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SARASOTA COUNTY

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Water Supply Master Plan Update

Technical Memorandum 3 - Water Supply Projects

March 2006

carollo engineers

WATER SUPPLY MASTER PLAN UPDATE

TECHNICAL MEMORANDUM 3

WATER SUPPLY PROJECTS

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3.0 INTRODUCTION

Sarasota County (County) completed its most recent Water Supply Master Plan (WSMP) in 2001. The purpose of that document was to address the County's water supply needs through 2030 as part of their comprehensive water supply planning efforts. The report outlined future water demand projections, as well as current water supplies for the County. In addition, it described and evaluated several potential new ground and surface water sources, storage technologies and options, and associated costs.

Carollo Engineers was chosen to work with the County to review, update, and expand the 2001 WSMP. The primary goal of the WSMP Update (WSMPU) is to document the County's existing system and its performance and to provide a basis for the continuation of sustainable water supply development throughout Sarasota County.

The WSMPU will be comprised of five technical memoranda and a final, comprehensive graphics-oriented Executive Summary. This document, Technical Memorandum 3 - Water Supply Projects (TM3), evaluates the potential of various water supply projects to meet future demands. This assessment identified guiding principles and evaluation criteria for preliminary investigation of County and regional water supply projects. The potential projects were evaluated according to the developed criteria. Projects located in Sarasota County were investigated in more detail to determine further information regarding their feasibility, advantages, disadvantages, and cost. This evaluation considered capital and lifecycle costs, capacity phasing, sustainability, and promise to provide diversity in supply sources within the context of water supply scenarios that can successfully meet the County's water demands through 2050.

3.1 WATER SUPPLY DEVELOPMENT BASIS

Water utilities in Florida, particularly southwest Florida, are challenged with supplying water to a rapidly growing population while sustaining natural resources in an area where the traditional raw water sources, fresh groundwater aquifers, are stressed. In addition, development of new water supplies will be required to meet the County's future water demands. Water supply development can be defined as the "planning, design, construction, operation, and maintenance of public or private facilities for water collection, production, treatment, transmission, or distribution for sale, resale, or end use," (Senate Bill 444, 2005). The following sections describe several factors considered in the preparation of this WSMPU with respect to the basis of water supply development.

3.1.1 Local Water Supply Status

Fresh groundwater aquifers historically were used as the primary supply for potable water, agriculture, industrial, and commercial uses in southwest Florida. Due to depressed aquifer levels, which can cause saltwater intrusion, as well as decreased flows in a number of local rivers and lakes, the Southern Water Use Caution Area (SWUCA) was identified. A Water Use Caution Area is an area that has been identified by the local water management district as one where water resources will become critical within 20 years. The Southwest Florida Water Management District (SWFWMD) has developed a recovery strategy for the SWUCA in order to restore minimum levels in water bodies such as the upper Peace River and to reduce the rate of saltwater intrusion in coastal counties, including Sarasota County. Specific methods of recovery include decreasing groundwater withdrawals from the Floridan Aquifer in a step-wise fashion over the next several years and developing alternative water supplies to decrease dependence on fresh groundwater.

An additional goal of local water management districts is to restore the natural environmental systems of the region, including timing and flows of waterways, in order to maintain the appropriate flow levels to support indigenous wildlife within the waterways and downstream water bodies. Surface water supply projects should be developed while preserving these hydrologic and biologic systems. In some instances, projects to restore natural systems provide an opportunity for potable water supply development, such as the proposed Dona Bay Watershed project described in Section 3.5.4 and the potential Long Island Marsh restoration project in DeSoto County described in Appendix A.

3.1.2 Recent Water Supply Legislation

Recent legislation has acknowledged that the need for water for potable supply, agriculture, industry, and mining will continue to increase and that based on this information there is a need to conserve water and develop alternative water supplies to sustain Florida's economic growth and natural resources. Florida Statute 373, Senate Bill 444 was enacted to impart policies to provide an environmentally responsible means for developing future water supplies in Florida while managing and restoring natural watersheds in the state. Some of the specific goals of Senate Bill 444 are to:

- Encourage cooperation between local governments, regional water supply authorities, special districts, and publicly and privately owned water utilities in the development and timing of alternative water supplies.
- Establish funding criteria for monetary assistance for alternative water supply development.

- Require local governments and other entities to select and incorporate alternative water supply projects into their future water supply plans.
- Promote the development of alternative water supplies and cooperation between water-related entities to prevent the undesirable effects of competition for limited supplies of water.

3.1.3 Alternative Water Supplies

Alternative water supplies are and will continue to be an important component of the County's potable water supply. Senate Bill 444 defines an alternative water supply as "salt water; brackish surface and groundwater; surface water captured predominantly during wet-weather flows; sources made available through the addition of new storage capacity for surface or groundwater; water that has been reclaimed after one or more public supply, municipal, industrial, commercial, or agricultural uses; the downstream augmentation of water bodies with reclaimed water; stormwater; and any other water source that is designated as nontraditional for a water supply planning region in the applicable water supply plan," (Senate Bill 444, 2005).

The County currently utilizes a number of alternative water supplies, such as brackish groundwater, and will continue to look at alternative water supplies for future development. The Intermediate Aquifer System is also listed as an alternative source to the Floridan Aquifer in the SWUCA Plan.

Surface waters also play a large role in supplying potable water in the local region, with approximately 60 percent of the current potable supply in Charlotte, DeSoto, Manatee, and Sarasota Counties originating as fresh surface water. Future expansions to local surface water treatment facilities will allow additional storage of water captured during wet-weather flows, which is in alignment with alternative water supply development as defined in Senate Bill 444.

3.1.4 Funding Opportunities

Funding made available through Senate Bill 444 will be allocated based on several factors. Projects that receive funding assistance will be those deemed to have substantial benefit with regard to various criteria, with an emphasis placed on the following:

- Does the project provide substantial environmental benefits by eliminating or limiting adverse water resource impacts?
- Does the project reduce competition for water supplies?

- Will the project be implemented by a multijurisdictional water supply entity or regional water supply authority?
- Does the project initiate replacement of traditional water sources in order to help implement a minimum flow or level?
- Will the project be implemented by a consumptive use permittee that has achieved the targets contained in a goal-based water conservation program?
- The quantity of water supplied by the project as compared to its cost.
- Projects in which the construction and delivery to end users of reuse water are major components.

3.1.5 Regional Coordination

The Sarasota County WSMPU is being prepared in agreement with the objectives of Senate Bill 444 and the SWFWMD Regional Water Supply Plan (RWSP). The RWSP is a planning document that is used to assess projected water demands within the SWFWMD and to identify potential sources of water to meet those demands within a 20-year planning horizon. The County will meet with SWFWMD staff to discuss the County's WSMPU with regard to its compatibility with the forthcoming RWSP Update expected in 2006.

Based on the direction of state regulations and SWFWMD, the County will continue to promote conservation and to support the development of regional and alternative water supplies in their future planning efforts. This WSMPU has been developed in alignment with state and regional regulations and goals, and selection of future projects will be made with consideration of these initiatives.

3.1.6 Guiding Principles to Water Supply Development

A set of Guiding Principles was developed to provide a foundation for the selection of future water supply projects. The Guiding Principles were developed based on a WSMPU meeting with County staff on May 25, 2005. The meeting provided an opportunity for the project team to brainstorm and identify the factors that are important to the County in selecting the best projects for future water supply. Minutes from the May 25 meeting are included in Appendix B. The project team identified 21 individual criteria, which were then grouped into four Guiding Principles according to their overall goal. The four Guiding Principles developed for future water supply development in Sarasota County are discussed below.

1. <u>Regional in Nature</u> - Any source developed should consider other regional partners; however, a source may or may not feed into the regional system. Sources should not

negatively compete, and wherever possible should work synergistically with other regional sources. This Guiding Principle includes the following factors:

- Stakeholder support
- Public acceptance
- Potential partners
- Expandability to outside existing boundaries

2. Sustainable & Environmentally Beneficial - Water source development should seek to sustain the environment as well as favor sources in which the quality and quantity of water can be protected in the future. This Guiding Principle includes the following factors:

   - Reliability
   - Lifecycle costs
   - Environmental opportunities and restoration
   - Source protection
   - Environmental impact

3. Technically Feasible & Cost Effective - Water source development should consider permitting, cost-effectiveness, and yield. This Guiding Principle considers the benefits of the source and includes the following specific factors:

   - Permitability
   - Yield
   - Capital cost
   - Availability of grants
   - Operating cost
   - Certainty of the source
   - Timing of supply

4. Operationally Beneficial - The water supply sources should be developed with the ability to deliver high quality water to the customer. This Guiding Principle considers operational benefits and includes the following factors:
   - Geographic location
   - Drought tolerance/rotating supplies/diversity in sources
   - Expandability by phasing
   - Optimization of existing infrastructure
   - Management flexibility

The individual factors considered for each Guiding Principle are further defined as follows:

- Stakeholder Support - Will the project receive support and acceptance from stakeholders such as regulatory agencies and other utilities?
- Public Acceptance - Will the public feel comfortable with the project? This includes confidence that the project will meet demands and provide an aesthetically pleasing water, satisfaction that the project was a good use of taxpayer dollars, and potentially, acceptance of having the project constructed near a County neighborhood.
- Potential Partners - Does the project have the potential to team with other utilities?
- Expandability to Outside Existing Boundaries - Can the project be expanded to service areas outside of the current County water service area?
- Reliability - Does the project provide a reliable source of water?
- Lifecycle costs - What is the anticipated cost of the project throughout its useful life, including capital costs as well as costs for operation and maintenance (O&M), disposal, and possible required upgrades to modify treatment?
- Environmental Opportunities - Does the project provide opportunities for restoration or other means of enhancing the environment?
- Source Protection - How well does the project protect its source water?
- Environmental Impact - How much impact to the environment does the project have?
- Permitability - How likely is the project to be permitted by regulatory agencies?
- Yield - How much of the future demand is the project able to supply?

- Capital Cost - What is the estimated construction cost per gallon of treated water?
- Availability of Grants - Does the project qualify for grants or matching funds from federal, state, and/or local agencies?
- Operating Cost - What is the estimated operation and maintenance cost per 1,000 gallons of water treated?
- Certainty of the Source - What is the likelihood that the source or project will be available in the future?
- Timing of Supply - How long will it take to bring the project online as compared to when the supply is needed?
- Geographic Location - Is the geographic location of the source or project close to existing or anticipated demand centers?
- Drought Tolerance/Rotating Supplies/Diversity in Sources - How tolerant is the source to drought? Does the project present the opportunity to rotate supplies, such as utilizing primarily surface water when it is plentiful and utilizing primarily groundwater when surface supply is low? Does the supply improve the diversity of sources in the County and/or the region?
- Expandability by Phasing - Is the project easily expanded in phases, allowing the supply to be brought online as needed?
- Optimization of Existing Infrastructure - Can the project utilize existing infrastructure?
- Management Flexibility - Does the project allow the County to manage the source and/or enhance the flexibility of operating the water system as a whole?

Figure 3.1 summarizes the four Guiding Principles and their specific goals.

Water Supply Development Guiding Principles

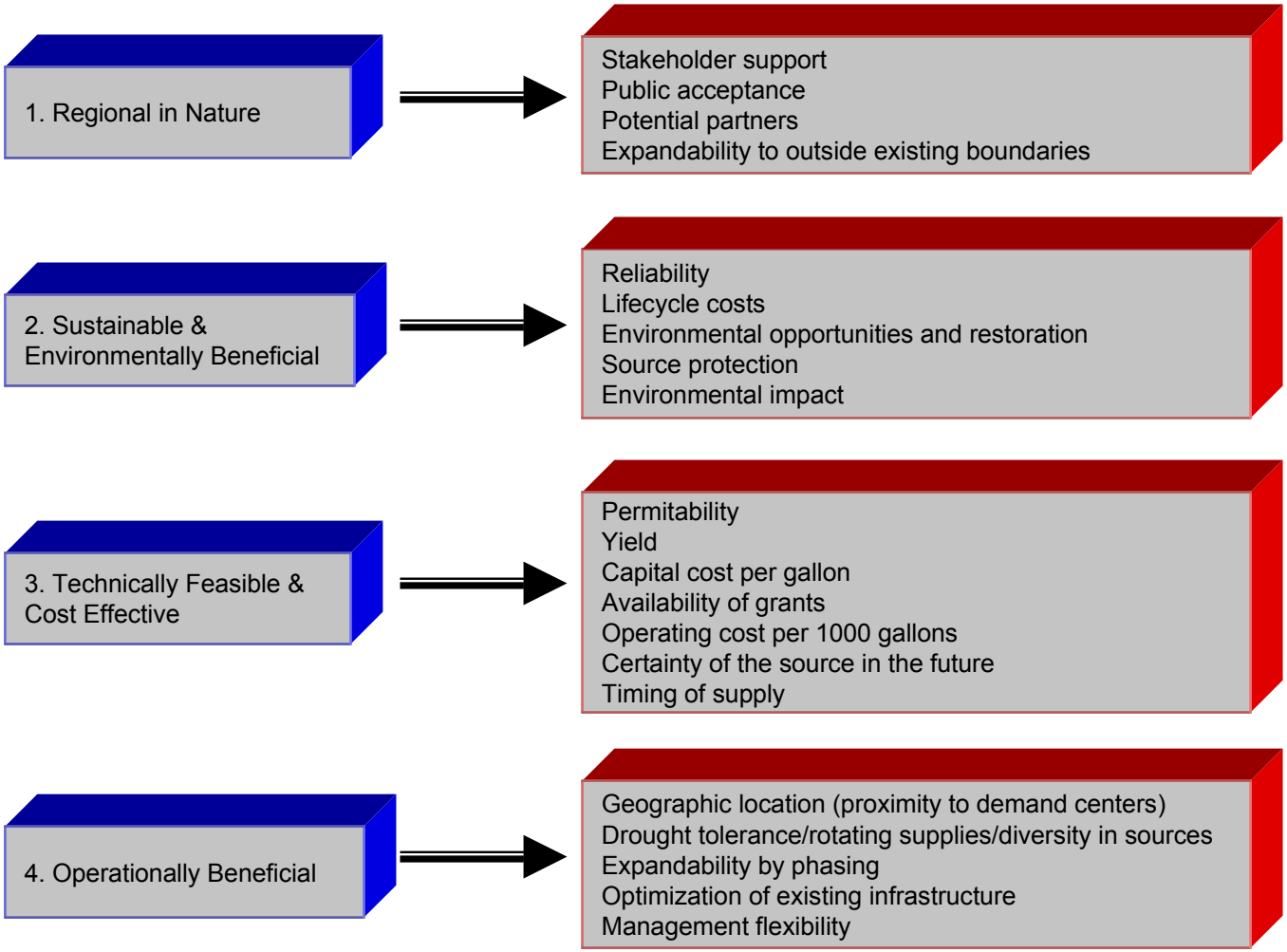


FIGURE 3.1

3.2 WATER PLANNING ALLIANCE PROJECTS

The Water Planning Alliance (Alliance) is a planning body comprised of Charlotte, DeSoto, Manatee, and Sarasota Counties; the Cities of Arcadia, Bradenton, North Port, Palmetto, Punta Gorda, Sarasota, and Venice; the Town of Longboat Key; and the Englewood Water District. The Alliance's main goal is to identify long-term water supply projects for its members on a regional, four-county-wide basis. The Alliance initiated the Regional System Planning and Engineering Study to "identify and demonstrate the feasibility of implementing construction projects that will meet the water supply needs of the Alliance members for a 20-year planning period" (Greeley and Hansen, 2003).

Phase I of this study was designed to assess existing water supplies, treatment processes, and delivery facilities. The Phase I study was completed in late 2003 and addressed the following areas: an inventory of existing water supply sources and treatment facilities, an inventory of wastewater and reuse systems, a review of current water conservation programs, a review of current capital improvement programs of Alliance members, an assessment of existing and proposed regulations, an evaluation of the water supply needs compared to the capacity of existing sources, and preparation of the Phase 1 report summarizing these findings (Greeley and Hansen, 2003).

Phase II of the study is ongoing and is focusing on an investigation of future water supplies to meet the projected demands. This phase includes investigating the capital improvements programs of the Alliance members, as well as formulating new strategies for future sources. A technical advisory committee (TAC) was formed to assist in developing and assessing the projects to be considered in the Phase II study. In July 2004, the Alliance TAC released a list of potential regional supply projects. The projects were broken into two groups: projects for configuration evaluation ("A" List) and projects for future consideration ("B" List). As part of the WSMPU, the Alliance "A" List projects will be included for consideration as water supply sources.

In November 2004, the Alliance made available the Phase II Future Supply Assessment and Prioritization Project Evaluation Summaries, which were developed as part of the Phase II study. In order to not duplicate efforts, the "A" List projects were considered in the WSMPU; however, further investigation of these projects was limited to projects located within Sarasota County. Detailed descriptions of these projects are included in Section 3.5.

3.2.1 New Water Source Projects

The Alliance "A" List new water source projects are listed in Table 3.1. These projects are those that could provide new raw or potable water for additional supply, aquifer storage and recovery (ASR), storage, treatment, and/or irrigation. The table includes the project name,

Alliance Project ID, a brief description, the potential yield, and the estimated project cost, which includes operation and maintenance costs and annualized capital cost over twenty years. Further information regarding the projects can be found in the Phase II Future Supply Assessment and Prioritization Project Evaluation for Configurations summaries, which are included in Appendix A. The information in Table 3.1 and Appendix A was provided by the Alliance.

Table 3.1 Water Planning Alliance "A" List New Water Source Projects[1]

Alliance Project ID	Project Name	Potential Average Yield (mgd)	Project Description	Estimated Project Cost ($/1000 gal)
13	Manatee County/Lake Parrish/Florida Power and Light	2.25	Use currently permitted surface water to supplement agricultural reuse system, thereby allowing the use of agricultural well credits at groundwater treatment facilities.	$1.30
27, 28, 29	Manatee County Tatum Sawgrass Diversion and Restoration Program	7.0	Construct a reservoir on existing Tatum Sawgrass area to store seasonal Myakka River flows. Remaining land to be used for wetlands restoration. Construct a new WTP and ASR system for potable water treatment and storage.	$5.56
31	Manatee County Well Credits and Permit Transfers	4.0	Renegotiate existing reclaimed water agreements to obtain the associated well credits from the current users. Construct a new wellfield to withdraw the groundwater.	$0.81
32	Manatee County Developer Provided Water Use Permit Transfers	Unknown	Develop a policy requiring developers to transfer water use permits to Manatee County, which would add the permitted quantities to an existing wellfield.	$0.78
33	Manatee County Direct Purchase of Water Use Permits	Unknown	Purchase permits from existing users who currently withdraw water from the Floridan Aquifer and transfer the permit to increase pumping at a new wellfield.	$0.93

Table 3.1 Water Planning Alliance "A" List New Water Source Projects[1]

Alliance Project ID	Project Name	Potential Average Yield (mgd)	Project Description	Estimated Project Cost ($/1000 gal)
97	Charlotte County Brackish Groundwater RO	5.0	Develop a new brackish groundwater RO WTF.	$2.65
113-117	Punta Gorda Reservoir and WTP Expansion	4.64	Increase the yield of the existing facility through expansion of WTP capacity and/or ASR well system, a new reservoir for raw water storage, and an increase in yield of the Shell/Prairie Creek system.	$3.14
121	DeSoto County Radial Well Surficial Aquifer	2.0	Construct a new horizontal well collection system withdrawing from surficial aquifer system and treat the water at the DeSoto RO facility (currently under construction).	$2.73
125	Desoto County Long Island Marsh Water Supply	Unknown	Restoration of agricultural land directing diverted flows to the Shell/Prairie Creek system making additional surface water available for use.	Being studied by SWFWMD. Estimated to be similar to Project 113-117.
147,148, 150	Peace River Facility Expansion	14.7	Construct new 6.0 BG reservoir and 24 mgd of treatment capacity to increase system yield to the permitted WUP of 32.7 mgd.	$2.63
155	Water Use Permit Conversion	Unknown	Acquire water use permits from existing permittees who currently withdraw from Floridan Aquifer. Replace permits with 50% of historical use with a new water use permit at a supply facility.	Unknown, but estimated at <$1.00.

Notes: [1] Information obtained from Alliance Regional System Planning and Engineering Study, Phase II Future Supply Assessment and Prioritization Project Evaluation for Configurations summaries.

3.2.2 Interconnection Projects

The Alliance also identified several regional interconnection projects that local Cities and Counties are considering in order to increase reliability and backup supply for emergency situations. Some interconnections are also proposed to provide regular potable water transmission to new areas. The interconnection projects identified by the Alliance are summarized in Table 3.2. Further information regarding the interconnect projects is available in Appendix A.

Table 3.2 Water Planning Alliance "A" List Interconnection Projects[1]

Alliance Project ID	Project Name	Project Description	Estimated Capital Cost
74	Sarasota County/Englewood Water District Potable Water Interconnect	Potable water interconnect between Sarasota County and the Englewood Water District along Route 776 for potable supply or transfer.	$50,000
85	Emergency Backup Potable Water Supply Interconnect - Longboat Key/City of Sarasota	Interconnection of Longboat Key and the City of Sarasota via a 12" diameter sub-aqueous pipeline through New Pass for emergency potable supply.	$2,000,000
98	Charlotte County/City of Punta Gorda Water Interconnect	Interconnect between the Charlotte County and the City of Punta Gorda Potable Water Systems via a 16" diameter pipeline. Provisions for a new storage tank and pumping station were also included in this project, which has been incorporated into the Regional Integrated Loop Project.	N/A - included in Project ID 151
112	City of Punta Gorda Emergency Interconnect with Peace River/Manasota Regional Water Supply Authority (PR/MRWSA)	Interconnect between the City of Punta Gorda and the PR/MRWSA water systems for emergency supply. This project has been incorporated into the Regional Integrated Loop Project, Alliance Project ID 151.	N/A - included in Project ID 151
126	DeSoto County Interconnect with Punta Gorda	Interconnect between the DeSoto County and City of Punta Gorda water systems along US 17 for emergency events.	N/A
127	DeSoto County Interconnect with City of North Port	Interconnection of water services between DeSoto County and City of North Port for potable water supply or transport.	N/A

Table 3.2 Water Planning Alliance "A" List Interconnection Projects[1]

Alliance Project ID	Project Name	Project Description	Estimated Capital Cost
145	Peace River Regional Transmission System Extension - DeSoto County	Construction of 16" potable water transmission line from the PR/MRWSA Facility to the proposed Wal-Mart Distribution Center in DeSoto County. Alliance Project ID 149 has replaced this project.	N/A
146	PR/MRWSA/Lettuce Lake Regional Transmission Line - DeSoto County	Construction of 16" potable water transmission line from the PR/MRWSA Facility to Lettuce Lake Avenue. Project ID 149 has replaced this project.	N/A
149	PR/MRWSA/Lettuce Lake Regional Transmission Line - PR/MRWSA	Construction of 20" potable water pipeline from the PR/MRWSA Facility to the proposed Wal-Mart Distribution Center for regional transmission of 3.1 mgd of potable water.	$1,006,000
151	Regional Integrated Loop System - PR/MRWSA	Transmission system that will connect the PR/MRWSA Facility with the City of North Port, Sarasota County, and Manatee County via a pipeline from the Carlton Wellfield to the Manatee County Lake Manatee WTF for potable water supply or transfer.	$63,000,000

Notes: [1] Information obtained from Alliance Regional System Planning and Engineering Study, Phase II Future Supply Assessment and Prioritization Project Evaluation for Configurations summaries.

3.2.3 Conservation/Reclaimed Water Projects

The Alliance also identified several reclaimed water and conservation projects that are being considered to offset potable water demand. Reuse and conservation are considered water supply projects because reuse can provide water supply for irrigation and other non-potable uses, and conservation can increase water use efficiency, which reduces the potable water demand. The reclaimed water and conservation projects, including their anticipated reclaimed water yield and/or potable water offset, are summarized in Table 3.3. Further information regarding the identified conservation and reclaimed water projects is included in Appendix A.

