ST. LUCIE WEST SERVICES DISTRICT

WATER TREATMENT PLANT CONCEPTUAL EXPANSION

BOARD OF SUPERVISORS
WORKSHOP MEETING
JANUARY 8TH, 2024

INFRASTRUCTURE
SOLUTION SERVICES

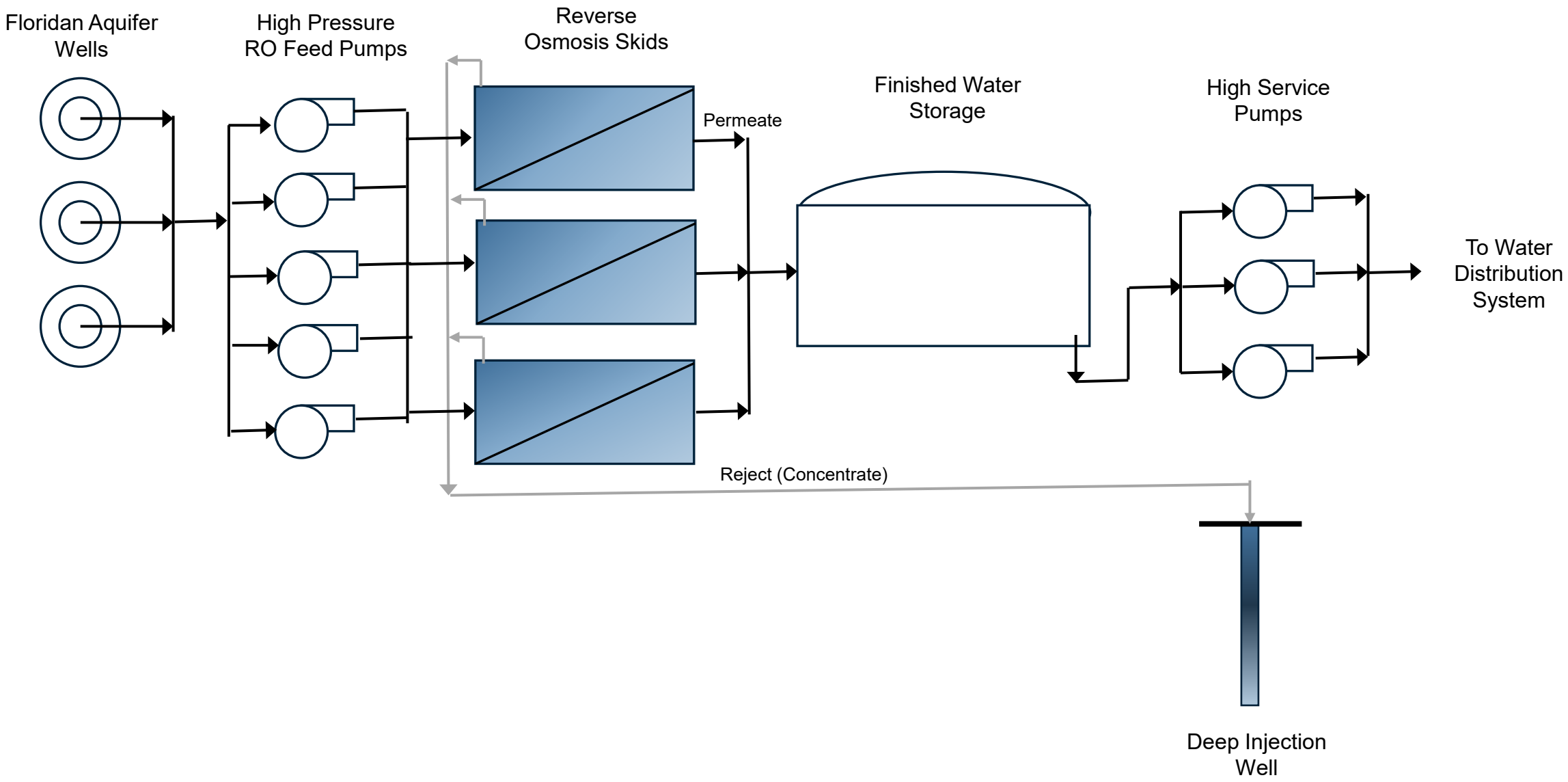
BACKGROUND, GOALS, AND OBJECTIVES

- The St. Lucie West Services District (SLWSD or District) provides water service to the entire District and the adjacent The Reserve community.

