Lake County Water Supply Plan

Technical Memorandum #3

September 2007

FINAL

Chapter 1 - Potable Water Demand – Public Supply and Domestic Self-Supply

Chapter 2 - Water Conservation / Potable Water Demand Reduction

Chapter 3 - Reuse Projections

Chapter 4 - Potential Reuse and Alternative Water Supplies Development

Chapter 5 - Aquifer Storage and Recovery Alternative

Prepared by

Water Resource Associates

1.0 Potable Water Demand – Public Supply and Domestic Self-Supply

1.1 Population Projections Introduction

With the burgeoning population growth throughout Lake County and the surrounding region, meeting demand for potable water becomes a challenging prospect. Population projections, and associated per capita water use rates, ultimately form the foundation for projected water demands. This technical memorandum explores projected populations, per capita rates, and water demand estimates. It also offers information on cost effective techniques to potentially reduce water demands through more aggressive conservation practices, and the use of reuse water to offset potable water used for irrigation purposes.

The population projections that were gathered and reviewed are from various sources, developed for specific purposes. This task required an examination of existing documents provided by the Alliance Members in addition to projections developed by the SJRWMD. Population projections were not developed independently for this Technical Memorandum. The review that follows includes evaluations that:

- Determine and assess methods used in the population projections;
- Assess differences in methodologies;
- Explain differences in population projections based on the available data;
- Address any shortcomings in projections; and
- Assess safety factors used in estimates (bracket potential range of projections).

1.2 Comparison of Municipal and Countywide Projections

Comparisons of Alliance Member demands to population estimates performed by the SJRWMD and Lake County are summarized in Tables 1-1 and 1-2 and Figure 1-1. The latest common projection year is 2025, so comparisons are made for projections in this year. A description of the population projections analyzed is as follows:

GIS Associates prepared population projections for purposes of updating the draft 2008 St. Johns Water Management District (SJRWMD) Water Supply Assessment. These projections were developed using a site specific analysis that included existing land use, future land use designations, and some site development constraints, among other factors. The population was allocated based on the total 2007 county-wide population of 519,395, which is consistent within 1% of the BEBR average medium-high 2025 projections.

<u>Lake County Comprehensive Plan</u>
Lake County prepared population projections for the update of the Comprehensive Plan. These projections addressed unincorporated Lake County and the municipalities. Lake County noted that the Lake-Sumter Metropolitan Planning Organization (MPO) used the same projections for the Long Range Transportation Plan. Unincorporated Lake County projections were based on the University of Florida's Bureau of Economic and Business Research (BEBR) 2004 medium-high projections. Lake County determined that these projections closely paralleled the County's own projections, which were based primarily on development order activity. The projections

were reviewed and approved by the Florida Department of Community Affairs in 2005. The Comprehensive Plan population projections calculated municipal population growth for two four-year periods: 1999 – 2003 and 2000 – 2004. The County took the average of those two calculations. It assumed that for the years 2005-2010, the growth rate for each city would remain the same as the average. For the period from 2015-2025, the County assumed that the growth rate for each city would be reduced by 50%.

Lake County School Concurrency Program / Municipal Projections
Lake County prepared a set of population projections for a countywide school concurrency program. Each municipality provided Lake County with its own population projections. Lake County provided some information on the source of the municipal projections. However, detailed information was not provided. For the unincorporated area, Lake County used the Comprehensive Plan update projections. This data was prepared in 2006.

Individual Municipal Projections for Water Supply Planning
Some municipalities provided population projections based on water supply planning. These are assumed to be relatively consistent with those provided to Lake County for the School Concurrency Program.

Table 1-1 Countywide Population Projections Comparison

SOURCE	2025[1] POPULATION PROJECTIONS	COMMENTS
SJRWMD Draft 2008 Water Supply Assessment	519,395	Based on 2007 BEBR Medium/High projections
Lake County Comprehensive Plan Update	463,500	Based on 2004 Medium/High BEBR projections and historical analysis of population growth
Lake County School Concurrency Projections	571,225	Based on individual projections prepared by each municipality – not normalized to a Countywide population projection

1.3 Analysis of Available Population Projections

The Lake County Comprehensive Plan projections were based on 2004 BEBR data and estimated historical municipality growth rates. Since the draft populations developed for the SJRWMD 2008 Water Supply Assessment use the most recent (2007) BEBR projections, historical growth trends, detailed parcel level information on future growth constraints, and accurate service areas, this data is more comprehensive than the Comprehensive Plan or School Concurrency data.

The Comprehensive Plan normalized population growth, both for municipalities and unincorporated Lake County, to the 2004 BEBR medium-high population projections of 460,103 for 2025. The SJRWMD used the more recent, 2007 BEBR medium-high population projections which total 519,335 for 2025. This difference in itself renders the SJRWMD more suitable for planning purposes. The Comprehensive Plan population projection methodology, used an

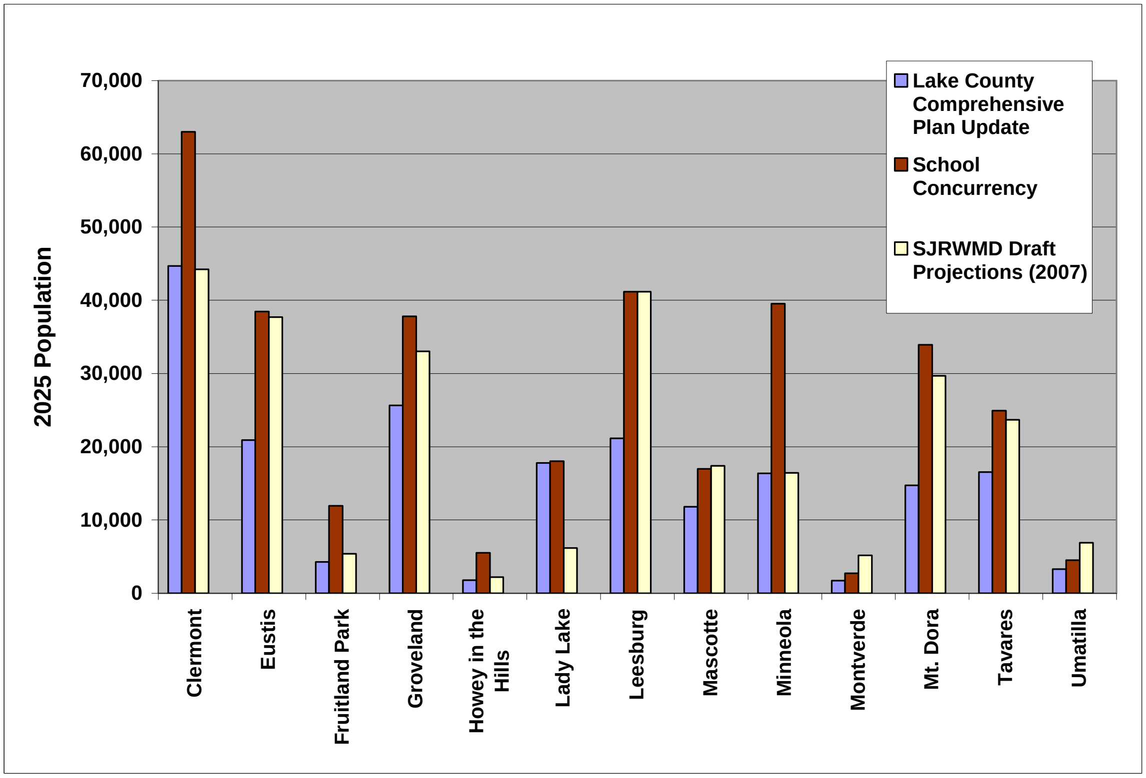
[1] 2025 populations were used for comparative purposes, as it was the latest year common to all data sources.

extrapolation of past population trends on a municipality-wide basis, rather than the site-specific SJRWMD analysis based on both historic and future growth drivers and constraints.

The School Concurrency projections were not normalized to a projected countywide population. Additionally, each municipality made independent decisions about future growth, including, presumably, annexations. Also, it appears that some projections were based on estimated future service areas and some on city limits, rather than existing service areas or known future service areas. These numbers are, therefore, the least reliable for planning purposes.

For the reasons listed, the SJRWMD population projections were used in this Technical Memorandum to develop demand projections. The results of these population projections are presented in Section 1.4.

Figure 1-1 2025 Alliance Member Population Projection Comparison



Refer to section 1-2 for description of Sources for Figure 1-1

1.4 Population Projection Results

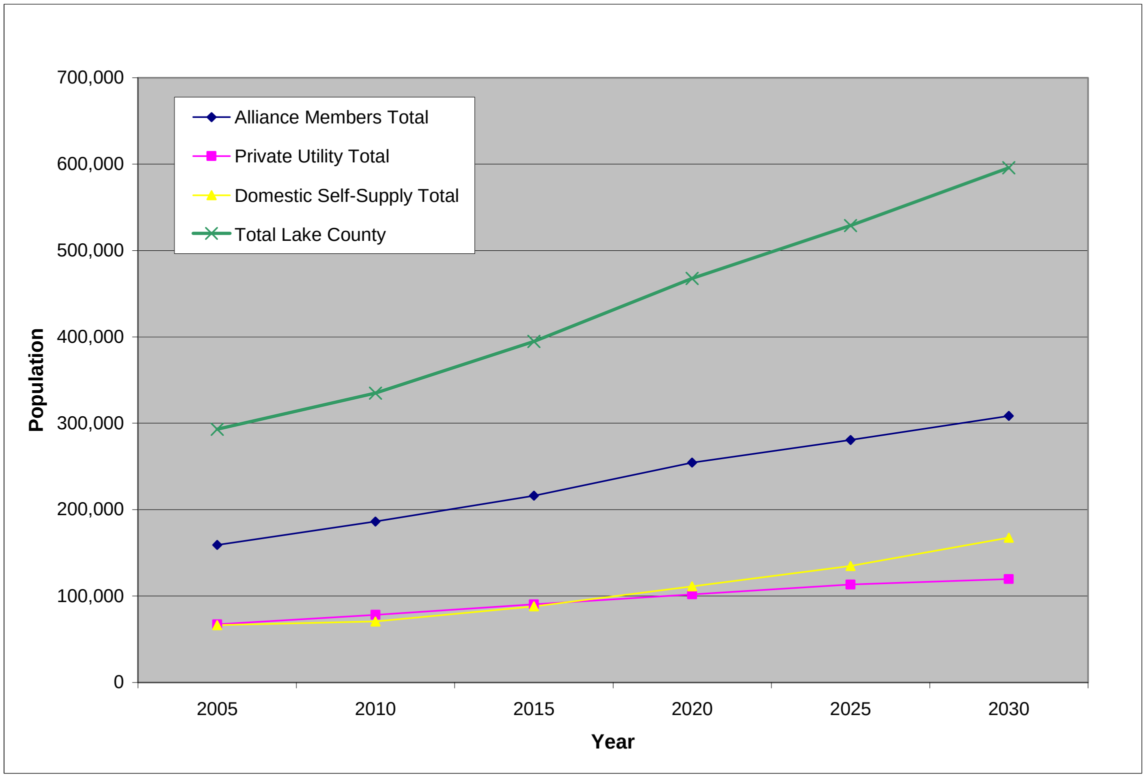
The population growth in Lake County was calculated for the SJRWMD by utility. For the purposes of this Technical Memorandum, populations are grouped into the following three categories:

- Alliance Members: Populations within the Alliance Member existing and projected service areas (Figure 1-2).
- Private Utilities: Populations for private utilities, located throughout unincorporated Lake County (Figure 1-2).

- Domestic Self-Supplied Lake County: Unincorporated populations that are self-supplied water users.

The population increase for Alliance Members over the 2005-2030 planning horizon is approximately 149,300 people (a 94% increase). The total private utilities population is expected to increase by 52,226, and the domestic self-supplied population by 102,885. Therefore, the total non-Alliance population increase is projected to increase by 155,111, or by 132%. The total Lake County population is projected to increase by 304,411 (a 110% increase) (Table 1-3, Figure 1-3, Figure 1-4). Private utility populations are ultimately competing water users for Alliance Members. Therefore, the following section discusses per capita rates and water demands for Alliance Members and private utilities within Lake County alike.

Figure 1-3 Lake County Population Projections



Source: SJRWMD draft projections

1.5 Water Demand Projections

Public supply water demand projections were calculated over the planning horizon from 2005-2030. Similar to population projections, these demand projections were assessed by Alliance Member, private utilities, and domestic-self supply users. The analysis that follows centers around Alliance Member demands. Some discussion of private utility and domestic self-supply users is also significant as these users ultimately are vying with the Alliance to meet their water supply needs.

The scope of this task does not require that independent methodologies be developed for public supply water demand projection quantities, but rather that data be collected from Alliance Members. This review included evaluations to:

- Determine and assess methods used in the water demand projections;
- Assess differences in methodologies between utilities;
- Address any shortcomings in projections; and
- Assess safety factors used in estimates (bracket potential range of projections).