Table 3.1 Water Planning Alliance "A" List New Water Source Projects[1]

Alliance Project ID	Project Name	Potential Average Yield (mgd)	Project Description	Estimated Project Cost ($/1000 gal)
44	Manatee County Port Manatee Seawater Desalination	5.0	Construct a seawater desalination facility at Port Manatee.	$4.74
45	Manatee County Coastal Brackish RO	6.0	Construct new coastal groundwater wells and treat with reverse osmosis (RO).	$2.54
53	City of Bradenton, Braden River	2.0	Increase pumping from the Manatee River during times of high flow, treat the water, and store it in ASR system for later use.	$5.47
63	Sarasota County Cow Pen Slough/Dona Bay Watershed	5.0	Capture excess flows from Cow Pen Slough, store in a newly constructed reservoir, treat at a new water treatment facility (WTF), and send to regional supply or store in ASR wells until needed.	$4.14
76	Sarasota County Potable Water ASR	2.0	Construct four new potable ASR wells and connect with piping to the Carlton WTF.	$1.02
78	Sarasota County Venice Gardens WTF Upgrade	1.0	Upgrade existing membranes for more efficient treatment.	<$1.00
79	Sarasota County Expansion of T. Mabry Carlton Jr. Memorial Reserve Wellfield	4.0	Apply for WUP increase and construct new water supply wells to supply the Carlton WTF.	$1.23
82	City of Northport Myakkahatchee Creek	1.29	Construct a treated water ASR system at the existing WTF.	$3.66
90	City of Venice Seawater Desalination	20.0	Construct a seawater desalination facility near the Venice Airport.	$3.27

Table 3.3 Water Planning Alliance "A" List Conservation/Reclaimed Water Projects[1]

Alliance Project ID	Project Name	Project Description	Reclaimed Water Yield/Potable Water Offset
36	IMC/MARS Storage in Manatee County	Reclaimed water pipeline from IMC-Agrico to supplement the MARS system. Decreases potable water demand of MARS system, thereby creating potable supply to other local entities or to the region.	15 mgd
38	Manatee County MARS Transmission System Improvements	Construction of improvements to the existing MARS reclaimed water system for additional potable water demand offset.	N/A - Transmission only
39	FPL/Piney Point/MARS Wet Weather Storage in Manatee County	Construct additional wet weather storage at FPL Cooling Plant and Piney Point. Construct a new pipeline and pumping station to supplement the MARS system to offset potable water demand.	3.56 mgd
40	Reclaimed Water Distribution to Millbrook Subdivision via MARS Interconnect	Extend MARS reclaimed water system to Millbrook Subdivision in order to eliminate existing irrigation wells and to offset potable water demand.	52,500 gpd
41	Reclaimed Water Distribution to Briarwood Subdivision via MARS Interconnect	Extend MARS reclaimed water system to Briarwood Subdivision in order to eliminate existing irrigation wells and to offset potable water demand.	26,400 gpd
42	Alternative Irrigation Source Rebate Program in Manatee County	Decrease potable water demand by providing incentives to homes and businesses using potable water for irrigation to convert to shallow wells or cisterns.	120,000 gpd
65	Celery Fields in Sarasota County	Divert storm water for treatment and storage to provide additional supply to the reclaimed water system.	1.5 mgd
69	Sarasota County Reclaimed Water ASR Wells	Construct a reclaimed water ASR system along the coast to allow greater utilization of reclaimed water from interconnected utilities, thereby decreasing potable water demand.	5.6 mgd

Table 3.3 Water Planning Alliance "A" List Conservation/Reclaimed Water Projects[1]

Alliance Project ID	Project Name	Project Description	Reclaimed Water Yield/Potable Water Offset
71	Sarasota County Reclaimed Water Interconnect	Finish connecting all of the County's reclaimed water systems to provide additional reclaimed water to their users and to provide potable water offset.	8 mgd
75	Sarasota County Surface Water Monitoring Program	Collection of rainfall and stream flow data for estimating potential future water availability.	N/A - study
84	City of Sarasota Reclaimed Water ASR Well	Construct a reclaimed water ASR well in the to provide reclaimed water more reliably and to decrease potable water demand.	N/A
86	Water Wise Irrigation Program on Longboat Key	Perform a study and implement an educational program that could decrease potable water demand.	N/A - study
88	Regional Alternative Irrigation Source Investigation on Longboat Key	Perform a study to explore alternative irrigation sources that could allow a decrease in potable water demand.	N/A - study
89	Palmetto ASR/Future Regional Transmission System Connection	Construct a new reclaimed water ASR well and pipeline for future connection to the regional reclaimed water system.	N/A
91	Venice Country Club Storm Water Reuse for Irrigation	Collect and utilize storm water to supplement the existing irrigation system.	N/A
92	Englewood Water District 2nd ASR Well	Construct a second ASR well for reclaimed water systems to provide additional reclaimed water to their users and to provide potable water offset.	N/A
100	Rotonda ASR Well Conversion for Reuse Water in Charlotte County	Convert the existing potable water supply wells at the former Rotonda RO WTF site into reclaimed water ASR wells to allow greater utilization of reclaimed water.	N/A
102	Rotonda/Longmarsh Golf Courses	Extend the reclaimed water distribution system area to include the Long Meadow and White Marsh Golf Courses to offset potable water demand.	0.3 mgd

Table 3.3 Water Planning Alliance "A" List Conservation/Reclaimed Water Projects[1]			
Alliance Project ID	**Project Name**	**Project Description**	**Reclaimed Water Yield/Potable Water Offset**
118	DeSoto County Reuse	Perform upgrades to the existing wastewater treatment plant and expand the County's reclaimed water system to provide additional potable water offset.	N/A
154	Optimization and Efficiency Study in Coastal SWUCA	Conduct a study to determine the efficiency of reclaimed water and to maximize its utilization.	N/A - study
156	FARMS Program	Implement the Facilitating Agricultural Resource Management Systems (FARMS) Program, which would implement farming best management practices and reduce agricultural water demand.	N/A
157	City of Venice Expansion to the Reuse System	Expansion of the City of Venice reclaimed water system to the Island of Venice for additional reclaimed water use.	2 mgd
Notes: [1] Information obtained from Alliance Regional System Planning and Engineering Study, Phase II Future Supply Assessment and Prioritization Project Evaluation for Configurations summaries.			

3.3 OTHER WATER SUPPLY PROJECTS

Utilities within the region are investigating a number of potential water supply projects that were not included in the Alliance's Phase II study. The following sections outline the projects being considered by Sarasota County, Charlotte County, and the City of North Port that were not included in the Alliance's project evaluations.

3.3.1 Sarasota County

Sarasota County has identified several other water supply projects in addition to those identified by the Alliance. The project team discussed with the County the projects that should be considered in this WSMPU. The following projects were identified for consideration by the project team:

- University Wellfield WTF upgrade
- Carlton electrodialysis reversal (EDR) WTF expansion
- Venice Gardens RO WTF upgrade

- Water use permit transfers as development occurs
- New brackish groundwater wells
- Other surface water development

These projects were considered in the project selection discussed in Section 3.4.

3.3.2 Charlotte County

Charlotte County is exploring a number of surface and groundwater supplies within their service area. In January 2005, the Charlotte County Utilities Department gave a presentation to the Charlotte County Commission on the status of future water supply for their customers ("The Future", 2005). In January 2006, an update to the future of water supply in Charlotte County was given ("The Future", 2006). In addition to some short-term interconnection and wholesale alternatives, the Charlotte Utilities Department identified the following projects as potential new water supplies for the region:

- Babcock Ranch potable water supply development
- Alligator Creek/Zemel Canal WTP
- Burnt Store RO WTP expansion
- Shell Creek WTP
- Groundwater RO plants throughout Charlotte County
- Desalination WTP in Charlotte County

3.3.3 City of North Port

In addition to an expansion at their Myakkahatchee Creek WTP, the City of North Port is investigating the feasibility of brackish groundwater RO treatment in two of the City's large, rapidly growing neighborhoods, Thomas Ranch and Panacea (Black & Veatch, 2004). These projects could be included as potential new water supplies for the region.

3.4 POTENTIAL PROJECT SELECTION

The most understood projects in the opinion of the County and the project team were chosen for further investigation of their ability to provide sustainable water supply for Sarasota County in the future. These projects were chosen based on their alignment with the Guiding Principles defined in Section 3.1.6. As more information about these projects is obtained in the future, the projects will continue to be developed with respect to feasibility

and timing. The purpose of this WSMPU is to identify those projects that are most likely to be developed in the County in the forty-year planning horizon. Combinations of these projects to provide the County's future water supply will be developed in TM 4 - 2050 Water Supply Scenarios.

The projects were considered for two different situations: development of water supply in Sarasota County and regional water supplies in the four-county area including utilities in Sarasota, Manatee, DeSoto, and Charlotte Counties.

3.4.1 Sarasota County Water Supply Projects

Several projects located within Sarasota County were chosen for further consideration and investigation in the County's WSMPU. These projects are described in detail in Section 3.5 and will be utilized in various scenario-planning alternatives to provide supply for the County to meet projected demands through the year 2050.

3.4.2 Regional Water Supply Projects Outside the County Boundaries

The County identified projects outside of their boundaries that they should support from a regional perspective. These projects likely will be important in the context of regional water supply in the future. The project team identified a small number of projects that they feel have the most potential to contribute to the regional water supply, such as the Punta Gorda Reservoir and WTP expansion, the Flatford Swamp/Tatum Sawgrass area (Upper Myakka Watershed), and projects relating to existing water use permit (WUP) conversions, transfers, and purchases. In addition, large sources such as a desalination facility at Port Manatee and potential water supply from the Babcock Ranch were discussed. Little is known about these projects, but their potential yield could have a substantial impact on the regional system. Sarasota County believes that more investigation of these sources is warranted.

Other potential projects exist; however, more knowledge of these sources and projects must be gained before developing them into water supplies. A summary of potential regional water supply projects located outside of Sarasota County boundaries is provided in Table 3.4.

Table 3.4 Potential Regional Water Supply Projects Outside of Sarasota County Boundaries

Possible Source	Description	Capacity Estimate	Feasibility Considerations	Sustainability Factors	Cost	Advantages	Disadvantages
Punta Gorda/Shell Creek Expansion	The City is exploring an option to expand the existing WTP and construct of an off-stream reservoir.	10 mgd total capacity	Additional permitting required for drawing water from the Shell Creek.	Minimum flows and levels currently are being evaluated to determine potential impacts to the downstream estuary system.	Mid-level	Adds reliability to the regional water system and increases regional water supply capacity.	Potential minimum flows and levels could affect yield of the raw water supply.
Flatford Swamp/ Tatum Sawgrass (Upper Myakka Watershed)	Manatee County and SWFWMD have evaluated options in the Upper Myakka Watershed to reduce the excess water flow to Flatford Swamp.	Unknown	Conveyance and storage options of the water are currently unknown and are being evaluated at this time.	As agriculture uses decrease the excess water will decrease, leading to lower yields. A joint program with WUP transfers may be needed to maintain the yield.	Unknown	Would assist with restoration of Flatford Swamp while providing a beneficial use.	Possible land use changes could impact the yield. Several unknowns exist in storage, treatment, and conveyance.
Regional Water Use Permit Transfers	Several regional utilities have potential to convert, transfer, or purchase WUPs.	Unknown	Approval for transfer of permits is somewhat of an unknown and will vary on a case-by-case basis.	Potential environmental benefit through decrease of overall groundwater pumping.	Low	A potential high-capacity, drought resistant source with low capital costs.	Permittability is somewhat of an unknown.
Port Manatee Desalination	Proposed seawater desalination site at Port Manatee	10 mgd, expandable to 20 mgd	Regulatory permitting considered feasible.	Consistent dependable source, low environmental impacts.	High	Unlimited raw water supply, with little surface water impact.	High capital and operational costs.
Babcock Ranch Water Supply Development	Involves a WUP transfer from agricultural to potable water use.	Unknown, potentially up to 10 mgd	Needs significant infrastructure. Faces permitting hurdles.	A drought resistant source. Need to manage aquifer to maintain quality.	High	Drought resistant source. Potential high quantities.	High cost and considered non-permittable at this time.

Notes: [1] Information provided by the Water Planning Alliance Studies and various communications with County staff.

3.5 SARASOTA COUNTY WATER SUPPLY PROJECTS

Based on discussions among the project team, the following Sarasota County projects were selected for further investigation based on their potential to provide future water supply:

- T. Mabry Carlton Jr. Memorial Reserve Wellfield expansion
- Carlton Wellfield and WTF expansion
- Dona Bay Watershed/Cow Pen Slough
- University WTF upgrade
- Venice Gardens WTF upgrade

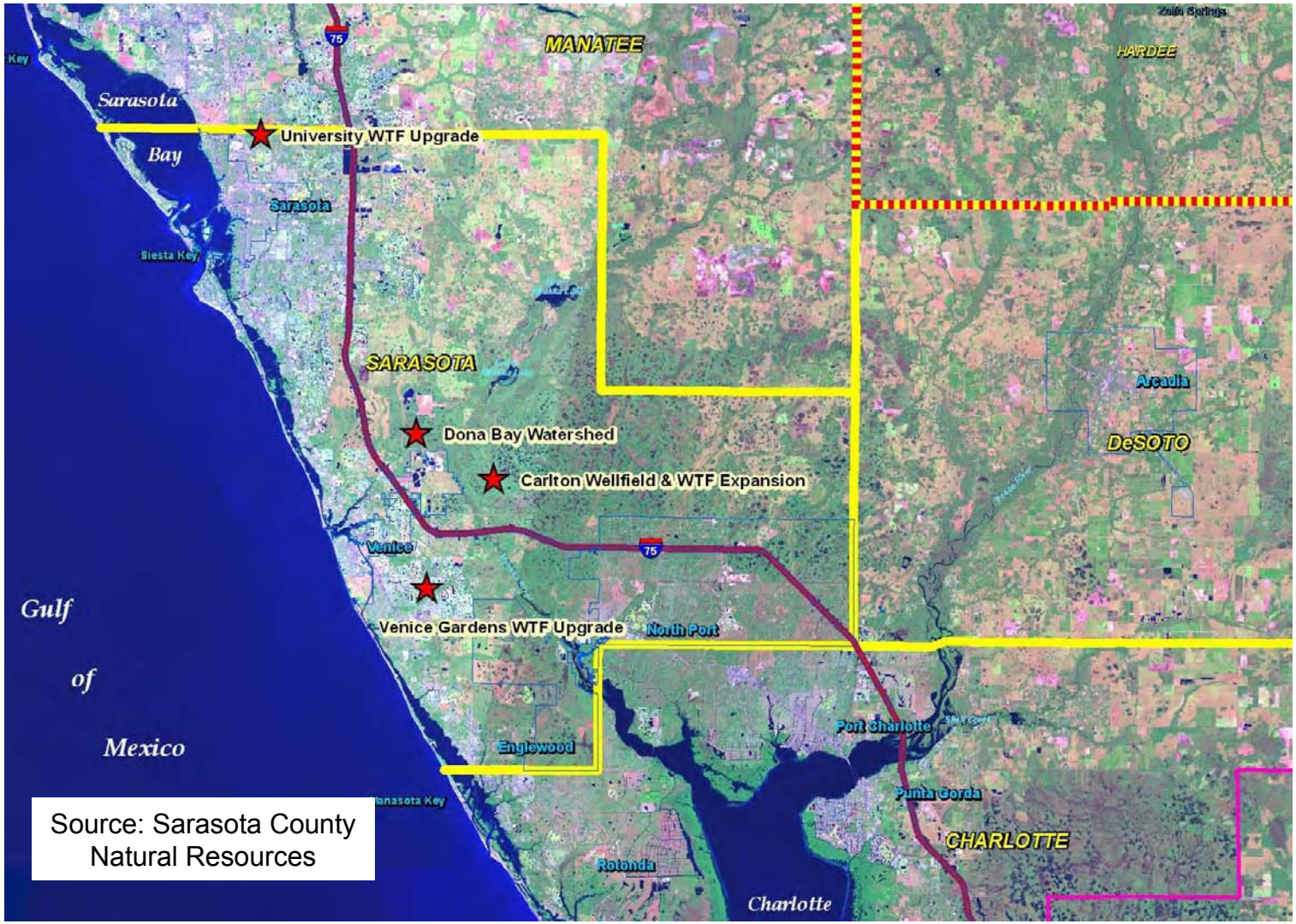
The Sarasota County project locations are illustrated in Figure 3.2. Each of these projects is described in further detail in the following sections. This analysis includes information on each project's capital and lifecycle costs, a capacity estimate, feasibility and operational considerations, advantages and disadvantages, and sustainability factors.

It should be noted that the estimated project costs were developed for comparison purposes. The cost opinions are order-of-magnitude cost estimates based on engineering judgment and were not prepared from detailed engineering analysis. Some of the cost estimates were developed in other studies and reports; the reference document for these costs is identified. The cost estimates generally exclude costs related to plant location, such as pipelines to and from the facility, connections to the County water system, and land acquisition. Costs for all projects were developed under 2005 prices, regardless of when the project is expected to be brought online. The cost of inflation must be taken into account for projects constructed in the future.

Both capital and O&M estimates were developed for each alternative. The capital cost includes the facility cost in dollars per gallon per day of capacity ($/gpd). This value was calculated by dividing the total capital cost by the design capacity of the facility.

The annual O&M cost is based on the total projected O&M cost per 1,000 gallons, which was calculated by dividing the total projected annual O&M cost by the design annual volume of water produced.

Sarasota County Potential Water Supply Projects



Source: Sarasota County Natural Resources

FIGURE 3.2

Sarasota County Water Supply Master Plan Update
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The lifecycle net present worth of each project was also calculated to determine the cost of the project over its useful life. The lifecycle cost was calculated by dividing the total annualized capital cost by the annual volume of water produced plus the annual O&M cost to attain a cost in dollars per 1,000 gallons. The annualized capital cost was calculated using an interest rate of 6% and a 20-year lifecycle.

3.5.1 Carlton Wellfield Expansion

The T. Mabry Carlton Jr. Memorial Reserve Wellfield Expansion project entails modifying the County's existing water WUP to increase the annual average and peak monthly withdrawal quantities and treating the additional water with existing Carlton WTF infrastructure. The additional supply would allow the County to supplement high demand days with excess permitted quantities and to meet annual average demand increases in future years.

3.5.1.1 Capacity Estimate

The Carlton WTF was designed to produce an annual average quantity of 8 mgd and has a peak treatment capacity of 12 mgd with all equipment in service (Boyle, 1995). However, upon analysis of the WTF components, it was determined that an annual average production of 9 mgd is possible with proper maintenance procedures. The existing WUP allows average annual withdrawals of 7.303 mgd and peak monthly withdrawals of 9.625 mgd. Assuming an average recovery of 80%, the plant is permitted to produce approximately 5.85 and 7.7 mgd on an annual average and peak month basis, respectively.

Increasing the WUP annual average permitted quantity to 11.25 mgd would allow the plant to be fully utilized to produce 9 mgd, assuming 80% treatment recovery. This requires the WUP annual average permitted pumping capacity to be increased by 3.947 mgd.

The peak month permitted quantity also could be increased to meet future peak demands. To allow the maximum production capacity of 12 mgd, the peak month permitted withdrawal must be increased to 15 mgd, assuming 80% recovery. This equates to a peak month withdrawal increase of 5.375 mgd. It should be noted that the peak plant production is dependent on the ability to maintain the equipment, especially the EDR units. It is unlikely that the plant could sustain a peak production of 12 mgd for an extended period of time.

The additional supply would be treated with existing infrastructure at the Carlton WTF. Although it is assumed that the existing plant was designed to treat this flow, a complete engineering evaluation is recommended to determine any required upgrades to the facility in order to increase plant production.

This project requires the construction of new production wells in the Carlton Wellfield in order to continue to allow rotation of well pumping.

3.5.1.2 Feasibility Considerations

A permit modification would be required to increase permitted withdrawal quantities. The current Carlton Wellfield WUP expires in 2009. County staff currently is exploring the possibility of obtaining a permit modification before the permit renewal is scheduled.

Because the source is already developed, the timing and certainty of the supply in the future are not concerns. This project could be brought online as soon as permitting requirements are met and well construction is complete.

The Carlton Wellfield Expansion project is advantageous because the groundwater source is not affected by drought and it allows maximum management flexibility by County water system operations staff. In addition, it may provide additional supply to be used as a rotational source with the Dona Bay Watershed project or other surface water sources. Additional studies could evaluate the feasibility of this option.

3.5.1.3 Sustainability Factors

The Carlton Wellfield is a reliable groundwater source. The T. Mabry Carlton Jr. Memorial Reserve Wellfield Management Plan (Sarasota County, 2003) was created to monitor the wellfield and to prevent water quality degradation and adverse impacts to its environmental systems. The Wellfield Management Plan maintains the sustainability of the system and addresses potential future increases in pumping.

3.5.1.4 Cost Opinion

This project requires the construction of new wells in the Carlton Wellfield to allow for continued well rotation. The cost to obtain a permit modification and to construct additional monitoring wells also is required. The O&M costs for production will be similar to the existing treatment costs at the Carlton WTF.

According to the Alliance Phase II Future Supply Assessment and Prioritization Project Evaluation Summaries, the capital cost for a similar project at Carlton that added 8 new production wells, a deep injection well, and 2 new monitoring wells was approximately $6.4M. The annual O&M cost for operation of the new wells and treatment was assumed at $1.25M per year, and the resulting lifecycle cost for the additional capacity was $1.23 per 1000 gallons. However, this cost assumed an average increase of 4 mgd of production capacity, as shown in the project Phase II Project Summaries included in Appendix A.

Because the plant's annual average design capacity is only 9 mgd, it is likely that the plant will be able to produce only approximately 3.15 mgd of additional treated water (to achieve

an annual average production of 9 mgd) without increasing the capacity of the WTF. Four mgd of additional capacity at Carlton on an annual average basis may be attainable with upgrades to the plant, specifically to the EDR units. The project described in Section 3.5.2 describes additional capacity that may be possible at the Carlton WTF with upgrades to plant processes.

In order to develop a cost for the wellfield expansion to only increase production to the annual average design capacity of 9 mgd, the costs presented in the Phase II Project Summaries were modified to account for only an additional 3.15 mgd. This would require approximately 6 new production wells and 2 new monitoring wells. It was assumed that the additional brine produced would be disposed of in the existing deep injection wells. The cost to construct 6 new production wells and 2 new monitoring wells is approximately $3.2M. Further analyses of the capital cost will be completed when developing projects for the capital improvements program (CIP) in Technical Memorandum No. 5.

The anticipated O&M cost for pumping and treating the additional water is approximately $940,000 per year, and the resulting lifecycle cost is approximately $1.21 per 1000 gallons.

3.5.1.5 Advantages and Disadvantages

A Carlton Wellfield expansion and WUP increase to bring permitted quantities up to the existing plant production capacity has the following advantages and disadvantages:

Advantages:

- Low capital costs.
- Allows the use of existing treatment capacity and distribution system infrastructure.
- Water quality of the source is compatible with existing treatment process.
- Could create conjunctive use opportunities with surface water sources.

Disadvantages:

- Requires permit modification to increase quantities.

3.5.2 Carlton Wellfield and WTF Expansion

The Carlton Wellfield and WTF Expansion project entails upgrading and expanding the plant to increase production capacity, in addition to expanding the wellfield and WUP pumping capacity. The expansion would include improvements to the existing EDR trains, such as new membranes and improved spacers, as well as increasing the throughput by

utilizing a higher voltage in some of the stages. This project would also require construction of new wells in the Carlton Wellfield to increase raw water supply to the plant.

3.5.2.1 Capacity Estimate

According to the EDR membrane manufacturer, several advances in their equipment have been attained since the construction of the Carlton WTF. Various retrofit options to increase the capacity of the EDR units have been presented to the County. These include new spacers and/or new membrane stacks. The potential peak capacity of the retrofitted EDR units is 15 mgd with all units online. The expected annual average capacity to allow for maintenance of the membranes is estimated at 11 mgd. Further information provided by the EDR manufacturer is included in Appendix C.

The potential for retrofitting the Carlton WTF with RO treatment could also be considered. Expanding the plant with the RO process (or expanding the plant with additional EDR trains) could increase the capacity of the Carlton WTF to beyond 15 mgd. However, for purposes of this planning effort, the anticipated annual average and peak capacity of the Carlton WTF will be assumed at 11 and 15 mgd, respectively.

