

Executive Summary

The Coquina Coast Seawater Desalination Alternative Water Supply Project currently includes two Supplier utilities (the cities of Palm Coast and Leesburg), and two “Ex Officio” utilities (the city of DeLand and St. Johns County). In an effort to meet increasing water demands and address limitations in future groundwater usage, these entities, known collectively as “the Partners”, together with the St. Johns River Water Management District (SJRWMD), are evaluating seawater desalination as a potential future alternative source of drinking water for the region. Water conservation is identified as serving a role in reducing the Partners’ demand, thereby reducing the need for alternate water supplies and the initial Coquina Coast Seawater Desalination plant design. The purpose of this report is review updated water needs projections, and document the efforts by the Partners related to conservation and demand management and the potential impact of those efforts to the Coquina Coast project. A summary of current water conservation initiatives and potential water supply savings will assist Partners in focusing on realistic phased projected demands from the Coquina Coast project.

Consumptive Use Permits (CUPs), under which the Partners are operating, show that current use is close to current allowable allocations. A condition of the 2010 permit renewal for the City of Leesburg provides that Leesburg must proceed to develop alternative water supply sources to meet a portion of future demands beyond 2020. Similarly, DeLand’s 2006 permit renewal requires DeLand to ensure that alternative water sources are timely developed for public supply use in its service area. Similar conditions are likely to be included in permit renewals currently being sought by Palm Coast and St. Johns County.

The St. Johns River Water Management District (SJRWMD), using information from the Conserve Florida Guide and the Alliance for Water Efficiency, performed a pilot study of five public water supply utilities, including three of the project Partners – Palm Coast, Leesburg and St. Johns County – to estimate potential water use savings from conservation. The findings of the study were then applied to other utilities to assess the potential effectiveness of conservation district wide. The conservation projections presented in the pilot study are used within this document with the water needs estimates of the four Partners to determine the potential impact of conservation on future water needs from the Coquina Coast project. Conservation measures considered in the pilot study include administrative and legislative actions, and rebate systems associated with indoor and outdoor conservation measures. Indoor measures include plumbing and toilet retrofits, and clothes washer rebates. Outdoor measures include water efficient landscapes and irrigation rebates for irrigation demand sensors.

Reuse is currently practiced by all of the project Partners, and all have available additional effluent capacity to enable system expansion to unserved areas to a greater or

lesser extent, subject to financial constraints. The potential savings from expansion have not been specifically quantified in this report, but may be done in future phases as the scope and size of the Coquina Coast project becomes more definitive.

Without additional demand management and conservation efforts, projected 2030 water needs above existing permitted capacities, for both the Suppliers and Ex Officio members, are approximately 25 million gallons per day (MGD). Implementation of additional demand side management and conservation programs are estimated to reduce projected water needs from the Coquina Coast project by approximately 7 MGD to slightly more than 18 MGD. Thus, there are still potential gains to be made by the Partners by implementing additional conservation efforts, resulting in a smaller future Coquina Coast project and potential cost savings. However, there is still a need for future alternative water supplies and the Coquina Coast project is a viable alternative to meet that need.

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Acronyms

AADD	annual average day demand
AADF	annual average day flow
AWE	Alliance for Water Efficiency
CFP	Conserve Florida Project
CUP	Consumptive Use Permit
FDEP	Florida Department of Environmental Protection
EPA	Environmental Protection Agency
gpcd	gallons per capita per day
MDD	maximum day demand
MGD	million gallons per day
NEPA	National Environmental Policy Act
SJRWMD	St. Johns River Water Management District
SWFWMD	South West Florida Water Management District
SJCUD	St. Johns County Utilities department
SWRO	seawater reverse osmosis
TDS	total dissolved solids
ULV	ultra low volume
WTF	water treatment facility
WWTP	waste water treatment plant

1.0 Introduction

1.1 Background

The Coquina Coast Seawater Desalination Alternative Water Supply Project currently includes two Supplier utilities (the cities of Palm Coast and Leesburg), and two “Ex Officio” utilities (the city of DeLand and St. Johns County). In an effort to meet increasing water demands and address limitations in future groundwater usage, these entities, known collectively as “the Partners”, together with the St. Johns River Water Management District (SJRWMD), are evaluating seawater desalination as a potential future alternative source of drinking water for the region.

An important part of this task is reviewing current water conservation efforts and updated water needs projections provided by the Partners together with trends in conservation efforts led by SJRWMD. The most recent projections mirror current economic uncertainties, but the need for additional alternative water supplies in the future remains clear.

1.2 Purpose of Document

Water conservation is identified as serving a role in reducing the Partners’ demand, thereby reducing the need for alternate water supplies and the initial capacity of the Coquina Coast Seawater Desalination Project. The purpose of this report is to document the efforts by the Partners related to conservation and demand management and the potential impact of those efforts to the Coquina Coast project. Summarized and updated forecast water needs from the Coquina Coast project are presented both with and without potential additional demand management savings. Assessing current water conservation initiatives and potential water supply savings from future initiatives will assist the Partners in identifying the true projected water needs from the Coquina Coast project and is likely to result in a smaller project and potential cost savings.

2.0 Summary of Available Guidance

2.1 Introduction

This section summarizes documented guidance that is available to water utilities and other water consumers seeking to conserve water. There are a number of sources of potential information and guidance at national, state-wide and local levels. The following discusses some of the higher profile and most commonly used sources of information and guidance.

2.2 Alliance for Water Efficiency

The Alliance for Water Efficiency (AWE) has embarked on the following seven key tasks to support and enhance national water conservation efforts, providing benefit to water utilities, water conservation professionals, planners, regulators, and consumers:

- Stand as a clear and authoritative national voice for water efficiency.
- Provide comprehensive information about water-efficient products, practices, and programs--what works and what doesn't. The AWE has created a web-based water conservation clearinghouse that offers product information, best practices specifications, research reports, training materials, program descriptions, codes and standards, program evaluation tools, drought planning and response, and professional expertise.
- Represent the interest of water efficiency in the development of codes and standards. Codes and standards that mandate water efficiency have driven significant water-use savings.
- Transform the market for fixtures and appliances. The AWE will help ensure that efficient products are available, tested, and clearly labeled.
- Coordinate with green building initiatives to institutionalize water efficiency.
- Develop core curriculum and technical training materials, and work with colleges and universities, trade organizations, and other educational entities to support the development of a professional water conservation work force.
- Provide up-to-date information on water efficient products, practices, and behaviors for the general public.