In addition to demand projections produced by Alliance Members, draft demand projections developed by the SJRWMD were reviewed for this task and compared with those provided by Alliance Members.

1.6 Comparison and Analysis of Water Demand Projections

Some water demand projections calculated by Alliance Members were provided in the form of CUP applications, spreadsheets, water audits and water supply studies. Methodologies accompanying municipal projections were not provided in many cases. In some instances, municipalities provided a range of data from different studies. It is apparent from the descriptions of methodologies and sources used as a basis for developing demand projections that there is a wide variation of methodologies employed by each municipality. Differences in approaches to population projection calculations (noted in Section 1.3) and methodologies for per capita rate determination (discussed below) contribute to these variations. Some projections were simply outdated or were not projected past 2010 or 2015. Additionally, these demands were usually based on peak capacity needs and not annual average demand.

The draft demand projections developed by the SJRWMD were determined to be the most appropriate projections available for use in the Plan. This data was selected in part due to the uniform approach employed by the SJRWMD for all Alliance Members, satisfying the need for a level playing field in terms of methodology. This “apples to apples” comparison of demands between Members is important for developing a consistent assessment for the Plan. Furthermore, projected water demands must be accepted by the SJRWMD in order to assign CUP allocations, so it is important that demand projections used in water supply planning efforts are generally consistent with demand projections developed by the SJRWMD.

While many demand projections were not independently provided by Alliance Members for the Plan, it is important to point out that some Alliance Members (e.g., Mount Dora, Minneola, and Montverde) have indicated that their demand projections are not generally consistent with the SJRWMD draft projections. A detailed review of each Member’s demand projections was beyond the scope of this study, but differences in approaches to population projection calculations and methodologies for per capita rate determination are likely to contribute to these variations. In the context of the Plan, an Alliance-wide planning tool, these discrepancies do not affect the outcome to any significant degree. However, if used for other purposes, such as SJRWMD’s review of future CUP applications, care should be taken and the source of these discrepancies distinguished before applying these demands on an individual Member basis.

1.7 Gross Per Capita Rate Analysis

Aside from the aforementioned differences in population projections among Alliance Members and the SJRWMD, differences in per capita rate calculations form the basis of the divergence in demand projection calculations. The SJRWMD projected demands by applying a gross per capita rate to projected populations for each service area. In order to analyze per capita rates in a manner suitable for water supply planning purposes, the SJRWMD averaged the historical 11-year record (from 1995 to 2005) of per capita rates for each service area. This average per capita rate was then held constant over the planning horizon and did not consider the potential reductions from water conservation. The SJRWMD average per capita calculations may differ from those used by Alliance Members for their consumptive use permit applications or other planning purposes. The most likely reasons for this are as follows[2]:

- Different time periods for calculating per capita use. If utilities use their last 5 very wet years only, Alliance Member projections will be lower than the SJRWMD average;

- Alliance Members are not basing their future per capita use solely on historical data, or they are adjusting their per capita downward to account for recent and more aggressive reuse and conservation programs; and

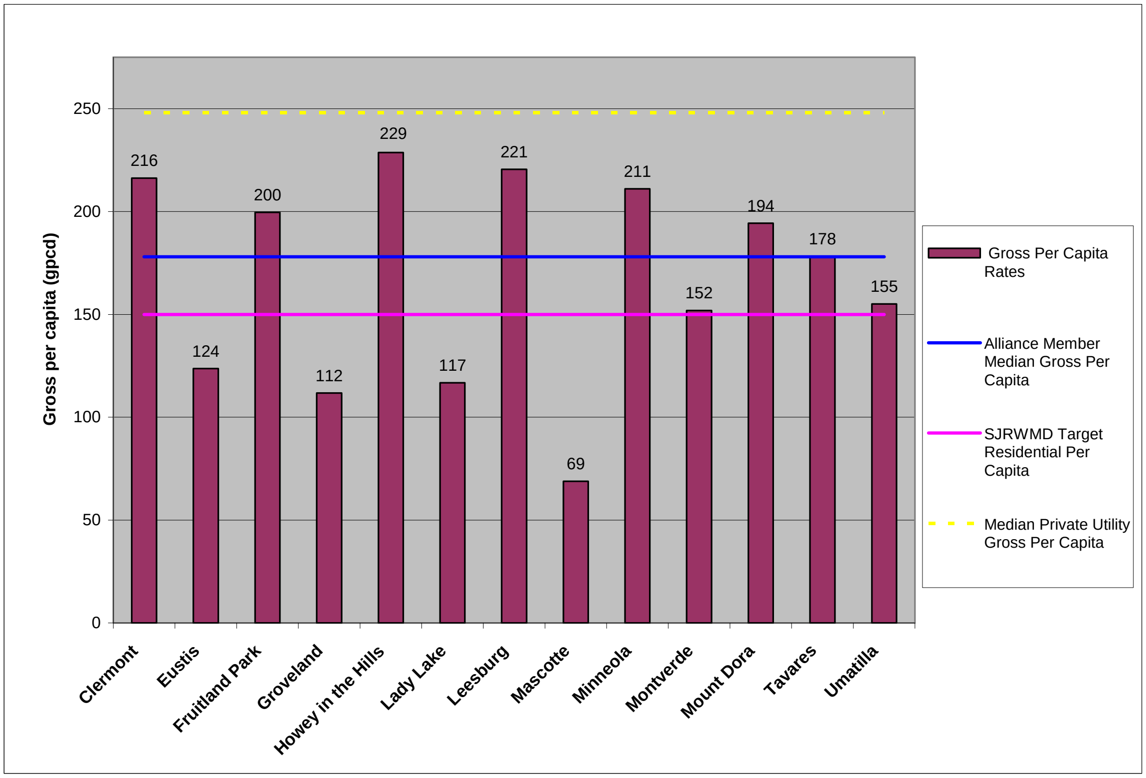
- Newly expanded service areas in Lake County often contain self-supplied populations, which in some cases may be in Alliance Member projections (resulting in lower per capita rates) but not in the SJRWMD projections.

Because of these discrepancies, the draft gross per capita rates calculated by the SJRWMD were selected as the best available data.

The gross per capita rates developed by SJRMWD were applied to Alliance Member populations and private utility populations to estimate projected water demands (Figure 1-5). Gross per capita rates represent total water demand within a service area divided by the total service area population. Gross per capita rates, therefore, encompass small commercial and industrial water users supplied by a utility. Additionally, using the 11-years of historical gross per capita rates includes higher water use rates due to drought-year conditions, so these conditions, which will likely reoccur, are carried forth in projections. Any recent gross per capita rate reductions within a service area are not fully reflected since they are averaged with historical rates.

[2] Correspondence with GIS Associates, 2007

Figure 1-5 Alliance Member Gross Per Capita Rates



Source: SJRWMD draft projections

The per capita rate for the population served by domestic self-supply was under development by the SJRWMD at the time of publication of the Plan, so is not included in the analysis.

It is important to recognize that because per capita rates are held constant over the planning horizon, reduction due to increased conservation practices are not considered in demand projections. This will be discussed further in Chapter 2 with respect to potential demand reduction opportunities.

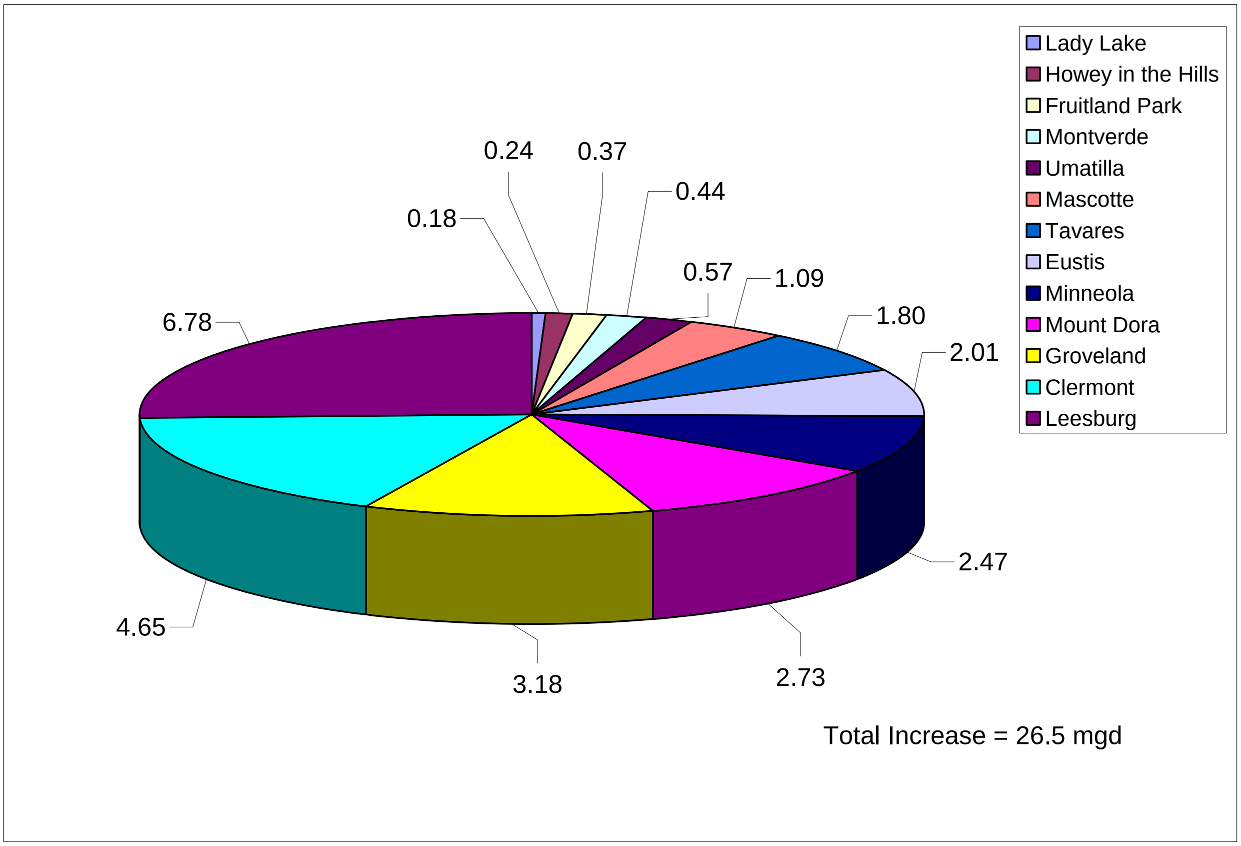
1.8 Demand Projection Results

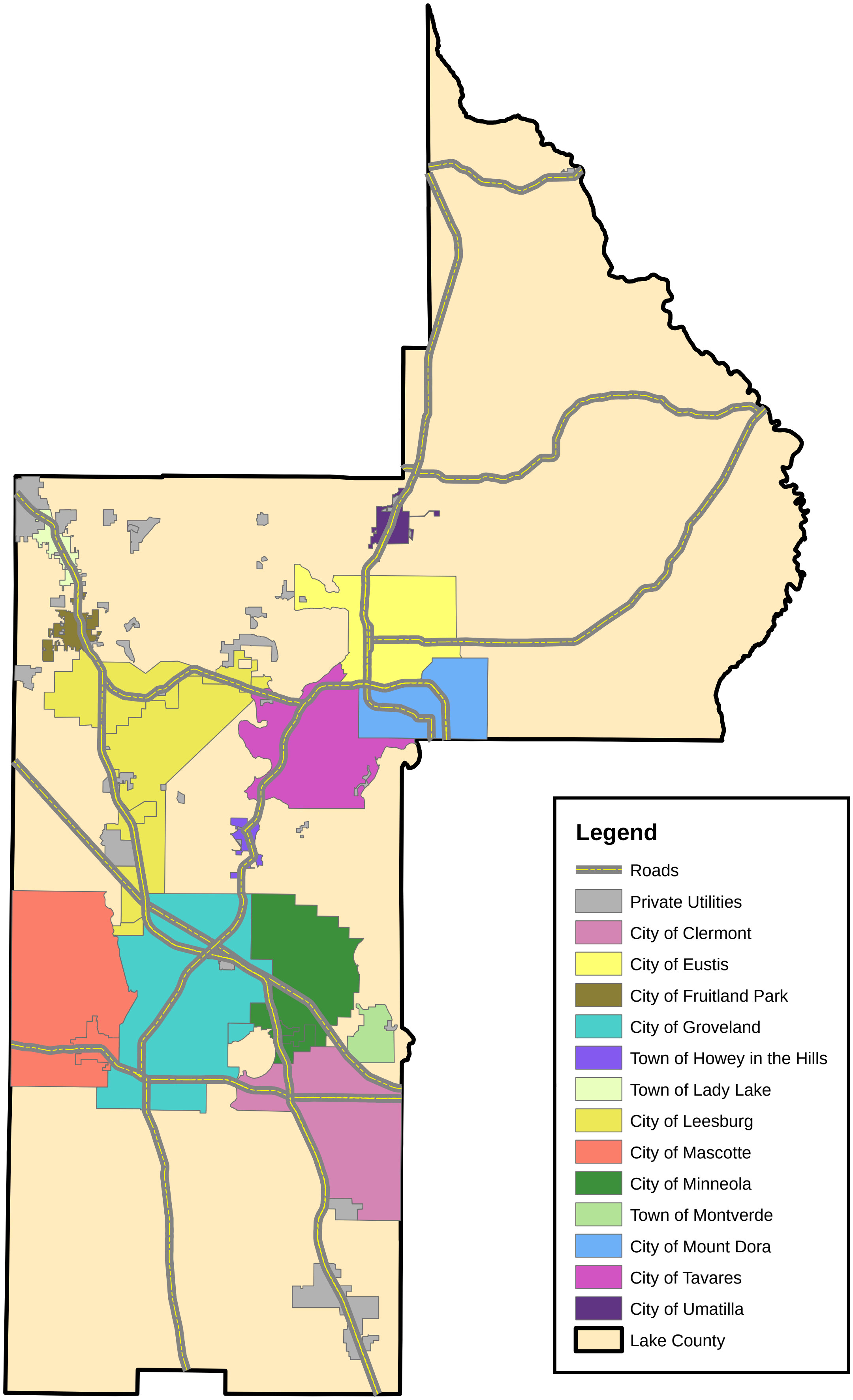
As with population projections, water demands were estimated for Alliance Members, private utilities, and populations served by domestic-self supply (Table 1-4).