- SLWSD owns and operates a reverse osmosis water treatment plant (ROWTP) with a Florida Department of Environmental Protection (FDEP) permitted capacity of 3.4 million gallon per day (MGD).

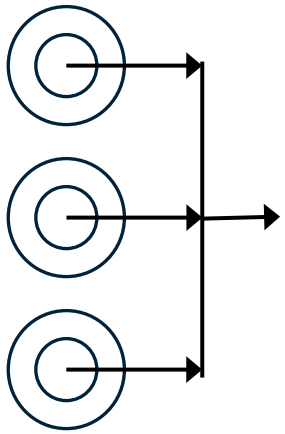
- The District anticipates the need to begin the planning for an expansion of the RO WTP capacity in the near future due to several factors including:
  - Increasing system demand due to redevelopment and additional commercial,
  - Additional capacity request from The Reserve community, and
  - Potential additional demand from Indian River State College expansion.

WATER SYSTEM BASICS



WATER SYSTEM BASICS - CAPACITY & REDUNDANCY

Floridan Aquifer Wells



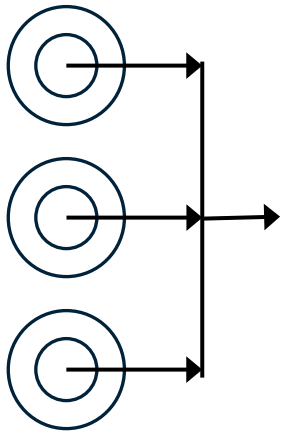
Well Capacity (each)
1,500 gpm or 2.2 MGD

Firm Capacity
Two Duty + One Standby
3,000 gpm or 4.3 MGD

Total Capacity
Three Duty
4,500 gpm or 6.5 MGD

WATER SYSTEM BASICS - CAPACITY & REDUNDANCY

Floridan Aquifer Wells



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Total Capacity
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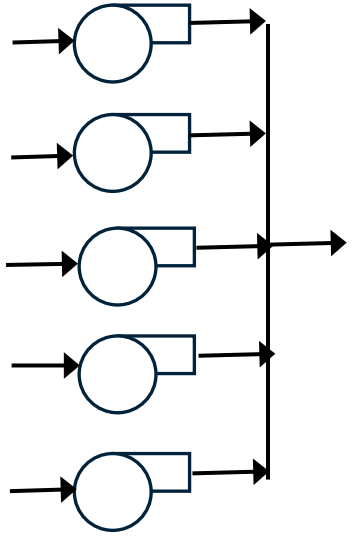
High Pressure RO Feed Pumps