2.3 Conserve Florida Project

The SJRWMD is a partner in the Conserve Florida Project (CFP), a statewide effort to assist public water supply utilities in the development of water conservation plans and programs. Partners in this project include the Florida Department of Environmental Protection (FDEP), the five water management districts, the Florida Rural Water Association, Florida Section of the American Water Works Association, Florida Water Environment Association, and the Florida Public Service Commission. The project partners consult with technical professionals when appropriate.

The CFP is designed to provide assistance to public water supply utilities in the development of goal-based water conservation plans that can be used by the utilities to optimize their water conservation programs and quantitatively measure the success of the practices they implement. Software, known as the Guide, was created to assist public supply utilities with the development of goal-based water conservation plans as part of the project. The Guide is hosted on the Conserve Florida Water Clearinghouse (Clearinghouse) web site (www.conservefloridawater.org). The Clearinghouse also includes the EZ Guide (a downloadable spreadsheet that can be used to do the analysis needed), a database of best management practices costs and effectiveness of water conservation practices, a library of water conservation information, and links to additional sources of information.

The Clearinghouse has accumulated and searched literature concerning the measurable effectiveness and costs of water conservation practices and provides access to that information. Of note is that the Conserve Florida Water Clearinghouse is also a contributing member to the AWE.

2.4 SJRWMD Applicants Handbook

The SJRWMD Consumptive Use Permit (CUP) Applicant's Handbook contains several mandatory articles relevant to conservation for public water supplies.

Article 10.3(e). All available water conservation measures, as applicable must be implemented unless the applicant demonstrates that implementation is not economically, environmentally or technologically feasible. Satisfaction of this criterion may be demonstrated by implementation of an approved Water Conservation Plan. Appendix I of the Handbook provides an outline of water conservation measures which the applicant may undertake to meet this requirement.

Article 10.3(f). When reclaimed water is readily available, it must be used in place of higher quality water sources unless the applicant demonstrates that its use is economically, environmentally or technologically unfeasible.

Article 12.2.5.1(a) Implement an audit of the amount of water used in the applicant's production and treatment facilities, transmission lines, and distribution system using the District's Water Audit Form. The audit period must include at least 12 consecutive months within the three-year period preceding the application submittal.

Article 12.2.5.1(b) Perform a meter survey, and correct the water audit to account for meter error, if the initial unaccounted for water is 10 percent or greater based on the results of the initial water audit.

Article 12.2.5.1(c) Implement a leak detection program immediately or develop an alternative plan of corrective action to address water use accountability and submit a new water audit to the District within two years, if audit shows greater than 10 percent unaccounted for water.

Article 12.2.5.1(d) Implement a meter replacement program for those applicants whose small and medium meter survey indicates that a group or type of meters is not 95 percent accurate.

Article 12.2.5.1(e) Coordinate a water conservation education program, which includes all of ten listed elements

Article 12.2.5.1(f) Submit a written proposal and implement a water conservation promoting rate structure.

Article 12.2.5.1(e) Reduce the need for back-up supply to reclaim water supplies.

Article 12.2.5.1(e) Implement other conservation measures as required by the District, to reduce a project's water use to a level consistent with projects of a similar type, or when an audit and/or other information indicates that additional significant water demand management savings can be achieved by implementing additional conservation measures.

Article 17.1 (e) Ensure that landscape irrigation shall be in conformity with the requirements set forth in subsection 40C-2.042(2), F.A.C.

Additional special conditions can be applied by the District when considered necessary to further protect water resources and the environment. Additionally Utilities located within the Central Florida Coordination Area (CFCA) , such as south Lake County, are required to identify at least one specific supplemental water supply project that the applicant will develop (either singly or in concert with others) and use to meet all the increase in quantity above its demonstrated 2013 demand, for the duration of the permit. The CFCA is an area of special concern designated by responsible water management districts where sustainable quantities of groundwater in central Florida are insufficient to meet all future public water supply demands, and that there is an immediate need to develop and implement supplemental water supply projects.

3.0 Projected Water Needs

3.1 Introduction

Water conservation efforts and projected future water needs were provided by the Partners both with and without additional conservation measures beyond those practiced by the Partners at the time that needs were estimated. Based on the information provided by the Partners and summarized in the following sections, up to 25 MGD of additional water supply is needed from the Coquina Coast project by 2030. Each partner's projected demand on the Coquina Coast Project was not accompanied by calculations, so may not bear a clear relationship to total demand projections. Projections are subject to change as forecasts and project membership changes.

3.2 City of Palm Coast

Palm Coast currently operates and maintains three water treatment facilities with a total hydraulic capacity of 15.38 MGD, equivalent to an annual average daily flow (AADF) of approximately 11.0 MGD. WTF No 1 is a lime softening plant with a 6.0 MGD permitted capacity. WTP No 2 is a membrane softening plant with a 6.38 MGD permitted capacity. WTP No 3 is a low-pressure reverse osmosis plant with a 3.0 MGD permitted capacity. WTP No's 2 and 3 operate at an average system recovery of 84 percent and discharge 16 percent of the total source water flow as concentrate, which in 2008 and 2009 amounted to 1.1 MGD in both years.

The City's single wastewater treatment plant (WWTP) is currently permitted to provide 4.55 MGD of secondary treatment, which is then sent to two privately-owned advanced treatment facilities. This wastewater is then treated to public access reuse standards and distributed to golf courses and urban landscape turf throughout these developments. The effluent reuse sites that are supplied directly from the WWTP are the Wild Oaks subdivision and golf course at Grand Haven, the Toscana subdivision and the Hidden Lakes subdivision. Reuse effluent is supplied to Hammock Dunes Golf Course Community, and the Town Center Development.

Currently, 2010 potable water consumption was recorded at approximately 8 MGD from an estimated population of 80,000, which equates to an average gross per capita demand of 100 gallons per capita per day (gpcd). Historical water consumption data is summarized in Table 3-1.