The total water demand increase for Alliance Members over the planning horizon is approximately 26.51 mgd (or 102%) (Figure 1-6). The total private utilities demands are expected to increase by 14.05 mgd (or 75%) and the domestic self-supply demands by 24.35 mgd (or 178%). The total non-Alliance demand increase is projected to increase by 38.40 mgd (or 118%). The total Lake County public supply and domestic self-supply demands are projected to increase by 64.91 mgd (or 111%).

These demands do not include potential reductions in demand that can be realized through more aggressive conservation practices. The unadjusted water demands presented - including those of Alliance Members, private utilities, and domestic self-supply users - do not include potential reductions in demand that can be realized through more aggressive conservation practices. The most powerful demand reduction techniques – watering restriction enforcement, dedicated water conservation staff, education, and aggressive potable water rate structures – are currently limited in their application or effectiveness for Alliance Members. These water demand reduction techniques are discussed in detail in Chapter 2.

Figure 1-6 Alliance Member Projected Demand Increases from 2005-2030 (mgd)





Water Resource Associates, Inc.
Engineering ~ Planning ~ Environmental Science
4260 West Linebaugh Avenue
Phone: 813-265-3130
Fax: 813-265-6610
www.wraconsultants.com

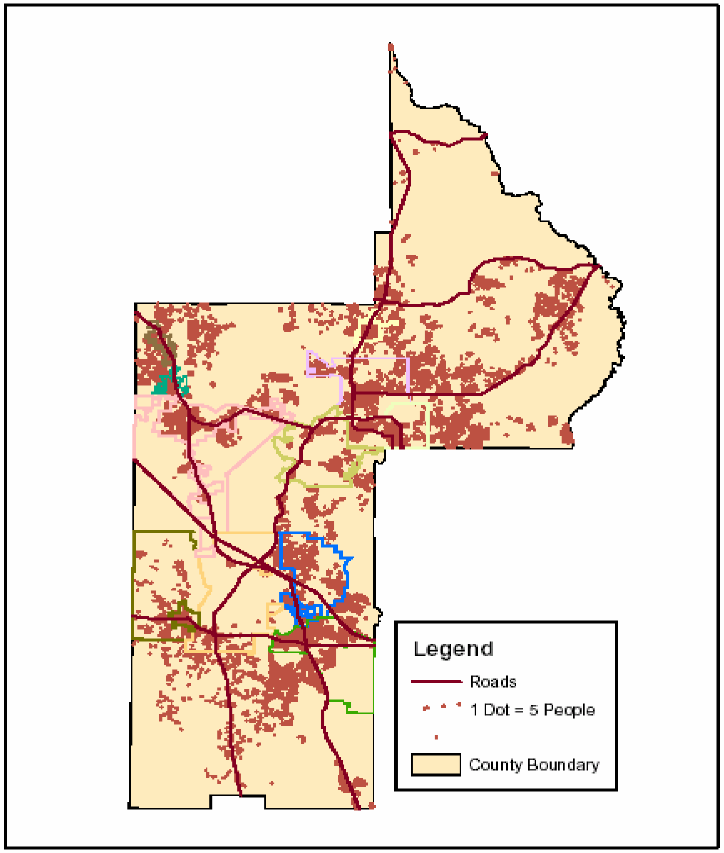
PROJECT: 0407 - Lake County Water Supply Plan Development

Figure 1-2
Lake County Alliance Members and Private Utilities Service Area Map

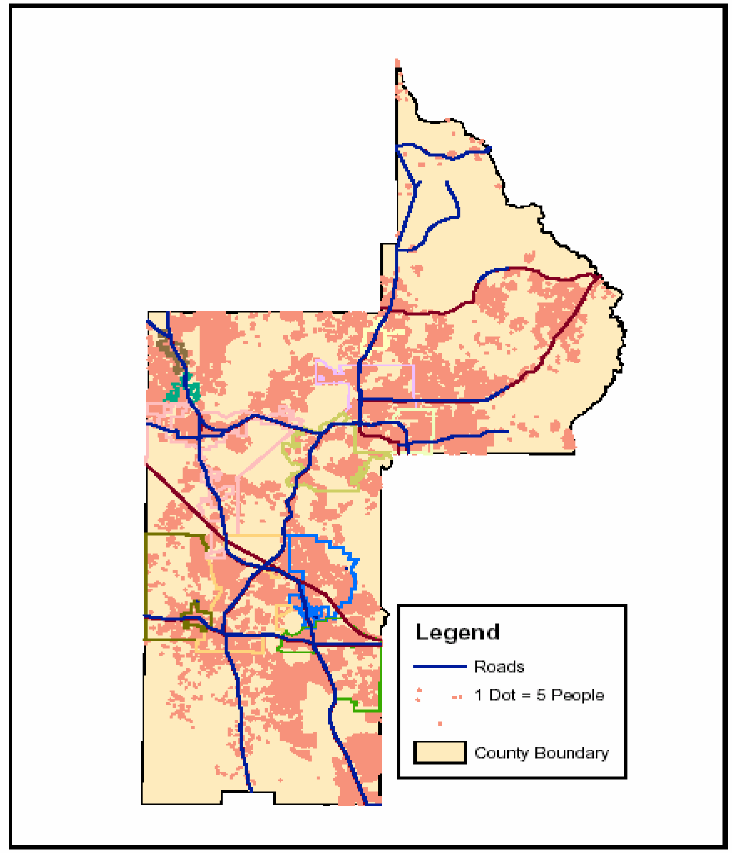
ORIGINAL DATE: 08-01-07
REVISION DATE: NA
JOB NUMBER: 0407
FILE NAME:Alliance and Private...mxd
GIS OPERATOR: DR

N
W E
S
1 Inch = 7 Miles

2005 Population Distribution



2030 Population Distribution



Water Resource Associates, Inc.
Engineering ~ Planning ~ Environmental Science
4260 W. Linebaugh Ave.
Phone: 813-265-3130
Fax: 813-265-6610
www.wraconsultants.com

PROJECT: Lake County Water Alliance

Figure 1-4
Lake County Approximate 2005 and 2030 Population Distribution

ORIGINAL DATE: 07-27-07
REVISION DATE: NA
JOB NUMBER: 0407
FILE NAME: 0407_Population_Dot...
GIS OPERATOR: LEF

Table 1-2 - Comparison of Population Projections

JURISDICTION	PROJECTION SOURCE	PROJECTION FOR 2025	COMMENTS
Countywide	Lake County Projection for Comprehensive Plan Update (2005)	**463,500**	Lake County Comp Plan Update and the LRTP relied on BEBR medium high estimates (2004 data). Lake County analyzed building permit activity to project population growth. These projections closely followed BEBR medium high projections.
	Lake County Projection for School Concurrency Planning (2006)	**571,225**	Unincorporated projections same as Comp Plan projections. Projections for municipalities provided by municipalities and described further in the municipal projections that follow.
	Draft SJWMD 2008 Water Supply Assessment	**519,395**	Projections are based on 2007 BEBR medium projections. The district-wide population is allocated within the County per the District's methodology.
All municipalities	Lake County Estimate for Comprehensive Plan Update (2005)	**200,991**	To allocate population within the municipalities the County determined the historic growth rates for each city over a five year increment beginning in 1999. Those rates were projected were to continue through 2010. For 2015 to 2025, the rates were reduced by 50%.
	Lake County Population Projections for School Concurrency (2006)	**340,003**	Each municipality provided population projections. The methodology used by the municipality is described below.
	Draft SJWMD 2008 Water Supply Assessment	**280,683**	Based on service area population developed using parcel-level population growth analyses.

Table 1-2 - Comparison of Population Projections

JURISDICTION	PROJECTION SOURCE	PROJECTION FOR 2025	COMMENTS
Clermont	Lake County Estimate for Comprehensive Plan Update (2005)	**44,696**	Lake County assumed 51% growth rate to 2010 and a 25% growth rate for each five year period from 2010 to 2025.
	Lake County Population Projections for School Concurrency (2006)	**62,988**	Municipal estimate
	GIS Associates Draft Projections (2007)	**44,222**	Based on service area population developed using parcel-level population growth analyses.
Eustis	Lake County Estimate for Comprehensive Plan Update (2005):	**20,904**	Lake County assumed 10% growth rate to 2010 and a 5% growth rate for each five year period from 2010 to 2025.
	Lake County Population Projections for School Concurrency (2006)	**38,473**	Assumed 4% annual growth rate.
	Consumptive Use Permit Application Projections for 2025 (2005):	**63,450**	Linear growth in current service area, new area projections based on DRIs and plan amendments.
	GIS Associates Draft Projections (2007)	**37,683**	Based on service area population developed using parcel-level population growth analyses.

Table 1-2 - Comparison of Population Projections

JURISDICTION	PROJECTION SOURCE	PROJECTION FOR 2025	COMMENTS
Fruitland Park	Lake County Estimate for Comprehensive Plan Update (2005)	**4,283**	Lake County assumed 10% growth rate to 2010 and a 5% growth rate for each five year period from 2010 to 2025.
	Lake County Population Projections for School Concurrency (2006)	**11,929**	Lake County estimate. Basis for estimate not provided.
	GIS Associates Draft Projections (2007)	**5,382**	Based on service area population developed using parcel-level population growth analyses.
Groveland	Lake County Estimate for Comprehensive Plan Update (2005)	**25,633**	Lake County assumed 76% growth rate to 2010 and a 38% growth rate for each five year period from 2010 to 2025.
	Lake County Population Projections for School Concurrency (2006)	**37,808**	Municipal estimate. Basis of estimate not provided.
	GIS Associates Draft Projections (2007)	**33,032**	

Table 1-2 - Comparison of Population Projections

JURISDICTION	PROJECTION SOURCE	PROJECTION FOR 2025	COMMENTS
Howey in the Hills	Lake County Estimate for Comprehensive Plan Update (2005)	**1,803**	Lake County assumed 19% growth rate to 2010 and a 10% growth rate for each five year period from 2010 to 2025.
	Lake County Population Projections for School Concurrency (2006)	**5,507**	Lake County estimate. Basis for estimate not provided.
	GIS Associates Draft Projections (2007)	**2,202**	Based on service area population developed using parcel-level population growth analyses.
Lady Lake	Lake County Estimate for Comprehensive Plan Update (2005)	**17,791**	Lake County assumed 11% growth rate to 2010 and a 6% growth rate for each five year period from 2010 to 2025.
	Lake County Population Projections for School Concurrency (2006)	**18,044**	Combination of County estimates and town comp plan.Basis of estimate not provided.
	Service Area estimates	**6,308**	Includes portions of The Villages in Sumter County. Basis of estimate not provided.
	GIS Associates Draft Projections (2007)	**6,185**	Based on service area population developed using parcel-level population growth analyses.

