EXECUTIVE SUMMARY

Based on a review of the RO/ASR Feasibility Study, the Town of Edisto Beach ("Town") has selected a preferred design for potential implementation. The design incorporates Reverse Osmosis (RO) and Aquifer Storage Recovery (ASR) to improve water quality and meet the Town's current and future water supply peak demands.

The design preferred by the Town includes a new Middendorf Supply Well, Reverse Osmosis Water Treatment Plant and Storage Tank at the McConkey Square site with one ASR well located at the State Park site, as shown on the attached Exhibit A, Existing and Proposed Facilities Location Map.

1. Current Water Supply Problems and Proposed Solutions

The Town's water supply problems are twofold. The Town's water is produced from groundwater wells in the Santee Limestone aquifer which contain elevated chloride, fluoride and sodium concentrations that affect taste and may cause corrosion in the distribution system and residential plumbing and appliances. In addition, the water system is subjected to high seasonal demands during the summer tourist season which far exceed the demands during winter months. Combining RO water treatment with ASR development is the recommended solution to the dual problems of water quality and water supply for the Town. The installation of a reverse osmosis water treatment plant will provide residents with high quality drinking water, and the development of an Aquifer Storage Recovery well will provide storage to supplement the high demand summer months.

2. Water Demand Projections

The Future Design Average Daily Demand (ADD) is 800,000 gallons per day (0.8 MGD), which is the recommended size of the RO plant. This is based on the current average usage of 250 gallons per day per customer, and an estimated 2,700 customers at buildout. A factor of safety of 20% is applied for potential future flow variations. The Future Design Peak Usage based on a peaking factor of 2.3 is 1.86 MGD.

A reverse osmosis water treatment plant with sufficient capacity to meet the future ADD of 0.8 MGD will either produce a surplus or deficit each month, depending on the monthly average demand. Table 1 below shows that during periods of low demand (October through April), the RO plant will produce an estimated total excess of 0.55 MG of treated water for storage in the ASR well for later recovery to meet the 0.55 MG total deficit estimated during the high demand season (May through September).

Table 1
0.8 MGD RO Facility and Future Monthly Demand

Month	RO Surplus (MG per Month)	RO Deficit (MG per Month)
January	11.87	
February	10.69	
March	8.41	
April	0.75	
May		-4.79
June		-16.67
July		-19.30
August		-10.44
September		-3.70
October	3.67	
November	7.32	
December	11.96	
Total Annual	54.66	-54.90

3. Groundwater Supply Well at McConkey Square

The most likely aquifer for the Town's supply well is the Middendorf Aquifer at an estimated depth of 2,100 to 2,300 ft. A Middendorf well typically yields up 2 to 3 MGD if sized to accommodate a pump with this capacity. The recommended scenario for the Town is the installation of one 1,700 gpm Middendorf well, which would supply approximately 1.6 MGD to the RO plant during the SCDHEC regulated 16-hour pumping day. SCDHEC regulations require the well head to be protected above the 100-year flood plain, which is 15 feet in this location. The well will have a variable frequency drive (VFD) motor to allow for flow variations to match the RO plant.

4. RO Water Treatment Plant at McConkey Square

The RO treatment plant is assumed to operate at approximately 75% permeate recovery to produce 1.2 MGD of treated water from the 1.6 MGD supplied by the Middendorf well. The RO plant must be capable of producing 0.8 MGD of permeate to meet present and future average daily demand; however, to provide partial redundancy and allow for maintenance/downtime, the RO plant would be sized to provide 1.2 MGD of treated water during the regulated 16-hour pumping day of the supply well. Please see Section 6 of this summary regarding the need for the RO plant to exceed the 16-hour time to meet peak day demands.

The RO system would consist of two RO membrane skids sized to produce a combined total of 1.2 MGD of permeate during a 16-hr. day. Components

integral to the membrane system are cartridge filters, high-pressure booster pumps, chemical feed systems, and a membrane cleaning system. Figure 1, attached, is an overall process flow diagram of the RO system. Other components integral to the RO treatment plant include water storage, high service pumps and additional chemical feed systems.

A 100,000 gallon ground storage tank at McConkey Square would store the treated water for later pumping into the distribution system by high service pumps. The tank would be approximately 20 ft. high by 30 ft. in diameter, and would be constructed above the 15 ft. 100-year flood plain elevation, which would not exceed the 40 ft. maximum height prescribed in the Town's ordinance. The storage tank is required for a buffer to allow the RO plant to operate at a constant flow.

a. Chemical Feed Systems

The chemical feed system for the RO plant includes antiscalants to prevent buildup of solid precipitants on the membrane surfaces and internal piping, sodium hydroxide for pH adjustment, sodium hypochlorite for disinfection, and a corrosion inhibitor such as orthophosphate.

b. Finished Water Quality Expectations

Table 2, below shows the estimated finished water quality parameters based on raw water quality data and membrane projection software.