Table 3-1: Palm Coast Residential and Gross Historic Water Use

Year	Water Service Population	Residential AADF (MGD)	Residential Per Capita Usage (gpcd)	* Total AADF (MGD)	* Gross Per Capita Usage (gpcd)
2005	61,765	4.032	65	6.814	110
2006	72,190	4.934	68	8.339	116
2007	74,288	4.698	63	7.940	107
2008	76,109	4.337	57	7.330	96
2009	77,889	4.142	53	7.000	90

* Excludes concentrate discharge from membrane plants

The current total treatment capacity of the three water treatment facilities can satisfy a 15.38 MGD maximum day flow (11.0 AADF). CUP No. 1947 renewal application was submitted to SJRWMD in April 2009, requesting an increase in AADF water allocation to 11.023 MGD. The current CUP is capped at 9.51 MGD AADF for 2010 through 2015 demand, including membrane concentrate, and expires December 2015. This allocation is increased to 10.45 MGD if the Dunes Development District does not bring a proposed RO plant on-line and Palm Coast continues to supply potable water through 2015.

Palm Coast Utilities provided potable water demand projections and required supply from the Coquina Coast project through 2035, which were projected linearly to 2050.

**Table 3-2: Palm Coast Water Demand Projections
(without additional demand management)**

	* Estimated Water Demand (MGD)								
	2010	2015	2020	2025	2030	2035	2040	2045	2050
System-wide AADD	8.1	9.9	12.1	14.3	16.5	18.5	20.7	22.8	24.9
System-wide MDD	11.2	13.8	16.9	19.9	22.9	25.7	28.8	31.7	34.7
Coquina AADD	0	0	4	6	9	12	15	18	21

* Excludes concentrate discharge from membrane plants

For planning purposes, it is assumed that supply from the Coquina Coast project will provide an AADF base load with augmentation from existing facilities to satisfy maximum day demand within permitted capacity.

3.3 City of Leesburg

Leesburg operates five water treatment plants within its utility service area, with a total of 17 Floridan Aquifer wells for public supply. Leesburg also owns and operates one Floridan Aquifer well, the “legacy” well, which is now designated for reuse water back-up only. An average of 6.98 MGD of groundwater were treated to potable water standards in 2007, of which 4.2 MGD was supplied to residential customers and 2.8 MGD to commercial/industrial customers. In addition, the City pumped 1.03 MGD directly from the dedicated legacy well for residential and golf course irrigation, as a

backup to reuse supply. Reuse water became available to residential and commercial customers in May 2010, and the legacy well is no longer in use.

Leesburg supplied water use data for years 2005 through 2008. Reclaimed water became available in May 2010 to certain residential areas and a golf course, which will decrease demand on raw water sources from 2010 forward.

Table 3-3: Leesburg Residential and Gross Historic Water Use

	Water Service Population	Residential AADF (MGD)	Residential Per Capita Usage (gpcd)	Total AADF (MGD) *	Gross Per Capita Usage (gpcd)
2005	30,541	N/A	N/A	5.92	194
2006	32,587	4.16	128	7.43	228
2007	33,535	4.17	124	7.48	223
2008	34,100	4.40	129	7.52	220

*Notes: *Includes supply from dedicated irrigation Legacy well*

SJRWMD renewed CUP No. 94 in November 2010, authorizing a maximum groundwater withdrawal of 9.13 MGD, which is expected to be sufficient through 2020 with current demand management measures. In years 2020 through 2030, the permit continues to allocate groundwater at the projected 2020 demand. The permit provides that Leesburg must proceed to develop alternative water supply sources to be used to meet a portion of future demands beyond 2020. Leesburg is required to supply minimum specified quantities of reclaimed water increasing from 0.88 MGD in 2010 to 2.17 MGD in 2030.

In November 2010, Leesburg supplied updated projections of water demand and supply needs from Coquina Coast through 2030, excluding reuse irrigation supplies. Water demands were projected linearly to 2050. Coquina Coast project requirements were considered constant beyond 2030.

**Table 3-4: Leesburg Water Demand Projections
(without additional demand management)**

	Estimated Water Demand (MGD)								
	2010	2015	2020	2025	2030	2035	2040	2045	2050
System-wide AADD *	8.1	9.5	11.2	12.5	15.3	16.8	18.20	20.00	21.80
System-wide MDD	11.8	13.2	15.0	16.3	19.8	21.3	23.3	25.2	27.2
Coquina AADD	0	0	0	1	3.5	4.0	4.0	4.0	4.0

*Note: * These demand projections supersede previous estimates by Leesburg, which were summarized in the October 2010 Project Requirements Letter Report*

For planning purposes, it is assumed that supply from the Coquina Coast project will provide a base load with augmentation from existing expanded facilities to satisfy maximum day demand within permitted treatment capacity.

3.4 *St. Johns County*

St. Johns County Utility Department serves unincorporated areas of the County that were previously served by two independent utility companies. The Ponte Vedra area is supplied from seven production wells in the Sawgrass and Plantation wellfields. The second area is supplied from the Inlet Beach and Marsh Landing wellfields with six active production wells.

There are nine County-owned water treatment plants serving approximately 35,000 customer connections. St Johns County owns and operates ten wastewater treatment facilities, of which seven produce reuse water.

St. Johns County provided an estimated AADF of 8.14 MGD for year 2010 and a per capita consumption of 103 gpcd.

St. Johns County has a transferred CUP (No.1142-13), originally approved December 2002 for the Inlet Beach and Marsh Landing wells, authorizing an average production rate up to 3.934 MGD by 2010. Usage limits are categorized under: household, commercial/industrial, and water utility/unaccounted water. The permit expired in April 2010 and is under renewal notice. A second permit (No. 1142-4) for the Ponte Vedra area, authorizing supply from Saw Grass and Plantation well fields, expired in August 2007 and is currently under renewal application. The original permit was for 4.08 MGD by 2007, and the renewal application (No. 1142-14) requests 3.476 MGD, both quantities excluding fire protection.

St. Johns County supplied water demand projections and required supply from Coquina Coast project through 2050.

**Table 3-5: St. Johns Water Demand Projections
(without additional demand management)**

	Estimated Water Demand (MGD)								
	2010	2015	2020	2025	2030	2035	2040	2045	2050
System-wide AADD	8.1	10	12.3	14.7	17.2	19.3	21.4	24.3	27.2
System-wide MDD	10.1	12.5	15.4	18.4	21.5	24.1	26.8	30.4	34.0
Coquina AADD	0	0	0	2.3	4.8	6.9	9.1	11.9	14.8

For planning purposes, it is assumed that supply from the Coquina Coast project will provide a base load with augmentation from existing facilities to satisfy maximum day demand within permitted treatment capacity.