The capacity of the other major treatment processes were analyzed to determine their ability to treat the additional annual average or peak flow. The degasification system, process feed pumps, pressure filters, cartridge filters, and transfer pumps are able to treat an annual average capacity of 11 mgd with one unit out of service. However, treating a peak capacity of 15 mgd is possible only with all units in service for each of the aforementioned processes, except for the transfer pumps, which have a design capacity of only 14.4 mgd. The chlorine contact tank has a normal available volume of approximately 302,000 gallons, providing detention times of 40 and 29 minutes at an average daily flow of 11 mgd and a peak flow of 15 mgd, respectively.

Further investigation of other plant equipment should be conducted to determine any required plant modifications such as pipe sizing, electrical improvements, and chemical feed requirements.

3.5.2.2 Feasibility Considerations

According to the EDR manufacturer, the capacity increase is attainable with their suggested improvements. The feasibility of this project depends on the acquisition of a WUP modification and/or increase, similar to what is described in the Carlton Wellfield Expansion project. The WUP must be increased to 13.75 and 18.75 mgd on an annual average and peak month basis, respectively, to provide sufficient water for treatment to the proposed capacities.

Expansion of the Carlton WTF will provide the County with further management flexibility to produce water when it is needed. In addition, it may provide additional supply to be used as a rotational source with the Dona Bay Watershed project or other surface water sources. Additional studies could evaluate the feasibility of this option.

3.5.2.3 Sustainability Factors

The Carlton Wellfield is a reliable groundwater source that is not affected by drought. As discussed previously, the Carlton Wellfield Management Plan was created to monitor the wellfield and to prevent water quality degradation and adverse impacts to its environmental systems. The Wellfield Management Plan maintains the sustainability of the system and addresses potential future increases in pumping. The project is not expected to incur additional environmental impacts.

3.5.2.4 Cost Opinion

This project requires an upgrade to the EDR units at the Carlton WTF, as well as the construction of additional wells in the Carlton Wellfield to allow for continued well rotation. The cost to obtain a permit modification and to construct additional monitoring wells and a new deep injection well also is required. The O&M costs for production will be similar to the existing treatment costs at the Carlton WTF.

In order to develop a cost to increase capacity to an annual average of 11 mgd, the costs presented in the Phase II Project Summaries were modified to account for the additional raw water required. It was assumed that this project would require approximately 8 new production wells and 2 new monitoring wells. In addition, upgrades to the EDR units are required for increased production. Based on budget cost estimates from GE/Ionics, the capital cost to upgrade the EDR units is approximately $7M. The total capital cost for EDR upgrades, new wells, and associated pipelines, is approximately $18.5M. Further analyses of the capital cost will be completed when developing the CIP in Technical Memorandum No. 5.

The annual O&M cost for operation of the new wells and treatment upgrades is estimated at $1.61M per year, and the resulting lifecycle cost for the additional capacity is $1.71 per 1000 gallons. This estimate assumes an average increase of 5.15 mgd of production capacity and only includes the cost for the additional capacity.

3.5.2.5 Advantages and Disadvantages

Some advantages and disadvantages of the Carlton WTF Expansion are listed below

Advantages:

- Allows the use of existing treatment capacity and distribution system infrastructure.

- Operators familiar with treatment process.
- Relatively low capital cost.
- Could create conjunctive use opportunities with surface water sources.

Disadvantages:

- Requires permit modification to increase quantities.

3.5.3 Venice Gardens WTF Upgrade

The Venice Gardens WTF Upgrade project involves expanding the existing treatment plant capacity by refurbishing the RO systems in Building 2. The additional treatment capacity would allow the WTF to utilize more of its existing WUP.

3.5.3.1 Capacity Estimate

The Jacaranda Wellfield WUP allows for withdrawal of 4.434 and 4.474 mgd of brackish water under annual average and peak month conditions, respectively. The existing WTF has the capacity to produce an average of 750,000 gallons per day from the RO skid located in Building 1, which operates at approximately 50 percent recovery.

Currently, the RO skids in Building 2 are not operable; however, the County could upgrade the equipment in Building 2 to generate a capacity of approximately 2 mgd, operating at 75 percent recovery. Therefore, upon completion of the project, the capacity of the Venice Gardens WTF would be approximately 2.75 mgd.

It should be noted that in order to produce the 2.75 mgd at the proposed recoveries, approximately 4.2 mgd of raw water is required. If Building 1 were expanded and upgraded to operate at 75 percent recovery, the Venice Gardens WTF could provide up to 3.33 and 3.36 mgd of supply under their existing annual average and peak month permitted quantities, respectively.

In addition, the County has acquired the Plantation Wellfield, which could provide an additional 1.49 mgd of raw water flow. If infrastructure to connect these wells to the Venice Gardens WTF were constructed, the plant could produce an additional 1.12 mgd of finished water assuming 75 percent recovery.

Although the immediate proposed project will only increase the Venice Gardens WTF capacity to 2.75 mgd, the ultimate treatment capacity of the facility utilizing all permitted quantities including the Plantation Wellfield and operating at 75 percent recovery, could be 4.44 mgd.

3.5.3.2 Feasibility Considerations

An upgrade at the Venice Gardens WTF is planned for 2006. The WUP already exists, and much of the infrastructure is already in place. Because the source is already developed, the timing and certainty of the supply are not concerns. This project could be brought online as soon as construction permitting requirements are met and the construction is complete.

Similar to the Carlton Wellfield Expansion project, the Venice Gardens Upgrade is advantageous because the groundwater source is not affected by drought and it allows maximum management flexibility by County water system operations staff. The Venice Gardens WTF provides supply, pumping, and storage for the southern portions of the County's service area.

3.5.3.3 Sustainability Factors

The Jacaranda Wellfield is a reliable groundwater source that has already been permitted. The wellfield is monitored and pumping is rotated to prevent water quality degradation and adverse impacts to the environmental systems. The County maintains the sustainability of the system and addresses potential future increases in pumping. This project is not expected to cause any additional environmental impacts.

3.5.3.4 Cost Opinion

Much of the infrastructure for this supply source is already in place, which will decrease capital costs associated with the project. The cost for the proposed upgrades includes modifications to the RO treatment units, new cartridge filters, new membranes, new instrumentation and monitoring equipment, and associated piping. The costs for rebuilding the feed water pumps in Building 2 are also required. The capital cost for the RO equipment can be estimated at $1.50 per gallon per day of additional capacity. Therefore, capital costs for the Venice Gardens upgrade is estimated at $3M. Further analyses of the capital cost will be completed when developing the CIP in Technical Memorandum No. 5

The O&M costs for the facility were estimated at $900,000 per year for the additional plant capacity. The resulting lifecycle cost for the project is estimated at $1.59 per 1000 gallons.

3.5.3.5 Advantages and Disadvantages

Some advantages and disadvantages of the Venice Gardens WTF Upgrade are listed below.

Advantages:

- Low capital costs.

- Allows the use of existing treatment capacity and distribution system infrastructure.
- Water quality of the source is compatible with existing treatment process.
- Does not require a modification of the existing WUP.

Disadvantages:

- None identified.

3.5.4 Dona Bay Watershed

The Dona Bay Watershed (also referred to as the Cow Pen Slough in some documents) project entails storing water from the Cow Pen Slough in an off stream reservoir prior to treatment at a new surface water treatment facility. The water could either be sent to the County's water system or utilized as a regional water supply. This source likely would be tied into the proposed integrated loop system discussed in Table 3.2. Most of the information regarding this project was primarily provided by the Phase II Future Supply Assessment and Prioritization Project Evaluation for Configurations summaries prepared for the Water Planning Alliance and from discussions with County staff.

3.5.4.1 Capacity Estimate

The estimated yield for this project as determined in previous studies by SWFWMD, who modeled flow data from similar watershed basins, is approximately 5.0 mgd. The study by SWFWMD used five months of monitoring data to calculate an average daily yield of 5.7 mgd. Further analysis of flows in the Cow Pen Slough could demonstrate a different yield. In addition, storm water projects currently being completed by the County could change the amount of flow entering the Dona Bay Watershed, which could alter the average yield from the river. It will be necessary to collect additional data to determine the reliable yield of this water source. An on-going study by the County and others is further evaluating the yield of the Cow Pen Slough and various water treatment plant and reservoir options.

3.5.4.2 Feasibility Considerations

This source could be linked to the potential regional integrated loop system, making it a flexible source of water not only to the County, but also to the region as a whole if and when additional water is needed. The facility could be owned and operated by the County and/or a regional authority. On-going discussions with regional players will determine the strategy utilized to design, construct, and operate this facility.

The timing of this source may take several years. The development, design, and construction of this facility were estimated to take approximately 8 years by the Alliance. This allows time for planning, preliminary design, public meetings, land acquisition,

construction and testing of ASR wells, permitting, design, construction, and startup. County staff have indicated that with an aggressive schedule, they expect this project to be complete in less time.

A new permit for this source would likely be obtainable; however, further analysis of flow data and the water budget needs of the Dona Bay Estuary are needed to determine the expected permitted quantity. The study currently being completed by others will assist in confirming the sustainable yield of this source.

3.5.4.3 Sustainability Factors

The use of surface water has received recent attention as an alternative water source that can be used to diversify supply and provide an abundant source of water during the rainy season. However, the reliability of surface water sources can also be affected by drought conditions and low flows. It is anticipated that the Dona Bay project could work in conjunction with the Carlton WTF to provide reliability.

The Dona and Roberts Bay estuarine systems have been severely impacted due to the ditching of connections to the Myakka Watershed, which has substantially increased flows to the estuary systems. The salinity of the water in the bay has been impacted by excessive fresh water, which can impact the estuarine system. Removal of some fresh water could improve the balance of salt and fresh water in the bay and help to restore it to its original condition.

3.5.4.4 Cost Opinion

This project requires the construction of a new raw water pump station, an off stream reservoir, a water treatment facility, and transmission mains to connect the facility to the regional integrated loop or to the County system. According to the Alliance Phase II Future Supply Assessment and Prioritization Project Evaluation Summaries, the estimated capital cost of this project (including potential ASR wells) is approximately $60M. The water cost, comprised of daily operation and maintenance costs and amortization of the capital cost over 20 years, is estimated to be $4.14 per 1000 gallons of water produced. The cost for a larger facility can be assumed to be similar to this estimate, although it may be slightly lower.

Further analyses of the capital cost will be completed when developing the CIP in Technical Memorandum No. 5. Discussions with County staff indicate that the cost may increase substantially due to the various unknowns associated with this project.

3.5.4.5 Advantages and Disadvantages

The Dona Bay Watershed supply project has the following advantages and disadvantages:

Advantages:

- An existing borrow pit for use as cover for a nearby landfill and potential use of mining pits very close to the location of the former connection between Cow Pen Slough and the Myakka River may facilitate construction of the reservoir.
- Surface water sources are a large part of the Regional Water Supply Plan, which may aid in the permitting and funding process.
- Could be used with the County's groundwater sources in potential conjunctive use scenarios.

Disadvantages:

- A limited amount of flow monitoring data exists for Cow Pen Slough, making the actual average yield for this source somewhat of an unknown at this time.

3.5.5 University WTF Upgrade

An upgrade to the University WTF involves constructing a treatment process to reduce total dissolved solids. A new treatment process is necessary to continue the use of the University Wellfield in the future without blending the water with water purchased from Manatee County. Two treatment alternatives were considered in this evaluation. The first was reverse osmosis treatment, which can reduce the total dissolved solids of the raw water utilizing membranes. This treatment alternative has been evaluated for implementation at the University WTF in the past.

An alternative to RO treatment at the University WTF is the use of the ion exchange process. This option would entail constructing a new ion exchange treatment system. Ion exchange was considered for treatment at the University WTF because it was thought to possibly be a more feasible, cost-effective approach for treating the raw water from the University Wellfield. Based on information obtained from an ion exchange manufacturer, this option was deemed unfeasible due to the amount of spent regenerant produced, the amount of chemicals used, and the amount of water that must be treated by the process to meet water quality goals (less than fifty percent bypasses treatment). Further information from the ion exchange system manufacturer is available in Appendix D.

Based on the preliminary analysis of ion exchange treatment, it will not be considered in the remainder of this planning effort. The following sections describe a project that would construct a reverse osmosis treatment system at the University WTF.

3.5.5.1 Capacity Estimate

The existing WUP at the University WTF allows 2.0 and 2.4 mgd of pumping under annual average day and peak month conditions, respectively. Assuming 75% RO recovery, the plant could produce 1.5 and 1.8 mgd of finished water under annual average and peak month conditions, respectively.

It should be noted that previous reports have stated that increasing the size of the University Wellfield and increasing the WUP could provide additional supply. This WSMPU assumes that only the existing WUP is available for future supply.

3.5.5.2 Feasibility Considerations

The County currently has a permit for this facility that will provide supply to the RO system. The supply is assumed to be available beyond the current permit period, provided the County continues to use the permitted supply. The timing of this project is based on the time it will take to plan, design, and construct the new WTF. Typical planning and design of an RO plant of this capacity requires approximately 12 to 16 months. Time for construction and start-up the facility would take approximately 20 to 24 months. Therefore, this project should be initiated approximately 3 and a half to 4 years prior to when the water is needed.

This facility will provide additional flexibility to the County. The County would not have to rely on blending with Manatee County water as they currently do. This supply will also provide water in the northern areas of the County, where it is currently the only source in the north aside from the Manatee County purchase.

Brine disposal could be a challenge at this location. Currently, no deep injection well exists on the facility site. Another alternative for brine disposal is discharge to the sanitary sewer. A sanitary sewer collector passes relatively near the University site. A mass balance exercise of the brine volume and concentration with the typical wastewater flows was conducted, and preliminary analyses suggest that the brine could be disposed to the sanitary sewer without impacts to the downstream wastewater treatment plant. Confirmation of this option should be conducted prior to commencing an RO plant design at the University WTF.

3.5.5.3 Sustainability Factors

Because they are a groundwater source, the University Wells are reliable. It is an established source, and rotation pumping of the aquifer is practiced to prevent any environmental degradation of the aquifers.

3.5.5.4 Cost Opinion

The total project cost for a typical RO facility of this capacity is approximately $3.00 per gallon per day. Therefore, capital costs for this project can be estimated at $5.4M, excluding the cost for construction of a deep injection well or other provisions for concentrate disposal. The feasibility of locating a deep injection well at the facility site was not assessed in this investigation. If discharge to the sanitary sewer is indeed a feasible method of disposal, it will add very little capital cost.

Further analyses of the capital cost will be completed when developing the CIP in Technical Memorandum No. 5.

The operating costs for the RO facility were assumed to be 15 percent of the capital cost. Therefore, the annual O&M cost for operation of the RO WTF was estimated at $810,000 per year, and the resulting lifecycle cost for the project can be estimated at $2.34 per 1000 gallons, excluding the costs for concentrate disposal.

3.5.5.5 Advantages and Disadvantages

Some advantages and disadvantages of the University RO WTF are listed below.

Advantages:

- Allows continued utilization of the existing WUP without blending with an outside source such as Manatee County.
- Provides supply in the northern areas of the distribution system.

Disadvantages:

- Brine disposal may be a challenge, although potential discharge to the sanitary sewer may alleviate this issue.

3.6 CONSERVATION

Sarasota County utilizes a number of methods to encourage conservation, including promoting both reuse and efficiency. The term water conservation encompasses both water reuse and water use efficiency, or “demand management,” measures. Reuse conserves by substituting reclaimed water for potable water. Efficiency, or demand management, which is the subject of this section, conserves potable water by reducing the overall demand for water. In this section, the term “conservation,” commonly used to refer to efficiency measures only, will be used interchangeably with “efficiency” and “demand management.”

Although not listed above as a new water supply source project, conservation will be a crucial part of the County's water supply in the future, as it is currently. Although the County presently has a relatively aggressive conservation program, further reductions in demand could possibly be achieved by implementing additional conservation measures. The following sections outline the County's current conservation programs, as well as some future considerations for additional conservation.

3.6.1 Existing County Conservation Programs

Sarasota County has long been an advocate of water conservation and began implementing successful water conservation programs more than 12 years ago. Conservation activities have reduced per capita water use by about 40 percent to one of the lowest residential water consumption rates in the region, from approximately 150 gallons per capita per day (gpcd) in 1992 to less than 90 gpcd today. Water use by the County's residential customers has averaged between 85 and 92 gpcd since 1995. The U.S. average gpcd for people living in single-family homes is 101 gpcd (Solley et al.).

This section summarizes current and past County water conservation programs. Information has been compiled from:

- Chapter 4 of the DRAFT Sarasota County Comprehensive Plan,
- List of activities provided by Sarasota County staff, dated August 7, 2002,
- www.scgov.net, and
- Interviews with Sarasota County staff.

It is likely that additional demand reduction could be realized through additional programs, a few examples of which are listed in Section 3.6.2. However, it is unlikely that such programs would materially affect potable water demand projections for master planning purposes. A more detailed analysis of selected conservation programs would be required to determine the impact on water demand and the cost-effectiveness as compared with other water supply alternatives.

3.6.1.1 Conservation-Oriented Water Rates

Sarasota County uses conservation-oriented tiered water rates based on consumption. Per unit rates increase with increasing volume of water used. "Inverted block rates," such as those used by the County, are generally an attempt to recognize the added cost of producing water during the peak watering season, which drives up facility sizing and cost.

3.6.1.2 Ordinances

The County has instituted several water conservation ordinances. The County implemented the first landscape ordinance in Florida to require water efficient landscapes in new construction. Other ordinances require automatic rain shut-off devices be operational on all automatic irrigation systems, authorizing a civil penalty of up to $500 for non-compliance. A golf course ordinance requires golf courses be located, designed, and operated to minimize natural resources impacts in accordance with various standards and plans promulgated by state and local agencies and recognized golf course environmental certification programs. The County continues to enforce once a week watering restrictions, even though the drought with which they started is over. This encourages residents to develop landscapes with deep root systems that are better able to survive naturally occurring droughts.

3.6.1.3 Education and Outreach Programs

Education and outreach for water conservation is a key component of, and major contributor to, the success of the County's conservation efforts. Several education and outreach programs, such as television advertising, brochures, workshops, and outreach events are cooperative efforts between the County, cities, water utilities, and SWFWMD.

Sarasota County has produced and distributed a variety of written outreach materials, including utility bill inserts, brochures, posters, CDs, and calendars focused on water conservation issues and programs. A water conservation message was wrapped around a transit bus that traveled around the County every day for several years. Many ads and articles have appeared in local newspapers, and numerous staff interviews have been held with local media. Public service announcements and a series of professionally produced 30-second spots aired on local television stations. An award-winning Maintenance Checklist for a Water-Efficient Landscape was produced, laminated, and distributed to 40,000 landscapers, irrigation contractors, and homeowners. This publication can be installed near an irrigation controller in order to prompt homeowners to conserve water year round.

The County and SWFWMD fund two outreach positions to promote efficiency measures in outdoor water use to developers and condominium and homeowner associations. Estimated potential water savings from the Community Associations Program, directed to condominium and homeowner associations, is roughly 625 million gallons per year. County horticultural staff educate Sarasota residents about environmentally sound landscape principles through a Horticultural Helpdesk and a website. Teacher education, based on Project WET (Water Environment for Teachers), is offered yearly to all teachers in the region in cooperation with SWFWMD, the G.Wiz Science Museum, and the PR/MRWSA. The County provides speakers on water conservation to community groups upon request.

Several demonstration projects incorporate both indoor and outdoor water efficiency measures and educational signage, brochures, and tours. The Florida House Learning Center includes the "Model Florida Yard," showing examples of low water use, wildlife gardening, water gardening, edible landscaping, xeriscape, and micro-irrigation. Indoors, the house contains water saving appliances and fixtures. Several County buildings, including all seven libraries, have landscapes that are certified as Florida Friendly under the Florida Yards and Neighborhoods program, which promotes environmentally friendly landscape practices including water efficiency. The recently built “Green Office Building,” uses a rainwater cistern to supply water for irrigation and flushing toilets, waterless urinals, and numerous educational displays for visitors. One purpose of this facility is to demonstrate water conservation in an office building setting in the same way the Florida House demonstrates it in a residential setting.

In partnership with SWFWMD, the Water Conservation Hotel and Motel Program (CHAMP) kicked off in Sarasota County in May 2005. CHAMP is a free education program targeted to hotels and motels to reduce water use and save energy and money. Further, water conservation and efficiency is a key element in Green Business Standards currently under development by the County.

3.6.1.4 Rebates and Retrofits

Sarasota County offered up to $50 for irrigation rain shut-off devices in conjunction with passage of Ordinance 96-021 that requires all automatic irrigation systems to include a shut-off device. One thousand customers participated in the program.

Since 1995, the County has promoted the installation of low flow toilets, showerheads, and faucet aerators for homeowners in existing homes through the use of public education and outreach, financial incentives, hardware giveaways, and demonstration projects. Over 10,000 toilets in Sarasota County were replaced through the Get WET toilet rebate program saving an estimated 100 million gallons a year. In addition, 1,680 toilets were replaced in a master metered condominium account. County staff estimates that there is little opportunity for further demand reduction through low flow toilet replacement programs, as the latest rebate offered did not garner much activity, even with a robust public outreach program. A showerhead program exchanged 10,000 water-wasting showerheads during three years of operation. Estimated water savings are about 30 million gallons per year. Low flow showerheads are still offered to residents free of charge.

3.6.1.5 Leak Detection

Thousands of dye tabs with educational information were distributed each year to customers with high water use, visitors to utilities offices and the Florida House, and those attending workshops and special events. Customers who have an abnormal high usage are

contacted by letter and sent conservation information. Meter readers meet with customers upon request and customer service staff are trained to discuss possible causes of high water consumption.

3.6.2 Potential Future Conservation Programs

The following are potential additional programs the County could implement to further water conservation efforts.

Air Conditioning Condensate Reuse – San Antonio, Texas recently passed an ordinance requiring "Newly constructed commercial buildings installing air conditioning systems…to collect condensate wastewater to provide for future utilization as (i) process water and cooling tower make-up and/or (ii) landscape irrigation water. Condensate wastewater shall not be allowed to drain into a storm sewer, roof drain overflow piping system public way, or impervious surface." They estimate savings of 165 acre-feet annually for each 400-ton air conditioning unit collecting condensate ("Ordinance," 2005).

Seasonal Irrigation Program (SIP) – Weekly customer advisory service of how much to water landscape based on daily evapotranspiration, weather data, type of grass and sun exposure. The SIP concept has been tested in San Antonio for five years and has shown that the average homeowner saves over 5,000 gallons of water per month ("Seasonal Irrigation," 2005).

Commercial Washer Rebates – Efficient commercial washers offer savings of 35 to 50 percent in energy, water use, and wastewater disposal compared with standard models. For laundromats, California's LightWash program provides $500 rebates for efficient washing machines, low- and no-cost efficient lighting retrofit services, and rebates for high-efficiency gas water heaters. Water and electric/gas utilities cooperate in the program.

Pre-Rinse Spray Nozzle Program – Replace high-water use spray nozzles located in restaurants, institutions, and commercial facilities with water-efficient models that use less hot water - 1.6 gallons of water per minute, compared to 2 to 6 gallons per minute with standard valves. Water and wastewater savings are estimated at 100 to 300 gallons of hot water per day ("Restaurant," 2005).

Water Smart Home Program – Homebuilders can build water conservation measures into new homes and qualify them under a Water Smart program. Metropolitan Water District in California gives homebuilders an incentive of $2,500 per home. In Nevada, homebuilders pay the Water Authority for the right to use the Water Smart brand. Water Smart homes include water-efficient landscaping and irrigation systems, hot water recirculation systems, and water-efficient appliances, saving approximately 30 percent of typical use.

Modification of Current Irrigation Days - The County currently is investigating a potential rule change to modify the allowable watering days. With the rule change, public awareness of watering restrictions likely will increase and may provide additional conservation.