Table 2
Summary of Water Quality Parameters

Parameter	Units	Raw	Finished	Concentrate
Sodium	mg/L	610	39	2,396
Chloride	mg/L	161	9.4	598
Carbonate	mg/L	24	0	151
Bicarbonate	mg/L	1,323	87	4,924
Fluoride	mg/L	7.3	0.5	27
Sulfates	mg/L	13.6	0.4	53
Silica	mg/L	18	0.8	72
Potassium	mg/L	4.1	0.3	15.6
Free Chlorine*	mg/L	0	1 - 2	0
Alkalinity	mg/L $CaCO_3$	1,125	71	4,287
TDS**	mg/L	2,178	138	8,245
pH*	S.U.	8.1	7.5 - 8	8.0
Temperature	º F	95 - 104	95 - 104	95 - 104

* Considers post-chemical feed application

** Measure of TDS at actual temperature (not 180º F)

In addition to the water quality parameters listed in the table, an RO system is capable of removing nearly all dissolved ions where other treatment processes such as ion exchange, anion exchange, or activated carbon may be selective. The selection of RO ensures a capability of providing treatment for potential future regulations and unforeseen contaminants.

c. Blending Water Supply

Water temperatures in deep aquifers are affected by the upward flow of heat from deep layers of rock. The temperature of groundwater supplied from a Middendorf well at Edisto Beach is anticipated to be approximately 104° F. To reduce the temperature, raw water from the Middendorf well will be blended prior to treatment with raw water from an existing well in the Santee Limestone aquifer, which has a temperature of approximately 68º F. A ratio of approximately 75% Middendorf to 25% Santee Limestone raw water will yield a finished water temperature of 95º F. The existing Well No. 6, a 495 gpm well located at McConkey Square, will be the source for blending water for the RO plant. If Well No. 6 is out of service, water pumped from the nearby Docksite Well (250 gpm) and Bay Point Well (135 gpm) would temporarily provide the blending water source.

5. ASR Well at State Park Site

Selection of the State Park site for the ASR well will ensure that water quality in the existing ground storage tank is maintained. The estimated Target Storage Volume for the ASR well is 110 MG, which includes 55 MG of stored water for recovery, and allows for a 55 MG buffer zone surrounding the stored water to separate it from the ambient brackish water in the Santee Aquifer.

Based on existing conditions, an ASR well at the State Park is expected to produce 350 gpm. The ASR well is not restricted to a 16-hour pumping day by SCDHEC regulations. Therefore, a 350 gpm ASR well will provide 0.5 MGD of recovery for periods of high demand. However, the ASR well will not supply complete redundancy for the single Middendorf supply well to meet the Future Design Peak Usage of 1.86 MGD.

6. Peak Day Usage

The week of July 4th is the peak usage period for the Town. To meet the peak demand of 1.86 MGD, the RO facility will need to run slightly over the 16-hour day regulated pumping time (1.86 MGD – 0.5 MGD ASR = 1.36 MGD RO) or approximately 18 hours/day.

7. Distribution System

The proposed RO concentrate outfall is on the South Edisto River near the existing Bay Point Well as shown on Exhibit A. Approximately 2,855 LF of force main will be constructed to convey the concentrate to the outfall. Approximately 3,200 LF of 8-inch water line will tie the Bay Point Well and Docksite well to the RO facility to provide Santee Limestone aquifer water for blending with Middendorf aquifer supply water in the event Well No. 6 is out of service.

8. Preliminary Economics Summary

The total preliminary project cost for the selected design is shown in Table 3, below.

Table 3
Total Estimated Project Costs

Project Description	**Total Cost**
Middendorf Supply Well (1,700 gpm)	$2,506,250
Reverse Osmosis Facility (1.2 MGD)	$3,891,250
ASR Well (State Park) (350 gpm)	$1,021,250
Distribution (Force Main and Blending Water Supply)	$1,043,500
Total Project Costs	**$8,462,250**

The Town will incur approximately $383,000 in O&M costs annually for operation of the RO treatment plant in addition to current O&M costs.