3.5 *City of DeLand*

The raw water supply for DeLand’s Main Water System is derived from 20 deep wells obtaining groundwater from the Floridan Aquifer. These wells can produce a total firm capacity in excess of 21.1 million gallons per day. The wells are located at various locations throughout DeLand. One additional well is used for irrigation only. Two

proposed wells will be located at the new Victoria Park development, and one in the City center.

DeLand currently has nine water treatment plants scattered throughout the service area. Treatment of the groundwater in this area prior to use is minimal as the water quality is good. Aeration is performed at some of the treatment plants and chlorine disinfection is provided at all of the plants. Treatment for acid neutralization and heavy metals removal, and fluoridation are also performed at all of the treatment plants. There is one water treatment plants currently under construction at the City center location and another to be constructed at the Victoria Park development.

Since 1990, DeLand has produced reclaimed water from the Wiley M. Nash Reclamation Facility, which produces approximately 3.0 MGD of effluent available for reuse. The reclaim system currently has 48 connections serving 1367 residents.

DeLand provided historic water use and gross per capita values, which are summarized in Table 3-6.

Table 3-6: DeLand Gross Historic Water Use

Year	Approx. Water Service Population	Gross Per Capita Usage (gpcd)	AADF (MGD)
2005	53,000	103	5.4
2006	54,000	130	7.0
2007	56,500	120	6.8
2008	59,000	100	5.9

The 2006 CUP Technical Staff Report includes estimates of water demand from residential and total system at 5.25 MGD and 6.29 MGD, equivalent to 98 gpcd and 117 gpcd respectively.

DeLand’s CUP, No. 50116 dated November 2006, authorizes an average groundwater use of 6.81 MGD at year of expiration in November 2016. The permit allows additional use up to 2.0 MGD surface water from the St Johns River for augmentation of DeLand’s reclaimed system. DeLand is required to ensure that alternative water sources are timely developed for public supply use in the City service area.

The City of DeLand provided water demand projections and supply requirements from Coquina Coast through 2030. Water demand projections were projected to 2050.

**Table 3-7: DeLand Water Demand Projections
(without additional demand management)**

	Estimated Water Demand (MGD)								
	2010	2015	2020	2025	2030	2035	2040	2045	2050
System-wide AADD	6.9	7.4	8	8.6	9.2	9.8	10.5	11.3	12.0
System-wide MDD	11	11.8	12.8	13.8	14.7	15.8	16.9	18	19.3
Coquina AADD	0	0.5	4.1	7.2	7.8	8.3	8.8	9	9.2

For planning purposes, it is assumed that supply from the Coquina Coast project will provide a base load with augmentation from existing facilities to satisfy maximum day demand within permitted treatment capacity.

3.6 Summary of Projected Needs of Partners

The combined needs of the four Partners are presented in Table 3-8, without additional demand management.

**Table 3-8: Combined Partner’s Water Demand Projections
(without additional demand management)**

	Estimated Water Demand (MGD)								
	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total AADF	31.2	36.8	43.6	50.1	58.3	64.4	71.2	78.8	86.4
Total Max Day	44.2	51.3	60.0	68.4	78.9	86.9	95.8	105.3	115.2
Total Coquina Use	0.0	0.5	8.1	16.5	25.1	31.7	37.4	43.4	49.6

The 2050 projections could amount to approximately 50 MGD in additional water needs without additional demand management beyond that currently practiced by the Partners.

4.0 Water Conservation Alternatives

4.1 Introduction

This section summarizes the various types of administrative, indoor, and outdoor conservation measures that have been identified as cost effective by the organizations listed in Section 2.0. The recent SJRWMD pilot study, which is summarized in Section 5.0, provides a basis to quantify localized conservation measures for potential water use reduction within public water systems.

4.2 Administrative and Maintenance

4.2.1 Block Rate Structure

Economic measures, such as inclining block rate structures, give price signals to customers for individual water use, particularly those with above average or very high water use. Such rate structures can be developed for single and multi-family residential units supplied through individual meters. Block rate structures are not generally applicable to commercial and industrial customers.

4.2.2 Monitor and Minimize Water Loss

Source, supply, and distribution metering is necessary to maintain accurate records of water use and loss patterns. Meter accuracy should be regularly checked, and programs should ensure replacement within expected 10 to 15 years lifespan, independent of accuracy.

4.2.3 Public Education and Outreach

Education and outreach programs are designed to inform the public and raise awareness about water conservation. This is done by disseminating information throughout the community in various ways. Pamphlets and other reading materials included in mailed billing statements, facts and figures posted on web sites, and public service announcements on television and radio are all common outreach methods.

4.3 Indoor

4.3.1 Plumbing Retrofits (shower heads, faucet aerators and toilet devices)

Plumbing retrofit kit give-aways or rebate structures achieve indoor water conservation through distribution of plumbing fixtures to retrofit high-volume and high water flow plumbing fixtures. Typically, retrofit kits contain easy-to-install low flow showerheads, faucet aerators, and toilet tank retrofit devices. The primary advantage of this measure is that these “after-market” modifications are more easily implemented than complete replacement of fixtures. The Conserve Florida website indicates that homes that installed kits can save 12.0 gpd per residential unit.

4.3.2 Low-Flush and Dual-Flush Toilet Rebates

Low-flush and dual-flush toilet programs are designed to offer rebates as an incentive for customers to replace their high water-volume toilets with more efficient models. Ultra low volume (ULV) toilets use about 1.6 gallons per flush (gpf), as opposed to older, less

efficient models using 3.5 to 7.0 gpf, depending on their age. While applicable for both residential and non-residential applications, the residential category presents the most potential for savings based on the sheer number of fixtures that could be replaced. ULV programs should be accompanied by consumer education about flapper replacement, since improper replacement of toilet flappers can significantly reduce the savings potential. Depending on the sector, the water saved from replacing high volume 3.5 gpf toilets with more efficient toilets can vary from 20 gpd to over 60 gpd per residential unit.

4.3.3 Clothes Washer Rebates

Clothes washer rebates achieve indoor water conservation through offering rebates for the installation of water efficient clothes washers in single family homes, multi-family housing and laundromats. Laundry washing accounts for 15-40 percent of the overall water consumption inside a typical household of four persons, according to the Alliance for Water Efficiency. A family of four using a standard clothes washer can generate more than 300 loads per year, consuming 12,000 gallons of water annually. High-efficiency clothes washers can reduce this water use by more than 6,000 gallons per year, or an average of 16 gpd per residential unit.