Table 1-2 - Comparison of Population Projections

JURISDICTION	PROJECTION SOURCE	PROJECTION FOR 2025	COMMENTS
Leesburg	Lake County Estimate for Comprehensive Plan Update (2005)	**21,145**	Lake County estimate. Basis for estimate not provided.
	Estimate for Lake County Population Projections for School Concurrency (2006)	**41,163**	Municipal estimates. Basis of estimate not provided.
	GIS Associates Draft Projections (2007)	**41,163**	Based on service area population developed using parcel-level population growth analyses.
Mascotte	Lake County Estimate for Comprehensive Plan Update (2005)	**11,804**	Lake County assumed 45% growth rate to 2010 and a 22% growth rate for each five year period from 2010 to 2025.
	Estimate for Lake County Population Projections for School Concurrency (2006)	**16,991**	Lake County estimate
	GIS Associates Draft Projections (2007)	**17,407**	Based on service area population developed using parcel-level population growth analyses.
Minneola	Lake County Estimate for Comprehensive Plan Update (2005)	**16,390**	Lake County assumed 26% growth rate to 2010 and a 13% growth rate for each five year period from 2010 to 2025.
	Estimate for Lake County Population Projections for School Concurrency (2006)	**39,530**	Green Consulting estimate. Basis of estimate not provided.
	GIS Associates Draft Projections (2007)	**16,427**	Based on service area population developed using parcel-level population growth analyses.

Table 1-2 - Comparison of Population Projections

JURISDICTION	PROJECTION SOURCE	PROJECTION FOR 2025	COMMENTS
Montverde	Lake County Estimate for Comprehensive Plan Update (2005)	**1,705**	Lake County assumed 16% growth rate to 2010 and a 8% growth rate for each five year period from 2010 to 2025.
Estimate correlates with domestic water supply estimate.	Estimate for Lake County Population Projections for School Concurrency (2006)	**2,737**	Green Consulting estimate. Basis of estimate not provided.
	GIS Associates Draft Projections (2007)	**5,169**	Based on service area population developed using parcel-level population growth analyses.
Mt. Dora	Lake County Estimate for Comprehensive Plan Update (2005)	**14,727**	Lake County assumed 14% growth rate to 2010 and a 7% growth rate for each five year period from 2010 to 2025.
	Estimate for Lake County Population Projections for School Concurrency (2006)	**33,909**	From the Mount Dora Comprehensive Plan (2015). Basis of estimate not provided.
	Mt. Dora and Lake County Eastern Service Area Population Projections (2006)	**24,925**	Projections do not include Joint Planning area to west of City. Basis of estimate not provided.
	GIS Associates Draft Projections (2007)	**29,685**	Based on service area population developed using parcel-level population growth analyses.

Table 1-2 - Comparison of Population Projections

JURISDICTION	PROJECTION SOURCE	PROJECTION FOR 2025	COMMENTS
Tavares	Lake County Estimate for Comprehensive Plan Update (2005)	**16,544**	Lake County assumed 16% growth rate to 2010 and a 8% growth rate for each five year period from 2010 to 2025.
	Estimate for Lake County Population Projections for School Concurrency (2006)	**24,925**	City estimate assuming 4% annual increase
	GIS Associates Draft Projections (2007)	**23,690**	Based on service area population developed using parcel-level population growth analyses.
Umatilla	Lake County Estimate for Comprehensive Plan Update (2005)	**3,293**	Lake County assumed 13% growth rate to 2010 and a 7% growth rate for each five year period from 2010 to 2025.
	Estimate for Lake County Population Projections for School Concurrency (2006)	**4,509**	Lake County Estimate. Basis of estimate not provided.
	GIS Associates Draft Projections (2007)	**6,906**	Based on service area population developed using parcel-level population growth analyses.

Table 1-3.
Lake County Population Projections

Service Provider	Population Projections[1]							
	2005	2010	2015	2020	2025	2030	2005 - 2030 increase	2005 - 2030 increase (%)
Clermont	32,554	37,575	41,118	42,840	44,222	45,582	13,029	40%
Eustis	24,919	27,038	30,591	34,942	37,683	41,146	16,227	65%
Fruitland Park	3,657	3,884	4,648	5,057	5,382	5,498	1,842	50%
Groveland	10,928	14,864	20,787	26,610	33,032	39,388	28,460	260%
Howey in the Hills	1,213	1,350	1,896	1,954	2,202	2,283	1,069	88%
Lady Lake	4,734	5,402	5,862	5,973	6,185	6,263	1,528	32%
Leesburg	27,646	34,334	39,010	49,497	52,692	56,575	28,929	105%
Mascotte	5,933	7,060	10,144	13,964	17,407	21,680	15,748	265%
Minneola	7,050	9,784	10,530	14,776	16,427	18,776	11,727	166%
Montverde	2,397	3,202	4,169	4,663	5,169	5,318	2,921	122%
Mount Dora	19,221	20,628	23,160	26,567	29,685	33,291	14,071	73%
Tavares	15,315	16,907	19,214	21,602	23,690	25,411	10,096	66%
Umatilla	3,673	4,167	5,108	6,173	6,906	7,327	3,654	99%
Alliance Members Total	**159,239**	**186,195**	**216,239**	**254,618**	**280,683**	**308,538**	**149,300**	**94%**
Private Utility Total	67,342	78,221	90,363	101,794	113,421	119,569	52,226	78%
Domestic Self-Supply Total	49,961	58,799	78,177	100,231	125,231	152,846	102,885	206%
Total Non-Alliance	**117,304**	**137,019**	**168,540**	**202,025**	**238,652**	**272,415**	**155,111**	**132%**
Lake County Total	**276,542**	**323,214**	**384,779**	**456,643**	**519,335**	**580,953**	**304,411**	**110%**

All data extracted from SJRWMD 2007 draft projections for the SJRMWD 2008 Water Supply Assessment

(1) Draft projections based on 2007 BEBR medium-high projections, and aggregated to the parcel level using modeling techniques. All populations reflect total served population (except in the domestic self-supply category). Some Alliance Members (e.g., Mount Dora, Minneola, and Montverde) have indicated that their population projections are not generally consistent with the SJRWMD draft projections. In the context of the Lake County Water Supply Plan, an Alliance-wide planning tool, these discrepancies do not affect the outcome to any significant degree. However, if used for other purposes, such as SJRWMD's review of future CUP applications, care should be taken and the source of these discrepancies distinguished before applying these demands on an individual Member basis.

Table 1-4.
Lake County Projected Potable Water Demands

Service Provider	Gross Per Capita[1] (gpcd)	Public Supply Water Demand Projections [2] (mgd)							
		2005	2010	2015	2020	2025	2030	2005 - 2030 increase	2005 - 2030 increase (%)
Clermont	216	5.21	8.13	8.89	9.26	9.56	9.86	4.65	89%
Eustis	124	3.08	3.34	3.78	4.32	4.66	5.09	2.01	65%
Fruitland Park	200	0.73	0.78	0.93	1.01	1.07	1.10	0.37	51%
Groveland	112	1.22	1.66	2.32	2.97	3.69	4.40	3.18	260%
Howey in the Hills	229	0.28	0.31	0.43	0.45	0.50	0.52	0.24	88%
Lady Lake	117	0.55	0.63	0.68	0.70	0.72	0.73	0.18	32%
Leesburg	221	5.69	7.57	8.60	10.92	11.62	12.48	6.78	119%
Mascotte	69	0.41	0.49	0.70	0.96	1.20	1.49	1.09	265%
Minneola	211	1.49	2.06	2.22	3.12	3.47	3.96	2.47	166%
Montverde	152	0.36	0.49	0.63	0.71	0.79	0.81	0.44	122%
Mount Dora	194	3.74	4.01	4.50	5.16	5.77	6.47	2.73	73%
Tavares	178	2.73	3.01	3.42	3.85	4.22	4.53	1.80	66%
Umatilla	155	0.57	0.65	0.79	0.96	1.07	1.14	0.57	99%
Alliance Members Total	N/A	**26.06**	**33.12**	**37.92**	**44.39**	**48.35**	**52.57**	**26.51**	**102%**
Private Utility Total	N/A	18.86	22.31	25.32	28.23	31.31	32.91	14.05	75%
Domestic Self-Supply Total	N/A	13.65	15.73	19.99	25.48	31.38	38.00	24.35	178%
Total Non-Alliance	N/A	**32.51**	**38.05**	**45.31**	**53.71**	**62.68**	**70.91**	**38.40**	**118%**
Lake County Total	N/A	**58.57**	**71.17**	**83.23**	**98.10**	**111.03**	**123.48**	**64.91**	**111%**

All data extracted from SJRWMD 2007 draft projections for the SJRMWD 2008 Water Supply Assessment

(1) Gross per capita rate = total water demand/population served. Values shown are an average of gross per capita rates from 1995 to 2005. Clermont and Leesburg per capita rates increase from 2005 to 2010 (2010 to 2030 per capita shown for these cities). Domestic self-supplied household per capita is was under development by the SJRWMD at the time of publication of the Lake County Water Supply Plan, so is not listed in the table.

(2) Public Supply Demand projections = Gross per capita x Population for each 5-year increment. Some Alliance Members (e.g., Mount Dora, Minneola, and Montverde) have indicated that their demand projections are not generally consistent with the SJRWMD draft projections. In the context of the Lake County Water Supply Plan, an Alliance-wide planning tool, these discrepancies do not affect the outcome to any significant degree. However, if used for other purposes, such as SJRWMD's review of future CUP applications, care should be taken and the source of these discrepancies distinguished before applying these demands on an individual Member basis.

2.0 Water Conservation / Potable Water Demand Reduction

2.1 Conservation Best Management Practices

Water conservation is an important part of Florida's overall water management strategy. Water conservation is an essential, cost effective element of water supply planning that allows for management of water demands from existing users and new growth without requiring major capital outlays. Although water conservation applies to all water use sectors, it is particularly relevant in the residential sector, since the greatest potable water demand for water in Lake County falls under this category. Demand reduction due to conservation beyond the borders of Lake County is also significant since water use in surrounding areas ultimately affects availability of water for the County. For example, conservation efforts in Marion, Sumter, and Orange Counties are ongoing and being developed as a significant part of water supply planning efforts in those counties.

These conservation tools are considered best management practices, or BMP's. For the purposes of the Lake County Water Supply Plan, BMP's are analyzed and categorized under regulation, education, and incentives. A summary of the presence or absence of these BMP's is presented in Table 2-1. Note that these BMP's, though a comprehensive list, are not all-inclusive, so other conservation tools should not be excluded from incorporation into local governments' conservation plans. An explanation of various applications that fall under these categories follows:

Regulation

- Watering restrictions – The SJRWMD's water conservation measures for irrigation are in effect year-round, except where stricter measures have been imposed by local governments. These restrictions specify days and times when lawn irrigation is allowed.
- Inverted rate structures – The more water consumed, the more money is charged. Inverted rate structures can reduce water use and maintain revenues for water utilities. In general, water use decreases with increases in water price.
- Water efficient landscape measures – Efficient use and protection of water quality. Some local governments have ordinances requiring certain principles (such as drought tolerant plants and efficient irrigation systems) be applied within both existing and new communities.
- Mandatory dual lines for new developments – Separate lines for potable and reuse water. Governments can require dual line installation for developments served by a central water system, even if reuse is not yet available.
- Water audits – Compares water sales and other metered and accounted for usage to water pumpage data to determine if system leakage is a significant source of lost potable water.

Public Education

- Citizen awareness groups – These groups can be local to a municipality or county-wide, and raise awareness on water conservation issues by holding meetings, distributing information at public events, etc.
- Bill stuffers – Pamphlets mailed to water utility customers on a regular basis with useful data and tips on how to effectively conserve water.

- Education programs – Programs organized by local governments and to inform citizens about water conservation.
- Dedicated staff – Staff hired specifically for implementing and disseminating water conservation information to its citizens by organizing and coordinating educational programs.

Incentives

- Metering programs – Programs implemented by local governments to monitor and detect plumbing leaks by detecting abnormal water usage through meter readings.
- Toilet rebates – An incentive for replacing old, high-volume toilets with new low volume models.
- Leak detection and repair – Systematic search for leaks within a utility's distribution system, using electronic equipment to identify leak sounds and to pinpoint the precise locations of underground leaks (Wright, 2005).
- Water efficient plumbing retrofit kits – Kits provided to residents that include low flow shower heads, low-volume toilets, sink aerators, water displacement bags for toilet tanks, and toilet leak detection dye tabs.
- Rain sensors – Sensors installed on irrigation systems that prevent the system from functioning when a certain amount of rain is collected.
- Pressure monitoring and control – Method of ensuring water pressure in a system is maintained such that water loss through leaks and high flow rates is avoided.

The above list of conservation programs describes the various BMP's that were inventoried for the Lake County Water Supply Plan. A more detailed analysis of existing conservation practices currently employed by Alliance Members and often embedded in Member CUPs is attached in Appendix A. It is critical that the selection of BMP's within a conservation program carefully considers consumers and applies the BMP's most likely to reduce demands for the target end use.