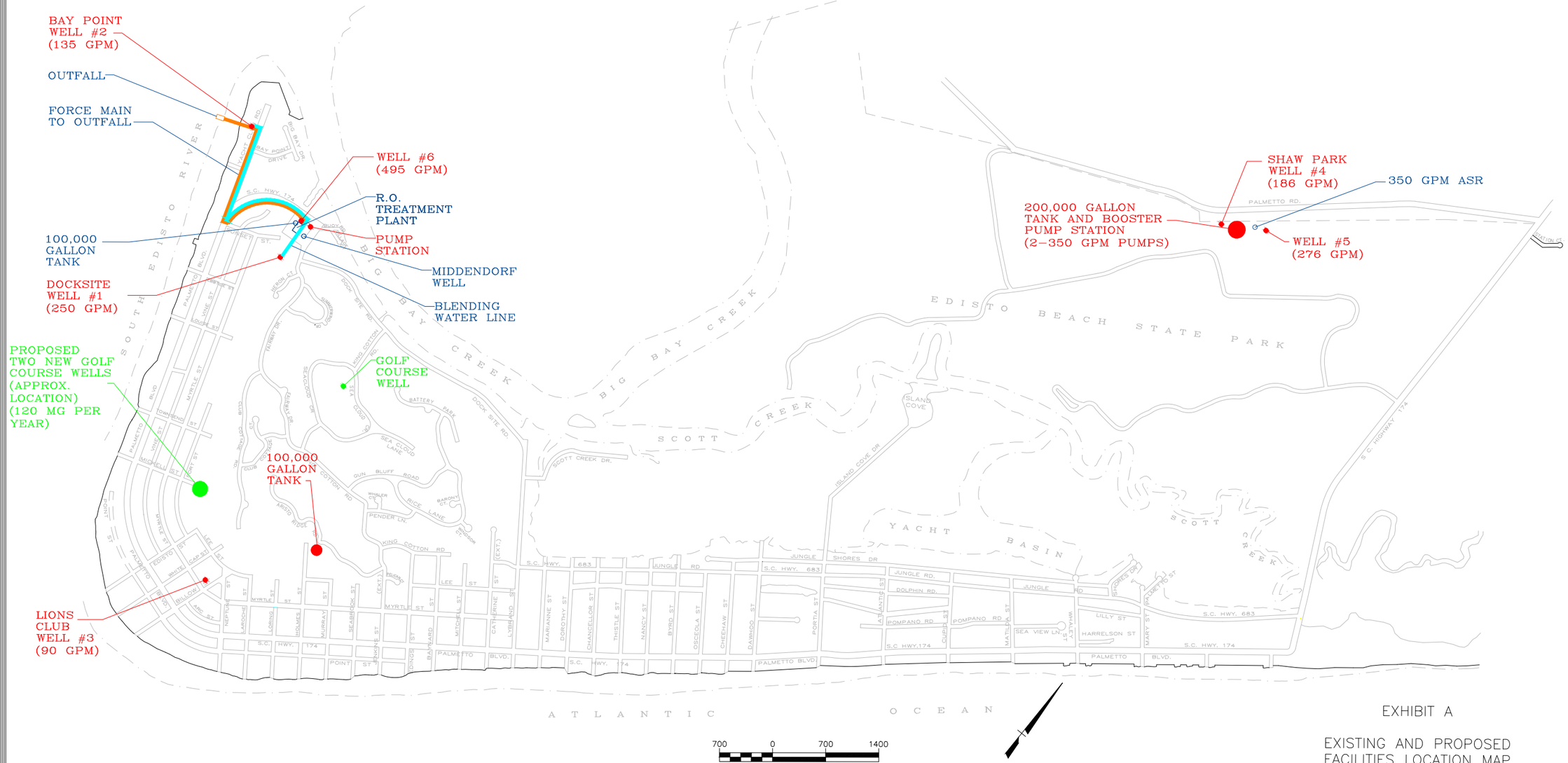
9. Conclusion and Recommendations

The Town's selection of a reverse osmosis treatment plant at McConkey Square and one ASR well at the State Park is a viable option to solve the water quality and water supply problems for the Town of Edisto Beach; however, full redundancy is not provided for the selected alternative. Additional easements will be required to protect the groundwater wellfield.

The Town of Edisto Beach should incorporate the estimated costs in Table 3 into its water service rate schedule to determine the financial impact of the proposed improvements. If the Town determines the financial impact is acceptable, the Town should proceed with design of the proposed improvements and explore potential funding opportunities such as the State Revolving Fund (SRF).

10. Rendering of Proposed RO Plant and Storage Tank at McConkey Square

The attached Figure 2 depicts the proposed RO facility at McConkey Square, as viewed from Hwy. 174. The RO facility as shown encompasses the existing Well No. 6.