4.4 Outdoor

4.4.1 Water Efficient Landscapes (Audits, Water Budgets, Ordinances)

Landscape audits or evaluations may include recommendations for soil moisture shut-off devices, rain sensor shut-off devices, efficient sprinkler nozzles, and/or irrigation controllers. Recommendations provided by the auditor may include suggestions such as:

- Installing additional controllers for specific micro-climates and to isolate turf from landscape plant areas
- Water-efficient landscape maintenance suggestions
- Relocating sprays and rotors to separate irrigation zones
- Replacing sprinkler heads that have mismatched precipitation rates
- Identifying system components that need repair
- Installing additional meters (for large accounts)
- Mulching
- Education

Following implementation and inspection of recommended system improvements, the customer is typically offered rebates or other incentives by the utility.

4.4.2 Irrigation Rebates (Rain Sensors and Soil Moisture Sensors)

Rain sensor devices reduce water used by automatic irrigation systems by shutting down irrigation during significant rain events. Rebate programs encourage the purchase and installation of rain sensors. The potential average water saving is estimated to be up to 50 gpd per residential unit.

Soil moisture shut-off devices reduce water used by automatic irrigation systems by eliminating irrigation during times when the soil is known to have sufficient moisture to meet plant evapotranspiration needs. Rebate programs encourage the purchase and installation of rain sensors. The average water savings is estimated to be up to 200 gpd per residential unit.

Regulatory measures are governmental codes and ordinances that requiring water efficiency standards for new or re-development. For example, the National Energy Policy Act of 1992 requires that all new residential construction built after 1994 be equipped with low-volume plumbing fixtures. Similarly, Florida Statute 373.62 requires rain sensor shutoff devices on all new automatic irrigation systems installed after May 1, 1991. Such measures are great long-term solutions, but have a limited short-term impact because they do affect only a portion of existing water uses.

4.5 Reuse

4.5.1 Expansion of Existing WWTP Effluent Reuse System

Reuse water is supplied within portions of all respective Partners' service areas, of which some have greater potential for expansion than others. Wastewater treatment facilities that do not meet Chapter 62-610 FAC requirements for slow rate land application with public access would need to be upgraded before reuse of effluent. Upgrading is necessary to ensure effluent standards relating to suspended solids content and disinfectant residuals are met. Construction of additional storage facilities may also be necessary. The cost of a dedicated distribution system may limit the extent of reclaim water availability, and large users would be the primary initial target, e.g. golf courses currently using potable water or well water.

4.5.2 Reuse Offset for Irrigation

Irrigation offset in residential public water supply was shown in a recent district-wide study presented in the South Florida Water Management District (SWFWMD) 2010 Regional Water Supply Plan, to have a potential to save up to 80% of total potential residential conservation savings. The study did not show significant potential irrigation savings in commercial/ industrial supplies.

The FDEP 2009 Reuse Inventory identified reuse in all Florida counties. The 67 counties within the State of Florida were ranked according to reuse flow per capita, averaging 36.8 gpcd. Table 4-1 shows the 2009 per capita use of the Coquina Partners.

Table 4-1: Reuse Flow Summary

COUNTY	Reuse Flow (gpcd)
Flagler (incl. Palm Coast)	70
Lake (incl. Leesburg)	42
Volusia (incl. DeLand)	42
St. Johns County	17
State of Florida Average	37

4.6 Legislative Actions by SJRWMD

4.6.1 Consumptive Use Permit Requirements

Chapter 40C-2, *F.A.C.*, requires water conservation as a part of all CUPs and states that, “All available water conservation measures must be implemented unless the applicant demonstrates that implementation is not economically, technically, and environmentally feasible”. Under Rule 40C-2.301(4)(e), *F.A.C.*, (Conditions for Issuance of Permits), public supply utilities in SJRWMD are required to have programs designed to ensure utility operating efficiencies and achieve water conservation by individual customers.

Section 12.2.5 of the *Consumptive Use Permit Handbook* specifies water conservation practices for public supply CUPs. These requirements are summarized in Section 1.2.3 of this report.

In addition to water conservation requirements for public supply systems, customers who use more than 100,000 gallons per day from a public supply system may be required to obtain a secondary use permit, which makes large water users directly responsible for implementing water conservation measures.

4.6.2 Landscape Irrigation Restrictions

The SJRWMD has the most stringent, district-wide, year-round watering restrictions of any water management district in Florida (Rule 40C-2.042, *F.A.C.*, General Permit by Rule). These restrictions are designed to ensure the efficient use of water for landscape irrigation. The mandatory restrictions specify the time of day when watering may occur, the amount of water that may be applied, and the days when watering may occur for residential and nonresidential locations. This rule also authorizes local governments to enforce these restrictions within their jurisdictions by adopting an ordinance that fully implements the rule.

4.6.3 Rule Revisions to Enhance Water Conservation

The SJRWMD is undertaking rulemaking to make water conservation requirements for permitting programs more effective at reducing water use. The anticipated rule revisions will address the water use efficiency of new land development through the Environmental

Resource Permitting Program and the efficiency of major water use types through the Consumptive Use Permitting Program. Key concepts of this ERP/CUP linkage include:

- Requiring maximum feasible reuse of stormwater for landscape irrigation
- Setting landscape design standards that reduce the need for irrigation
- Requiring covenants and restrictions for developments to include efficient landscaping and irrigation system designs

5.0 SJRWMD Water Conservation Pilot Program

5.1 Program Objectives

SJRWMD is currently working on the 2010 District Water Supply Plan. Chapter 3 will be dedicated to water conservation and include the results of the conservation pilot program recently completed.

SJRWMD performed a pilot study of public water supply systems of five public utilities (Gainesville Regional Utilities, City of Leesburg, City of Palm Bay, City of Palm Coast, and St. Johns County) to develop a land parcel based methodology for estimating the quantities of potential water use reduction that can be achieved through conservation. The findings of this study were then applied to other utilities to assess the feasibility of using conservation to reduce projected future water use district-wide.

5.2 Methodology

Water use groups were defined by land-use code, age of structure (plumbing code implications), and the value and yard size of single family residences. Utility specific water-use benchmarks were developed for each water-use group based on actual use by each sampled utility. Benchmarks then were applied to unmatched accounts using the proportion of matched accounts.