3.7 WATER SUPPLY PROJECTS SUMMARY

A summary of the potential Sarasota County water supply projects described in Sections 3.5.1 through 3.5.5 is provided in Table 3.5. The table identifies the project and lists its estimated annual average capacity and anticipated cost. The geographic locations of these projects were shown in Figure 3.2. A combination of several of these projects will be used to provide a substantial portion of Sarasota County's water supply in the future. Demand projections developed in TM1 - Water Demand Projections will be used to predict the quantity of water needed through 2050. Although the projected demands provide a useful starting point for planning future supply, the projects chosen to meet these demands may be altered in the future due to changes in growth patterns and/or per capita water use. Various scenarios of a range of combinations of water supply sources to meet the projected demands will be shaped in a subsequent TM. It should be noted that based on discussions with County staff in October 2005, the water demand projections presented in TM1 were modified due to recent permit and zoning changes. The updated demand projections that will be used for future WSMPU TMs are provided in Appendix E.

In addition to new water supply sources and treatment alternatives, the WSMPU will identify key distribution system factors that will affect future supply to the County's water customers. The water distribution system and major County water assets were identified and cataloged in TM 2 - Water System Assets. This information was analyzed to determine key issues with regard to providing a reliable water source to the County's customers. The major treatment and distribution elements needed for supply based on the future planning scenarios also will be outlined in a subsequent TM, which will include the development of a 10-year water capital improvements program.

Table 3.5 Sarasota County Potential Water Supply Projects

Project	Project Description	Potential Annual Average Yield	Estimated Lifecycle Cost ($/1000 gal)
Carlton Wellfield Expansion	Modify the existing WUP to increase the withdrawal quantities and treat the water with existing Carlton WTF infrastructure.	3.15 mgd increase (9 mgd total)	$1.21

Carlton Wellfield and WTF Expansion	Modify the existing WUP to increase withdrawal quantities, and upgrade and expand the WTF to increase production capacity, primarily by retrofitting the existing EDR units.	5.15 mgd increase (11 mgd total)	$1.71
Venice Gardens WTF Upgrade	Refurbish the RO units and associated equipment in Building 2.	2 mgd increase (2.75 mgd total)	$1.59
Dona Bay Watershed	Withdraw water from the Cow Pen Slough (collected from Dona Bay Watershed) and store it in an off stream reservoir before treatment at a new surface water treatment facility.	5 mgd, expandable to 10 mgd	$4.14
University WTF Upgrade - RO	Construct an RO treatment process to decrease total dissolved solids.	1.5 mgd	$2.34

3.8 REFERENCES

Black and Veatch. 2004. City of North Port Utility Master Plan.

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Sarasota County Environmental Services. 2003. "T. Mabry Carlton Jr. Memorial Reserve Wellfield Management Plan." January 31, 2003.

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Appendix A

ALLIANCE PROJECT SUMMARIES AND EVALUATIONS

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WPA - Project ID No.: 13	**Project Name:** Manatee County/Lake Parrish – FPL	**Basin/Watershed:** Manasota/Little Manatee River

Project Description:

This project is to utilize a portion of currently permitted surface water withdrawal quantity from the Little Manatee River at Florida Power and Light's Parrish power facility to supplement Manatee County's Manatee Agricultural Reuse System (MARS) with additional irrigation water. The project anticipates 4.5 MGD of surface water could be provided to MARS. Agricultural well credits of 2.25 MGD would then be developed and utilized at the County's existing or proposed groundwater wellfields.

Project Yield: 2.25 MGD

Project Cost:

The main project component for this project is the expansion of the existing berm around FPL's Manatee Plant cooling pond, a pump station, and a 36-inch diameter transmission main to the County's MARS system to provide approximately 4.5 MGD of irrigation water, and construction of the County's proposed new East County Wellfield - II.

A cost of $1.30/1,000 gallons was attributed to this project in the Manatee County Water Supply Plan Update, April 2004, Black & Veatch.

Evaluation for Configurations

Yield: This project has been evaluated by Manatee County's consultant and determined to have a potable water yield of 2.25 mgd, delivered at the proposed East County Wellfield II. The potable water quantity is developed by providing 4.5 mgd of irrigation water from FPL's Lake Parrish Reservoir to MARS users. Well credits from those users are to allow development of the new groundwater pumping.

Water Quality/Compatibility: The treated water quality from this ground water source will meet drinking water requirements and is considered compatible with the County's existing ground water system and the regional system.

Permittability: This project will require a new Water Use Permit for the proposed ECWF-II. The SWFWMD has indicated that alternative sources of potable water supply should be evaluated prior to the use of new groundwater sources. The draft Southern Water Use Caution Area (SWUCA) Recovery Plan has not been adopted; however, the recent SWFWMD Governing Board (October 2004) included discussion of not allowing transfers of Water Use Permits where a change in ownership or use is anticipated, which would be required under this project. It is not known at this time what provisions in the draft SWUCA Recovery Plan specific to this project will be adopted. The permittability of this project is in question until the draft SWUCA Recovery plan is adopted.

Schedule: The County's annual average demand exceeds the capacity of its current source in approximately 2014. The implementation schedule for this project indicates a period of approximately 5 years to develop, design and construct the project. It is considered that adequate time is available for implementation of this project.

Cost: The cost of the 2.25 mgd source is estimated as $1.30/1000 gallons. This cost is considered reasonable.

Potential Environmental Impact: Construction activities associated with the project have impacts that must be mitigated to the extent that the environment is impacted. This project is proposed as a "net benefit" project, through reduction of overall groundwater pumping in the area, by providing irrigation water for irrigation for existing historical groundwater pumping, and replacing the historical groundwater pumping with 50 percent of the historical pumping.

Although the project provides the benefit of public/private partnership and overall reduction of groundwater pumping, the permittability of the project cannot be determined until the draft SWUCA Recovery plan rules are adopted. At that time, a re-evaluation of the project feasibility should be made. This project will not be considered for the configurations for this study, because of the uncertainty of permitting. The project may be considered for the future, should other projects selected for configuration evaluation prove infeasible.

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WPA - Project ID Nos.: 27, 28 and 29	**Project Name**: Manatee Co./Tatum Sawgrass - Diversion and Restoration Program	**Basin/Watershed:** Manasota/Myakka River

Project Description:

This project consists of a combination of potable water supply and wetland restoration/creation. It is proposed to utilize the existing Tatum Sawgrass area (approximately 4,000 acres in eastern Manatee County) to construct a 2.1 billion gallon reservoir in which to store seasonally high flows from the Myakka River for use as a potable water supply. The reservoir would be constructed on areas that have been previously impacted by agriculture. Two thousand acres of the remaining area would be utilized as a wetlands restoration/creation area. For potable water use, a new water treatment facility (design capacity of 14 mgd) and ASR system (5.1 billion gallons storag e) are proposed. The annual diversion rate from the river would be 7.8 mgd and the system would result in a net potable water yield of 7.0 mgd.

Project Yield: 7.0 MGD

Project Cost:

The main project components for this project include the construction of the 2000 acre off-line reservoir (2.1 billion gallons); a raw water pump station (42 mgd); a new 14 mgd treatment plant and approximately eight 1.0 mgd ASR wells; a finished water pumping station and transmission piping to the proposed regional integrated loop project and wetland mitigation costs.

The estimated cost of the project is $5.56/1,000 gallons.

Evaluation for Configurations

Yield: This project was evaluated and determined to have possibility of providing up to an additional 7 m gd of potable water to meet regional needs.

Water Quality/Compatibility: The treated water quality from this surface water source will meet drinking water requirements and is considered compatible with the regional system.

Permittability: It is anticipated that a permit for the proposed yield from the Myakka River could be obtained. Seasonal harvesting of high flows from surface water bodies, treatment of those flows and storage of the excess water using ASR is currently in use at the PR/MWRSA Peace River Facility, and is compatible with the SWFWMD's Regional Water Supply Plan and draft SWUCA Recovery Plan. There are no existing withdrawals on the Myakka River for potable supply. It can be anticipated that extensive hydro-biological monitoring of the River will be required to determine potential impacts prior to permit approval and issuance.

The Myakka River in the project location is an Outstanding Florida Water. There has been significant concern raised by stakeholders concerning the potential environmental impacts associated with construction of the project and the potential water withdrawal. Restoration of approximately 2000 acres of disturbed wetland at Tatum Sawgrass has been proposed to create a additional environmental benefit to compensate for potential environmental impacts.

One potential issue is the mobilization of heavy metals from underground aquifers when using an ASR system. The Department of Environmental Protection is currently permitting construction and testing of ASR wells, however, approvals to place the wells into service are not currently being issued unless the recovered water meets drinking water regulations.

Schedule: This project is not associated with a particular public water supplier, but can meet regional water supply needs. The implementation schedule for this project indicates a period of approximately 8 years to develop, design and construct the project.

Cost: The cost of the 7 mgd project was estimated as $5.56/1000 gallons. This cost is considerably greater than other projects under consideration. One reason for the higher cost is the mitigation costs associated with Tatum Sawgrass. It is possible that SWFWMD co-funding may be available for portions of this project, but has not been evaluated for this study.

Potential Environmental Impact: Construction activities associated with the project have impacts that must be mitigated to the extent that the environment is impacted. The yield analysis indicated the likelihood that sufficient water is available for the proposed withdrawal. Any proposed withdrawal must meet District Rule criteria to obtain a permit. The project proposes restoration of 2000 acres of Tatum Sawgrass as an environmental enhancement. The project has potential of impacting an Outstanding Florida Water.

This project will not be considered for the configurations for this study, because of the relatively high unit cost of water. The project may be considered for the future, should other projects selected for configuration evaluation prove infeasible.

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WPA - Project ID No.: 31	**Project Name**: Manatee Co./Acquisition of Well Credits & Permit Transfers	**Basin:** Manasota

Project Description:

Manatee County proposes to renegotiate the terms of their existing reclaimed water agreements (through the Manatee Agricultural Reuse Supply System) to obtain the associated well credits from the current users. Based on the County's existing agreements, (totaling 8.02 MGD of reclaimed water use, as of 4/2004) it is estimated that the County could obtain an additional 4.0 MGD of supply via a 2 to 1 ratio of well credits. Manatee County has proposed the option to develop a new wellfield, the East County Wellfield II (ECWF -II), to withdraw a portion of the permitted groundwater supply associated with MARS well credits.

Project Yield: 4.0 MGD

Project Cost:

A cost of $0.81/1,000 gallons is based on the well credits being provided to the County at no cost, and a capital cost associated with construction of the new East County Wellfield – II. This cost was obtained from the Manatee County Water Supply Plan prepared by Black & Veatch, April 2004.

Evaluation for Configurations

Yield: This project has been evaluated by Manatee County's consultant and determined to have a potable water yield of 4 mgd, delivered at the proposed East County Wellfield II. The potable water quantity is developed by providing 8 mgd of reclaimed water to MARS users. Well credits from those users are proposed to allow development of the new groundwater pumping at a 2:1 ratio.

Water Quality/Compatibility: The treated water quality from this ground water source will meet drinking water requirements and is considered compatible with the County's existing ground water system and the regional system.

Permittability: This project will require either a new Water Use Permit (WUP) for the proposed ECWF-II or a modified WUP at the County's existing wellfield. The SWFWMD has indicated that alternative sources of potable water supply should be evaluated prior to the use of new groundwater sources. The draft Southern Water Use Caution Area (SWUCA) Recovery Plan has not been adopted; however, the recent SWFWMD Governing Board (October 2004) included discussion of not allowing transfers of Water Use Permits where a change in ownership or use is anticipated, which would be required under this project. It is not known at this time what provisions in the draft SWUCA Recovery Plan specific to this project will be adopted. The permittability of this project is in question until the draft SWUCA Recovery plan is adopted.

Schedule: The County's annual average demand exceeds the capacity of its current source in approximately 2014. The implementation schedule for this project is unknown due to the uncertainty of time necessary for the County to negotiate contracts with the existing reclaimed water users. However, it is assumed that ten years is adequate time for implementation of this project.

Cost: the County's consultant, Black & Veatch estimated the cost of the 4 mgd source as $0.81/1000 gallons (April 2004). This cost is considered reasonable.

Potential Environmental Impact: Construction activities associated with the project have impacts that must be mitigated to the extent that the environment is impacted. This project is proposed as a "net benefit" project, through reduction of overall groundwater pumping in the area, by providing reclaimed water for irrigation for existing historical groundwater pumping, and replacing the historical groundwater pumping for irrigation with 50 percent of the historical pumping for potable supply use.

Although the project provides the benefit of overall reduction of groundwater pumping, the permittability of the project cannot be determined until the draft SWUCA Recovery plan rules are adopted. At that time, a re-evaluation of the project feasibility should be made. This project will not be considered for the configurations for this study, because of the uncertainty of permitting. The project may be considered for the future, should other projects selected for configuration evaluation prove infeasible.

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WPA - Project ID No.: 32	**Project Name**: Manatee Co./Developer Provided Water Use Permit Transfers	**Basin:** Manasota

Project Description:

As described in Manatee County's Water Supply Plan Update (Plan) by Black & Veatch, April 2004, Manatee County proposes to implement a policy that will require new developers to transfer water use permits to the County. This requirement would be part of the Land Development Approval process through the County's Planning Department. Such a policy would encourage developers to obtain the previous landowner's water use permit as part of the land purchase. The water permits would then be transferred to the County, who in turn would seek to transfer the permit from the developer, to increase groundwater pumping at one of the County's groundwater wellfields. It is proposed to transfer the permitted withdrawal quantities at a one-to-one ratio.

Project Yield:

Unknown. The Plan states that the amount of additional water supply available through such a policy is undefined and would be dependent on the language of the policy implemented.

Project Cost:

A cost of $0.78/1,000 gallons is based on the well credits being provided to the County at no cost and a capital cost associated with construction of the new East County Wellfield – II. This cost was obtained from the Manatee County Water Supply Plan prepared by Black & Veatch, April 2004.

Evaluation for Configurations

Yield: This project has an unknown yield. Water Use Permits would be transferred to the County from developers by a proposed ordinance. Well credits from those Water Use Permits are proposed to allow development of new groundwater pumping by the County at a 2:1 ratio.

Water Quality/Compatibility: The treated water quality from this ground water source will meet drinking water requirements and is considered compatible with the County's existing ground water system and the regional system.

Permittability: This project will require a new Water Use Permit for the County's existing East County Wellfield (ECWF) or the proposed ECWF-II. The SWFWMD has indicated that alternative sources of potable water supply should be evaluated prior to the use of new groundwater sources. The draft Southern Water Use Caution Area (SWUCA) Recovery Plan has not been adopted; however, the recent SWFWMD Governing Board (October 2004) included discussion of not allowing transfers of Water Use Permits where a change in ownership or use is anticipated, which would be required under this project. It is not known at this time what provisions in the draft SWUCA Recovery Plan specific to this project will be adopted. The permittability of this project is in question until the draft SWUCA Recovery plan is adopted.

Schedule: The County's annual average demand exceeds the capacity of its current source in approximately 2014. No implementation schedule has been developed for this project, as no potential transfers have been identified. It is expected that the implementation schedule for this project would be similar to that of Project No. 31, which indicates a period of approximately 8 years to develop, design and construct the project. It is considered that adequate time is available for implementation of this project.

Cost: A cost of $0.78/1,000 gallons is based on the well credits being provided to the County at no cost and a caopital cost associated with construction of the new East County Wellfield – II. This cost was obtained from the Manatee County Water Supply Plan prepared by Black & Veatch, April 2004.

Potential Environmental Impact: Construction activities associated with the project may have impacts that must be mitigated to the extent that the environment is impacted. This project proposes to utilize the transferred well credits at a one-to-one ratio and would not provide a "net benefit" to the region.

The permittability of the project cannot be determined until the draft SWUCA Recovery plan rules are adopted. At that time, a re-evaluation of the project feasibility should be made. In addition, the project requires passage of an ordinance requiring developers to transfer their water use permits to the County. The certainty of this type of ordinance being passed is unknown. This project will not be considered for the configurations for this study, because of the uncertainty of the permitting and policy changes. The project may be considered for the future, should other projects selected for configuration evaluation prove infeasible.

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WPA - Project ID No.: 33	**Project Name**: Manatee Co./Direct Purchase of Water Use Permits	**Basin:** Manasota

Project Description:

As described in Manatee County's Water Supply Plan Update (Plan) by Black & Veatch, April 2004, Manatee County proposes to acquire water use permits from existing permittees whom currently withdraw from the Floridan Aquifer. The County would seek to transfer the permit(s) through SWFWMD to increase groundwater pumping at the proposed East County Wellfield – II. It is proposed to transfer the permitted withdrawal quantities at a one-to-one ratio.

Project Yield:

Unknown. The amount of additional water supply available through direct purchases is undefined.

Project Cost:

A cost of $0.93/1,000 gallons is based on historical data suggesting that water use permits can be purchased for approximately $0.84/ per gallon per day ($840,000 for 1 mgd) and capital recovery of the ECWF-II construction. This cost was obtained from the Manatee County Water Supply Plan prepared by Black & Veatch, April 2004.

Evaluation for Configurations

Yield: This project has an unknown yield. Water Use Permits would be purchased by the County from existing water permit holders. It is proposed to transfer the permitted withdrawal quantities to the County at a one-to-one ratio.

Water Quality/Compatibility: The treated water quality from this ground water source will meet drinking water requirements and is considered compatible with the County's existing ground water system and the regional system.

Permittability: This project will require a new Water Use Permit for the County's proposed East County Wellfield - II. The SWFWMD has indicated that alternative sources of potable water supply should be evaluated prior to the use of new groundwater sources. The draft Southern Water Use Caution Area (SWUCA) Recovery Plan has not been adopted; however, the recent SWFWMD Governing Board (October 2004) included discussion of not allowing transfers of Water Use Permits where a change in ownership or use is anticipated, which would be required under this project. It is not known at this time what provisions in the draft SWUCA Recovery Plan specific to this project will be adopted. The permittability of this project is in question until the draft SWUCA Recovery plan is adopted.

Schedule: The County's annual average demand exceeds the capacity of its current source in approximately 2014. No implementation schedule has been developed for this project due to the uncertainty of the SWFWMD SWUCA rules.

Cost: A cost of $0.93/1,000 gallons is based on historical data suggesting that water use permits can be purchased for approximately $0.84/ per gallon per day ($840,000 for 1 mgd) and capital recovery of the ECWF-II construction. This cost was obtained from the Manatee County Water Supply Plan prepared by Black & Veatch, April 2004. This cost is considered reasonable.

Potential Environmental Impact: Construction activities associated with the project may have impacts that must be mitigated to the extent that the environment is impacted. This project proposes to utilize the transferred well credits at a one-to-one ratio and would not provide a "net benefit" to the region.

The permittability of the project cannot be determined until the draft SWUCA Recovery plan rules are adopted. At that time, a re-evaluation of the project feasibility should be made. This project will not be considered for the configurations for this study, because of the uncertainty of the permitting. The project may be considered for the future, should other projects selected for configuration evaluation prove infeasible.

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WPA - Project ID No.: 44	**Project Name**: Manatee Co/Port Manatee Seawater Desalination	**Basin/Watershed:** Manasota/Little Manatee River

Project Description:

Manatee County has identified a proposed seawater desalination facility site at the Port Manatee area in the northern part of the County on Tampa Bay. The County's consultant (Black & Veatch) proposed a 10-mgd, expandable to 20-mgd plant at this site. The County has expressed an interest in developing a 10 mgd plant (expandable to 20-mgd) that would initially be operated at half capacity, producing 5-mgd to meet daily demand. The remaining 5-mgd of plant capacity would serve as emergency reserve capacity. For this evaluation, two sizes of desalination plants were assumed: 5 mgd and 10 mgd.

Project Yield: 5.0 MGD or 10 MGD annual average yield

Project Cost:

The main project components for this project include the construction of either a new 5-mgd or 10-mgd desalination facility, including a deep injection well for reject water disposal, and the associated transmission pipelines.

The estimated cost of the 5 mgd project is $4.74/1,000 gallons. The estimated cost of the 10 mgd project is $5.62/1,000 gallons. Neither cost reflects co-funding of the capital portion of the project.

Evaluation for Configurations

Yield: This project has been proposed as a 10 mgd source, with 5 mgd for continuous supply and 5 mgd as emergency supply. The water source for this project has unlimited quantity; long-term degradation of the raw water quantity or quantity is not considered likely. This source is considered "drought proof".

Water Quality/Compatibility: The raw water is seawater obtained from Tampa Bay. Due to the relatively small yield when compared to the virtually unlimited supply of seawater, cumulative impacts resulting from the development of this project would be limited to the potential long-term impacts associated with concentrate disposal. ("Long Term Water Supply Planning, Project Alternative Information", Black & Veatch, December 2001). Tampa Bay in this area is considered to be a Class 3 water body and is not classified as an Outstanding Florida Water. The treated water will be aggressive because of low dissolved solids, which will require blending with other treated water or chemical adjustment prior to use. This project proposes that the output of the desalination plant be piped to the regional loop pipeline at the Lake Manatee WTP, where it may be blended. The treated water quality from this source will meet drinking water requirements and is considered compatible with the County's existing ground water system and the regional system if the product water is blended.

Permittability: This project is considered permittable. One of the major concerns with projects of this type is the discharge of reject water or brine to surface waters. This project will utilize deep injection wells for brine disposal. The project is considered an alternative source, and is consistent with the draft SWUCA Recovery Plan. The purpose of this water supply development is for meeting future needs, providing emergency supply and rotational capacity. A Water Use Permit from the District is not required for this project.

Schedule: The County's annual average demand exceeds the capacity of its current source in approximately 2014. The implementation schedule for this project indicates a period of approximately 6 years to develop, design and construct the project. It is considered that adequate time is available for implementation of this project.

Cost: The estimated cost of the 5 mgd project is $4.74/1,000 gallons. If 50 percent SWFWMD funding for the capital costs of the project is assumed, the cost is $3.19/1000 gallons. The estimated cost of the 10 mgd project is $5.62. If 50 percent SWFWMD funding for the capital costs of the project is assumed, the cost is $3.79/1000 gallons.

Potential Environmental Impact: Construction activities associated with the project have impacts that must be mitigated to the extent that the environment is impacted. The major environmental concern (reject water disposal to surface waters) is mitigated by the use of deep injection wells. The project is proposed in Port Manatee, where a facility of this type is considered acceptable. The project allows for emergency supply capabilities and rotational capacity for the region through providing a drought-proof water supply. Use of seawater source alleviates stress of potable aquifers.

This project provides a significant increment of water. Through its proposed interconnection with the regional loop system, the project meets regional demands. The project yield is from seawater, which is considered by the District to be an alternative source, as well as being drought-proof. The project is considered to be permittable, subject to meeting the Department of Environmental Protection criteria. The implementation schedule for this project will allow it to be constructed ahead of its required implementation date. The potential for environmental impacts as result of this project can be mitigated through proper design of the deep injection well.

For these reasons, this project will be considered for configurations for this study.

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Project Evaluation for Configurations

WPA – Project ID No.: 45	**Project Name**: Manatee Co./Coastal Brackish RO	**Basin:** Manasota

Project Description:

This project consists of the development of new coastal groundwater wells utilizing Reverse Osmosis (RO) treatment technology. Manatee County proposes to develop several coastal wells sites to provide a total of 6.0 mgd of new supply. Preliminary plans are to develop the coastal wells in two 3.0 mgd phases by 2013. The 6.0 mgd of supply is proposed to come from well credits from retired WUP permits withdrawing from the Upper Floridan Aquifer.

Project Yield: 6.0 MGD

Project Cost:

The County's consultant, Black & Veatch, evaluated the feasibility of the development of several small (approximately 1-mgd) coastal well withdrawal sites. The cost as presented in the County's Water Supply Plan Update, (Black & Veatch, April 2004) is $1.85/1,000 gallons per 1 mgd Coastal RO well, and includes the following components: Well and pump; RO system; process building; disinfection system; piping; pumps storage; land; site work and a sewer system disposal of the concentrate.

Greeley and Hansen evaluated the feasibility of the project assuming the development of four brackish groundwater wellfields with three wells at each wellfield. The four wellfields would feed two 3-mgd RO treatment facilities (two wellfields per facility). The reject water from the RO treatment processes will be disposed of through deep injection wells. The estimated cost for this project is $2.54.

Evaluation for Configurations

Yield: This project has been proposed as a 6 mgd source, developed at more than one location. With proper design and operation of the wellfield within its permitted limits, it is not anticipated that long-term degradation of the raw water supply would occur.