LEGEND

- Existing Town Facility
- Proposed Town Facility
- Golf Course Well (Existing/ Proposed)
- N8W
- N8FM

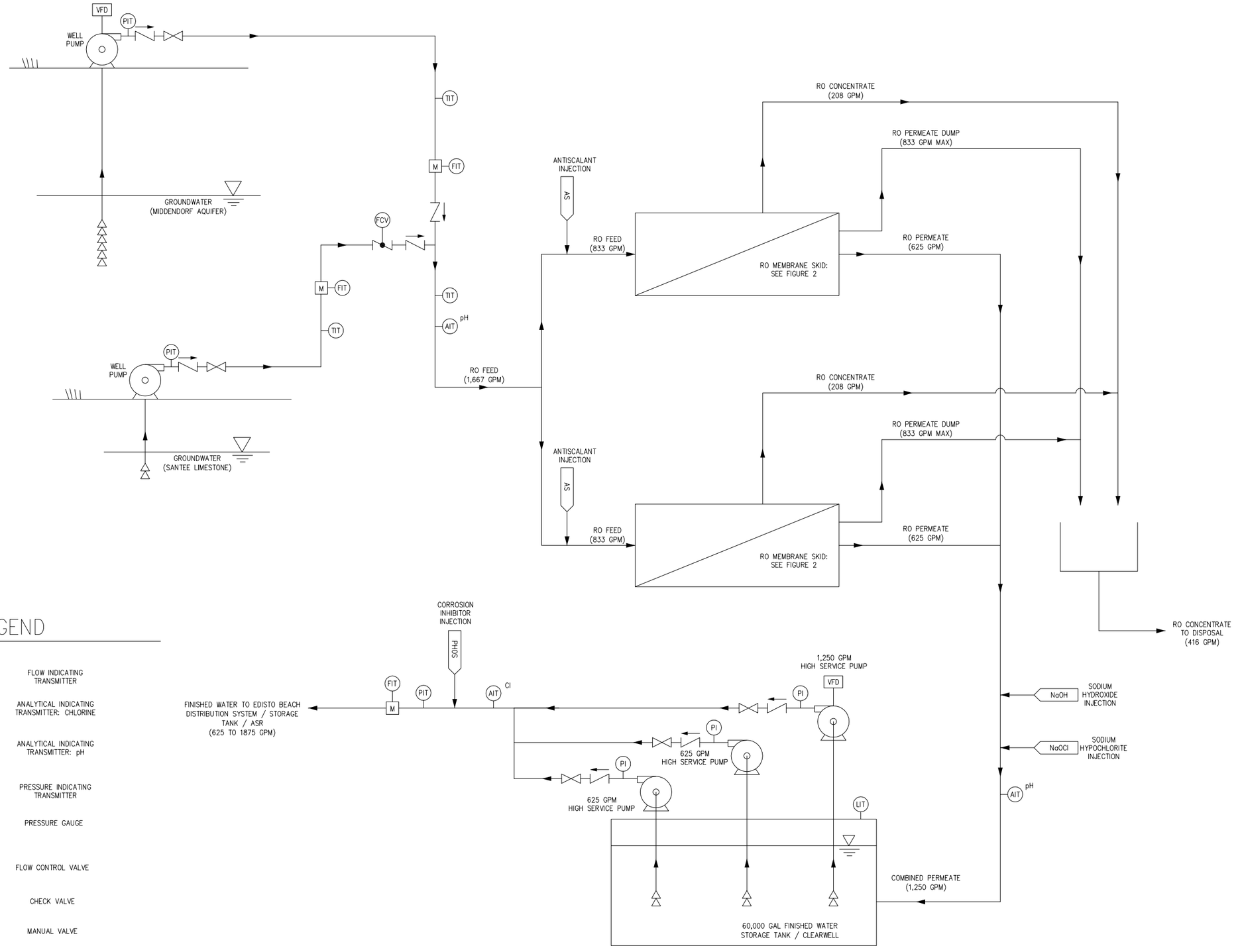
URS

EXHIBIT A

EXISTING AND PROPOSED FACILITIES LOCATION MAP

PREPARED FOR
THE
Town of Edisto Beach
PROJECT NO. 46422294
DECEMBER 2012

CONCEPTUAL DRAWINGS
NOT FOR CONSTRUCTION



LEGEND

M — FIT	FLOW INDICATING TRANSMITTER
AIT (Cl)	ANALYTICAL INDICATING TRANSMITTER: CHLORINE
AIT (pH)	ANALYTICAL INDICATING TRANSMITTER: pH
PIT	PRESSURE INDICATING TRANSMITTER
PI	PRESSURE GAUGE
FCV	FLOW CONTROL VALVE
	CHECK VALVE
	MANUAL VALVE

DRAWN JKK	DATE 4/13/12
CHECKED JKK	JOB NO 46422294
SCALE NONE	

OVERALL PROCESS FLOW DIAGRAM

TOWN OF EDISTO BEACH
REVERSE OSMOSIS
FEASIBILITY STUDY

URS

FIGURE 1

FIGURE 2