Fourteen best management practices (BMPs) from a BMP library were considered for all current and projected accounts to get the water conservation potential and costs for each water use group. Those measures considered to be cost-effective were composited for each utility. The measures adopted in the pilot program, which contained water savings and costs that are unique to each water-use group, included the following potential programs:

- High-efficiency toilet replacement
- Soil moisture sensor shut-off devices
- Efficient irrigation system (non-turf)
- High-efficiency shower head replacement
- Ordinances for indoor plumbing efficiency
- Aggressive meter monitoring program for non-residential customers

After completing the process for the five sample utilities, the established savings rates were applied district-wide to other utilities to obtain regional scale estimates of water demand management potential. Reduction estimates for non-pilot utilities were based on percent savings seen in the study applied to benchmark water use per county property appraiser record of building and irrigable area square footages.

5.3 Findings and Recommendations

The study showed medium level estimates of potential water supply offset from cost-effective water conservation measures to be approximately 9.4 percent of predicted 2030

district-wide water demand. Low and high level estimates were presented as 8.5 percent and 10 percent respectively. The medium level potential water conservation estimates represent the public supply water use efficiency goals adopted by SJRWMD for regional scale water supply planning. Equivalent medium level estimates for the Partners averaged 12.8 percent.

6.0 Conservation and Demand Side Management for the Coquina Coast Partners

6.1 *Current and Future Conservation Efforts*

6.1.1 City of Palm Coast

Palm Coast continues to enhance water conservation efforts in a variety of ways. The latest CUP Technical Staff Report, dated Feb 2009, noted the current City Ordinances and Resolutions, including:

- A City Land Development Code is currently being drafted which will require the use of specific types of irrigation equipment, promote the use of native vegetation, and require storm water use where available.
- Rain shut-off devices are required by the Palm Coast Building Department.
- City water restrictions require that homeowners and commercial and institutional businesses irrigate only two days per week.
- All new developments within the City limits are required to install a dual piping system to accommodate reclaimed water supply when it becomes available.
- The Palm Coast Building Department has required low flow plumbing fixtures on all new construction since October 1, 2005.
- Palm Coast has implemented a water-conserving inclined block rate structure for potable and reclaimed water customers.

The City is adopting two recent resolutions addressing water conservation:

- A resolution adopting Ordinance 2009-15 – Water Conservation Policy
- Resolution 2009-2107 adopting Level 1 Irrigation Restrictions

Palm Coast has flow meters at each production well that are checked for accuracy and recalibrated if necessary once every year. Meters found to be inaccurate by more than 5 percent are either recalibrated or replaced. Unaccounted-for-water losses are consistently well below the SJRWMD's 10 percent threshold requiring a meter survey or a leak detection and repair program. Palm Coast keeps detailed records of unmetered uses including water-flushing records, water break repair records, and fire fighting and training water use records.

Palm Coast has identified several objectives to improve data collection and water-use efficiency including:

- Completing a monthly unaccounted for water report accounting for all water quality flush water, Fire Department usage, water produced, and water sold.
- Completing a Monthly Water Audit of water usage compared to the CUP allocation including a per capita section.

- Adopting a Water Supply Facilities Work Plan as part of the City Comprehensive Land Use Plan projecting population, per capita use, and demand to the year 2035, including alternative water source planning and funding.
- Participating in the SJRWMD's Water Conservation Cost Share Program by developing customer billing system database automated auditing and code enforcement tracking tools integrated into a GIS database system.
- Participating in the SJRWMD's Water Star Grant Program by replacing all toilets and urinals in the administrative building with low flow fixtures and track previous and future consumption.

Following are additional water conservation activities adopted by Palm Coast:

- Providing plumbing retrofit devices and/or kits to residential customers.
- Appointing a water conservation coordinator to design and implement the City's conservation plan.
- Creating a webpage in Palm Coast Website and an educational door tag describing the Water Conservation Ordinance and Resolution.
- Publishing conservation education material in the Palm Coaster Newsletter and the Annual Water Quality Report (Consumer Confidence Report).
- Providing a Water Conservation Education Board and handing out brochures to all of the students at each Citizens Academy School.
- Adopting a proclamation declaring each April as Water Conservation Month.
- Creating a water conservation demonstration project including Florida friendly landscapes, groundcovers, appropriate irrigation systems, rain gardens and a storm water management system with the use of pervious paver bricks. Promote the demonstration project to the community.
- Continuing participation in the St. Johns River Water Management District's Water Conservation probability protocol study for the 2010 Water Supply Plan.

Palm Coast's Reuse Program is a significant feature of the City's overall water conservation plan. All new developments within the city limits are required to install a dual piping system to accommodate reclaimed water supply when it becomes available. In the future, reclaimed water will be utilized at City of Palm Coast's Golf Course, and the Conservatory and Grand Landings Developments.

6.1.2 City of Leesburg

Leesburg is involved in a number of conservation efforts and is committed to conservation. Leesburg policy states, "*The City shall conduct annual water audits on per capita potable water consumption to determine if consumption is being reduced and adjust the city's water use rate structure accordingly to maintain per capita consumption at or below previous levels.*" Other efforts include commitments outlined in the 2010 CUP, economic incentives through a block rate structure, and educational materials and

activities, proposed conservation programs, and expansion of the City owned reclaim system. These are all outlined below.

- SJRWMD renewed the City's CUP in November 2010. In it, Leesburg made a commitment to expand conservation efforts including: The SJRWMD Irrigation Ordinance.
- A Florida-Friendly Landscape Ordinance. The ordinance includes an extensive list of drought-tolerant plants which are suitable for the Leesburg area
- An Alternative Water Source ordinance that requires all new developments to install dual line distribution systems for the use of alternative water sources (reclaimed, storm water, service water, etc.) when available, for irrigation.
- A Draft Landscape Ordinance, which will also affect future development, to promote a Florida Friendly landscape using drought tolerant plants.
- A high water-use program, which will target specific developments and individual customers that have a pattern of high water-usage for corrective action. The draft report program shall be submitted to SJRWMD for review and approval no later than April 2011.

Leesburg has implemented a water conservation promoting inclined block rate structure with separate rates for potable water, irrigation water, and reclaimed water. The rate structure further differentiates between customers inside the City and those outside to account for the property size differences.

Residential and commercial water accounts are reviewed on a monthly basis to identify customers whose monthly water use is 30 percent or more above the 12-month running average. Those customers are notified of the higher than typical usage and to provide water conservation information.