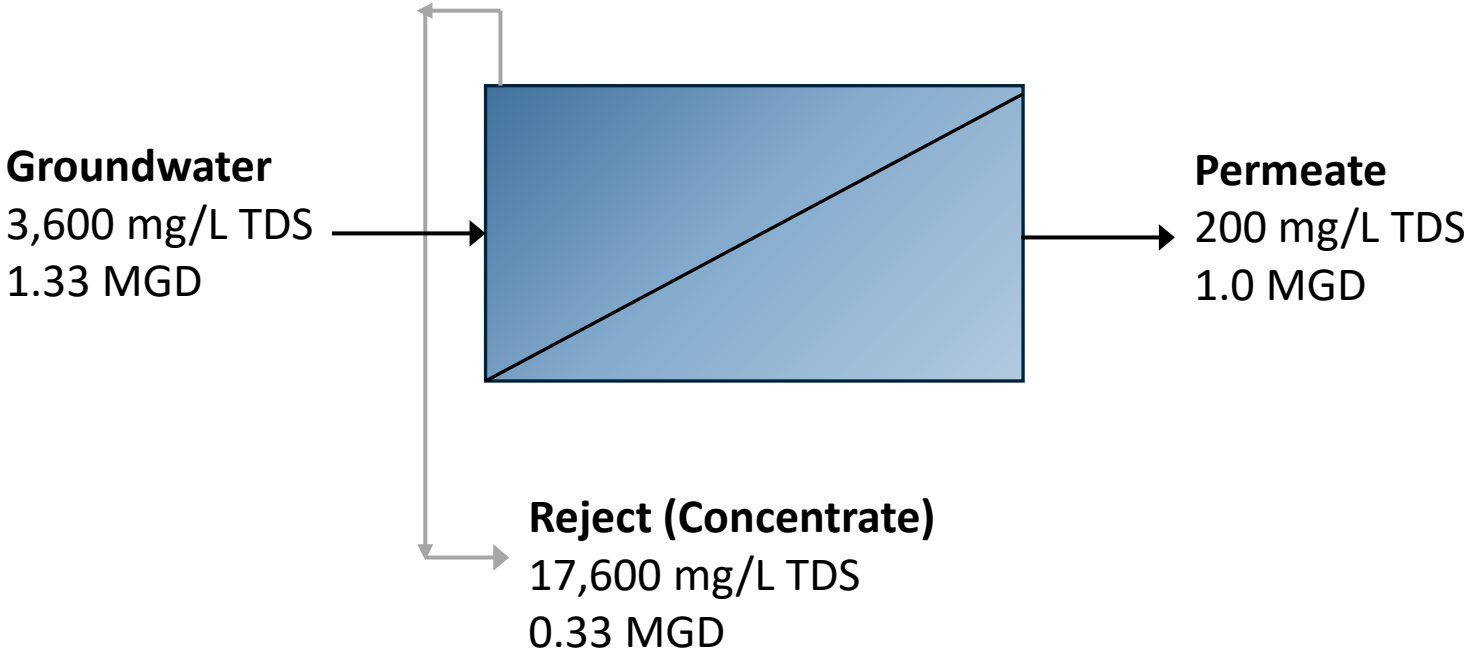


Pump Capacity (each)
785 gpm or 1.1 MGD

Firm Capacity
Four Duty + One Standby
3,140 gpm or 4.6 MGD

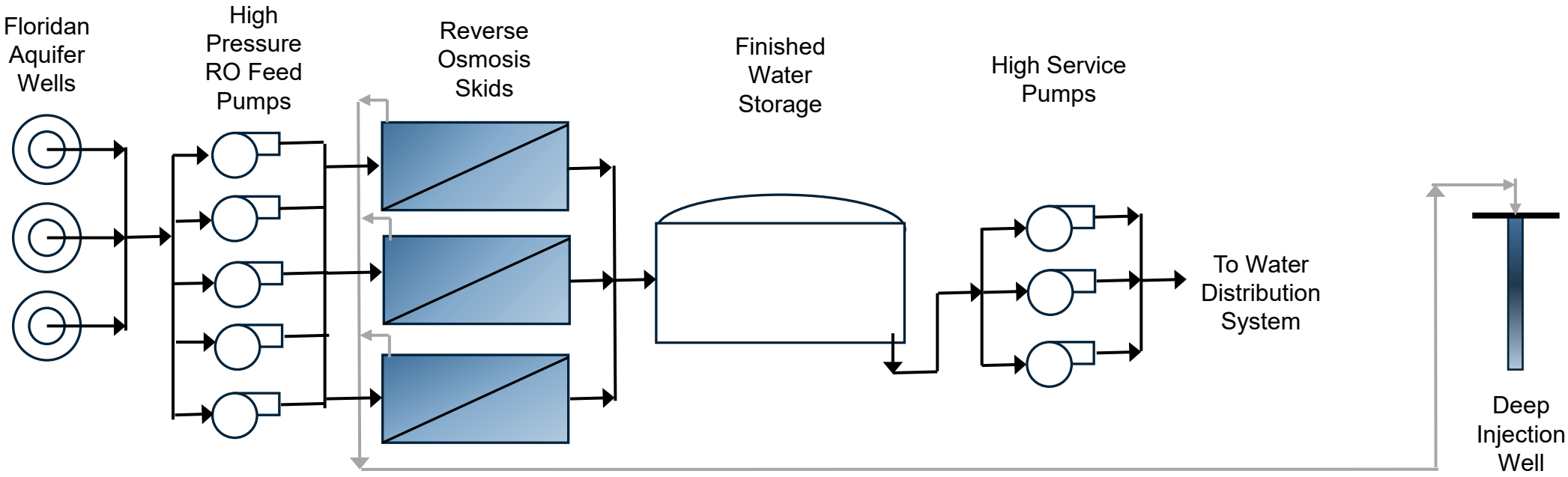
Total Capacity
Five Duty
3,900 gpm or 5.65 MGD

