation achieved pursuant to the Applicant's Handbook for Water Use Permit Applications criterion [2.3.2. F.1.c. and Rule 40E-2.331(4)(a)2.b. (SFWMD), 1.4.3.3.1(c) (SJRWMD), and 2.4.8.7 (SWFWMD), when effective] ; and / or renewals beginning (*Insert Date of Guidance Memo*):

December 13, 2013
Page 4

This project is located in the Central Florida Water Initiative (CFWI) area, an area with on-going impacts to water resources which are being addressed by the CFWI. If the District determines that adverse impacts to water resources or existing legal users are occurring or are projected to occur because of the Permittee's authorized withdrawals over the permit duration, the District, upon reasonable notice to the permittee and including a statement of facts upon which the District based its determination, may modify quantities permitted or other conditions of the permit, as appropriate, to address the impact, but only after an opportunity for the permittee to resolve or mitigate the impact or to request a hearing. Such modification, if any, will consider such factors as the permittee's relative contribution to the water resource impact being addressed due to groundwater withdrawals, the timing of this permit issuance compared to presently existing legal use of water, and other considerations identified by the CFWI Solutions Planning and Regulatory Teams. Modifications may include mitigation of impacts and / or reconsideration of allocations or requirements to timely implement required actions that are consistent with the long-term, regional water supply solutions as implemented by rules. Such actions may include the development of alternative water supplies, the implementation of water resource and / or water supply development projects, the application of impact offsets or substitution credits, operating plans, heightened water conservation or other appropriate actions. Nothing in this condition is intended to abrogate the rights of the Governing Board or of any other person under Section 373.233, Fla. Stat.

##. The Central Florida Water Initiative documented existing water resource environmental impacts within its boundaries. This Initiative remains underway and is, in part, crafting long-term water supply solutions for the region. As a component of immediate, interim measures the permittee is encouraged to participate in the District's on-going, heightened water conservation public education program. Given the permittee's use class, opportunities may include such activities as participation in water conservation public service announcements, demonstrations of irrigation efficiency at community gardens, posting water conservation information or links on the permittee's website. Please contact (INSERT contact information) to discuss opportunities for participation in this important District effort.

If you have any questions regarding this guidance memo, please contact Tom Beck, Director of the Office of Water Policy, at Tom.Beck@dep.state.fl.us or 850/ 245-3643.

HTV/DB/tb

cc: Tom Beck, Ph.D., Director, Office of Water Policy, FDEP

SECTION 10: FDEP FACT SHEET: PER CAPITA WATER USE

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

May 2014

Per Capita Water Use

Water Resource
Fact Sheet Series

Available Fact Sheets

- *Florida's Water Resource Management System*
- *Minimum Flows and Levels*
- *Water Use Trends in Florida*
- *Water Conservation*
- *Alternative Water Supplies*
- *Regional Water Supply Planning*
- *Water Reservations*
- *Drought and Water Management*
- *Local Sources First*
- *Per Capita Water Use*
- *Desalination*
- *Reclaimed Water*

For More Information

Office of Water Policy
Florida Department of Environmental Protection
3900 Commonwealth Blvd., MS 46
Tallahassee, FL 32399-2400
(850) 245-3166
http://www.dep.state.fl.us/water/waterpolicy/index.htm

The concept of *per capita water use* is often used for comparing water use over time or among groups of people (cities, counties, etc.) that use public water supplies (e.g., city water). But, what does per capita water use really mean, and is it a valid way to compare water use among groups? Generally, it means the average amount of water each person in a particular area uses on a daily basis, expressed as "gallons per capita per day." But, as explained below, water use can be calculated many different ways, which makes fair comparisons of water use among populations difficult.

How Are Per Capita Water Rates Used?

Water managers use per capita measurements for a number of purposes such as:

- assessing water demand and identifying use patterns,
- setting goals and establishing use thresholds in permitting,
- evaluating conservation program effectiveness, and
- public communication.

How Is Per Capita Water Use Calculated?

At first glance, calculating per capita water use seems as simple as dividing the amount of water withdrawn or used by the number of people using it. However, it is sometimes necessary to use more sophisticated calculation methods.

For example, in an area with a high population of seasonal residents (e.g., winter-only residents in Florida), the per capita rate can be very different depending on whether or not seasonal residents are in the area. Time of day also can be important. Commuters can affect per capita rates during work hours, by increasing water use in the city they commute to, while decreasing water use where they live. Large quantity users affect per capita as well. Facilities that use millions of gallons of water per day in their manufacturing processes can raise per capita water use rates, even though residents in the same service area do not use unusually high quantities of water.

In addition, there are differences in how the amount of water used is calculated. In some cases, it is appropriate to use the total water withdrawn. This is how much water is actually pumped from the water source. Other times, it is necessary to use what is called "finished" water. This is the water withdrawn plus any water imported from another utility, minus water exported to another utility and minus losses that occur during transport and treatment of the water. Water managers consider these and other factors when making per capita calculations for specific purposes.

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Uniform Per Capita Measures

Because capita water use is so often used in public communication, the Department of Environmental Protection and the five water management districts determined it was important to develop standardized per capita calculations for reporting per capita use to the Department. The goal of the uniform methodology is to provide a common means of comparing and reporting per capita water use among different populations throughout the state. Other per capita methods will continue to be used by the water management districts for regulation, planning, and other purposes requiring a more sophisticated calculation method.