Leesburg has an active water conservation education program that promotes water conservation via many different media, including brochures, cable television, and internet presentations. This program includes distribution of water-wise landscaping and water conservation brochures on racks at libraries and in utility offices. Leesburg has constructed and marked a water-wise demonstration project. As part of the education efforts, a Water Conservation Programs Handbook summarizing current and future City conservation programs involving accountability, public outreach, and education was recently produced.

Leesburg has proposed a "cash for grass" landscape conversion incentive pilot project and a standard developer's agreement that will require water-conserving landscaping practices and ultra-low flow plumbing fixtures in new construction.

Leesburg began delivering reclaimed water to customers on May 28, 2010. Average day reuse usage is 1.8 MGD, including residential and one golf course. A second golf course is scheduled to come on line by end of 2010. A high school campus should be on line by end of 2011. Other reuse extensions in design will serve city park sites, hospital campus

and medical office sites and city medians. Current usage represents approximately 40% of available reuse.

6.1.3 St. Johns County

St. Johns County promotes conservation in several ways. Permit requirements in the 2007 CUP ownership transfer state that St. Johns County must institute a water conservation program for duration of the permit, which includes:

- Sending water conservation material bi-annually to customers as part of billing mail-outs or through separate mailings.
- Providing water conservation videos, presentations and information, as well as sponsoring water conservation speakers to local schools and civic organizations
- Constructing, maintaining and publicizing water efficient landscape demonstration projects.
- Providing water conservation exhibits in public places such as utility offices.
- Providing water conservation literature that is easily accessible to the public.

St. Johns County is required by CUP to have all flow meters checked for accuracy at least once every three years, and recalibrated for differences between actual flow and meter readings above 5 percent. St. Johns County must submit an annual water audit of the water distribution system every two years. The audit is required to be completed in accordance with the Water Audit Form set forth in the Applicant's Handbook.

As previously noted, St. Johns County participated in the SJRWMD pilot study to develop a methodology for estimating the effect of water conservation measures on demand. Achieving maximum potential conservation offset to water supplies will depend on the adoption and successful implementation of the appropriate ordinances by the County.

County Ordinance No 2009-28 requires that water efficient landscaping and irrigation systems be used in order to maximize the conservation of water.

Ordinance N0 2010-29 promotes water conservation through more efficient landscape irrigation by establishing a landscape irrigation schedule that limits irrigation to two times per week during Daylight Savings Time and once per week during Eastern Standard Time. The ordinance limits the hours of irrigation and the volume of water applied. The ordinance requires automated landscape irrigation systems be equipped with a properly installed, maintained, and operated technology that inhibits operation during sufficient moisture.

Other current St. Johns County conservation activities include:

- Providing landscape irrigation audits and irrigation system operating instructions to local businesses and residents.
- Establishing a water audit customer assistance program that addresses both indoor and outdoor water uses.

- Operating a four-tier inclined block rate structure for water billing, in accordance with CUP requirements.

St. Johns County supplies reuse water to common landscape areas of major developments and area golf courses from seven of the 10 County waste water treatment facilities. All new subdivisions containing golf courses are required to install reclaimed water lines for use as irrigation for the golf course. Additionally, St. Johns County is in the process of reviewing ordinances on residential reclaimed water.

6.1.4 City of DeLand

DeLand developed a Water Conservation Plan for public supply, which was approved with the last CUP application, and outlines water conservation activities. DeLand is required to have all flow meters checked for accuracy and recalibrated if necessary at least once every three years. DeLand has embarked on a system wide program to reduce unaccounted for water losses, which includes three components: meter calibration and replacement, leak detection and repair, and water main replacement. Replacement of water mains up to 80 years old is an ongoing program.

DeLand has adopted the following ordinances and resolutions focused on water conservation:

- Implemented a water-conserving inclined rate structure for potable and reclaimed water customers.
- Adopted a program where impact fees are reduced for residences and businesses built with low volume appliances meeting SJRWMD Water Star program criteria.
- Discontinued issuance of new “irrigation only” meters.
- Passed Land Development Regulations requiring connection to the reclaimed water system where reasonably available, or installation of dry lines.
- Adopted SJRWMD watering restrictions
- Adopted program where new customers receive a welcome kit with a water-saving showerhead and other devices and conservation tips.
- Implemented a low flow toilet rebate program.
- Passed an ordinance that prohibits master meters within the City service area on all new construction unless the builder obtains a SJRWMD variance.

The September 2009 disbanding of the Water Authority of Volusia (WAV), which had spearheaded a county-wide conservation outreach program and a successful shower head replacement program, will likely result in water supply issues moving to the Volusia Council of Governments, a countywide forum of elected officials.

DeLand’s water reuse program is a significant feature of the City’s overall water conservation plan. All golf courses within the City limits, DeLand High School, DeLand Middle School, Stetson University Campus, City’s Earl Brown Park Complex, Alabama Avenue Greenway, and baseball and football stadiums are irrigated with reclaimed water. The Public Services facility and a number of residential subdivisions also receive reclaimed water. DeLand is currently constructing a pump station at the St. Johns River

to provide 2 MGD of additional non-potable water to augment the existing supplies. On an average annual basis, 85 percent of wastewater flow is reused and discharge occurs only during wet weather periods. DeLand, in cooperation with neighboring communities, has commissioned a joint study to determine cost of retrofitting existing neighborhoods and to maximize use of reclaimed water in the future, and has applied for grant funding for design and construction of City interconnects.

6.2 Impact to Project Future Water Needs

The SJRWMD pilot study information, which was presented in the draft 2010 District Water Supply Plan, is the most recent study of conservation available. Palm Coast, Leesburg and St. Johns County Utilities Department were chosen as three of the five pilot study participants. Chapter 3 and Appendix F of the plan give medium estimates of potential demand reduction quantities for each utility, based on the average reduction in water use from passive savings and the most cost effective conservation measures. Potential demand management impact for each Partner in 2030 is outlined in Table 6-1 and projected graphically in Figure 6-1 from 2010 to 2030.

Table 6-1: Conservation and Demand Management Impact on Coquina (2030)

Partner	Supplier Projected Demand 2030 (MGD)	Additional Demand Management (MGD)	Coquina AADD without additional conservation 2030 (MGD)	Coquina AADD with additional conservation 2030 (MGD)
Palm Coast	16.45	*1.62	9.00	7.38
Leesburg	15.35	**1.04	3.54	2.5
St. Johns County	17.16	***2.50	4.80	2.30
DeLand	9.20	*1.95	7.80	5.85
Totals	56.33	7.11	25.14	18.03

*Conservation potential based on SJRWMD Draft District Water Supply Plan 2010, Appendix F, and assuming equal increments to maximum conservation potential in year 2030.