WATER SYSTEM BASICS – RO RECOVERY



$$\text{Percent RO Recovery (\%)} = \frac{Permeate\ (1.0\ MGD)}{Ground\ Water\ (1.33\ MGD)} = 75\%$$

WATER SYSTEM BASICS – FIRM, DESIGN & RATED PLANT CAPACITY



	Floridan Wells	High Pressure Feed Pumps	Reverse Osmosis Skids	High Service Pumps	Deep Injection Well
Firm Capacity (MGD)	4.3	4.6	3.6	6.1	3.9
Design Capacity (MGD)			3.6		
FDEP Rated Capacity (MGD)			3.4		

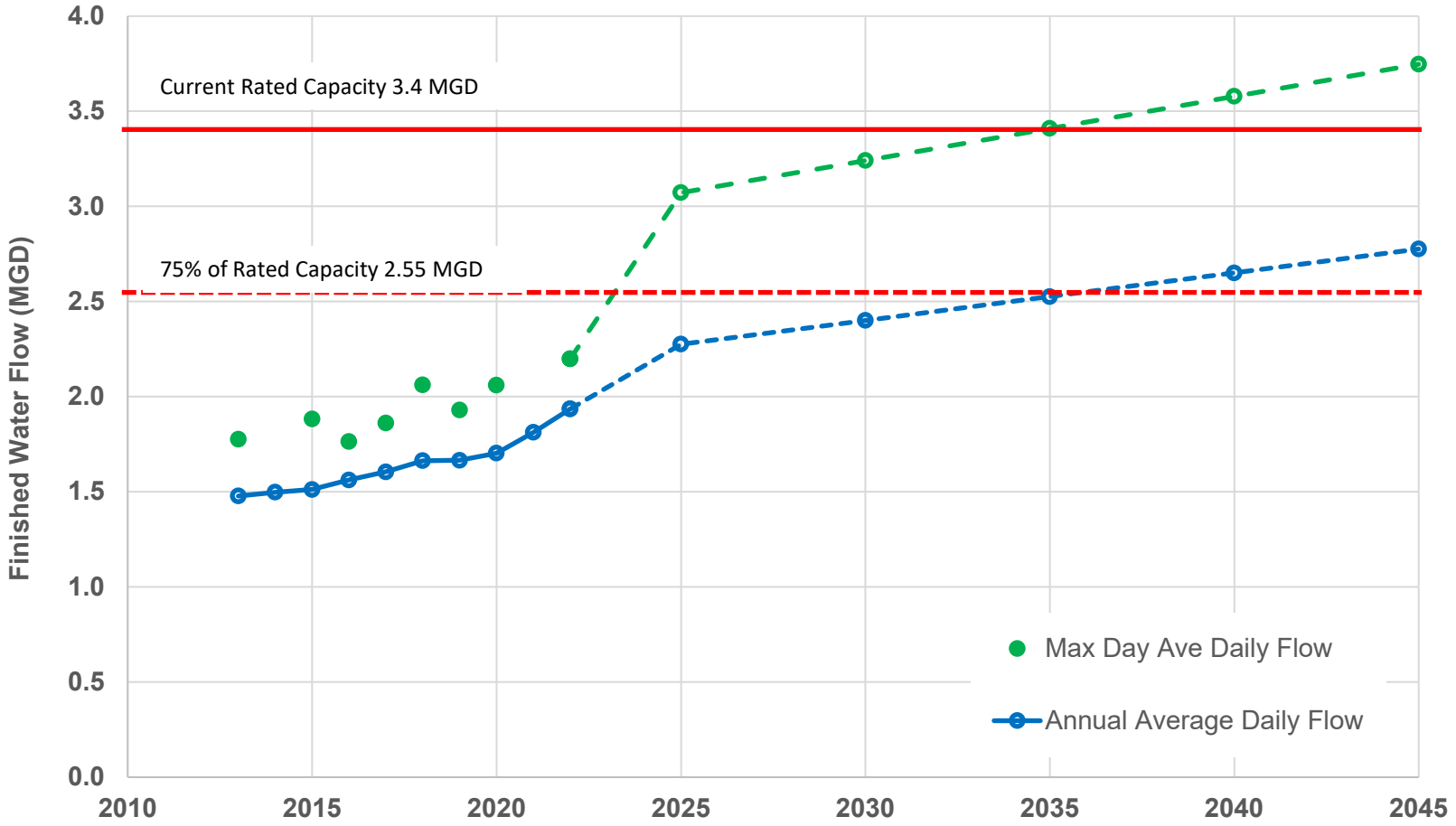
WATER TREATMENT PLANT CAPACITY NEEDS

- Reevaluation of future water demands through 2045.
  - Multifamily Redevelopment – Additional 500 ERCs (0.125 MGD)
  - Commercial & Institutional – Additional 1,300 ERCs (0.325 MGD)
  - The Reserves WTP Demand – Additional 400 ERCs (0.1 MGD) in 2025
  - The Reserves Future Growth – Additional 200 ERCs (0.05 MGD)

- ROWTP is projected to approach its current permitted rated capacity in 2035; additionally, based on demand projections SLWSD should expect a max finished daily water demand of 3.75 by 2045.

- Considering these observations, a treatment plant capacity expansion of at least 1.0 MGD was recommended.

WATER TREATMENT PLANT CAPACITY NEEDS



ROWTP EXISTING UNIT PROCESSES AND CURRENT RATED CAPACITY

Unit Process	Description	Firm Rated Capacity (MGD)