Water Quality/Compatibility: Groundwater supply facilities will be designed and operated at yields to ensure consistent water quality over the long term. The disposal wells will need to be constructed for the brine reject water. The treated water will be aggressive because of low dissolved solids, which will require blending with other treated water or chemical adjustment prior to use. The treated water quality from this source will meet drinking water requirements and is considered compatible with the County's water system if the product water is chemically adjusted.

Permittability: The SWFWMD has indicated that alternative sources of potable water supply should be evaluated prior to the use of new groundwater sources; however, brackish groundwater is identified as a potential source in the SWFWMD's Regional Water Supply Plan. This project is located in the SWFWMD designated Most Impacted Area (MIA) of the SWUCA, which presents additional issues in permitting. Discussion of this project with the District has indicated that there are concerns with permitting additional groundwater in the MIA. These concerns may be alleviated by use of well credits to reduce the overall groundwater pumping. One of the major concerns with projects of this type is the discharge of reject water or brine to surface waters. This project will utilize deep injection wells for brine disposal.

Schedule: The County's annual average demand exceeds the capacity of its current sources in approximately 2014. The implementation schedule for this project indicates a period of approximately 5 years to develop, design and construct the project. It is considered that adequate time is available for implementation of this project.

Cost: The estimated cost of the project is $2.54/1,000 gallons. This cost is considered reasonable.

Potential Environmental Impact: Construction activities associated with the project have impacts that must be mitigated to the extent that the environment is impacted. With proper design of the wellfield, this project should not create adverse environmental impacts through movement of the saltwater interface in groundwater or surface effects. Brine disposal by use of injection wells will prevent surface water impacts. Use of a brackish groundwater source alleviates stress of potable aquifers. This project is proposed as a "net benefit" project, as described in the draft SWUCA Recovery Plan. Overall groundwater pumping in the area will be reduced, by replacing the historical groundwater pumping with 50 percent of the historical pumping.

This project provides a significant increment of water. The project also can help meet regional demand by making water available to the regional loop at the Manatee River WTP. The project yield is from brackish groundwater, which is considered to be drought-proof. The project is considered to be permittable, subject to meeting District Rule criteria. The implementation schedule for this project will allow it to be constructed ahead of its required implementation date. The project cost is considered reasonable. The potential for environmental impacts as result of this groundwater project can be mitigated through proper design of the project to prevent movement of the saltwater interface.

For these reasons, this project will be considered for configurations for this study.

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Project Evaluation for Configurations

WPA - Project ID No.: 53	**Project Name**: City of Bradenton/Braden River	**Basin/Watershed:** Manasota/Manatee River

Project Description:

The City of Bradenton currently utilizes the Braden River, impounded by the Bill Evers Reservoir, for its potable water supply. This project proposes to increase pumping from the river at the reservoir (the reservoir is contained by the John Ward Lake Dam, an 838 foot concrete impoundment located about 2 miles southwest of I-75 and State Road 70) during times of high flow, treat the water to potable standards and either immediately use the water or pump the additional supply into an ASR system for later use. This project provides for additional potable water storage, allowing for demand management, rotational capacity and emergency supply within the region.

Project Yield: 2.0 MGD

Project Cost:

The main project components for this project include the expansion of the existing water treatment plant; construction of potable water ASR wells; construction of a raw water pump station; and the piping associated with the improvements.

The estimated cost of the project is $6.44/1,000 gallons, based on providing new facilities that will provide an annual average yield of 2 mgd. If the wet season excess capacity of the existing water treatment plant (12 mgd peak minus 8 mgd annual average capacity = 4 mgd) is utilized, then only a 4 mgd new plant increment needs to be constructed and the project cost is reduced to $5.47. These costs are for additional capacity above the City's existing water use permit limits, with an allowance for possible minimum flow requirements.

There may be physical or operational modifications to the City's existing facility that may provide additional incremental capacity at a lower cost than that representative of water produced for regional use.

Evaluation for Configurations

Yield: This project was evaluated and determined to have possibility of providing up to an additional 2 mgd of potable water to meet the City's needs and possibly regional needs.

Water Quality/Compatibility: The treated water quality from this surface water source will meet drinking water requirements and is considered compatible with the City's existing system and the regional system.

Permittability: The yield analysis indicated that there is the potential for additional water from the Brade n River; however, the quantities determined from the analysis are relatively low. It is anticipated that a permit for the proposed additional yield from the Braden River could be obtained. Seasonal harvesting of high flows from surface water bodies, treatment of those flows and storage of the excess water using ASR is currently in use at the PR/MWRSA Peace River Facility, and is compatible with the SWFWMD's Regional Water Supply Plan and draft SWUCA Recovery Plan. Discussion of this project with the District has indicated that there are no known impediments to this project, subject to the project meeting District Rule criteria.

One potential issue is the mobilization of heavy metals from underground aquifers when using an ASR system. The Department of Environmental Protection is currently permitting construction and testing of ASR wells, however, approvals to place the wells into service are not currently being issued unless the recovered water meets drinking water regulations.

Schedule: The City's annual average demand does not exceed the capacity of its current sources during the planning period. The implementation schedule for this project indicates a period of approximately 4 years to develop, design and construct the project. It is considered that adequate time is available for implementation of this project.

Cost: The cost of the 2 mgd expansion was estimated as $6.44/1000 gallons if all new facilities were constructed for the project or $5.47/1000 gallons if a portion of the existing plant capacity was utilized. It is likely that this project, if implemented, would utilize a portion of the existing plant capacity. This cost is considerably greater than other projects under consideration. It is possible that SWFWMD co-funding may be available for portions of this project, but has not been evaluated for this study.

Potential Environmental Impact: Construction activities associated with the project have impacts that must be mitigated to the extent that the environment is impacted. The yield analysis indicated the likelihood that sufficient water is available for the proposed withdrawal. Any proposed withdrawal must meet District Rule criteria to obtain a permit. This project is an expansion of an existing facility, and does not include impacts in new areas. For these reasons, the potential environmental impact is considered acceptable. A new Water Use Permit would be required. In conjunction with this permit, additional hydro-biological monitoring, wetland impact analysis and other environmental monitoring/mitigation programs may be necessary. Minimum Flows and Levels (MFL's) for the Braden River are to be set in 2006. Currently there is a basin initiative project for the Braden River to assist in the determination of MFL's.

It is recommended that this project not be considered in the final configurations for this study, because of the relatively high unit cost of water. The project may be considered for the future, should other projects selected for configuration evaluation prove infeasible.

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Project Evaluation for Configurations

WPA - Project ID Nos.: 63	**Project Name**: Sarasota Co./Cow Pen Slough	**Basin/Watershed:** Manasota/Southern Coastal

Project Description:

This project consists of capturing flows from Cow Pen Slough for use as a new potable water source or a potential irrigation source. For the purpose of this report an evaluation as a potable water source is provided. Water would be diverted from Cow Pen Slough as determined necessary to maintain the historical hydro periods within the slough and stored in a small surface reservoir. There is an existing borrow pit in the vicinity of the proposed withdrawal point that could serve as the footprint for the reservoir (approximately 500 MG) The water would be treated at a new water treatment plant (10 mgd design capacity) to potable water standards and then sent to potable water ASR wells for storage until needed or sent directly into the existing public supply via Sarasota County's existing infrastructure, or sent into the regional supply via the proposed integrated loop system. In addition to the benefit of additional public supply, this project would also potentially alleviate some of the downstream flooding and fresh water/salt water imbalances caused by excessive fresh water in the estuarine system found in Dona Bay.

Project Yield: 5.0 MGD

Yield listed for this project was determined in previous studies conducted by the SWFWMD using proxy flow data from similar basins, since Cow Pen Slough does not have regular flow monitoring. In this study, 5 months of flow monitoring data was available and used to calculate an average daily yield from the Slough of 5.7 MGD. This data tends to confirm the previous analysis; however, several years of flow data is required to help quantify potential yields. Sarasota County has on-going storm water projects and initiatives that may change the historical storm runoff in the Cow Pen Slough Basin and has requested that the SWFWMD not set MFLs until 2007, so that the effect of this work may be captured in the MFLs. There is currently a basin initiative project to assist with the determination of MFLs for Cow Pen Slough.

Project Cost:

The main project components consist of a new pump station, reservoir, water treatment plant, ASR wells and piping to the new regional integrated loop.

The estimated cost of the project is $4.14/1,000 gallons

Evaluation for Configurations

Yield: The yield for this project was evaluated previously by the SWFWMD and determined to be 5 mgd. There is no regular flow monitoring data for Cow pen Slough, making the yield subject to collection of flow data for a sufficient period of time to determine reliably a yield a necessity. Storm water projects and initiatives proposed by Sarasota County may affect the yield of the project.

Water Quality/Compatibility: The treated water quality from this surface water source will meet drinking water requirements and is considered compatible with the regional system.

Permittability: It is anticipated that a permit for a yield from Cow Pen Slough could be obtained; however, the proposed yield of 5 mgd is subject to verification of flow data. Seasonal harvesting of high flows from surface water bodies, treatment of those flows and storage of the excess water using ASR is currently in use at the PR/MWRSA Peace River Facility, and is compatible with the SWFWMD's Regional Water Supply Plan and draft SWUCA Recovery Plan. There are no existing withdrawals on Cow Pen Slough for potable supply. It can be anticipated that hydro-biological monitoring of the Slough will be required to determine potential impacts prior to permit approval and issuance.

Reduction of wet season high flow by water withdrawal may present an environmental benefit to Dona and Roberts Bays, which has been determined to have excessive freshwater flows caused by the channelization of Cow Pen Slough.

One potential issue is the mobilization of heavy metals from underground aquifers when using an ASR system. The Department of Environmental Protection is currently permitting construction and testing of ASR wells, howeve r, approvals to place the wells into service are not currently being issued unless the recovered water meets the drinking water regulations.

Schedule: This project is not associated with a particular public water supplier, but can meet regional water supply needs. The implementation schedule for this project indicates a period of approximately 9 years to develop, design and construct the project. This time period includes collection of flow data in the project development phase. It is recommended that flow data collection be implemented at Cow Pen Slough so that its consideration as a water supply project can be evaluated with more reliability.

Cost: The cost of the 5 mgd project was estimated as $4.14/1000 gallons. This cost is considerably greater than other projects under consideration. It is possible that SWFWMD co-funding may be available for portions of this project, but has not been evaluated for this study.

Potential Environmental Impact: Construction activities associated with the project have impacts that must be mitigated to the extent that the environment is impacted. The yield analysis indicated the likelihood that sufficient water is available for the proposed withdrawal. Any proposed withdrawal must meet District Rule criteria to obtain a permit. The project may restore a more natural salinity balance in Dona and Roberts Bays.

It is recommended that this project not be considered in the final configurations for this study, because of the relatively high unit cost of water, and the potential of changes to and reliability of the flow quantity estimate. The project may be considered for the future, should other projects selected for configuration evaluation prove infeasible. It is recommended that flow monitoring of Cow pen Slough be implemented to facilitate future consideration.

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Project Evaluation for Configurations

WPA - Project ID No.: 76	**Project Name**: Sarasota Co./Potable Water ASR	**Basin/Watershed:** Manasota/ Myakka River

Project Description:

This project consists of construction of four potable water ASR wells at the Carlton Reserve in Sarasota County to store potable water from the Peace River/Manasota Regional Water Supply Authority (PR/MRWSA). The source of water for the ASR wells will be water delivered to Sarasota County under its contract with the PR/MRWSA. The County plans to ultimately store approximately 720 million gallons of treated water in the ASR wells. It is proposed that the stored water can be recovered during annual high demand periods and provide an emergency backup if the supply from the PR/MRWSA is interrupted.

Project Yield: 4.0 MGD ASR, with a yield of 2.0 MGD

Project Cost:

The main project components consist of 4 new potable water ASR wells drilled into the PZ3 (top of the Suwannee formation); the associated piping and discharge pumps; treatment (disinfection) and transmission piping to the existing Carlton Facility and possibly connection to the proposed regional integrated loop system.

The estimated cost of the project is $1.02/1,000 gallons.

Evaluation for Configurations

Yield: This project was evaluated and determined to have possibility of providing 2 mgd of potable water to meet the County's and regional needs.

Water Quality/Compatibility: The treated water quality from the ASR system is expected to meet drinking water requirements and is considered compatible with the County's existing system and the regional system.

Permittability: It is anticipated that a construction permit for the proposed ASR wells can be obtained. Cycle testing with water quality testing of the ASR system will be required prior to an operating permit being issued. ASR is currently in use at the PR/MWRSA Peace River Facility, and is compatible with the SWFWMD's Regional Water Supply Plan and draft SWUCA Recovery Plan. Discussion of this project with the District has indicated that there are no known impediments to this project, subject to the project meeting District Rule criteria.

One potential issue is the mobilization of heavy metals from underground aquifers when using an ASR system. The Department of Environmental Protection is currently permitting construction and testing of ASR wells, however, approvals to place the wells into service are not currently being issued unless the recovered water meets drinking water regulations.

Schedule: The County's annual average water sources exceed demand through the year 2023. This project would provide water to the region if implemented. The implementation schedule for this project indicates a period of approximately 4 years to develop, design and construct the project. It is considered that adequate time is available for implementation of this project.

Cost: The cost of the project was estimated as $1.02/1000 gallons. This cost is considered reasonable. It is possible that SWFWMD co-funding may be available for portions of this project, but has not been evaluated for this study.

Potential Environmental Impact: Construction activities associated with the project have impacts that must be mitigated to the extent that the environment is impacted. The project is not expected to have any adverse impact to ground waters.

Location of the project allows for emergency supply capabilities, demand management and rotational capacity for the region through the existing pipeline connection Sarasota County to the PR/MRWSA or the proposed regional integrated loop project.

Through interconnections, the project can help meet regional demand. The project yield is from surface water, which is considered by the District to be an alternative source. The water quality from this source is compatible with the local water supplier and can be used regionally with minimal additional treatment. The implementation schedule for this project will allow it to be constructed ahead of its required implementation date. The project cost is considered reasonable.

For these reasons, this project will be considered for configurations for this study.

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Project Evaluation for Configurations

WPA - Project ID No.: 78	**Project Name**: Sarasota Co./Venice Gardens WTP Upgrade	**Basin/Watershed:** Manasota/ Southern Coastal

Project Description:

This project consists of replacing the existing lower efficiency membrane treatment trains at the Venice Gardens Water Treatment Plant with higher efficiency membranes resulting in an increased potable production from the existing water use permits. It is anticipated that the County could gain an additional 1.0 mgd with the proposed improvements.

Project Yield: 1.0 MGD

Project Cost:

The main project components for this project include the upgrading of the existing membranes. This project will benefit Sarasota County by providing more water through more efficient treatment. The project is estimated to have a cost of $1.00 or less/1000 gallons as determined by the County's consultant. Comparative project cost information was not calculated by the project team.

Evaluation for Configurations

Yield: This project was evaluated and determined to providing 1 mgd of potable water to meet the County's and regional needs.

Water Quality/Compatibility: This project is to increase the yield of an existing facility, by increasing treatment efficiency. The treated water quality is expected to meet drinking water requirements and is compatible with the County's existing system.

Permittability: No water use permitting is required. A FDEP construction permit for the water plant will be required. No changes to the existing water use permit or injection well permits are anticipated.

Schedule: The County's annual average water sources exceed demand through the year 2023. This project would provide water to the County and possibly the region if implemented. The implementation schedule for this project indicates a period of approximately 2 years to develop, design and construct the project. It is considered that adequate time is available for implementation of this project.

Cost: The cost of the project is estimated as $1.00/1000 gallons. This cost is considered reasonable.

Potential Environmental Impact: No environmental impacts are expected from this project. The amount of water disposed of through the injection wells should be reduced with this project.

Location of the project allows for emergency supply capabilities, demand management and rotational capacity for the region through the existing pipeline connection of Sarasota County to the PR/MRWSA or the proposed regional integrated loop project.

The project can help meet regional demand by making water available to the regional loop at Carlton WTP. The project yield is from existing permitted ground water and is considered as being drought-proof. The water quality from this source is compatible with the local water supplier and can be used regionally with minimal additional treatment. The project is assumed to be permittable since the County will be gaining better efficiency with their existing system. The implementation schedule for this project will allow it to be constructed ahead of its required implementation date. The project cost is considered reasonable.

For these reasons, this project will be considered for configurations for this study.

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WPA - Project ID No.: 79	**Project Name**: Sarasota Co./Expansion of Carlton Reserve Wells	**Basin/Watershed:** Manasota/Myakka River

Project Description:

This project consists of construction of new water supply wells on the Carlton Reserve to discharge to the County's existing elecctrodialysis reversal (EDR) treatment plant. The Carlton water treatment plant currently draws brackish water from the Intermediate and Upper Floridan aquifers and treats the water using the EDR membrane technology. The current Water Use Permit allows an average daily groundwater withdrawal of 7.303 MGD and a peak month of 9.625 MGD. With a pretreatment efficiency rating of 80%, there is a maximum permitted allocation of 7.7 MGD of finished water. The rated plant capacity is 12 MGD. This project proposes to utilize the plant's additional capacity by obtaining a WUP modification to allow for construction of eight new wells to withdraw a minimum of 5.5 MGD with an anticipated treated yield of 4.0 MGD.

Project Yield: 4.0 MGD

Project Cost:

The main project components consist of 8 new potable water wells constructed to the Suwannee formation, two additional monitoring wells (1 into the Suwannee and 1 into the Intermediate); one additional Injection well (into the Avon Park formation); two monitoring wells for the injection well and the associated discharge piping.

The estimated cost of the project is $1.23/1,000 gallons, which includes the new wells, pipelines, and the County's reported cost of treatment.

Evaluation for Configurations

Yield: This project has been proposed as a 4 mgd source. With proper design and operation of the wellfield within its permitted limits, it is not anticipated that long-term degradation of the raw water supply would occur.

Water Quality/Compatibility: The treated water quality from this source will meet drinking water requirements and is considered compatible with the County's existing ground water system and the regional system.

Permittability: The SWFWMD has indicated that alternative sources of potable water supply should be evaluated prior to the use of new groundwater sources; however, brackish groundwater is identified as a potential source in the SWFWMD's Regional Water Supply Plan. Discussion of this project with the District has indicated concern with development of additional groundwater for this project, although if the project meets District Rule criteria, additional withdrawal may be possible. MFL's for the intermediate aquifer are scheduled to be set in 2005.

Schedule: The County's annual average water sources exceed demand through the year 2023. This project would provide water to the region if implemented. The implementation schedule for this project indicates a period of approximately 4 years to develop, design and construct the project. It is considered that adequate time is available for implementation of this project.

Cost: The estimated cost of the project is $1.23/1,000 gallons. This cost is considered reasonable.

Potential Environmental Impact: Construction activities associated with the project may have impacts that must be mitigated to the extent that the environment is impacted. With proper design and operation of the wellfield, this project should not create adverse environmental impacts through movement of the saltwater interface in groundwater or surface effects. Brine disposal by use of injection wells will prevent surface water impacts. Use of a brackish groundwater source alleviates stress of potable aquifers.

This project provides a significant increment of water. Through the regional loop interconnection, the project also can help meet regional demand. The project yield is from brackish groundwater, which is considered to be a drought-proof source. The water quality from this source is compatible with the local water supplier and can be used regionally with minimal additional treatment. The project is considered to be permittable, subject to meeting District Rule criteria. The implementation schedule for this project will allow it to be constructed ahead of its required implementation date. The project cost is considered reasonable. The potential for environmental impacts as result of this groundwater project can be mitigated through proper design of the project to prevent movement of the saltwater interface.

For these reasons, this project will be considered for configurations for this study.

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WPA - Project ID No.: 82	**Project Name**: City of North Port/Myakkahatchee Creek	**Basin/Watershed:** Manasota/ Myakka River

Project Description:

This project consists of the construction of a one to two MGD treated water ASR system at the City of North Port's existing water treatment plant. For this project, Myakkahatchee Creek water will be pumped directly to the existing water treatment plant for treatment during the rainy months as defined as "Option 2" in the City of North Port's Aquifer Storage and Recovery Feasibility Study prepared by Boyle Engineering and Water Resource Solutions, Inc, September 1999. It was proposed to implement this project in 4 phases. Phase I of the project began in 1999 and was funded by both the City of North Port and the SWFWMD. Phase II of the project was completed in March of 2001 and consisted of obtaining the DEP and SWFWMD permits. Phase III of the project includes construction and testing of one of the ASR and monitoring wells. This phase is currently underway.

Project Yield: The Boyle report indicated that 4 wells would provide an estimated annual average day yield of 1.29 MGD, based on a single well capacity of 1.0 MGD. It was estimated that, under these conditions, pumping to the ASR wells would occur approximately 154 days per year or 40 percent of the year and retrieval from the ASR wells would occur 192 days per year.

Project Cost:

The main project component for this project is the construction of four new potable water ASR wells, a new raw water pumping and piping system that will increase pumping capacity to 4.0 MGD from Myakkahatchee Creek to the WTP and a new ASR transfer pumping station.

The estimated cost of the project is $3.66/1,000 gallons, based on the analysis conducted in the Boyle Study ($3.05/1,000 gallons in September 1999). This cost is not directly comparable to the other cost estimates used in this Study since Boyle's estimation assumes use of the City's existing facilities.

Evaluation for Configurations

Yield: This project was evaluated and the yield of 1.29 mgd by the City's consultant determined to be reasonable. Although this yield is relatively low for a regional project, the additional yield exceeds the projected water supply deficit of 0.85 mgd during the planning period. For this reason, the yield is considered adequate and will allow the City to meet its water supply needs. The additional yield also will allow the City to operate its water treatment plant during all of the year, which will help the City solve the operational problems associated with its current period where there is no flow in Myakkahatchee Creek.

Water Quality/Compatibility: The treated water quality from this surface water source will meet drinking water requirements and is considered compatible with the City's existing system and the regional system.

Permittability: It is anticipated that a permit for the proposed additional yield from Myakkahatchee Creek could be obtained. Seasonal harvesting of high flows from surface water bodies, treatment of those flows and storage of the excess water using ASR is currently in use at the PRMWRSA Peace River Facility, and is compatible with the SWFWMD's Regional Water Supply Plan and draft SWUCA Recovery Plan. Discussion of this project with the District has indicated that there are no known impediments to this project, subject to the project meeting District Rule criteria.

One potential issue is the mobilization of heavy metals from underground aquifers when using an ASR system. The Department of Environmental Protection is currently permitting construction and testing of ASR wells, however, approvals to place the wells into service are not currently being issued unless the water meets drinking water regulations. The City is currently constructing ASR wells. Should there be an issue with metal mobilization, the City should have ample notice for modifications to its planning prior to the anticipated water supply deficit.

Schedule: The City's annual average demand exceeds the capacity of its current source in approximately 2020. The implementation schedule for this project indicates a relatively short period of approximately 2 years to construct the project, which is underway. The City is implementing this project in advance of its water supply deficit, in order to alleviate operational problems associated with periods of no flow in Myakkahatchee Creek

Cost: The cost of the project was estimated as $3.66/1000 gallons. This cost is considered reasonable, as it solves operational problems at the City's facility and helps the City meet is water supply deficit. It is possible that SWFWMD co-funding may be available for portions of this project, but has not been evaluated for this study.

Potential Environmental Impact: Construction activities associated with the project have impacts that must be mitigated to the extent that the environment is impacted. The yield analysis indicated the likelihood that sufficient water is available for the proposed project. No new water withdrawal is proposed under this project. For these reasons, the potential environmental impact is considered acceptable.

Through interconnections, the project also can help meet regional demand. The project yield is from surface water, which is considered by the District to be an alternative source. The water quality from this source is compatible with the local water supplier and can be used regionally with minimal additional treatment. The project is considered to be permittable, subject to meeting Department of Environmental Protection and District Rule criteria. The implementation schedule for this project will allow it to be constructed ahead of its required implementation date. The project cost is considered reasonable. The proposed withdrawals are within the City's existing Water Use Permit.

For these reasons, this project will be considered for configurations for this study.

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WPA - Project ID No.: 90	**Project Name**: City of Venice/Seawater Desalination	**Basin/Watershed:** Manasota/ Southern Coastal

Project Description:

The SWFWMD Regional Water Supply Plan (RWSP) identified an option to develop 20 mgd of potable water in the general vicinity of the Venice Airport. The site was chosen because it is near areas of water demand and has access to potential intake and discharge sites in the Intercoastal Waterway and Gulf of Mexico. The site is also located near an existing water treatment plant, which is interconnected to the Sarasota County Water System and may provide a point for distribution of product water. The RWSP concept has been modified for this analysis to consider the use of injection wells for reject water disposal in lieu of a surface water discharge.