2.3 Alliance Member Conservation Program Analysis

The unadjusted water demands presented in Chapter 1 - including those of Alliance Members, private utilities, and domestic self-supply users - do not include potential reductions in demand that can be realized through more aggressive conservation practices. Although individual per capita rates vary, viewing these rates from an Alliance-wide and Countywide perspective, the median gross per capita rate is a good indicator of water use trends. This rate is 178 gpcd, which is above the SJRWMD residential Districtwide goal of 150 gpcd (Hollingshead, email correspondence 6/8/2007). The removal of commercial use would show an Alliance-wide residential per capita rate closer to the SJRWMD target. However, additional conservation efforts can reduce usage below this level. A residential per capita rate of 120 to 130 gpcd is possible based on land use in Lake County comparable to other areas in Florida. The statewide residential average per capita is reported at 106 gpcd (Marella, 2004), and the SWFWMD residential average per capita is reported at 113 gpcd (Hazen and Sawyer, 2007).

The scope of conservation program elements and BMPs employed by the Alliance Members differs by member. The effectiveness of these programs as a whole were assessed on the basis of comparing per capita rates of Alliance Members to the demands targeted by these programs. Most members have an opportunity to reduce per capita rates, and therefore water demands, through increasing the aggressiveness of existing BMPs or adding effective BMPs to their existing programs. The SJRWMD's Applicant Handbook (2006) for consumptive use permitting does not list reduction in per capita water consumption as a factor to be considered in determining the duration of a permit. However, aggressive inverted rate structures, wide-ranging education programs, dedicated water conservation staff, and watering restriction enforcement are highly effective BMP's that are emphasized and applicable to nearly all Alliance Members, as described in Section 2.3.1 – 2.3.3.

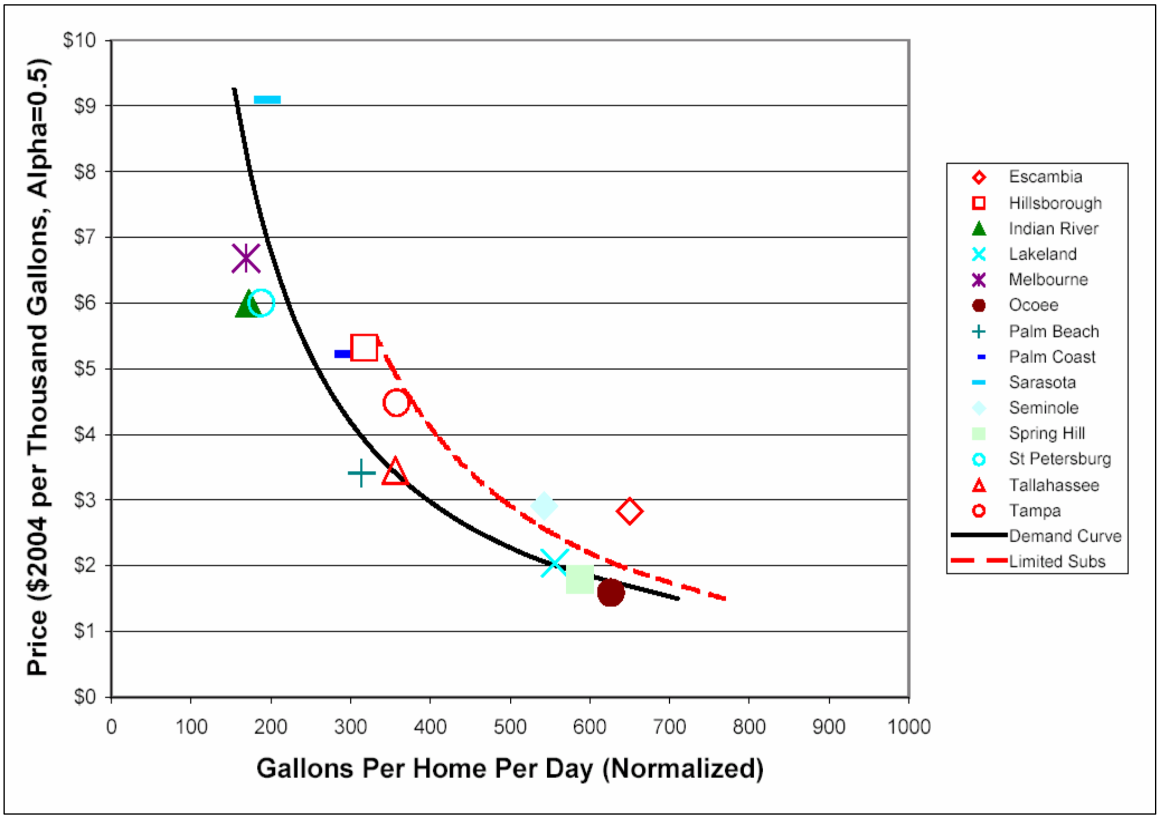
The potential demand reductions will not be realized immediately after strengthening or implementing these programs / BMPs. The nature of the conservation programs emphasized in the following sections is such that a cultural shift of sorts must occur in residential customers for long-term demand reduction achievement. Continual monitoring of these programs is crucial for the most effective demand reductions to be achieved and maintained.

2.3.1 Inverted Rate Structures

Inverted or conservation rate structures are one of the most effective conservation BMP's. With inverted rate structures, price per unit increases as consumption increases. This BMP targets high and medium volume residential users. Decreases in water usage due to increases in price are predictable and statistically valid, and price-induced changes in water use also vary with property value. Customers residing in more expensive homes tend to use more water, but price increases reduce their use by a higher amount than customers in less expensive homes because they use more water for discretionary purposes, such as landscaping. Access to substitute water sources, such as irrigation wells, also affects the amount of demand reduction accomplished by pricing (Whitcomb, 2005). As a result, changes to pricing structures must be accompanied by ordinances restricting access to substitute sources. Devising and implementing rate structures must be a long-term commitment on the part of utilities, in order to track the effectiveness and customer responsiveness as part of an ongoing cultural shift.

Figure 2-1 depicts the existing rate structures for Alliance Members. As can be seen in this graphic, Alliance Members taken as a group cluster in the $2.00/1,000 gallons to $3.00/1,000 gallons range. Compared to other proven effective rate structures, such as Seminole County, Orange County Utilities, the City of Ocala, and others, these rates are considerably low. These rates barely begin to realize the benefits of reduced water consumption, as can be see in Figure 2-2. As shown, for a typical household, the noticeable declines in water use are caused by rates beginning at about $3.00/1,000 gallons, with a stronger water use decline occurring above that rate. Figure 2-2 also illustrates that allowing source substitution causes the water use curve to shift towards greater water consumption at the same charge.

Figure 2-2 Water Demand Curve and Rate Structure Effectiveness



Source: Yingling G. and Whitcomb, J. "Rate Structure and Single Family Residential Water Use in Florida" (2005).

2.3.2 Education Programs/ Dedicated Conservation Staff

Public education is critical to achieving public acceptance of conservation BMP's and to facilitate the shift in thinking towards reducing water consumption. For example, when lawn watering restrictions or inverted rate structures are utilized, it is necessary to educate the public about these measures. When used alone, education is not typically very effective, but the most effective conservation programs always contain a strong educational component. It appears that education alone can add an additional 4%-8% to the overall per capita reduction rate (Irvine Ranch Water District, 2004; Rocky Mountain Institute, 1991; SWFWMD, 2001).

Alliance members have some educational elements within their existing conservation programs. In many cases, Alliance Members have existing or proposed a customer and employee water conservation education program that meet District criteria. For Alliance Members as a whole, there is potential to improve these programs beyond established criteria, particularly with respect to the frequency and scope of educational outreach.

Dedicated water conservation staff are essential for coordinating, overseeing and implementing educational programs and activities related to interfacing between the utility and public on water conservation awareness. Dedicated conservation staff positions can be integrated to either a planning department or a utility department. A major advantage of embedding staff into a utility department is that water conservation educational material can be sent out in conjunction with monthly bills. The cost of dedicated staff will vary with the size of the customer base and the size and extent of the proposed programs for which the staff member will be responsible. The only Alliance Members currently employing full-time water conservation coordinators are the Cities of Clermont and Mount Dora.

2.3.3 Residential Lawn Irrigation Restriction Enforcement

A common water usage restriction in Florida is the limiting of lawn watering to specific days and times. For example, houses with addresses ending in an even number may be allowed to water on two specific days, and houses with addresses ending in an odd number are allowed to water on two different days. Watering is typically not allowed during the hottest part of the day, in an effort to reduce water loss due to evaporation.

Lawn watering restrictions can be an effective best management practice, particularly when enforcement programs are in place (Davis, 1996; TBW, 1999). The SJRWMD has established watering restrictions, and all the Alliance Members have watering restriction ordinances that follow the SJRWMD rules. Currently, the Cities of Mount Dora and Clermont, enforce watering restrictions. As with the other recommended BMP's, ensuring customer adherence to watering restrictions is an ongoing effort that must help ensure the shift in customer water use patterns occurs.

The enforcement of watering restrictions begins with appropriate code and ordinance adoption. This is typically accomplished in-house using existing staff. The means of watering restriction enforcement will vary with the size of the local government and may range from the use of existing staff during working hours to the use of existing staff at overtime rates. Therefore, costs associated with such a recommended violation enforcement system are tied to internal staffing considerations. Often, the salary of officers assigned the duty of enforcing water restriction rules are paid by the fines collected associated with violations.

2.4 Potable Water Demand Reduction Calculations

2.4.1 Introduction

Demand projections made by the SJRWMD were based on an average of historical per capita rates. Inherent in this calculation, therefore, is the potential to lower future per capita rates to achieve significant demand reductions through implementation of more aggressive conservation BMP's. The previous section provided a brief outline and discussion of existing BMP's and highlighted areas that could be improved. In particular, aggressive rate structures, watering restriction enforcement, and increased educational programs, including dedicated conservation staff could have a great effect on reducing future potable water demands.

2.4.2 Potable Water Demand Reduction Methodology

Potential water savings associated with implementing or improving these conservation elements are difficult to quantify. In an effort to estimate potential water savings for both Alliance Members and private utilities, the following methodology and assumptions were used (Table 2-2):

- The percent of permitted household and commercial use were ascertained from Technical Staff Reports on existing permits. Where Technical Staff Reports (TSRs) were not available or no breakdown of use types were specified, 100% of allocated quantities were assumed to be residential, as most of the cities not having detailed TSRs were small, and therefore assumed to be without a significant commercial/industrial constituent. This percentage was assumed to remain constant over the planning horizon.

- The percent of water currently allocated for residential use was applied to projected demands for each utility, yielding projected residential quantities to which demand reductions were applied. Commercial/industrial uses were excluded from this analysis because the public-supply commercial water use in Alliance Members is significantly less than the residential, and residential water users are more likely to be less efficient users.

- Existing conservation measures and practices were evaluated by utility and a range of potential percent demand reductions was assigned according to the existing conservation practices and the 11-year average per capita rate.

- For planning purposes, the potential demand reduction percentage was selected from the established range of reductions. Often this percentage fell in the mid-range. However, if the per capita rate was high for a given utility, or if few conservation practices were currently employed, this potential percent was selected towards the upper end of the range.

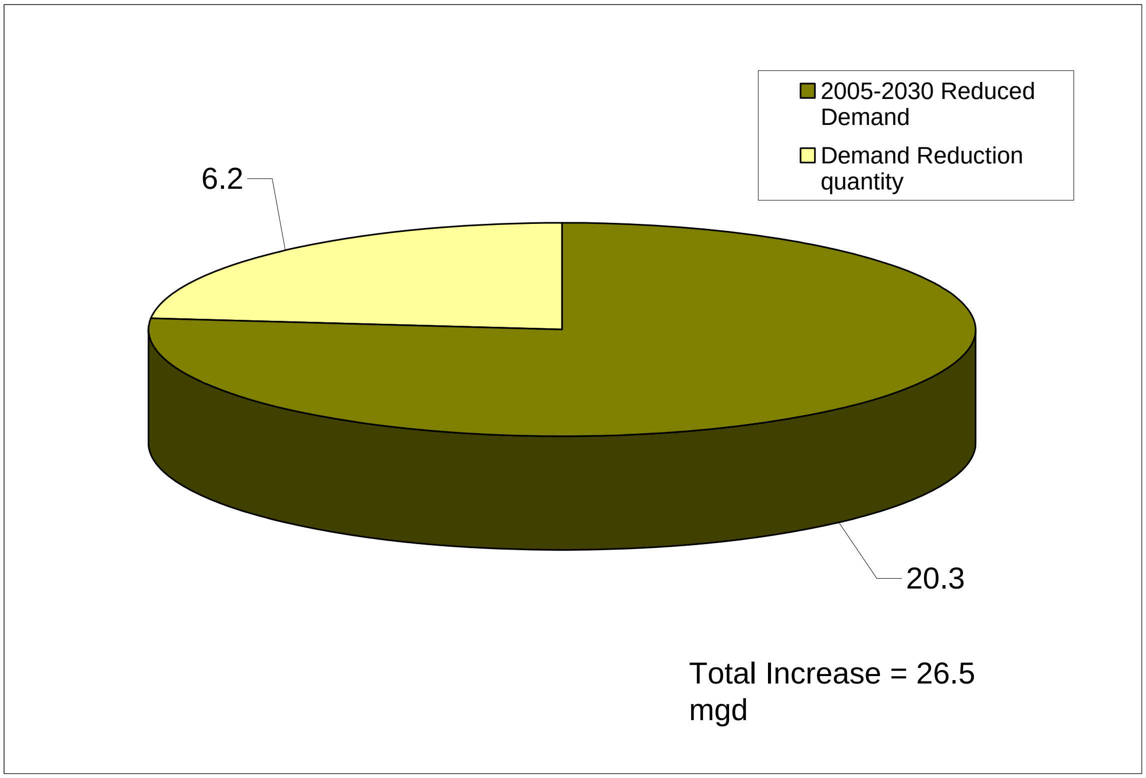
- The above-cited percentages were applied to each utility's projected 2030 residential demand. 2005 water demands were subtracted from the 2030 reduced demands to calculate a 2005-2030 water demand increase incorporating more aggressive water conservation practices.