Water Supply	Groundwater Wells - Two Duty + One Standby Floridan Groundwater Wells rated for 1,500 gpm Well Pumps - One duty for each well rated for 1,400 gpm @ 45 ft TDH, 50 HP	4.3
Pretreatment	Micron Cartridge Filtration -Two Duty + One Standby 5 micron Vertical Cartridge Filters (Parker Filtration), 32-in dia, 10-in dia Inlet/Outlet, rated for 2.4 MGD each at 4 gpm per 10" Cartridge	4.8
Reverse Osmosis	High Pressure RO Feed Pumps (HPP) – Four Duty (two per RO Skid) + 1 Standby Vertical Turbine Pumps (Afton) rated at 785 gpm @ 245 ft TDH, 3,600 rpm, 150 HP each.	4.6
	Reverse Osmosis Process – Two Duty + One Standby Two Stage RO Treatment Skids with Inter-Stage Boost in a 28:14 Configuration rated for 1.8 MGD @ 14.2 gpd flux each w/ 42 FRP pressure vessels. Each vessel contains seven membrane elements @ 8-in day by 40-in long.	3.6
Post Treatment	Calcite Contractors – Four Duty Contactors 8 ft dia 6.25 gpm/SF loading rate rated at approximately 300 gpm each @ 50% Bypass Flow.	3.5
	Degasification – Two Duty Degasifiers each 8 ft dia by 13 ft tall rated at 30 gpm per SF with 3-in Packing Media with 10,000 SCFM Blower.	4.0
	Odor Control – One Duty Two Stage Countercurrent Wet Chemical Scrubber rated at 10,000 SCFM using Caustic & Hypochlorite Scrubbants.	4.0
Primary Disinfection	Clearwell/CCC – One duty CCC, 24 ft wide x 52 ft long x 9.5 ft deep; 11,400 CF or 85,272 gal. 30 min Contact Time	4.1