Project Yield: 20.0 MGD. Additional yields were considered, as follows: 5 MGD and 10 MGD.

Project Cost:

The main project components for this project include the construction of a new desalination facility, including a deep injection wells for reject water disposal, and the associated transmission pipelines.

The estimated cost of the project for the three sizes considered are as follows: 5 MGD, $4.58/1,000 gallons; 10 MGD, $3.84/1000 gallons; and 20 MGD, $3.27/1000 gallons. These costs do not assume any co-funding of capital portions of the project.

Evaluation for Configurations

Yield: Three plant capacities (5 MGD, 10 MGD and 20 MGD) were considered. The water source for this project has unlimited quantity; long-term degradation of the raw water quantity or quantity is not considered likely. This source is considered "drought proof".

Water Quality/Compatibility: The raw water is seawater obtained from the Gulf of Mexico. Due to the relatively small yield when compared to the virtually unlimited supply of seawater, cumulative impacts resulting from the development of this project would be limited to the potential long-term impacts associated with concentrate disposal. The treated water will be aggressive because of low dissolved solids, which will require blending with other treated water or chemical adjustment prior to use. The treated water quality from this source will meet drinking water requirements and is considered compatible with existing water systems and the regional system if the product water is chemically adjusted.

Permittability: This project is considered permittable. One of the major concerns with projects of this type is the discharge of reject water to surface waters. This project will utilize deep injection wells for reject water disposal. The project is considered an alternative source, and is consistent with the draft SWUCA Recovery Plan. The purpose of this water supply development is for meeting future needs, providing emergency supply and rotational capacity.

Schedule: This project would be developed to meet regional water needs. The implementation schedule for this project indicates a period of approximately 7 years to develop, design and construct the project. It is considered that adequate time is available for implementation of this project.

Cost: The estimated cost of the project for the three sizes considered are as follows: 5 MGD, $4.58/1,000 gallons; 10 MGD, $3.84/1000 gallons; and 20 MGD, $3.27/1000 gallons.

Potential Environmental Impact: Construction activities associated with the project have impacts that must be mitigated to the extent that the environment is impacted. The major environmental concern (reject water disposal to surface waters) is mitigated by the use of deep injection wells. The project is proposed adjacent to the City of Venice airport. The acceptability of this type of facility in the City must be determined. The project allows for emergency supply capabilities and rotational capacity for the region through providing a drought-proof water supply. Use of seawater source alleviates stress of potable aquifers.

The project provides the same benefits as the proposed seawater desalination project at Port Manatee. This project, however, has not been identified by the local water supplier as a project needed to meet their demand. Previous input from the City of Venice (July 2004 Alliance Board meeting) indicated that the project might not be acceptable to local residents. Use of the Port Manatee desalination location provides advantages, as follows: the location helps provide water to meet local water supply needs of Manatee County; and the location at a port is a more appropriate location. The project may be considered for the future, should other projects selected for configuration evaluation prove infeasible.

Water Planning Alliance
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Project Evaluation for Configurations

WPA – Project ID No.: 97	**Project Name**: Charlotte Co./Brackish Groundwater RO	**Basin/Watershed:** Peace River/ Charlotte Harbor

Project Description:

This project consists of the development of a new groundwater supply from wells in the Intermediate and/or Upper Floridan Aquifer with small brackish water Reverse Osmosis (RO) facility. Charlotte County is currently pursuing this alternative and has retained a consultant to determine the feasibility of construction of a new brackish water reverse osmosis water supply. Two potential sites and sizes were identified in the County's Water Management Plan prepared by Dufresne-Henry, Inc., September 2002. These two sites are the northeast Rotonda area and the Mid-County (Greater Port Charlotte) area at an estimated capacity of 3 and 5 mgd respectively.

Project Yield: For the purpose of this report, the 5.0 MGD yield facility is considered.

Project Cost:

The main project components for this project include the wells and pumps; the RO treatment plant; Storage facility; transmission piping and reject water disposal system.

The estimated treatment cost of the project as calculated by Greeley and Hansen is $2.65/1,000 gallons for 5 MGD of yield.

Evaluation for Configurations

Yield: This project has been proposed as a 5 mgd source. With proper design and operation of the wellfield within its permitted limits, it is not anticipated that long-term degradation of the raw water supply would occur.

Water Quality/Compatibility: Groundwater supply facilities will be designed and operated at yields to ensure consistent water quality over the long term. The disposal wells will need to be constructed for the brine reject water. The treated water will be aggressive because of low dissolved solids, which will require blending with other treated water or chemical adjustment prior to use. The treated water quality from this source will meet drinking water requirements and is considered compatible with the County's existing ground water system and the regional system if the product water is chemically adjusted.

Permittability: It is anticipated that a permit for the wellfield and disposal well could be obtained. The SWFWMD has indicated that alternative sources of potable water supply should be evaluated prior to the use of new groundwater sources; however, brackish groundwater is identified as a potential source in the SWFWMD's Regional Water Supply Plan. MFL's for the Intermediate Aquifer are scheduled to be set in 2005. This project is not located in the SWFWMD designated most impacted area of the SWUCA. Therefore, there are fewer issues in permitting with respect to this new groundwater supply. Discussion of this project with the District has indicated that there are no known impediments to this project, subject to the project meeting District Rule criteria. One of the major concerns with projects of this type is the discharge of reject water or brine to surface waters. This project will utilize deep injection wells for brine disposal.

Schedule: The County's annual average demand exceeds the capacity of its current source in approximately 2016. The implementation schedule for this project indicates a period of approximately 5 years to develop, design and construct the project. It is considered that adequate time is available for implementation of this project.

Cost: The estimated cost of the project is $2.65/1,000 gallons. This cost is considered reasonable.

Potential Environmental Impact: Construction activities associated with the project have impacts that must be mitigated to the extent that the environment is impacted. With proper design of the wellfield, this project should not create adverse environmental impacts through movement of the saltwater interface in groundwater or surface effects. Brine disposal by use of injection wells will prevent surface water impacts. Use of a brackish groundwater source alleviates stress of potable aquifers.

This project provides a significant increment of water. The project also can help meet regional demand. The project yield is from brackish groundwater, which is considered to be drought-proof. The project is considered to be permittable, subject to meeting District Rule criteria. The implementation schedule for this project will allow it to be constructed ahead of its required implementation date. The project cost is considered reasonable. The potential for environmental impacts as result of this groundwater project can be mitigated through proper design of the project to prevent movement of the saltwater interface.

For these reasons, this project will be considered for configurations for this study.

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Project Evaluation for Configurations

WPA - Project ID Nos.: 113-117	**Project Name**: Punta Gorda/Facility Expansion	**Basin/Watershed:** Peace River/Peace River

Project Description:

This project consists of a combination of improvements or additions to the City of Punta Gorda's existing potable water supply facility to increase the yield from Shell and Prairie Creeks. These im provements include expansion of the water treatment plant capacity from the existing design capacity of 8.0 mgd; expansion of the existing ASR well system from the existing 4 wells to increase finished water storage; construction of a new off-line reservoir for increased raw water storage, improvements to the existing in-line reservoir structure to increase its reliability, and an increase in the raw water annual average yield of Shell/Prairie Creek from 5.36 mgd.

Project Yield: The analysis conducted for this study indicated up to a 10.0 MGD annual average yield in addition to the existing 5.36 mgd annual average yield.

Project Cost:

The main project components for this project include the expansion of the existing water treatment plant; construction of a new off-line reservoir; construction of ASR wells; construction of a pump station; and the piping associated with the improvements.

The estimated cost of the project is $3.14/1,000 gallons, based on providing new facilities that will provide an annual average yield of 10 mgd. This cost is not representative of modifications to the City's existing facility (such as improvement to the existing reservoir and its re-rating) that may provide additional incremental capacity at a lower cost than that representative of water produced for regional use.

Evaluation for Configurations

Yield: This project was evaluated and determined to have possibility of providing up to an additional 10 mgd of potable water to meet the City's needs and possibly regional needs.

Water Quality/Compatibility: The treated water quality from this surface water source will meet drinking water requirements and is considered compatible with the City's existing system and the regional system.

Permittability: It is anticipated that a permit for the proposed additional yield from Prairie and Shell Creeks could be obtained. Seasonal harvesting of high flows from surface water bodies, treatment of those flows and storage of the excess water using ASR is currently in use at the PR/MWRSA Peace River Facility, and is compatible with the SWFWMD's Regional Water Supply Plan and draft SWUCA Recovery Plan. Discussion of this project with the District has indicated that there are no known impediments to this project, subject to the project meeting District Rule criteria.

One potential issue is the mobilization of heavy metals from underground aquifers when using an ASR system. The Department of Environmental Protection is currently permitting construction and testing of ASR wells, however, approvals to place the wells into service are not currently being issued unless the recovered water meets drinking water regulations.

Schedule: The City's annual average demand exceeds the capacity of its current source in approximately 2013. The implementation schedule for this project indicates a period of approximately 7 years to develop, design and construct the project. It is considered that adequate time is available for implementation of this project.

Cost: The cost of a 10 mgd expansion was estimated as $3.14/1000 gallons. This cost is considered representative of an 8 mgd expansion also.

Potential Environmental Impact: Construction activities associated with the project have impacts that must be mitigated to the extent that the environment is impacted. The yield analysis indicated the likelihood that sufficient water is available for the proposed withdrawal. Any proposed withdrawal must meet District Rule criteria to obtain a permit. The facility expansion would not include impacts in new areas, however, construction of an approximate 2 billion gallon, 400-acre, reservoir site will require either on-site or off-site mitigation. For these reasons, the potential environmental impact is considered acceptable.

This project provides a significant increment of water. Through interconnections, the project also can help meet regional demand. The project yield is from surface water, which is considered by the District to be an alternative source. The water quality from this source is compatible with the local water supplier and can be used regionally with minimal additional treatment. The project is considered to be permittable, subject to meeting District Rule criteria. The implementation schedule for this project will allow it to be constructed ahead of its required implementation date. The project cost is considered reasonable. The potential for environmental impacts as result of this project can be mitigated by on site or off-site or "banking" of mitigation credits. The surface water withdrawal impacts have been considered by use of conservative assumptions for surface water withdrawals; additional environmental studies to determine the safe yield will be required during project design.

For these reasons, this project will be considered for configurations for this study.

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Regional System Planning and Engineering Study
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Project Evaluation for Configurations

WPA – Project ID No.: 121	**Project Name**: DeSoto County/Radial Well Surficial	**Basin/Watershed:** Peace River/Peace River

Project Description:

This project consists of construction of a 2.0 MGD water supply source utilizing a horizontal well collection system withdrawing from the surficial aquifer within DeSoto County. It is proposed to locate the horizontal wells at the existing Department of Juvenile Justice's (formerly the G. Pierce Wood Memorial Hospital Facility) water treatment plant. The existing facility (currently under construction by DeSoto County) is a 500,000 GPD RO (membrane) plant located off State Road 31 in DeSoto County.

Project Yield: 2.0 MGD

Project Cost:

The main project components consist of a new horizontal (radial) well collector with a 2 MGD capacity and either upgrading the existing RO plant to treat the groundwater, or construct a new conventional water treatment plant and discharge into the existing distribution system at the Facility.

The estimated cost of the project is $2.73/1,000 gallons, assuming that water treatment is by Reverse Osmosis (RO) and all new facilities, including a reject water injection well, are constructed. The cost of the project is $1.85/1000 gallons if the new surficial aquifer source is treated at a conventional water treatment plant.

Evaluation for Configurations

Yield: This project has been proposed as a 2 mgd source of treated water. With proper design and operation of the wellfield within its permitted limits, it is not anticipated that long-term degradation of the raw water supply would occur; however, a surficial aquifer water source may be subject to the effects of lowered water tables in drought conditions.

Water Quality/Compatibility: The treated water quality from this source will meet drinking water requirements and is considered compatible with the County's existing treated brackish ground water system and with water obtained from the regional system.

Permittability: This project will require a water use permit from the SWFWMD for developing the new water. The project is located in the SWUCA, but not in the most impacted area. The SWFWMD 40D-2.301 permitting rules will need to be addressed. A sensitive issue related to those rules is the potential impact to wetlands and the surficial aquifer.

Schedule: The implementation schedule for this project indicates a period of approximately 4 years to develop, design and construct the project.

Cost: The estimated cost of the project is $2.73/1,000 gallons, assuming that water treatment is by Reverse Osmosis (RO) and all new facilities, including a reject water injection well, are constructed. The cost of the project is $1.85/1000 gallons if a conventional treatment plant is utilized. The cost of $2.73/1000 gallons is assumed for configuration analysis because the County has indicated interest in the RO treatment.

Potential Environmental Impact: Construction activities associated with the project have impacts that must be mitigated to the extent that the environment is impacted. With proper design of the wellfield, this project should not create adverse environmental impacts through drawdown of the surficial aquifer under wetlands or other surface water bodies. Use of a surficial groundwater source alleviates stress of potable aquifers.

The project yield is from water within the surficial aquifer, which is considered by the District to be an alternative source. The water quality from this source is compatible with the local water supplier and can be used regionally with minimal additional treatment. The project is considered to be permittable, subject to meeting District Rule criteria. The implementation schedule for this project will allow it to be constructed ahead of its required implementation date. The project cost is considered reasonable. The potential for environmental impacts as result of this project can be mitigated through proper design and monitoring of the surrounding wetlands and wells.

For these reasons, this project will be considered for configurations for this study.

Water Planning Alliance
Regional System Planning and Engineering Study
Phase II - Future Supply Assessment and Prioritization
Project Evaluation for Configurations

WPA - Project ID No.: 125	**Project Name:** DeSoto County/Long Island Marsh	**Basin/Watershed:** Peace River/Peace River

Project Description:

This project consists of restoration of agricultural land within southeast DeSoto County known as the "Long Island Marsh" area. The property is currently privately owned and contains approximately 6000 acres. The SWFWMD has evaluated the marsh for land acquisition and restoration under the Florida Forever Program and United States Department of Agriculture Wetlands Reserve Program. Currently, a portion of the surface water from the area is diverted from its historical flow path to the Shell/Prairie Creek watershed to the SFWMD watershed through the man-made surface water improvements made at the marsh for agriculture. The proposed SWFWMD restoration project would redirect these diverted flows back to the Shell/Prairie Creek system, making additional surface water potentially available for use.

Project Yield: Undetermined. Additional hydrological data will need to be obtained prior to estimating an approximate yield.

Project Cost:

The proposed restoration project is being considered by the SWFWMD independently of this study. The proposed restoration project would increase water flow to the Shell/Prairie Creek system. Costs for capturing and treating this water would be similar to those identified for Project No. 113 – 177.

Evaluation for Configurations

Yield: No flow information from gauging stations is available to determine potential yields from restoration of natural flow patterns from the proposed restoration project. Although not quantified, this project has potential of increasing the yield and lowering the cost of water treatment facilities constructed on Shell and Prairie Creeks.

Water Quality/Compatibility: The proposed source of water is surface water to recharge the existing Shell/Prairie Creek system. No incompatibilities with the existing surface waters are anticipated. The SWFWMD Report did not indicate any water quality issues with the surface water runoff from the marsh, and indicated that restoration (with retirement of current sod farm groundwater pumping and its runoff) should decrease total dissolved solids and sulfates in the surface water).

Permittability: No water use permitting is required; however the restoration project must be implemented with the agreement of the SWFWMD and the SFWMD. It is reported that the SFWMD does not oppose restoration of the marsh, with its restoration of natural water diversions. Additional water supply developed from the additional source at Shell and Prairie Creeks would have similar regulatory issues as described in Project No. 113-117.

Schedule: The schedule for the restoration project is unknown.

Cost: No direct project cost is associated with the restoration project, as it is being considered independently of this study by the SWFWMD. Costs associated with development of additional water supply from the restoration of historical water flow to the Shell/Prairie Creek systems would be similar to those identified for Project No. 113 –117.

Potential Environmental Impact: The SWFWMD Report has indicated that there is positive environmental impact from the proposed restoration.

This project will not be directly considered for the configurations for this study, because of lack of data concerning the actual quantities of water that may result from the diversion and the fact that restoration of the Long Island Marsh is being separately considered. The project is considered to have positive impact for future water supply of Shell/Prairie Creeks, as it has the potential of increasing low flow conditions in this system and also improving water quality.

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Project Evaluation for Configurations

WPA - Project ID Nos.: 147, 148 and 150	**Project Name:** Peace River Facility Expansion	**Basin/Watershed:** Peace River/ Peace River

Project Description:

This project consists of the construction of improvements to the existing Peace River/Manasota Regional Water Supply Authority's (PR/MRWSA) facility. The improvements include the construction of a new 6.0 billion gallon reservoir and 24 MGD of treatment capacity to provide an ultimate finished water delivery capacity of 32.7 mgd annual average.

Project Yield: 14.7 MGD

Project Cost:

The main project components for this project include the reservoir, water treatment plant expansion and pump station and piping.

The estimated cost of the project is $2.63/1,000 gallons.

Evaluation for Configurations

Yield: The facility has a permit for 32.7 mgd annual average treated water delivery and currently delivers 18 mgd annual average. The additional yield of 14.7 mgd will expand the existing facility up to its permitted limit.

Water Quality/Compatibility: The treated water quality from this surface water source will meet drinking water requirements and is considered compatible with the existing water supply and regional system.

Permittability: No additional water use permitting is required for this project. One potential issue is the mobilization of heavy metals from underground aquifers when using an ASR system. No new wells are proposed under this project.

Schedule: The schedule for this project shows increments of the additional capacity being available from the year 2009 though 2013. This additional capacity has been reflected in the water supplies for Charlotte, DeSoto and Sarasota Counties, and the City of North Port.

Cost: The cost of the 14.7 mgd expansion was estimated as $2.63/1000 gallons. This cost is considered reasonable. It is possible that SWFWMD co-funding may be available for portions of this project, but has not been evaluated for this study.

Potential Environmental Impact: Construction activities associated with the project have impacts that must be mitigated to the extent that the environment is impacted. This project is an expansion of an existing facility, for which the Water Use Permit exists. For these reasons, the potential environmental impact is considered acceptable.

This project provides a significant increment of water. The project will meet regional demand. The project yield is from surface water, which is considered by the District to be an alternative source. The water quality from this source is used regionally with no additional treatment. The project already has a water use permit. There are no additional surface water withdrawals proposed.

For these reasons, this project will be considered for configurations for this study.

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Phase II - Future Supply Assessment and Prioritization
Project Evaluation for Configurations

WPA - Project ID No.: 155	**Project Name**: Water Use Permit Conversions	**Basin:** Peace River and Manasota

Project Description:

This project proposes to acquire water use permits from existing permittees whom currently withdraw from the Floridan Aquifer. These permits would be replaced by 50 percent of the historical use with a new Water Use Permit at a water supply facility.

Project Yield:

Unknown. The amount of additional water supply available through such a project is undefined. It is anticipated that as agricultural areas adjacent to currently developed areas are displaced with urbanization, that some quantity of groundwater usage will also be available for this type of project.

Project Cost:

The cost to implement this policy is unknown. It is anticipated that the cost may be similar to that described for Project 31, and is anticipated to be less than $1.00/1000 gallons.

Evaluation for Configurations

Yield: This project has an unknown yield. Water Use Permits would be purchased from existing users. Well credits from those Water Use Permits are proposed to allow development of new groundwater pumping by a public water supplier at a 2:1 ratio.

Water Quality/Compatibility: The treated water quality from this ground water source will meet drinking water requirements and is likely to be compatible with water systems and the regional system.

Permittability: This project will require a new Water Use Permits. The SWFWMD has indicated that alternative sources of potable water supply should be evaluated prior to the use of new groundwater sources. The draft Southern Water Use Caution Area (SWUCA) Recovery Plan has not been adopted; however, the recent SWFWMD Governing Board (October 2004) included discussion of not allowing transfers of Water Use Permits where a change in ownership or use is anticipated, which would be required under this project. It is not known at this time what provisions in the draft SWUCA Recovery Plan specific to this project will be adopted. The permittability of this project is in question until the draft SWUCA Recovery plan is adopted.

Schedule: No implementation schedule has been developed for this project, as no potential transfers have been identified.

Cost: The cost of this type of source is estimated as less than $1.00/1000 gallons, similar to that of Project Nos. 31, 32 and 33. This cost is considered reasonable.

Potential Environmental Impact: Construction activities associated with the project may have impacts that must be mitigated to the extent that the environment is impacted. This project may be a "net benefit" project, if reduction of overall groundwater pumping in the area is achieved.

Although the project may provide the benefit of overall reduction of groundwater pumping, the permittability of the project cannot be determined until the draft SWUCA Recovery plan rules are adopted. At that time, a re-evaluation of the project feasibility should be made. This project will not be considered for the configurations for this study, because of the uncertainty of the permitting and potential policy promulgation. The project may be considered for the future, should other projects selected for configuration evaluation prove infeasible.