**Conservation potential from City of Leesburg, excluding reuse from May 2010. Demand and conservation projections differ from SJRWMD estimates (10.3mgd and 1.61mgd by 2030, respectively).

***Conservation potential from St. Johns County Utilities Department. Demand and conservation potential differ from SJRWMD estimates (24.05mgd and 3.29mgd by 2030, respectively).

Figure 6-1: Effect of Additional Demand Management on Demand Projections

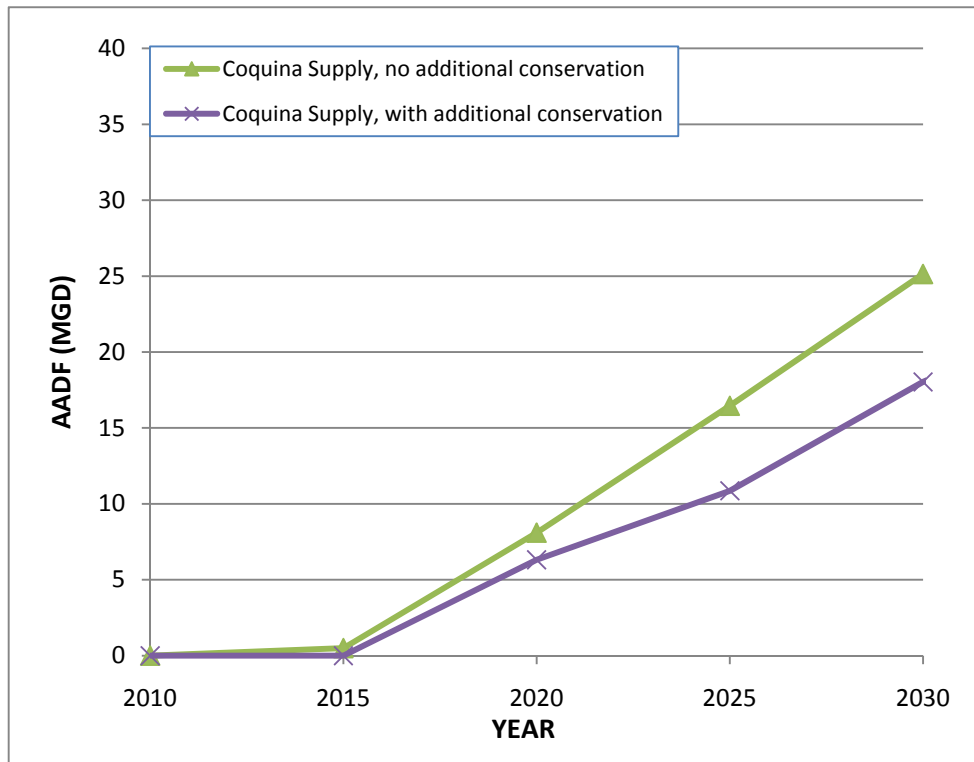


Figure 6-1 shows the continued need for alternative water resources, both with and without additional water demand management measures by the Partners. The net result of additional demand management is that the projected water supply needs of the Partners in 2030 are reduced by approximately 7 MGD from 25 MGD to approximately 18 MGD. This would likely reduce at least the initial capacity of the Coquina Coast project and could result in cost savings. The impact of additional demand management offsets beyond 2030 have not been estimated at this time. However, using the average 12.8 percent medium level estimate of conservation savings indicated in the SJRWMD pilot program for the Partners, and the approximate 50 MGD projected 2050 needs summarized in Section 2, 2050 needs could be reduced by a total of approximately 7 MGD. Additional savings can be realized with increased reuse availability for irrigation, subject to cost effectiveness of system expansion. For example, a 4 gpcd increase in reuse availability is equivalent to approximately 1.0 MGD combined reduction in Partners' average daily water demand.

7.0 Summary and Conclusions

All project Partners have implemented effective conservation programs and have plans in place to expand future conservation efforts. The results of the recent pilot conservation program, which will be included in the SJRWMD 2010 District Water Supply Plan, show the potential for additional water conservation savings for the service areas supplied by the Partners. Even with additional conservation, there is a need for future alternative water supplies for the Partners.

Water loss monitoring and control measures are currently integrated into all Partners' conservation activities, but have potential for improvement. Water meter checking and replacement and water-use auditing, which are requirements of the most recent CUP approvals, remain essential tools in addressing these issues.

Indoor conservation measures are practiced to some degree by all of the Coquina Partners, but have the potential to be expanded in the future. These include:

- Plumbing retrofits (showers, faucets and toilet tank devices)
- Low flush and dual flush toilets for new construction or through existing residential rebate program
- Clothes washer rebate program

Outdoor alternatives consist of irrigation restrictions, landscape ordinances and irrigation by waste water effluent reuse or storm water augmentation. All Partners are adopting irrigation restrictions and have reuse systems in place. Some of the partners have a greater potential to expand reuse availability than others. Landscaping ordinances are currently in-process at Palm Coast and Leesburg.

The recently renewed CUP for the City of Leesburg requires that Leesburg must proceed to develop alternative water supply sources to meet a portion of future demands beyond 2020. Similarly, DeLand is required to ensure that alternative water sources are timely developed for public supply use in its service area. This condition is likely to continue in CUP renewal approvals to the other Partners. Estimates of demand management potential were provided by Palm Coast and Leesburg, whereas the SJRWMD pilot-study medium potential 2030 estimates were used for St Johns County and DeLand. The estimates show a continued need for alternative water supply from the Coquina Coast Desalination Project by 2020. The collective 2030 needs of the project Partners could be reduced by approximately 7 MGD from 25 MGD to 18 MGD by additional conservation efforts. Further demand offsets can be made with increase availability of reuse effluent for irrigation. Such reductions could reduce the initial capacity and associated cost of the Coquina Coast project.

Regarding future conservation efforts, the Partners should consider the potential for adoption of the most cost-effective conservation measures for the specific conditions within each utility, as identified by the SJRWMD pilot study, and evaluate the feasibility of increased reclaimed water feasibility. Water demand and demand management projections for Phase 2B participants need to be projected to year 2035, to assist in determining a realistic Phase 1 design capacity for the Coquina Coast project. These projections are likely to influence current and future CUP renewal applications.