ROWTP EXISTING UNIT PROCESSES AND CURRENT RATED CAPACITY

Unit Process	Description	Firm Rated Capacity (MGD)
Transfer Pumping	Transfer Pumping – Two Duty + One Standby Vertical Turbine Pumps rated at 1,200 gpm @ 35 ft TDH, 15 HP (Pumps No 1 & 2) and 1,400 gpm @ 30 ft TDH, 25 HP (Pump No. 3). Pumps being operated at 2,600 gpm total.	3.7
Water Storage and Distribution	Finished Water Storage – Two duty 2.0 MG Ground Storage Tanks. 25% Max Day Finished Water Storage Capacity Required	16
	High Service Pumping – Set A: Three Duty + One Standby Split Case Centrifugal Pumps. Pump No. 1 rated at 700 gpm, 50 HP; Pump No. 2 rated at 1,400 gpm, 100 HP, Pumps No. 3 & 4 rated at 3,000 gpm @ 150 HP. Set B: Two Duty + One Standby Split Case Centrifugal Pumps. Pump 1 & 2 rated at 1,400 gpm, 100 HP; Pump No. 3 rated at 700 gpm, 50 HP Firm Pumping Capacity Provided – 7,200 gpm. @ 1.7 Peak Hour PF.	6.3
Concentrate Disposal	Deep Injection Well – 12-in dia casing to 2,695 ft deep. 900 gpm (1.3 MGD) Permitted Injection Rate 75% Recovery	3.9
Chemical Feed Systems	Anti-Scalant (Nalto PC 1850T @ 37%) One 450 gal bulk storage tank, 1 Duty + 1 Standby Chemical Feed Pumps rated at 2.5 gal/hr. 4.0 mg/L Chemical Dose; 7 gal/day Usage	3.6
	Acid (Sulfuric Acid @ 93%) One 12,000 gal bulk storage tank, one 1,000 gal Day Tank; 1 Duty + 1 Standby Chemical Feed Pumps rated at 14.4 gal/hr. 45 mg/L Chemical Dose; 88 gal/day Usage	
	Caustic (Sodium Hydroxide @ 50%) One 4,000 gal bulk storage tank, one 550 gal Day Tank; 1 Duty + 1 Standby Chemical Feed Pumps rated at 3.6 gal/hr. 50 mg/L Chemical Dose; 94 gal/day Usage	
	Fluoride (Hydrofluosilicia Acid @ 24%) One 750 gal bulk storage tank, one 110 gal Day Tank; 1 Duty + 1 Standby Chemical Feed Pumps rated at 2 gal/hr. 0.8 mg/L Chemical Dose; 12 gal/day Usage	
	Chlorine (Chlorine Gas) Four 1 Ton Gas Cylinders 1 Duty + 1 Standby Gas Chlorinators rated at 200 lbd/d. 5 mg/L Chemical Dose; 142 lbs/d Usage	

SLWSD ROWTP EXPANSION CONCLUSIONS

- St. Lucie West Service District's ROWTP currently operates 3.4 MGD FDEP permitted capacity RO water treatment plant. Due to increasing system demands, including a request from the Reserves community for additional capacity and increased demand from future development from within the district, an evaluation of the current unit process capacities of the treatment plant, ISS has recommended an expansion of at least 1 MGD.

Recommended Rated Capacities

- Water Supply & Pretreatment – 6.4 MGD
- Reverse Osmosis Treatment – 4.8 MGD (Finished Water)
- Disinfection & Post Treatment – 4.8 MGD
- Concentrate Disposal – 2.1 MGD (1,500 gpm Max)

- To expand the treatment plant capacity and achieve a finished daily water capacity of 4.8 MGD the ROWTP requires improvements to several of the unit processes, each of these have been evaluated and a summary of recommended upgrades is provided on the following slide.