WATER PLANNING ALLIANCE
REGIONAL SYSTEM PLANNING AND ENGINEERING STUDY
PHASE II - FUTURE SUPPLY ASSESSMENT AND PRIORITIZATION

PROJECT LIST FOR CONFIGURATION EVALUATION
AS DEVELOPED BY TAC 07-08-04

LOCATION/ CATEGORY	Project List ID #	Water Supply Projects - Project Name and Description		Project Type	Potential Average Yield (MGD)	Reference Document	Benefit Type Description	SWFWMD Basin/ Watershed
NEW WATER SOURCE PROJECTS								
BRADEN RIVER	53	Braden River	Withdraw Raw Water from Braden River at Ward Lake during high flow and pump into either brackish water ASR Wells (for Future Treatment for Public Supply and Saltwater Intrusion Control), pump into Brackish Water ASR wells for MARS system or treat and pump into freshwater ASR wells for potable.	Raw or Potable Water ASR for Irrigation or Potable Supply	5 -10 MGD	Surface Water and Storm water Technical Memo 3, SWFWMD, Sept. 14, 1999	Provides additional potable water as one option, or potable water offsets if used for supplementing MARS reclaimed system. Potential for regional benefit through new interconnections.	Manasota/Manatee River
COW PEN SLOUGH	✓ 63	Cow Pen Slough - Potable and Non-Potable Use	Surface storage of diverted excess flows, Full Treatment or Partial Treatment at WTP then Pump to Freshwater Aquifer ASR or Brackish Water ASR for Potable or Irrigation respectively.	Surface Storage and Treatment or Potable Water ASR	4 to 10 MGD	TAC Input (Sarasota County), based on SWFWMD documents	Provides additional potable water as one option, or potable water offsets if used for supplementing reclaimed system or well credits if used for replacement of agricultural irrigation. Potential for regional benefit through new interconnections.	Manasota/Southern Coastal
DESOTO COUNTY	121	DeSoto County - Surface Water Supply	Construct a new 2.0 MGD Surface Water Supply Facility via radial collectors	Additional Supply	2 MGD	TAC Input DeSoto County	Provides additional potable water. Potential for regional benefit through existing interconnections or new interconnections.	Peace River/Peace River
	125	DeSoto County - Long Island Marsh Water Supply	Acquisition of approximately 1 billion gallon water supply source from Long Island Marsh.	Additional Supply	-	TAC Input DeSoto County	Provides additional raw water storage. Potential for regional benefit if associated with treatment with connections to regional system.	Peace River/Peace River
MYAKKA-HATCHEE CREEK	82	Myakkahatchee Creek	Augment Water Storage at North Port's Water Supply Facility on Big Slough by Withdrawing Additional Water During High Stream Flows. Provide Level 1 treatment and pump to Freshwater Aquifer ASR Wells	Additional Supply, Potable ASR	2.5 MGD	Surface Water and Storm water Technical Memo 3, SWFWMD, Sept. 14, 1999	Provides additional potable water. Potential for regional benefit through existing interconnections or new interconnections.	Manasota/ Myakka River
PEACE RIVER	147, 148 AND 150	Peace River Regional Facility Expansion - PR/MRWSA	Increase volume of raw water reservoir from existing 625 MG to 2 BG to increase raw water storage capacity. Construct 2 ASR test wells for monitoring associated with finished water storage. Construct 26 additional ASR wells and increase treatment capacity from 24 MGD to 54 MGD to increase annual average delivery capacity.	Raw Water Storage, Potable water Storage and Treatment	14.7 MGD	List of SWFWMD FY2005 Coop. Fund. Submittals	Provides additional potable water to PR/MRWSA members. Part of expansion of existing 18 MGD (AADF) facility to 32.7 MGD (AADF) facility.	Peace River/Peace River
SEAWATER DESALINATION	44	Port Manatee Seawater Desalination	Seawater Desalination plant, initial capacity of 10 MGD and expandable to 20 MGD, at the Port Manatee on Tampa Bay.	Additional Supply	5 MGD (Supply) and 5 MGD (Emergency)	TAC Input (Manatee Co. Water Supply Plan)	Provides additional potable water. Potential for regional benefit through existing interconnections or new interconnections.	Manasota/Southern Coastal
	90	Venice Seawater Desalination	Seawater Desalination plant, up to 20 MGD, near the Venice Airport.	Additional Supply	Up to 20 MGD	Regional Water Supply Plan, SWFWMD, Board Approved August 2001, Page 230	Provides additional potable water. Potential for regional benefit through existing interconnections or new interconnections.	Manasota/Southern Coastal
SHELL CREEK	113 - 117	City of Punta Gorda Potable Water Facility Expansion	Project components may include expansion of water treatment plant capacity (from 8 MGD to 12 MGD or greater); expansion of ASR well system (from 4 existing wells to 8 total wells) for finished water storage, construction of a new off-line reservoir for raw water storage, improvements to existing in-line reservoir structure, and an increase of raw water yield of Prairie/Shell Creek source (from existing yield of 7.8 MGD to proposed yield of 17.8 MGD)	Surface Water Storage, Potable Water Treatment and Storage	4 to 10 MGD	TAC Input and CIP (Punta Gorda)	Provides additional potable water. Potential for regional benefit through new interconnections.	Peace River/Peace River

WATER PLANNING ALLIANCE
REGIONAL SYSTEM PLANNING AND ENGINEERING STUDY
PHASE II - FUTURE SUPPLY ASSESSMENT AND PRIORITIZATION

PROJECT LIST FOR CONFIGURATION EVALUATION
AS DEVELOPED BY TAC 07-08-04

LOCATION/ CATEGORY	Project List ID #	Water Supply Projects - Project Name and Description		Project Type	Potential Average Yield (MGD)	Reference Document	Benefit Type Description	SWFWMD Basin/ Watershed
LITTLE MANATEE RIVER	13	Manatee County Lake Parrish - FPL Manatee Plant Cooling Pond.	FPL operates a pumping facility that currently diverts an annual average of approximately 8.9 MGD from the Little Manatee River. This project would increase the diversion rate during periods of high river flow, store the additional water within the existing reservoir and provide for agricultural use. The increased river withdrawals would remain within FPL's existing permit. Potable water would be developed from agricultural well credits.	SW for Ag offset + GW from credits for Potable Supply	2.25 MGD	TAC Input (Manatee County Water Supply Plan) based on SWFWMD documents	Provides additional potable water. Potential for regional benefit through existing interconnections or new interconnections.	Manasota/Little Manatee River
TATUM SAWGRASS	27, 28 AND 29	Tatum Sawgrass	Project components may include diversion of surface water the Myakka River and/or Flatford Swamp during periods of high flow; development of a natural reservoir at Tatum Sawgrass; distribution to agriculture with potable supply development from associated groundwater credits; or treatment to potable standards for freshwater injection with ASR wells for aquifer recharge or potable use.	Raw Water Storage, Irrigation Supply or Potable Water Treatment and Storage	Up to 11.4 MGD for Potable and Ag. Irrigation	Surface Water and Storm Water Technical Memo 3, SWFWMD, Sept 14, 1999; and TAC Input (Manatee Co. Water Supply Plan)	Provides additional potable water. Potential for regional benefit through existing interconnections and new interconnections.	Manasota/ Myakka River
BRACKISH GROUNDWATER	45	Manatee County Coastal Brackish RO facilities	Manatee County would develop new coastal wells with small brackish RO facilities from well credits using Floridan and intermediate aquifer as source. Sites will also provide emergency supply.	Additional Supply	6 MGD	TAC Input (Manatee Co. Water Supply Plan)	Provides additional potable water. Potential for regional benefit through existing interconnections or new interconnections.	Manasota
	78	Sarasota County - Venice Gardens Water Treatment Plant Upgrade	Sarasota County - Venice Gardens Water Treatment Plant Upgrade, consisting of replacing lower efficiency membrane treatment with higher efficiency membrane treatment, resulting in increased potable production from existing water use permits.	Additional Supply	2 MGD	Sarasota County's CIP	Provides additional potable water. Potential for regional benefit through existing interconnections or new interconnections.	Manasota/Southern Coastal
	97	Charlotte County Brackish Ground-Water Desalination Option	Proposed 1 MGD facility would incorporate a brackish groundwater wellfield, an RO treatment plant and storage tanks, high service pumping station and a deep injection well. If necessary, develop well credits to offset new source.	Additional Supply	1 MGD	Regional Water Supply Plan, SWFWMD, Board Approved August 2001, Page 224	Provides additional potable water. Potential for regional benefit through new interconnections.	Charlotte Harbor
CARLTON WTP	76	Sarasota County Potable Water Aquifer Storage and Recovery - Sarasota County	4 Potable Water ASR Wells in Vicinity of Carlton WTF to provide an equivalent of 120 day supply.	Potable Water ASR	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Provides additional potable storage, allowing demand management or rotational capacity.	Manasota/Southern Coastal
	79	Sarasota County Expansion of the Carlton Reserve Wells	Add new wells to the Carlton Reserve to discharge to the existing treatment plant in which additional treatment capacity exists.	Additional Supply	4 MGD	TAC Input (Sarasota County)	Provides additional potable water to local entity. Potential for regional benefit through existing interconnections or new interconnections.	Manasota/Southern Coastal
WATER USE PERMIT CONVERSION	31	Manatee County acquisition of well credits/permit transfers	Manatee County would renegotiate the terms of their existing reclaimed water agreements to obtain the associated well credits from the users.	Additional Supply	4 MGD	TAC Input (Manatee Co. Water Supply Plan)	Provides additional potable water. Potential for regional benefit through existing interconnections or new interconnections.	Manasota
	32	Manatee County Developer provided water use permit transfers	Manatee county would implement a policy that would require new developers to transfer existing water use permits to the County in sufficient quantity to meet the increased demand of the proposed development.	Additional Supply	-	TAC Input (Manatee Co. Water Supply Plan)	Provides additional potable water. Potential for regional benefit through existing interconnections or new interconnections.	Manasota
	33	Manatee County Direct Purchase of Water Use Permits	Manatee County would acquire (from a property owner willing to part with their water supply) water use permits from existing permittees whom currently withdraw from the Floridan Aquifer.	Additional Supply	-	TAC Input (Manatee Co. Water Supply Plan)	Provides additional potable water. Potential for regional benefit through existing interconnections or new interconnections.	Manasota
	155	WUP Conversion	Convert Ag WUP to Utilities for Potable Water, with offset amount for overall reduction in groundwater usage.	Additional Supply	-	TAC Input (EWD)	Provides additional potable water in region. Environmental enhancement by reducing groundwater usage.	Peace River and Manasota
				INTERCONNECTION PROJECTS				
	74	Sarasota County / Englewood Water District Potable Water Interconnect - Sarasota County	Potable Water Interconnect between Sarasota County and Englewood Water District	Potable Water System Interconnect	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Interconnection of two entities in the Region for potable supply or transfer.	Manasota/Southern Coastal
	85	Emergency Backup Potable Water Supply Interconnect - Longboat Key	12-inch diameter interconnect pipeline with the City of Sarasota	Potable Water System Interconnect	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Interconnection of two entities in the Region for potable supply or transfer.	Manasota/Southern Coastal

WATER PLANNING ALLIANCE
REGIONAL SYSTEM PLANNING AND ENGINEERING STUDY
PHASE II - FUTURE SUPPLY ASSESSMENT AND PRIORITIZATION

PROJECT LIST FOR CONFIGURATION EVALUATION
AS DEVELOPED BY TAC 07-08-04

LOCATION/ CATEGORY	Project List ID #	Water Supply Projects - Project Name and Description		Project Type	Potential Average Yield (MGD)	Reference Document	Benefit Type Description	SWFWMD Basin/ Watershed
	98	Charlotte County / City of Punta Gorda Water Interconnect - Punta Gorda	Interconnect between Charlotte County and Punta Gorda Potable Water Systems	Potable Water System Interconnect	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Interconnection of two entities in the Region for potable supply or transfer.	Peace River/Peace River
	112	City of Punta Gorda Emergency Interconnect with PR/MRWSA	Interconnect between PR/MRWSA and Punta Gorda Potable Water Systems	Interconnect	-	TAC Input & Punta Gorda's CIP	Interconnection of two entities in the Region for potable supply or transfer.	Peace River/Peace River
	126	DeSoto County - Interconnection with City of Punta Gorda	Interconnection of Water Service with the City of Punta Gorda at DeSoto County Line.	Interconnect	-	TAC Input DeSoto County	Interconnection of two entities in the Region for potable supply or transfer.	Peace River/Peace River
	127	DeSoto County - Interconnection with City of North Port	Interconnection of Water Service with the City of North Port at DeSoto County Line.	Interconnect	-	TAC Input DeSoto County	Interconnection of two entities in the Region for potable supply or transfer.	Peace River/Peace River
	145	Peace River Regional Transmission System Extension - DeSoto County	16-inch diameter Potable Water Transmission Main from the PR/MRWSA Facility to Wal-Mart Distribution Center	Potable Water Transmission	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Regional transmission facility.	Peace River/Peace River
	146	PR/MRWSA/Lettuce Lake Regional Transmission Line - DeSoto County	16-inch diameter potable water pipeline from PR/MRWSA Facility to Lettuce Lake Ave.	Potable Water Transmission	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Regional transmission facility.	Peace River/Peace River
	149	PR/MRWSA/Lettuce Lake Regional Transmission Line - PR/MRWSA	16-inch diameter potable water pipeline from PR/MRWSA Facility to Lettuce Lake Ave.	Potable Water Transmission	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Regional transmission facility.	Peace River/Peace River
	151	Regional Integrated Loop System - PR/MRWSA	Backbone Pipeline for Interconnecting Major Systems	Potable Water Transmission	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Regional transmission facility, connecting PR/MRWSA members and other Regional water suppliers for potable water supply or transfer.	Peace River/Peace River
		RECLAIMED WATER/CONSERVATION PROJECTS SUGGESTED FOR IMPLEMENTATION BY ALLIANCE MEMBERS						
	36	IMC/MARS Storage	Reclaimed water line from a storage pond on IMC-Agrico property in northeast Manatee County to supplement MARS system with potable water offset.	Reclaimed Storage	-	Regional Water Supply Plan, SWFWMD, Board Approved August 2001, Page 165	Decreases potable water demand of local entity, making existing potable water supply available to local entity or potentially available to region through existing or new interconnections. Estimated reclaimed water yield of 15 MGD.	Manasota/Little Manatee River
	38	Manatee County MARS transmission system Improvements	Reclaimed water transmission mains.	Reclaimed Water Trans. System (Potable Offset)	-	Manatee County's CIP	Reclaimed transmission facilities for local entity.	Manasota
	39	FPL/Piney Point/MARS Wet Weather Storage Project - Manatee County	Additional Wet Weather Storage at FPL (Manatee Plant Cooling Pond) and Piney Point, New Pipeline and Pumping Station to supplement MARS system.	Reclaimed Storage and Transmission	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Decreases potable water demand of local entity, making existing potable water supply available to local entity or potentially available to region through existing or new interconnections. Estimated reclaimed water yield of 3.56 MGD.	Manasota/Little Manatee River
	40	Reclaimed Water Distribution to Millbrook Subdivision via MARS Interconnect - Manatee County	Eliminate Existing Irrigation Wells at Millbrook Subdivision, connect to MARS	Reclaimed System Expansion	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Decreases potable water demand of local entity, making existing potable water supply available to local entity or potentially available to region through existing or new interconnections. Estimated potable water offset of 0.0525 MGD.	Manasota
	41	Reclaimed Water Distribution to Briarwood Subdivision via MARS Interconnect (Phase I) - Manatee County	Eliminate use of Potable Water for Irrigation in Briarwood Subdivision by providing Reclaimed via new 6-inch line connecting to an existing MARS transmission line.	Reclaimed System Expansion	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Decreases potable water demand of local entity, making existing potable water supply available to local entity or potentially available to region through existing or new interconnections. Estimated potable water offset of 0.0264 MGD.	Manasota
	42	Alternative Irrigation Source Rebate Program - Manatee County	Provide Incentives to Homeowners and Businesses Using Potable Water for Irrigation to Convert to Shallow Well or Cistern	Public Education/ Assistance	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Decreases potable demand of local entity. Estimated savings of 0.12 MGD.	Manasota

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	65	Celery Fields	Divert Stormwater, Provide Treatment and Storage.	Storage Treatment	-	TAC Input (Sarasota County)	Provides supplemental source for reclaimed system to local entity. Estimated reclaimed water yield of 1.5 MGD.	Manasota/Southern Coastal
	69	Sarasota County Reclaimed ASR Wells	Reclaimed water ASR well system along coastal Sarasota County to enable greater storage and utilization of the reclaimed water flows from interconnected utilities	Reclaimed ASR	-	Regional Water Supply Plan, SWFWMD, Board Approved August 2001, Page 165	Decreases potable water demand of local entities, making existing potable water supply available to local entity or potentially available to region through existing or new interconnections. Estimated potable water offset of 5.6 MGD.	Manasota/Southern Coastal
	71	Sarasota County Reclaimed Interconnect	Interconnection between all of Sarasota County's Reclaimed water systems that are not currently connected	Reclaimed System Interconnect	-	Regional Water Supply Plan, SWFWMD, Board Approved August 2001, Page 165	Decreases potable water demand of local entities, making existing potable water supply available to local entity or potentially available to region through existing or new interconnections. Estimated potable water offset of 8 MGD.	Manasota/Southern Coastal
	75	Sarasota County Surface Water Monitoring Program - Sarasota County	Surface Water Monitoring - Rainfall/Stream Gages	Data Collection	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Monitoring beneficial for future estimations of water availability for region.	Manasota
	84	City of Sarasota - Reclaimed ASR well.	Construct Reclaimed Water ASR Well.	ASR	-	City of Sarasota's Reclaimed CIP	Decreases potable water demand of local entity, making existing potable water supply available to local entity or potentially available to region through existing or new interconnections.	Manasota/Southern Coastal
	86	Water Wise Irrigation Program - Longboat Key	Study / Public Education Project	Study	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Decreases potable demand of local entity.	Manasota
	88	Regional Alternative Irrigation Source Investigation - Longboat Key	Study - Explore Alternative Irrigation Sources	Study	-	List of SWFWMD FY2005 Coop. Fund. Submittals		Manasota/Southern Coastal
	89	Palmetto ASR / Future Regional Transmission System Connection - Palmetto	New ASR Well and new 12-inch diameter reclaimed main for future connection point to regional reclaimed system.	Reclaimed Storage/ Interconnect	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Decreases potable water demand of local entity, making existing potable water supply available to local entity or potentially available to region through existing or new interconnections.	Manasota/Manatee River
	91	Venice Golf and Country Club Storm Water Reuse for Irrigation - Venice Golf and Country Club	Supplement Existing Irrigation System with Captured Stormwater	Stormwater Reuse for Irrigation	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Provides supplemental source for reclaimed system to local entity.	Manasota/Southern Coastal
	92	Englewood Water District - 2nd ASR well	Englewood Water District to construct a second ASR well for Reclaimed Water Capacity	New Reclaimed ASR	-	Englewood Water District's CIP	Decreases potable water demand of local entity, making existing potable water supply available to local entity or potentially available to region through existing or new interconnections.	Manasota/Southern Coastal
	100	Rotonda ASR Well Conversion for Reuse Water - Charlotte County	Convert existing supply wells at the former Rotunda RO plant site into ASR wells for reuse water	Reclaimed ASR	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Decreases potable water demand of local entity, making existing potable water supply available to local entity or potentially available to region through existing or new interconnections.	Peace River/Southern Coastal
	102	Rotonda/Longmarsh Golf Courses	Increase service area of reclaimed distribution to include the Long Meadow and White Marsh golf courses	Reclaimed Transmission	-	Regional Water Supply Plan, SWFWMD, Board Approved August 2001, Page 165	Decreases potable water demand of local entity, making existing potable water supply available to local entity or potentially available to region through existing or new interconnections. Estimated potable water offset of 0.3 MGD.	Peace River/Southern Coastal
	118	DeSoto County Reuse Project - DeSoto County	Wastewater Treatment Plant Upgrades, Expansion of Reuse System	Reclaimed System Expansion	-	List of SWFWMD FY2005 Coop. Fund. Submittals	Decreases potable water demand of local entity, making existing potable water supply available to local entity or potentially available to region through existing or new interconnections.	Peace River/Peace River

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LOCATION/ CATEGORY	Project List ID #	Water Supply Projects - Project Name and Description		Project Type	Potential Average Yield (MGD)	Reference Document	Benefit Type Description	SWFWMD Basin/ Watershed
	154	Optimization and Efficiency Study in Coastal SWUCA	Reclaimed water efficiency study to maximize the utilization of reclaimed water	Study	-	Regional Water Supply Plan, SWFWMD, Board Approved August 2001, Page 165	Study.	Peace River and Manasota
	156	FARMS Program	Facilitating Agricultural Resource Management Systems (FARMS) Program - implement agricultural BMP's within the SWUCA to provide resource benefits that include reduced Floridan aquifer withdrawals.	On-going Program	-	TAC Input	Reduction in agricultural demand through use of Best Management Practices.	Peace River and Manasota
	157	City of Venice Expansion to the Reuse System	Expansion of the City of Venice's residential reuse system to the Island of Venice for approximately 2 MGD of reuse disposal.	Reclaimed Expansion	-	TAC Input (City of Venice 06/03/04)	Decreases potable water demand of local entity, making existing potable water supply available to local entity or potentially available to region through existing or new interconnections.	Manasota/Southern Coastal

Appendix B

WSMPU PROGRESS MEETING MINUTES

PROJECT MEETING MINUTES

Project Name:	Water Supply Master Plan Update	**Date:**	5/25/2005
Client:	Sarasota County	**Project Number:**	6873C.00
Prepared By:	Laura Baumberger		
Reviewed By:	Steve Bupp		
Subject:	Water Supply Master Plan Update Progress Meeting		
Attendees:	*Sarasota County*: Theresa Connor, Dave Cash, George MacFarlane, Jennifer Steadman Ryan		
	PR/MRWSA (representing Water Planning Alliance): Susan Hochuli		
	PBS&J: Pete Putman		
	Carollo Engineers: Bob Cushing, Steve Bupp, Laura Baumberger		

The following is a summary of the project meeting held for the Sarasota County Water Supply Master Plan Update on May 25, 2005. This is our understanding of the subject matter covered in this meeting. If this differs with your understanding, please notify us.

The updated demand projections in Draft TM1 - Water Demand Projections were reviewed.

- The housing growth trends population projections were chosen for future planning scenarios in the WSMPU.
- County comments on Draft TM1 will be sent to Carollo by Friday, May 27. Carollo will then prepare and deliver Final TM1. Carollo will also send a copy of TM1 to McKim & Creed to provide the demands for the hydraulic model.

A brief update of Task 3: Collect Asset Information was given.

- Carollo has completed the majority of site visits for collecting asset information, but there are a few site visits left to conduct (Carlton WTP second visit, Venice Gardens WTP, 2 remaining automatic flushing units, and the City of Venice Interconnect).
- After finishing site visits, Draft TM2 - Water System Assets will be prepared and delivered for County comment. A meeting will be scheduled at end of June to discuss TM2.
- Carollo will give a copy of Final TM2 to McKim & Creed to provide data for the hydraulic model.

The group discussed Task 4: Source Evaluation and how the next TM will evaluate water supply projects for the County, as well as for the region as a whole.

- The Draft Alliance Report summarizing the information collected for the *Regional System Planning and Engineering Study* will be available in early June.
- The purpose of the WSMPU is to evaluate the Alliance projects, as well as other projects not being considered by the Alliance, from a County perspective.
- The WSMPU should identify the projects that the County should complete to meet demands through 2050, as well as those projects that the County should support because they improve the water supply for the region as a whole.
- The WSMPU will use this information to develop a 10-year CIP for initiating some of these projects.
- It should be noted that the projects will fall into one of the of the following categories:
    - Those that the County can develop and control.
    - Those that the County can participate in with partners.
    - Those that the County should support for the Region, although they may not be directly involved.

Criteria for ranking the potential projects were discussed. The criteria were organized into 4 broad categories on which the evaluations will be based. The criteria and sub-criteria include:

- Regional Nature
    - Stakeholder support
    - Public acceptance
    - Potential partners
    - Expandability to provide supply outside current regional boundaries
- Sustainability
    - Reliability
    - Lifecycle costs
    - Environmental opportunities (restoration)
    - Source protection
    - Environmental impact (+ or -)
- Source Analysis
    - Permitability
    - Yield
    - Capital cost per gallon
    - Operating cost per 1000 gallons
    - Certainty of source in the future
    - Timing of supply
- Implementation and Operational Mix Opportunities
    - Geographical location (proximity to demand centers)
    - Drought tolerance/rotating supplies/diversity in sources
    - Availability of grants
    - Expandability by phasing
    - Optimization of existing infrastructure
    - Management flexibility

The next steps in Task 4 will be to:

- Work with the County to identify those projects that are most promising (~20-25).
- Rank those projects in a preliminary evaluation on the 4 major criteria to create a short-list of projects.

- Investigate the short-listed projects (~10) in more detail to provide capital, operational, and lifecycle costs, detailed capacity estimates, and more specific information.

Action Items

1. The County will deliver any comments on Draft TM1 to Carollo Engineers by Friday, May 27.
2. Carollo will incorporate County comments and produce and deliver Final TM1 - Water Demand Projections.
3. Carollo will conduct remaining site visits to Carlton WTP, Venice Gardens WTP, the automatic flushing units in the southern portion of the County, and the City of Venice Interconnect.
4. Carollo will prepare and deliver Draft TM2 - Water System Assets by mid-June.
5. Carollo will meet with County staff to identify the most promising water supply projects from the list of Alliance and County-defined projects.

GE/IONICS ELECTRODIALYSIS RETROFIT INFORMATION

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June 9, 2005

County of Sarasota
Carlton Water Treatment Plant
2015 Cattleman Rd
Sarasota, FL 34232

ATTENTION: **MR. DAVE CASH**
General Manager
Carlton Water Treatment Plant

SUBJECT: **EDR RETROFITTED SYSTEMS PERFORMANCE**

REFERENCE: Upgrading EDR Units At Carlton

Since there are numerous items to discuss regarding the potential retrofitting of your EDR systems, this will be the first of several letters covering these items. This letter will discuss the performance enhancements available with either new spacers (3-G retrofit) retrofitted into the existing membrane stacks, or with all new MkIV-2 stacks.

Changing to the newer spacers will allow the use of 3-stage membrane stacks in series – instead of the existing 4 stage design. In total, 80 membrane stacks would be eliminated. At the same time, the flow (per AQUAMITE 120 system) can be increased from 835 gpm to 1041 gpm. With all ten (10 each) EDR units on line, product flow would be increased from 12 mgd to 15 mgd. On a product equivalent basis, DC energy consumption within the membrane stacks and feedwater pumping pressure would be reduced.

1. Use Retrofitted Model 3-G Spacers

The 3-G spacer was developed to offer enhanced DC field performance by utilizing a more open "window screen" design with fewer and wider flowpath channels. We have enclosed one of these spacers. It is labeled "A". With the 3-G spacerthe pressure drop per stage is lower. The 3-G retrofit spacer was designed to fit within an existing EDR membrane stack without having to change all the internal stack parts, such as end blocks, membranes, etc. The trapazoidal holes in the center of the spacer perfectly match the older membranes. There is less structural material (ie "dead space") in the spacer to make more effective use of membrane

stack DC field across the membranes. Enhanced use of the DC field allows for greater salt reduction per stage.