No demand reductions were established for the domestic self-supply water use category, primarily because pricing and regulatory incentives do not reach this user group. While watering restriction enforcement can be an effective conservation tool for domestic users, this user group is within the jurisdiction of the unincorporated County and the users do not fall under SJRWMD CUP regulations. Since Lake County is not a member of the Alliance and the SJRWMD does not have regulatory jurisdiction, demand reductions are not anticipated for this user group.

2.4.3 Water Demand Reduction Results

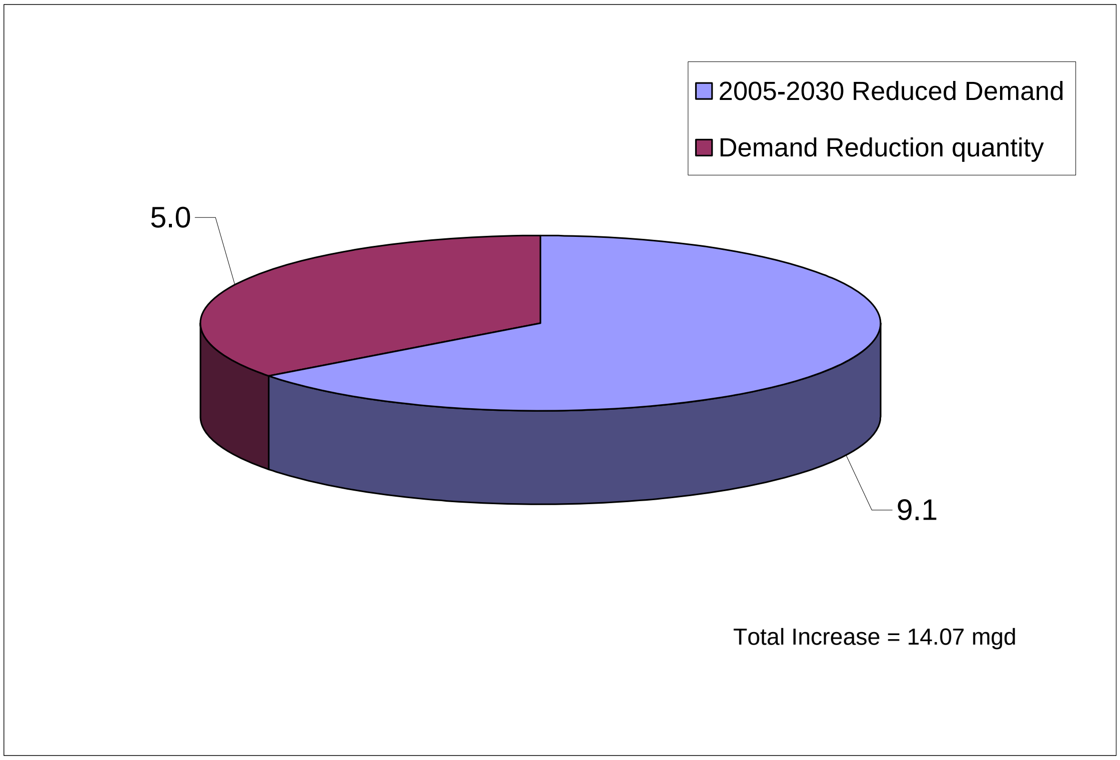
The Alliance Members can potentially reduce projected water demands by a total of 6.18 mgd over the planning horizon (Table 2-2, Figure 2-3). This demand reduction reduces the total Alliance potable water demand over the planning horizon by 23%, from 26.5 mgd to 20.3 mgd.

Figure 2-3 Potential Demand Reduction for Alliance Water Demands from 2005-2030 (mgd)



Private utilities can potentially reduce water demands by a total of 4.98 mgd over the planning horizon (Table 2-3, Figure 2-4). This demand reduction reduces the total private utilities demand by 35%, from 14.07 mgd to 9.09 mgd.

Figure 2-4 Potential Water Demand Reduction for Private Utilities from 2005-2030 (mgd)



While this is a significant reduction in the draft demand projections developed by the SJRWMD, there is currently little incentive for Alliance Members to reduce demands projected by the SJRWMD further, as decreased water use can translate to reduced CUP allocations granted by the SJRWMD.

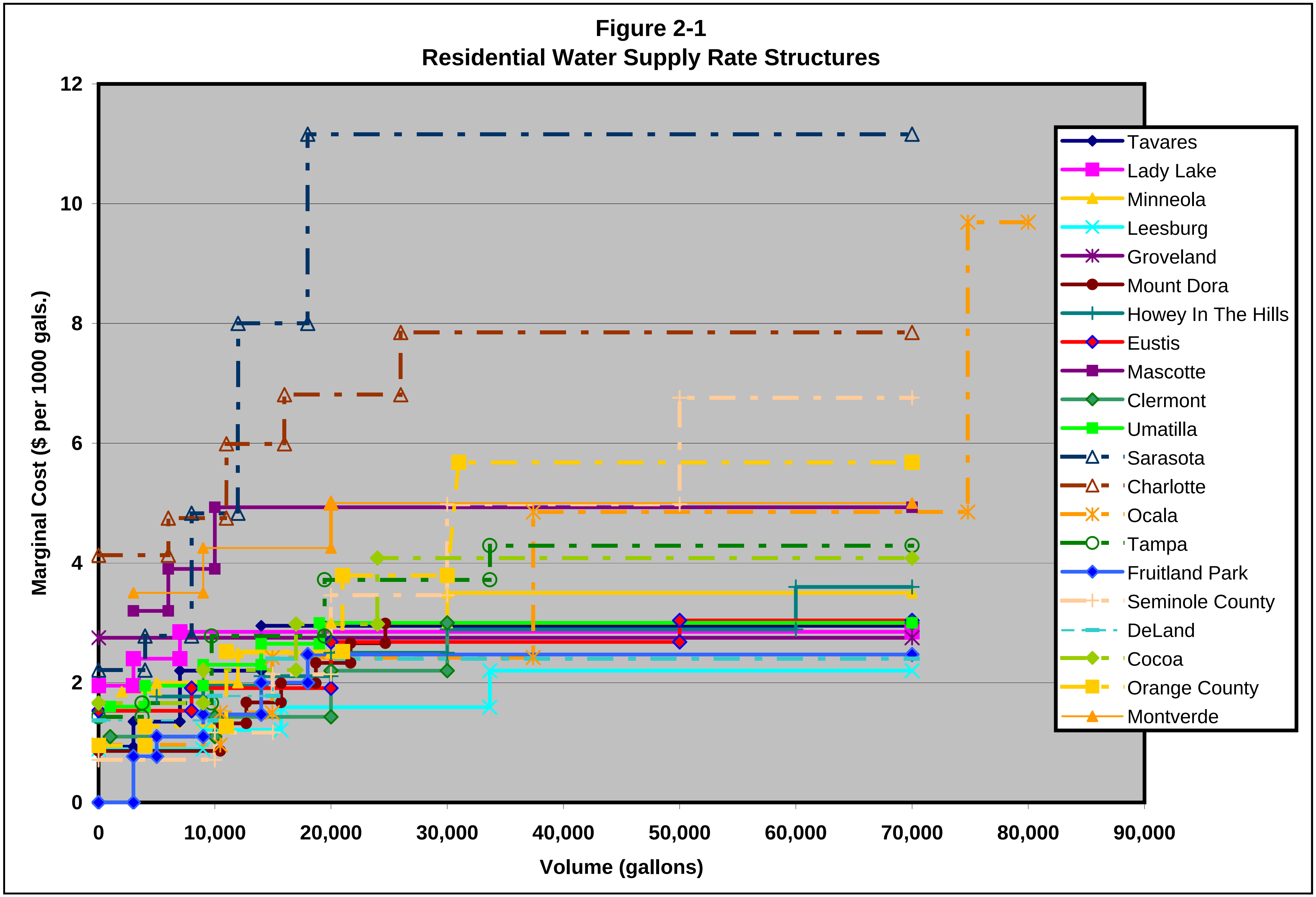


Figure 2-1
Residential Water Supply Rate Structures
Marginal Cost ($ per 1000 gals.)
0
2
4
6
8
10
12
0
10,000
20,000
30,000
40,000
50,000
60,000
70,000
80,000
90,000
Volume (gallons)
Tavares
Lady Lake
Minneola
Leesburg
Groveland
Mount Dora
Howey In The Hills
Eustis
Mascotte
Clermont
Umatilla
Sarasota
Charlotte
Ocala
Tampa
Fruitland Park
Seminole County
DeLand
Cocoa
Orange County
Montverde

Table 2-1
Existing and Proposed Conservation Measures Inventory

Alliance Member	Projected Gross Per Capita Rate [1] (gpcd)	REGULATION					EDUCATION			INCENTIVES					
		Watering Restriction Enforcement	Inverted Rate Structure	Mandatory Dual Lines for New Development	Distribution System Water Audits	Landscape Ordinances/ Florida Friendly Landscaping	Dedicated Staff	Bill Stuffers, Door Hangers and other readily available literature	Education Programs	Metering Programs	Leak detection, Prevention, and repair	Toilet Rebates	Pressure Monitoring and Control	Rain Sensors for Automatic Irrigation Systems	Retrofit Packages (Aerators, Toilet Dams, Shower Heads, etc.)
Clermont	216	Y	Y	Y[2]		Y	Y	Y	Y	Y					
Eustis	124		Y	Y	Y	Y				Y	Y				
Fruitland Park	200		Y		Y	Y[3]		Y	Y	Y					
Groveland	112		N		Y				Y						
Howey in the Hills	229		Y		Y			Y							
Lady Lake	117		Y[4]		Y	Y			Y						
Leesburg	220		Y	Y	Y	Y		Y	Y	Y	Y			Y	
Mascotte	69		Y												
Minneola	81		Y	Y	Y	Y		Y	Y	Y				Y	
Montverde	152		Y		Y	Y		Y			Y				
Mount Dora	194	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y
Tavares	178		Y	Y[5]	Y	Y		Y	Y		Y		Y	Y	
Umatilla	155		Y					Y	Y					Y	

(1) Draft 2007 SJRMWD projection Gross per capita rate = total water demand/population served. Values shown are an average of gross per capita rates from 1995 to 2005. Clermont and Leesburg per capita rates increase from 2005 to 2010 (2010 to 2030 per capita shown for these cities

(2) East Service Area

(3) Proposed in 4/28/06 CUP Technical Staff Report (TSR)

(4) Where potable water is used for irrigation, it is charged at the highest block rate.