UNIT PROCESS CAPACITY EXPANSION SUMMARY

Unit Process	Proposed Capacity Expansion Improvements
Water Supply	One Duty Floridan Groundwater Wells rated for 1,500 gpm with 50 HP Well Pump
Pretreatment	One Duty 5 micron Vertical Cartridge Filters rated for 2.4 MGD
Reverse Osmosis	Two Duty Vertical Turbine Pumps rated at 785 gpm @ 245 ft TDH, 3,600 rpm, 150 HP each. (required with new skid)
	One Two Stage RO Treatment Skids with Inter-Stage Boost in a 28:14 Configuration rated for 1.8 MGD @ 14.2 gpd flux each
Primary Disinfection	Second duty Clearwell / CCC 24 ft wide x 52 ft long x 9.5 ft deep; 11,400 CF or 85,272 gal
Post Treatment	Two Duty Calcite Contactors each rated for 0.86 MGD @ ~50% Bypass (required with new skid)
	One Duty Degasification and 10,000 SCFM Blower.
	One Duty Odor Control Unit or Biotrickling filter
Transfer Pumping	One Duty vertical turbine Transfer Pump rated at 1,400 gpm @ 30 ft TDH, 25 HP
Water Storage and Distribution	One Duty High Service Pumping Split Case Centrifugal Pump rated at 1,400 gpm @ 50 HP 5,700 gpm firm pumping capacity required. 7,900 gpm firm pumping provided @ 1.7 Peak Hour PF
Concentrate Disposal	New DIW, 10-in rated up to at 1,500 gpm max.
Chemical Feed	Anti-Scalant, Acid, & Caustic Bulk Storage Tanks, Day Tanks, and Chemical Feed Skids

OPINION OF PROBABLE CONSTRUCTION COST FOR ST. LUCIE WEST SERVICES DISTRICT EXPANSION IMPROVEMENTS

Proposed Capacity Expansion Improvements	Opinion of Probable Construction Cost
New Raw Water Supply Wells	$2,680,000
New Raw Water Transmission Main	$463,000
Chemical Feed System Replacements	$910,000
Upgrades to ROWTP Cartridge Filtration	$390,000
Upgrades to ROWTP High-Pressure Pumping Capacity	$1,050,000
New ROWTP Membrane Skid	$6,560,000
Upgrades to Calcite Contactors	$504,000
Upgrades to ROWTP Degasifier and Odor Control System	$1,780,000
Upgrades to ROWTP Chlorine Contact Chamber/Clear Well System	$1,020,000
Upgrades to Transfer Pumps	$236,000
Upgrades to High-Service Pumps	$402,000
Underground Injection Well [1]	$13,900,000
Underground Injection Well Site	$970,000
Electrical System Upgrades	$2,350,000
Instrumentation & Control System Upgrades	$413,000
Total	**$33,628,000**

NEXT STEPS

- Land acquisition of proposed water supply well site. The proposed parcel in question is owned by CGI St. Lucie LLC and is approximated to be 0.48 acres in size

- Finalize formal needs requirements from associated entities such as The Reserves, universities, etc., in addition to a timeline of when these entities will be operational and require water services from the District

- The District continues the design and permitting of the proposed Deep Injection Well (DIW) with the respective design firm in addition to permitting agencies such as the Florida Department of Environmental Protection (FDEP).

NEXT STEPS

- The District meets with the associated water management district (South Florida Water Management District – SFWMD) to discuss any modifications to their existing Consumptive Use Permit and required documentation.
- The District conducts additional research into potential grant and funding sources.
- Complete rate study to determine rate impact of proposed WTP capacity expansion.
- Develop project schedule
  - Consumptive Use Permitting: 3 to 12 months
  - WTP Design: 9 to 12 months
  - WTP Bidding: 3 to 5 months
  - WTP Construction: 18 to 24 months