The 3-G spacer is thinner, and offers the ability to build membrane stacks with 600 cell pairs vs. 500 cell pairs with the Mark III-3 spacers. The height of the stacks is the same. The 20% increase in total cell pairs per stage offers higher product flow per line. In looking at cost effective usage of the membranes already in place at the Carlton plant, the latter stage EDR membrane stacks might simply have an additional 100 cell pairs of new membrane retrofitted in. The 1st and 2nd stage stacks might require replacement of all the membranes. Testing of individual stage membranes would better define this. And, the "when" as to when this is done (2005 vs. 2009) would also come into play.

2. Use MkIV-2 Spacers

This new spacer was developed in 1996 – 1997. We have enclosed one, marked "B". The MkIV-2, like the 3-G retrofit, is a thin spacer using the same window screen, wide channel flow path for high flow and low pressure drop. Once again, 600 cell pairs per stage allow for higher flow rates per stack and per line. This spacer does NOT HAVE the trapazoidal holes in the center. Instead, it uses larger diameter holes in only one end of the spacer for flow . Without the middle of the spacer being "blanked out" the DC field is applied to more of the membrane area – compared to the 3-G. This means the MkIV-2 spacer requires a totally new membrane stack, with different cut membranes, etc. The MKIV-2 will give slightly greater salt cuts than the 3-G retrofit in terms of KWHr/ppm of salt removed. And, it has a slightly lower pressure drop compared to the 3-G version.

One thing common to <u>both the 3-G and the MkIV-2 spacer</u> (*and the open window screen spacer design)* is the lack of hot spot formation in membrane stacks. The older "tortuous flowpath" MkIII-3 spacers offered more flow resistance…and a tighter "squeeze" in the flow path. This added restriction (compared to the 3-G and MkIV-2) allowed for foreign material hold back, and the growth of scale seeding.

3. Performance Comparisons

Our now retired Bob Allison told this writer that you and your staff have a copy of the Ionics WATSYS program to use in monitoring EDR system performance. Since you understand WATSYS, we have taken the liberty of including a number of EDR projections, to illustrate what happens with the 3-G and MkIV-2 spacers. We have attached a series of WATSYS runs separately stapled into two groups:

a. your facility currently produces 835 gpm of product per AQ 120. To illustrate an apples-to-applies comparison, the first group of EDR WATSYS runs shows:

   1. a <u>4-stage</u> MkIII-3 EDR, on a 1365 ppm TDS water, with 155 ppm SO4 in the product. This plant requires <u>1.4 KWhr/1,000 gallons</u> of 362 ppm product water

II. a 3-stage 3-G retrofit plant (with the same 500 cell pairs) producing the same 155 ppm SO4 water. Note the DC power has dropped to 1.2 KWHr/1,000 gallons of product. This is less energy with fewer membrane stacks.

iii. a 3-stage MkIV-2 system (with 500 cell pairs), with the same 155 ppm SO4 water. The DC power has dropped still further to 1.1 KWHr/1,000 gallons

iv. if you look at all three WATSYS runs, you will also note the stack pressure drop is 34.5 psi for the existing 4-stage MkIII-3 system, and 31.9 psi for the MkIV-2 runs. The 3-G retrofit spacer will also have a lower pressure drop. We will be building a test stack to determine the exact comparison of 3-G to MkIV-2 pressure drops.

The bottom line is, using the newer spacers (either 3-G or MkIV-2) yields the potential for superior performance, with fewer membrane stacks, reduced DC power and reduced pumping energy per gallon of water treated. This leads to the next point (b – below).

b. since you have asked for product water with less than **100 ppm SO4**, the next set of runs shows **90 ppm SO4** with several different feedwaters which we have pulled up from historical records. Feed TDS values range from 1266 ppm to 1480 ppm, with corresponding SO4 levels of 676 ppm and 789 ppm. These runs also have product water volume at 1041 gpm per AQ 120. For all 10 each AQ 120's on line, this is 15 mgd total flow, compared to todays 12 mgd. The WATSYS runs show:

i. on lower TDS water, the 3-G and the MkIV-2 systems operate at 85% water recovery – keeping the CaSO4 level in the BBD to about 225%.

ii. on higher TDS water (with higher SO4), we are showing 83% recovery – to keep the CaSO4 well below the 250% max level currently OK'd by GE-Ionics. With the use of polysulphonate anti-scalants, like those currently used at Carlton, we might be able to go above 250%……10 mgd to 15 mgd is a large/high capacity plant. Until we prove otherwise – it might be better to stay conservative at 225%. To counter this – we will be sending you another letter describing the retrofitting of air actuated butterfly valves into the existing AQ 120 systems. Compared to a nominal 15 – 17 second electrical actuation time for the existing valves, 8 inch air actuated valves will cycle in about 0.6 seconds. The faster valve actuation will directly result in more efficient reversal – this will bump water recovery higher.

iii. On worst case water (1480 ppm TDS with 789 ppm SO4), 90 ppm SO4 water is delivered with 1.9 KWHr/1,000 gallon product. The electrical callout for DC rectifier volts and amps is well within the capability of the existing DC power supplies for each of the AQ 120 systems. Nothing needs to be changed here.

Early on, what the Carlton plant might look to do is either retrofit the 1st stage of one AQ 120 with either 3-G retro spacers, or replace the stacks with a MKIV-2 setup. Since changing only a single line of stacks would induce pressure imbalances within the lines all 8 first stage stacks would have to be dealt with. We would recommend using the full size 600 cell pair design to

keep the existing stack shrouding, and to have those stacks already there, when the entire AQ 120 unit is retrofitted.

This would validate the WATSYS projections to your actual operation – confirming the projections for 3 stage system performance. It also would validate the reduction (if not elimination) of hot spot formation within the first stage stacks – the ones that remove more salt than any of the other existing stages.

In the next letter, we will ask some questions concerning the operation of the existing EDR units. We also we go to our records to see what our latest "membrane analysis' show for your plant. That will help better define the costs of doing a 1st stage retrofit "test" on one of the AQ 120 systems.

To further round out what's what with the new spacers, we have included a copy of our technical papers TP-378 *"New High Performance Spacers in Electrodialysis Reversal (EDR) Systems"* and TP-381 *"Advances In Electrodiaysis Reversal Systems".*

We will be back with you shortly with the next, in a series of letters.

Thank you for being a GE-Ionics customer. This writer was very impressed with your plant, and with the folks that run it. Right now, on this application, this writer is acting as EDR Product Manager. I will coordinate all of our very capable staff to keep communicating with you. We collectively as a company are going to do everything we can to define and wring out all the options available to both increase the flow, and to decrease the operational requirements of the EDR systems at your plant.

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October 20, 2005

Carollo Engineers
401 North Cattleman Rd
Suite 306
Sarasota, FL 34232

ATTENTION: **LAURA BAUMBERGER**

SUBJECT: **SARASOTA EDR RETROFIT PROGRAM**

REFERENCE: ***Expanding and Updating EDR Systems***

In a meeting we had – too long ago – a number of items were discussed concerning ways to increase the 12 mgd capacity of the plant , and upgrade the system for more efficient operation and easier maintenance.

This will likely be the first in a series of back and forth communications that will ultimately result in the optimum combination of money spent vs. benefits received. Our initial ideas may not exactly match what it is that Sarasota wants to do. Our first pass intention is to provide maximum value.

1. EDR MEMBRANE STACKS

The plant presently has 4-stage EDR membrane stacks in series. The original plant was installed using Mk3-3 tortuous flow path flat sheet spacers. By using newer spacers (*either 3-G Retrofit or Mk-IV*), a water with less than 100 ppm SO4 can be delivered with only 3-stages in series. This would eliminate a total of 80 each membrane stacks.

The **3-G Retrofit** spacers will fit into the existing membrane stacks. Putting issues of repair & maintenance of the existing stacks aside (sandblasting and painting for example), the ORIGINAL membranes, or the better of all the membranes that are left, can be located in the 3-stage in series stacks. The existing stacks contain 500 cell pairs. The thinner 3-G retrofit spacers allow for as many as 600 cell pairs per stack. With 3-stages, 600 cell pairs and the 3-G retrofit spacers, a 20% improvement in flow per EDR unit is practicable. This takes the overall facility from 12 mgd to 14.4 mgd. Compared with the DC power consumption of the existing 4-stage system, the 3-stage 3-G Retrofit option would have about 0.2 KWHr/1,000 (product) less power demand at the equivalent 150 ppm SO4 product water level now seen in the EDR product.

Improving this to < 100 ppm SO4 reduces the savings to 0.1 KWHr/1,000 gallons, so the DC energy required is about the same as today's plant.

This small DC power savings would be negated by higher membrane stack pressure drop due to the design of the spacer - more water would be available though.

Using the 3-G retrofit spacers would allow Sarasota to keep their stainless steel membrane stack feet, and most of the other stack hardware.

The **Mk-IV spacers** also offer 3-stage performance, with reduced DC power demand, and less membrane stack pressure drop than the 3-G Retrofit spacer. The flow from each EDR unit could be increased approximately 25%, giving 15 mgd total output. The Mk-IV spacer does not, however, have direct fit with the existing membranes or membrane stack electrodes. All new membrane stacks would have to be supplied. It could be possible to tear the existing stacks down and use some of the existing hardware – such as the stack feet supports. In reality, with the costs of all new Mk-IV type membranes, new Mk-IV type electrodes, along with other detail parts replacement, and the extensive labor that would be required, it would be better to do all new stacks and be done with it.

At < 100 ppm SO4 EDR product water, (and 1.5 mgd per unit), MK-IV spacers have about the same DC power demand as the existing plant, with 150 ppm SO4 product water. The added O&M savings comes from reduced feed pressure. Due to the open design of the spacer, the membrane stack inlet pressure is estimated at 19.8 psi (at 1041 gpm product) vs. 34 psi stack inlet pressure at 835 gpm (for the existing system). While this may be a bit "theoretical" it is good for a comparison. The Mk-IV stack would save more in O&M costs than the 3G retrofit option – and it would provide slightly more product water. The capital cost differential will be affected by how many new EDR membranes would have to be used when the 3G retrofit operation takes place. With all new Mk-IV stacks, that is all included.

Assuming that ONE EDR system is membrane stack retrofitted, and the existing membranes are in good enough shape to use with 3-G retrofit spacers, the "material" costs for retrofitting only the 3-G spacers, or replacing the stacks with Mk-IV versions would be **BUDGET** estimated at:

3-G Retrofit:	$200,000 for 24 membrane stacks (8lines / 3 stage) (500 cell pairs), or $240,000 for the spacers needed to do 600 cell pairs (for higher flow)
Mk-IV stacks:	$700,000 for 24 brand new membrane stacks, with stack shrouds, tie rods, base plates and stack feet.

The prices do not include freight, off loading, nor installation at site.

One option might be to change out the first stage membrane stacks in one complete unit (8 each membrane stacks) to check out the performances of the Mk-IV stacks, or 3-G retro spacers. In doing this, the salt cut comparison for the existing 1st stage, and an updated first stage could be checked out. It would not be possible to retro one complete line of membrane stacks….this would throw the entire EDR 120 unit out of balance. The costs for this would be $66,000 (3G Retro) or $233,000 (Mk-IV stacks).

We have attached three EDR computer runs to this letter. The first indicates the originally installed plant, with 4-stages in series. The second, shows the same 835 gpm product flow with 3-G retro spacers (notice the < 100 ppm SO4 product water), while the last one shows a flow expanded Mk-IV stack arrangement, with 3-stages and < 100 ppm SO4 water.
……Two last things.

One: On the computer runs, you will notice the original design (run #1) has 274% CaSO4 saturation listed in the BBD (Brine Blowdown) water. This is a bit higher than what we believe is about 230% CaSO4 saturation in the actual operation. The run #3 (the 1041 gpm EDR with Mk-IV membrane stacks) shows 233% - at 17% waste. This corresponds to 83% water recovery.

Two: The DC power cabinets have adequate power to operate the 3 stage plant, as they currently exist. No changes need to be made here.

2. MOTOR OPERATED vs. AIR ACTUATED VALVES

As with other, older, EDR plants electrically actuated valves have been shown to require more maintenance than Sarasota staff have liked. In June, we provided Jim Conley with data on how much air it would take to do all replace these electric valves with air actuated valves. During the visit we all made, the issue of not being able to duplicate the exact valve dimensions with another valve came up. For several reasons, we think the simplest approach would be to replace the existing electric valve actuators with pneumatic devices – leave the valves, themselves, as is. If 110 volt solenoids valves are mounted on the valve actuators, the local control cabinets do not have to be reworked or replaced. A single air line per air actuated valve would be used. This would be the easiest way to upgrade the valves for reduced maintenance.

3. LOCAL INSTRUMENTATION UPGRADE

Most of the instruments (ie - gauges) on the EDR skids already have 4-20 milliamp backup that goes to the local and the main electrical room master PLC. In looking over the original design, what might be informationally helpful would be to add a 4-20 milliamp brine blowdown flow meter/transmitter. The pipe diameter (4 inch) vs length is suitable for a MAG type meter. Adding two stack differential pressure transmitters would also be helpful.

4. ELECTRICAL / NETWORK / CONTROL ISSUES

The Sarasota system was installed in 1993 – 1994 using local control cabinets, (10 each) with small Allen Bradley monitoring screens, and PLC 5 units inside the cabinet. These PLC's communicate with the electrical room, in which are the DC rectifier/transformer cabinets (2 per EDR unit) and a main PLC (called PLC 16) located in a separate cabinet. The DC power supply cabinets each have current sensor devices, with Sixnet controllers and displays. The cabinets also have SCR devices that have been getting hard to replace. …(*see Item #5 for further discussion on this*)….The PLC16 cabinet contains an Allen Bradley PLC5/20 unit, and also a Sixnet control board, which communicates with all the DC power supplies. The Sixnet

board communicates with the PLC 5/20, which then communicates with the local cabinets via an Allen Bradley DH+ system. The local control cabinets receive local readouts of individual membrane stack volts / amps for display on the small Allen Bradley readout screens.

This plant was one of the first large EDR systems built with DC current monitoring. This became standard afterwards. It would not take much to upgrade the controls to bring everything up to today's standards. This includes both the electrical room, and the local cabinets.

The Sixnet control board could be replaced with Allen-Bradley Point I/O hardware and a Compact Logix PLC, using a Device Net or Ethernet link between the Compact Logix unit and new multiplexer (MUX) board assemblies to be located in the twenty DC power supplies. A total of 2 MUX boards would be located in each DC cabinet. A small Allen Bradley Panel View terminal would replace each existing display. The MUX board setup would use an Ethernet or Device Net system to communicate with the Copact Logix unit. The existing PLC 5/20 would not need replacement. It would continue to communicate with the new Compact Logix unit.

The total budget cost for these electrical room modifications would be $100,000.00

The subject had been raised about replacing or retrofitting the (10 each) local control cabinet. Here, we think we have good news.

At the local control cabinet, the existing display screen could be replaced with anything from an Allen Bradley 300 Touch Screen to a 1000 version. The degree of total data viewable would vary from needing multiple displays (with the 300) up to a single, in color, informational display screen (with the 1000). A cost comparison might be $750 for the AB 300 to $4,000 - $5,000 for a 1000 touch screen. For any of the Touch Screens chosen, they would fit into the existing local panel doors with nothing more than a larger cutout needed. The depth of the new AB touchscreens would not require any modification inside the panels. The panel doors would not need to be replaced. If the simple retrofitting of air actuators on the existing EDR valves is done, no other modification to the cabinets is required, as the capability for a single electrical connection to each valves solenoid valve already exists. For whatever new touch screen is selected, significant PLC and HMI programming will be needed.

5. SCR ISSUES

Here too, we may have goods news. First, about getting replacements for the existing SCR boards:

The Suffolk, Virginia folks are upgrading their EDR system (went on line 1990) with a 100% expansion in flowrate (7.4 mgd vs. 3.7 mgd), and they are replacing all the membrane stacks and original control cabinets. The Suffolk plant did not have the auto current sensing system that was included with Sarasota. The original control and DC power supply cabinets are being replaced. They have nine (9 each) SCR boards that are the same model Sarasota uses…..and they are in very good condition. Sarasota could probably make a arrangement with Suffolk to buy these SCR's.

Concerning the replacement of the SCR package, the vendor has a new set up they are manufacturing for GE-Ionics. The new package has new reversing rectifier electronics mounted on the old style heat sink to allow for easy mounting within the existing cabinet. The dimensions are a little different (width vs. length) but it will fit inside the Sarasota cabinets.

6. MECHANICAL ISSUES

We are checking to confirm (or not) that the existing brine pumps (Worthington (50HP)) Model D1012, will have enough capability to run at higher flows needed.

We are also checking to see what can be done with the Asahi valves.

If Carollo Engineers and The Carlton plant can look over this letter and make comments, we will fill in some of the other cost items. This pertains to what is the best approach to upgrading membrane stacks, how to do a "test" of the new spacer/stacks (3-G or Mk-IV), the issue of upgrading the electrical room with minimal changes to local cabinets and butterfly valve actuation via compressed air.

- - Gene Reahl - -

HUNDERFORD & TERRY ION EXCHANGE INFORMATION

HUNGERFORD & TERRY, INC.

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Fax No. 856 881-6859

To:	Scott Pugh	**From:**	Kenneth M. Sayell
Firm:	Carollo Engineers	**Pages:**	3
Fax:	941-371-9873	**CC:**	Al Rubens 407-324-1352
Date:	July 20, 2005	**Re:**	TDS and sulfate reduction

Dear Scott,

In keeping with your recent correspondence with our Harold Aronovitch, we have prepared the attached data sheets for the referenced project. Based on the information provided the solubility limits of both calcium and strontium sulfate are almost reached making RO or other concentration techniques difficult. Due to the high hardness, sulfates, and TDS ion exchange systems will have a short run time. In spit of this ion exchange looks like the best solution.

The system Harold has designed uses a strong acid cation exchanger followed by a weak base anion exchanger. Of the total flow of 1389 gpm, 700 would be treated in the ion exchange system and 689 gpm would by-pass treatment and be blended with the exchanger effluent. The blended effluent would have a total hardness of 402 mg/L reduced from 810, sulfates of 324 mg/L reduced from 601, and a TDS of 645 mg/L reduced from about 1100

The cation exchanger would regenerate with HCL at a level of 4 lbs/ft3 of resin. A total of 2,660 lbs. of acid would be used for each regeneration. The weak base anion exchanger would regenerate using caustic at a level of 3.5 lbs/ft3 of resin. A total of 1,732.5 lbs. of caustic would be used for each regeneration. Run time between regenerations would be a little over 9 hours and each regeneration will take 3 ¾ hours. Each regeneration will produce 80,000 gallons of waste. All of the other pertinent operating data is listed on the data sheets.

The system would consist of three 50% trains. Two trains would be on line at 350 gpm each, and the third train would be in regeneration/stand/by. Acid and caustic regeneration equipment, instrumentation and an automatic control panel would also be included.
The budget price for a system of this size would be in the $1.9 to $2.0 million range.
I hope that you find this preliminary information helpful. If you have any questions on any of the data or the system performance please feel free to contact Harold or the writer.

Best regards

Ken Sayell

e-mail address: ksayell@hungerfordterry.com

CATION		ANION	
NET GALLONS:	192,800	NET GALLONS:	192,800
GROSS GALLONS:	228,490	GROSS GALLONS:	199,440
NET KGR/CU FT:	16.0	NET KGR/CU FT:	15.9
GROSS KGR/CF:	19.0	GROSS KGR/CF:	16.4
NET KGR:	10,650	NET KGR:	8,207
GROSS KGR:	12,622	GROSS KGR:	8,489

for neutralization:
CATION/ANION LBS REQ'D OF CAUSTIC 703

CAROLLO ENGINEERS
SCOTT PUGH
SARASOTA FL

ENG'R : CAROLLO
BY : H & T INC
HLA

LAB DATA SHEET # : BUDGET

DATE : 18-Jul-05
TIME : 08:17 AM

UNIT	CATION	WEAK ANION
QUANTITY	3	3
MEDIA		
TYPE	AMBERJET 1200 MARATHON C	AMBERLITE IRA 96 MARATHON WBA
FORM	SODIUM	FREE BASE
VOL-EFF	665	495
VOL-TOTAL	674	523
% EXP	3 to 5	10 to 15
DIA (FT)	12	12
% F'BOARD	75	100
REGENERANT	HCL	NaOH
LBS/CF	4	3.5
LBS TOTAL	2660	1732.5

Appendix E

DEMAND PROJECTION ADDENDUM

ADDENDUM

TO

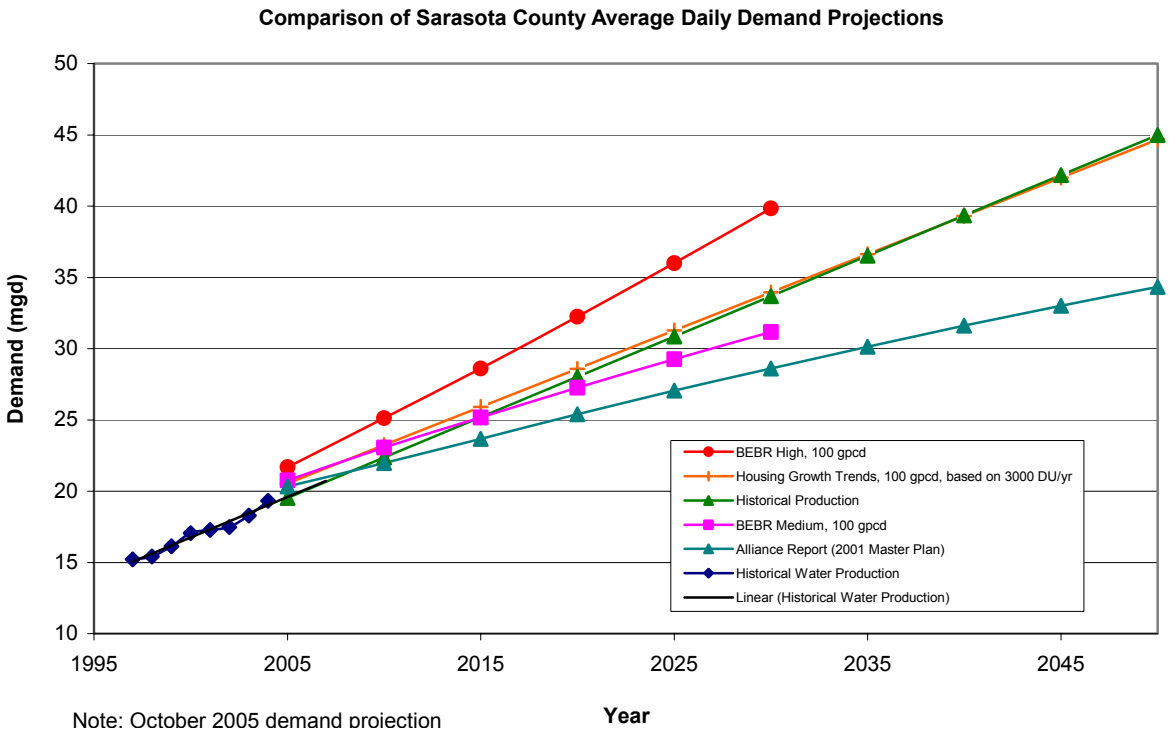
Technical Memorandum No. 1 - Water Demand Projections

Sarasota County

November 4, 2005

Based on discussions with County staff in October 2005, the water demand projections presented in Technical Memorandum No. 1 - Water Demand Projections were modified due to recent permit and zoning changes. The housing growth demand projection methodology will still be used for remaining master planning activities; however, the number of housing units added per year was increased from 2,341 units per year to 3,000 units per year. This resulted in an increase in water demand of approximately 5 mgd in 2050. The updated demand projections that will be used for remaining master planning activities are as follows:

Year	Annual Average Daily Demand (mgd)	Peak Month Demand (mgd)
2010	23.2	27.9
2015	25.9	31.1
2020	28.6	34.3
2025	31.3	37.5
2030	34.0	40.7
2035	36.6	44.0
2040	39.3	47.2
2045	42.0	50.4
2050	44.7	53.6



Note: October 2005 demand projection