(5) New urban developments within the reuse service area have been requried to install reclaimed water distribution lines. 12/14/04 CUP TSR

Table 2-2.
Allaince Member Potential Demand Reductions

Utility	Gross Per Capita[1]	Public Supply Water Demand Projections[2] (mgd)						Existing Residential Allocation[3]		2030 Residential Demand[4]	Increase 2005- 2030 (mgd)		2030 Demand Reduction Percentage Range[5]		2030 Demand Reduction[6] (mgd)	2030 Reduced Demand (mgd)	2005-2030 Increase with Demand Reduction
		2005	2010	2015	2020	2025	2030	Residential Allocation mgd	% of Total Allocation		Total	Residential	Lower	Upper			
Clermont	216	5.21	8.13	8.89	9.26	9.56	9.86	7.37	78%	7.69	4.65	3.62	15%	25%	1.54	8.32	3.11
Eustis	124	3.08	3.34	3.78	4.32	4.66	5.09	3.70	55%	2.82	2.01	1.11	5%	5%	0.14	4.95	1.87
Fruitland Park	200	0.73	0.78	0.93	1.01	1.07	1.10	0.79	100%	1.10	0.37	0.37	15%	25%	0.27	0.82	0.09
Groveland	112	1.22	1.66	2.32	2.97	3.69	4.40	3.18	100%	4.40	3.18	3.18	5%	15%	0.22	4.18	2.96
Howey in the Hills	229	0.28	0.31	0.43	0.45	0.50	0.52	0.24	100%	0.52	0.24	0.24	15%	25%	0.13	0.39	0.11
Lady Lake	117	0.55	0.63	0.68	0.70	0.72	0.73	0.69	100%	0.73	0.18	0.18	5%	15%	0.04	0.70	0.14
Leesburg	221	5.69	7.57	8.60	10.92	11.62	12.48	5.06	55%	6.91	6.78	3.76	15%	25%	1.73	10.75	5.06
Mascotte	69	0.41	0.49	0.70	0.96	1.20	1.49	1.09	100%	1.49	1.09	1.09	5%	10%	0.07	1.42	1.01
Minneola	211	1.49	2.06	2.22	3.12	3.47	3.96	2.51	100%	3.96	2.47	2.47	5%	15%	0.20	3.76	2.28
Montverde	152	0.36	0.49	0.63	0.71	0.79	0.81	0.35	100%	0.81	0.44	0.44	5%	15%	0.08	0.73	0.36
Mount Dora	194	3.74	4.01	4.50	5.16	5.77	6.47	2.76	78%	5.04	2.73	2.13	15%	25%	1.01	5.46	1.73
Tavares	178	2.73	3.01	3.42	3.85	4.22	4.53	2.07	70%	3.18	1.80	1.26	15%	25%	0.64	3.89	1.16
Umatilla	155	0.57	0.65	0.79	0.96	1.07	1.14	0.53	100%	1.14	0.57	0.57	5%	15%	0.11	1.02	0.45
Alliance Members Total		26.06	33.12	37.92	44.39	48.35	52.57			39.80	26.51	15.70			**6.18**	**46.39**	**20.33**

(1) Extracted from SJRWMD 2007 draft projections for the SJRMWD 2008 Water Supply Assessment. Gross per capita rate = total water demand/population served. Values shown are an average of gross per capita rates from 1995 to 2005. Clermont and Leesburg per capita rates increase from 2005 to 2010 (2010 to 2030 per capita shown for these cities).

(2) Extracted from SJRWMD 2007 draft projections for the SJRMWD 2008 Water Supply Assessment. Calculated as the 2007 BEBR medium-high population projections multiplied by gross per capita rate. Some Alliance Members (e.g., Mount Dora, Minneola, and Montverde) have indicated that their demand projections are not generally consistent with the SJRWMD draft projections. In the context of the Plan, an Alliance-wide planning tool, these discrepancies do not affect the outcome to any significant degree. However, if used for other purposes, such as SJRWMD's review of future CUP applications, care should be taken and the source of these discrepancies distinguished before applying these demands on an individual Member basis.

(3) Demand increases in residential component determined by holding existing permitted household quanities constant through 2030. Existing household permitted amounts obtained from SJRWMD regulatory staff. Where data was not available, 100% was assumed to be residential for smaller communities. Eustis and Clermont residential percentages were estimated as less than 100% as they are larger cities having significant commercial constituents. Estimated Lady Lake, Mascotte, Minneola, Montverde allocation distribution.

(4) Only estimated residential demand reduced. Reduced according to (5).

(5) Percentages assigned according to per capita rates and existing and planned conservation elements.

(6) Optimized using percentage reduction that was the most appropriate within the range in (5), based on projected demands, the extent and effectiveness of existing and projected conservation programs as determined by per capita rates.

Figure 2-3.
Private Utilities Potential Demand Reductions

Utility	Gross Per Capita[1]	Public Supply Water Demand Projections[2] (mgd)						Increase 2005- 2030[3] (mgd)	Optimal 2030 Demand Reduction[4] (mgd)	Optimal 2030 Reduced Demand (mgd)	2005-2030 Increase with Optimal Demand Reduction
		2005	2010	2015	2020	2025	2030				
Aqua Source Inc	185	0.12	0.12	0.12	0.12	0.12	0.13	0.01	0.02	0.11	-0.01
Aqua Utilities Florida	132	0.76	1.19	1.26	1.28	1.37	1.37	0.61	0.21	1.17	0.41
Astor Park Water Assoc	128	0.31	0.37	0.41	0.44	0.47	0.48	0.17	0.07	0.41	0.10
Clerbrook Golf & Rv Resort	107	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.03	0.17	-0.03
Florida Water Services	1958	1.49	1.66	1.78	1.82	1.84	1.84	0.34	0.28	1.56	0.07
Harbor Hills Utilities	857	0.81	0.87	0.91	0.96	1.21	1.26	0.46	0.19	1.07	0.27
Hawthorne At Leesburg	260	0.48	0.48	0.49	0.49	0.50	0.50	0.02	0.08	0.43	-0.05
Lake Griffin Isles	691	0.12	0.12	0.12	0.12	0.12	0.12	0.00	0.02	0.11	-0.02
Lake Utility Services Inc	248	5.39	6.84	8.38	9.83	11.12	11.87	6.48	1.78	10.09	4.70
Mid Florida Lakes	250	0.42	0.43	0.44	0.45	0.45	0.46	0.04	0.07	0.39	-0.03
Montverde Mobile Home Assoc	91	0.05	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.05	0.00
Oak Springs Mhp	226	0.08	0.08	0.10	0.10	0.10	0.10	0.02	0.02	0.09	0.01
Orange Lake Mhp	558	0.12	0.12	0.12	0.12	0.12	0.12	0.00	0.02	0.10	-0.02
Plantation At Leesburg	47	0.16	0.17	0.18	0.19	0.19	0.19	0.03	0.03	0.16	0.00
Southlake Utilities	258	1.53	2.16	3.25	4.54	5.80	6.53	5.00	0.98	5.55	4.02
Springs Park Area Inc	207	0.08	0.08	0.10	0.11	0.11	0.11	0.03	0.02	0.09	0.01
Sunlake Estates	668	0.52	0.52	0.52	0.52	0.52	0.52	0.00	0.08	0.44	-0.08
Utilities Inc Of Pennbrooke	101	0.27	0.28	0.28	0.29	0.29	0.29	0.02	0.04	0.25	-0.03
Villages Of Lake Sumter	559	5.55	6.17	6.19	6.20	6.28	6.30	0.75	0.94	5.35	-0.19
Water Oaks Estates	357	0.46	0.46	0.46	0.48	0.51	0.53	0.06	0.08	0.45	-0.02
Wedgewood	227	0.20	0.21	0.21	0.21	0.21	0.22	0.02	0.03	0.19	-0.01
Private Utilities Total	N/A	19.13	22.59	25.60	28.52	31.59	33.20	14.07	**4.98**	**28.22**	**9.09**

All data extracted from SJRWMD 2007 draft projections for the SJRMWD 2008 Water Supply Assessment

(1) Gross per capita rate = total water demand/population served. Values shown are an average of gross per capita rates from 1995 to 2005.

(2) 2007 BEBR medium-high population projections multiplied by gross per capita rate.

(3) Residential demand assumed to be 100% of total existing allocation. 2030 demand was reduced by 15% for each private utility.

(4) Assumed 15% demand reduction for each private utility

3.0 Reuse Projections

Technical Memorandum 2 characterized the existing wastewater and reuse flows in Lake County. All of the centrally collected wastewater flows in the County are treated and provided to non-potable reuse applications. The reuse flows in the County are primarily distributed to golf course and landscape/residential irrigation, aquifer recharge, and sprayfield irrigation (see Technical Memorandum 2 for approximate %).

Reuse applications within Lake County vary in terms of their potable water offset and groundwater recharge potential, as discussed in Technical Memorandum 2. Beneficial reuse is defined for water supply applications as reuse that replaces or offsets potable water use.[3] Since beneficial reuse replaces or offsets potable water use, it can serve future water demands.

Reuse systems often use a mix of beneficial and non-beneficial application options. Since irrigation demand decreases significantly during the wet season while reuse supply generally remains steady,[4] reuse flows are often disposed of non-beneficially during the wet season while dry season flows are distributed beneficially. Matching variable irrigation demands to steadier reuse supplies is essential to the planning of beneficial reuse applications.

This Chapter develops average annual daily flow (AADF) projections to 2030 for centrally collected wastewater and associated reuse flows in Lake County. Existing reuse estimates are prepared for both beneficial and non-beneficial flows, in order to assess the amount of demand currently or proposed to be met by beneficial reuse. The existing reuse estimates are compared with future projections to determine the beneficial reuse flows that are expected to be available to reduce or offset future potable water demands. On a County-wide basis, the beneficial reuse expected to be available is compared to the increase in future water demands to establish the outstanding supply requirement. Within the County, the outstanding supply requirement is expected to be met by a combination of groundwater and alternative water supplies.

GIS mapping of reuse and potable water lines is also included in this Chapter.

3.1 Data Sources

Data for the wastewater and reuse flow projections were compiled and obtained from the following sources:

- WRA's Reuse Survey of Alliance Members;
- The Florida Department of Environmental Protection's (FDEP's) 2005 Reuse Inventory;
- FDEP Domestic Wastewater Permits for individual Alliance Member Facilities, and;
- Water and Wastewater Masterplans for individual Alliance Members.

[3] Golf course and landscape/residential irrigation are considered beneficial reuses, while aquifer recharge and sprayfield irrigation are not considered beneficial reuses.
[4] Irrigation demands and wastewater flows also fluctuate on a daily basis. Wastewater flows can also fluctuate seasonally, due to seasonal population increases and infiltration/inflow (I&I).

The GIS maps of reuse and potable water lines are based on data from Alliance Members, where it was provided. GIS maps of reuse lines are provided as Figures 3-1 through 3-3. GIS maps of potable water lines are provided as Figures 3-4 through 3-6.

3.2 Wastewater Flow Projections

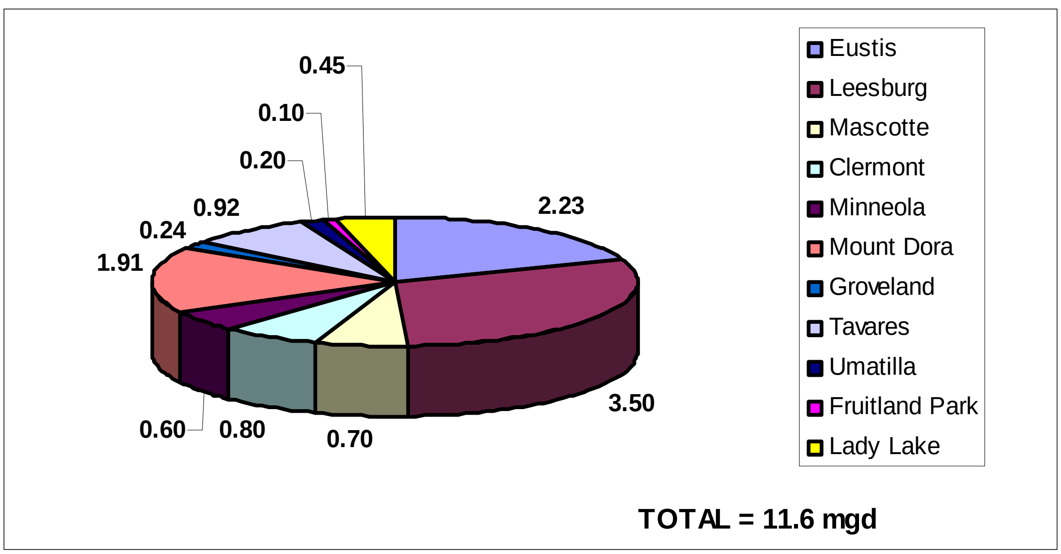
Existing wastewater flow estimates in 2005 and future wastewater flow projections to 2030 are developed for each permitted domestic wastewater facility within Lake County. Since all centrally collected wastewater is treated and provided to reuse applications in Lake County, wastewater flow projections are the basis for reuse flow projections.

Existing wastewater flows are estimated from FDEP's 2005 Reuse Inventory or individual Alliance Member Masterplan data (where available). Projected wastewater flows are calculated by multiplying existing flows by the percent increase in served population[5] from 2005 to 2030 (see Chapter 1 for population projections). All wastewater flows are annual average daily flows.

Where Alliance Member wastewater flow projections were available, the projected wastewater flows are calculated by multiplying the date of the Member projection by the percent increase in served population from that date to 2030. No Member projection extended beyond 2025.

Current wastewater flow estimates and future wastewater flow projections are shown for Alliance Members in Table 3-1. As shown, total existing flows for the Alliance are estimated in 2005 at 9.58 mgd. Total Alliance flows are projected in 2030 at 21.23 mgd, an increase of 11.65 mgd or about 122%. Figure 3-7 shows the increase in wastewater flows for each Member from 2005 to 2030.