The Department and districts developed two standardized per capita measures:

- *Uniform Gross Per Capita*, which is defined as:

$$\frac{\textbf{Utility Service Area Finished Water Use}}{\textbf{Utility Service Area Residential Population}}$$

- *Uniform Residential Per Capita*, which is defined as:

$$\frac{\textbf{Utility Service Area Finished Water Used by Dwelling Units}}{\textbf{Utility Service Area Residential Population}}$$

where

- *Utility Service Area Finished Water Use* is the sum of finished water (defined above) used by all sectors (residential, industrial, commercial, etc.) served by a utility.
- *Utility Service Area Finished Water Use by Dwelling Units* is the sum of finished water used by all dwelling units served by a utility.
- *Utility Service Area Residential Population* is the number of dwelling units served, multiplied by an estimate of persons per household.

The first measure considers all water users in a service area, including large quantity users, such as industrial, commercial or institutional users. The second measure evaluates household water use only. These measures improve the ability to understand statewide water use data, and compare water use among different populations.

Can Utilities Reduce Per Capita Water Use Rates?

Utilities can reduce per capita rates by implementing effective water conservation programs, including establishing rate structures that encourage conservation. Promoting the use of reclaimed water to meet non-potable water needs, such as landscape irrigation and industrial processes, also reduces potable water per capita rates.

How Can I Reduce My Per Capita Water Use?

Residents and businesses can reduce their per capita use by promptly repairing leaks, and by installing WaterSense certified toilets, showerheads and faucets, as well as Energy Star certified dishwashers, washing machines, and water heaters. Check with your utility to see if they offer rebates for these installations. Equally important is to irrigate landscapes only when needed, use reclaimed water if available, and to practice Florida-Friendly landscaping.

SECTION 11: FDEP MEMORANDUM: GUIDANCE FOR IMPROVED LINKAGE BETWEEN REGIONAL WATER SUPPLY PLANS AND THE CONSUMPTIVE USE PERMITTING PROCESS

Florida Department of Environmental Protection
Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Rick Scott
Governor

Jennifer Carroll
Lt. Governor

Herschel T. Vinyard Jr.
Secretary

TO: George Roberts, Chair, NWFWMD
Douglas E. Barr, Executive Director, NWFWMD
Donald J. Quincey, Jr., Chair, SRWMD
Charlie Houder, Acting Executive Director, SRWMD
Lad Daniels, Chair, SJRWMD
Hans Tanzler, Executive Director, SJRWMD
Paul Senft, Chair, SWFWMD
Blake Guillory, Executive Director, SWFWMD
Joe Collins, Chair, SFWMD
Melissa Meeker, Executive Director, SFWMD

THROUGH: Herschel T. Vinyard Jr. HTV
Secretary

FROM: Greg Munson GM
Deputy Secretary for Water Policy and Ecosystem Restoration

DATE: March 23, 2012

SUBJECT: Guidance for Improved Linkage between Regional Water Supply Plans and the Consumptive Use Permitting Process

Regional Water Supply Planning is a critical tool for ensuring that existing and future water needs of the state are met while also protecting our valuable natural systems. Regional Water Supply Plans are developed through collaboration among the Water Management Districts (Districts), water providers, water users and other stakeholders when future projected demands are estimated to exceed existing water supplies. The resulting plan provides a blueprint for the development of sustainable water sources by identifying water supply project options, from which local water suppliers can choose, that will be more than sufficient to meet future needs while protecting the water resources of an area.

The Department recently conducted stakeholder sessions around the state with water users and environmental interests seeking input on ways to improve the consistency and effectiveness of the consumptive use permitting program. One of the issues raised

www.dep.state.fl.us

by the stakeholders is that better coordination is needed between the District staff who identify water supply projects for inclusion in the regional water supply plan, and the District permitting staff who may eventually be responsible for reviewing an application for those projects.

Water suppliers are not required to choose a water supply development project identified in a regional water supply plan. However, by doing so, permit applicants should have confidence that the project has undergone initial screening for feasibility and has a likelihood of being permittable. The applicant should be assured that time and money spent in more detailed project development will not be wasted. To accomplish this, coordination between the staff who develop the regional water supply plan and the staff who are responsible for water use permitting is critical. Planning staff must know the criteria for permit issuance in order to incorporate conceptual level analysis and screening into plan development.

Similarly, the Districts need to ensure that permitting staff are knowledgeable about the projects in the plans, and the data and the analysis that supports those projects. While it is not required that projects identified in the plan be analyzed to the level of detail required to determine if they meet all the conditions for issuance of a consumptive use permit, an applicant who selects a project identified in the plan should have some assurances that 1) District staff are not only familiar with the project but will have access to and will apply the existing data available from the planning process when reviewing the application, and 2) permitting staff will facilitate, consistent with statute and District permitting rules, the successful permitting of the project.

Successful coordination, as outlined above, will promote the selection of sustainable water supply projects identified in the plans by improving the efficiency and timeliness of the consumptive use permitting process for those applicants who select them.

HTV/GM/as

cc: Ann B. Shortelle, Ph.D., Director, Office of Water Policy, FDEP

…A collaborative regional
water supply endeavor
to protect, conserve, and restore
our water resources

St. Johns River Water Management District
P.O. Box 1429
Palatka, FL 32178-1429
(386) 329-4500 • (800) 451-7106
floridaswater.com

South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406
(561) 686-8800 • (800) 432-2045
sfwmd.gov

Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34604-6899
(352) 796-7211 • (800) 423-1476
WaterMatters.org