Figure 3-7 Projected Member Increases in Wastewater Flow, 2005 – 2030



Current wastewater flow estimates and future wastewater flow projections are shown for private utilities in Table 3-2. As shown, total current flows for private utilities are estimated in 2005 at

[5] Water utility service areas were used and were considered best available information. Population projections by wastewater service areas were not available at the time of the analysis.

3.21 mgd. Total private utility flows are projected in 2030 at 5.20 mgd, an increase of 1.99 mgd or about 62%.

3.3 Reuse Flow Projections

3.3.1 Current Estimates

Current (2005) reuse flow estimates are compiled for each permitted domestic wastewater facility within Lake County. Where an Alliance Member has more than one wastewater facility, the flows from each facility are totaled for the Member analyses.

All reuse flows are designated as either beneficial or non-beneficial based on their application method, as previously described. The existing reuse application methods for various flows from each facility were gathered from FDEP's 2005 Reuse Inventory or from individual Alliance Member Masterplan data (where available).

In some cases, near term individual Member commitments to significantly increase flows to beneficial reuse applications were identified.[6] This generally involved in-progress upgrades to wastewater facilities, establishment of interconnects between wastewater facilities, and/or dry line installation to serve existing demands with pending increases in wastewater flow. Since these proposed beneficial reuse flows would serve existing demands and would not be available to serve future demands, the proposed commitments were incorporated into the current reuse estimates.

Existing and proposed reuse flow estimates are shown for Members in Table 3-1. As shown, total current and proposed beneficial reuse flow for the Alliance is estimated in 2005 at 4.11 mgd. Total non-beneficial reuse flow is estimated in 2005 at 6.13 mgd. Beneficial reuse comprises or is proposed to comprise approximately 40% of the total Alliance reuse flow in 2005.

Current reuse flow estimates are shown for private utilities in Table 3-2. As shown, total current beneficial reuse flow for private utilities is estimated in 2005 at 1.03 mgd.[7] Total non-beneficial reuse flow is estimated in 2005 at 2.18 mgd. Beneficial reuse comprises approximately 32% of the total private reuse flow in 2005.

3.3.2 Reuse Flow Projections

Future reuse flow projections to 2030 are developed for each permitted domestic wastewater facility within Lake County. Where an Alliance Member has more than one wastewater facility, the flows from each facility are totaled for each Member.

Since irrigation demands decrease significantly during the wet season, wet season reuse flows are often distributed to non-beneficial applications while dry season reuse flows are distributed to beneficial applications. A common planning target is 50% distribution of total AADF to beneficial reuse and often represents a cost feasibility limitation for individual facilities.[8] This is due to the cost of storage that would be required to effectively serve the seasonal variation in

[6] Mount Dora, Leesburg, Lady Lake, Mascotte and Tavares.
[7] Near term (proposed) private utility commitments to increase beneficial reuse flow were not identified.
[8] The SJRWMD's regulatory goal is 100% beneficial reuse (J. Hollingshead, email communication 7/17/07). The SWFWMD requires 50% beneficial reuse for eligibility for cost-share funding of reuse projects.

irrigation demand. Since water supply economies of scale (such as large storage volumes) that may be available with regional cooperation are not considered, this analysis is non-regional in scope.

The projected beneficial reuse flow for each Member is calculated by multiplying its projected wastewater flow by 50%, based on the common cost feasibility limitation for individual facilities. However, detailed analyses of individual facilities are not conducted here, so this method does not necessarily assume that 50% beneficial reuse is feasible for any given wastewater facility. Rather, the projections reflect a County-wide planning goal that is expected to be reached (on average) in 2030 by the wastewater facilities in Lake County.

The projected non-beneficial reuse flow for each facility is calculated by subtracting the projected beneficial reuse flow from the projected wastewater flow. This assumes that all centrally collected wastewater will continue to be provided to reuse applications.

Beneficial reuse flow projections are shown for Members in Table 3-1. As shown, total projected beneficial reuse flow for the Alliance in 2030 is 10.61 mgd. Total non-beneficial reuse flows are projected at 10.61 mgd. The projected available increase in beneficial reuse flow is calculated by subtracting the existing and proposed beneficial reuse flow estimate from the projected beneficial reuse flow. As shown, the total available increase in beneficial reuse flow for the Alliance to 2030 is 6.51 mgd.

Reuse flow projections to 2030 are shown for private utilities in Table 3-2. Since many of the private utilities are much smaller than the Member facilities, their ability to treat wastewater to more costly public access standards and distribute to beneficial reuse applications is likely to be more limited.[9] Therefore, reuse distribution to beneficial applications is not anticipated for the projections unless the utility currently distributes reuse beneficially or their wastewater flow is projected to increase by more than 0.25 mgd. As shown, total projected beneficial reuse flow for 2030 is 2.04 mgd. Total non-beneficial reuse flow is projected at 3.16 mgd. The total available increase in beneficial reuse flow to 2030 for Non-Alliance Members is projected at 1.01 mgd.

3.4 Projected Water Supply Contribution

Since beneficial reuse replaces or offsets potable water use, it can serve future water demands. Until recently, reuse applications in Florida were considered to be treated wastewater disposal options that were more environmentally friendly than treated wastewater discharges to surfacewaters (FDEP, 2003).

The emphasis on reuse as a disposal method has led to inefficient water supply applications even when used beneficially, since some utility suppliers have offered incentives to end users to accept reuse water. Landscape/residential irrigation use of water can increase four-fold when unrestricted reuse supply is made available at no cost to the consumer.[10],[11] In some cases, incentive low-charge cost structures are embedded in long-term residential/landscape reuse supply agreements that have precluded the efficient water supply use of the resource.

[9] Reuse treatment requirements for different applications are summarized in Appendix B.
[10] SWFWMD (2002).
[11] However, golf courses are typically considered to be efficient reuse water users due to water management practices already in place.

As traditional groundwater supplies become limited with increasing demand, more costly alternative water supplies must be developed. Reuse is now considered a valuable water resource and an essential component of an integrated water resource management strategy.

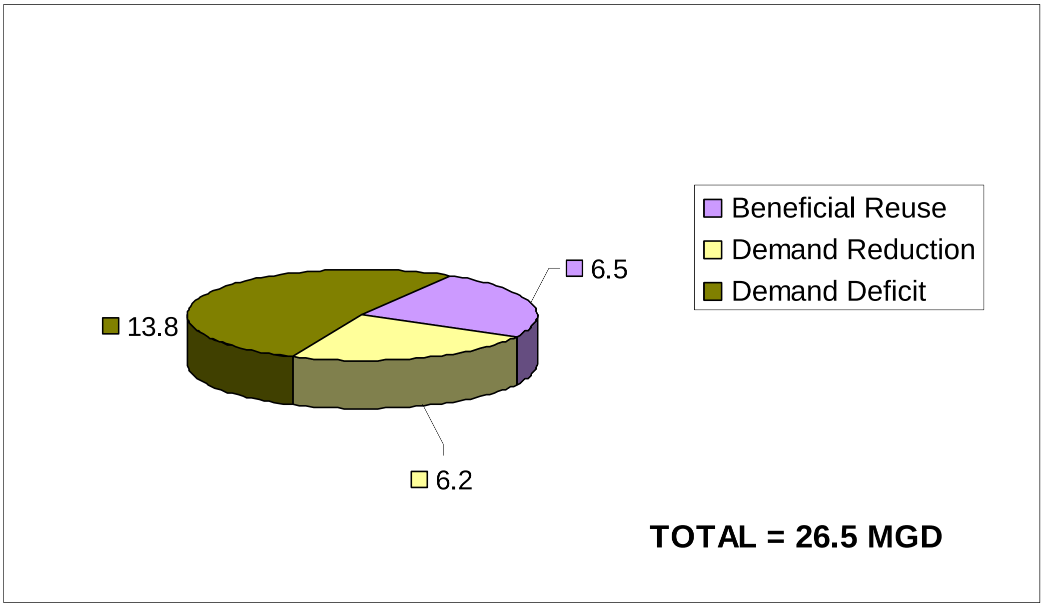
The recent emphasis on reuse as a water supply source requires its efficient water supply application when used beneficially. Conservation practices currently employed by Alliance Members are discussed in Chapter 2. Key conservation elements applicable to residential/landscape irrigation use include:

- Metering
- Volume-based Charges
- Enforcement of Watering Restrictions
- Use of Irrigation Timers and Moisture Sensors

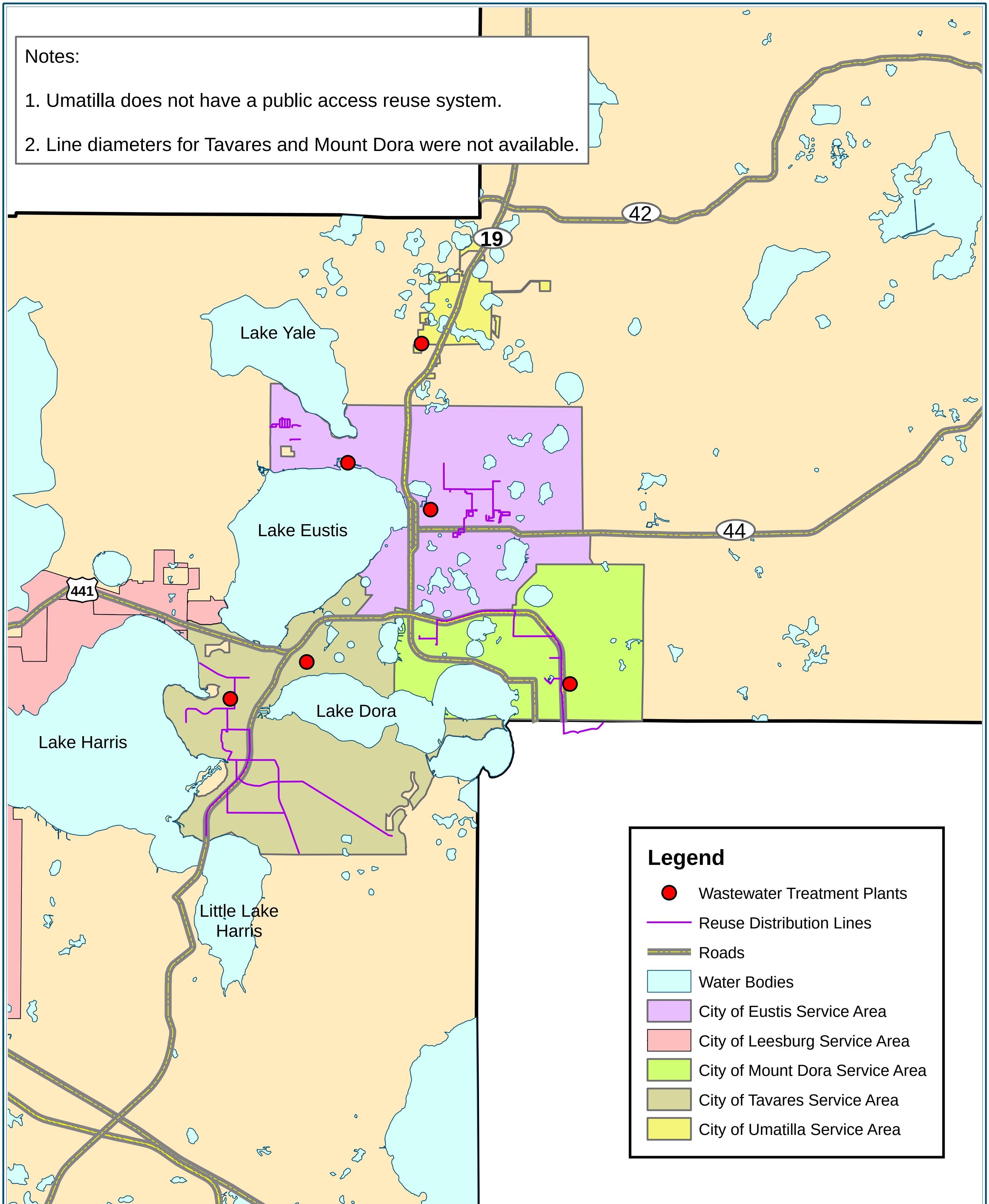
With sufficient reuse efficiency measures, it is expected that beneficial reuse flows available from 2005 to 2030 will be used as efficiently as potable water (for irrigation purposes). Therefore, the water supply benefit from available beneficial reuse is projected to be equivalent to that from potable water supply, since potable water is currently used for irrigation in Lake County.

The projected Alliance water supply contribution from the available reuse projections is shown on Figure 3-8. As shown, the available increase in beneficial reuse flows is 6.5 mgd and would serve approximately 25% of the Alliance water demand increase from 2005 to 2030.

Figure 3-8 2005-2030 Projected Alliance Demand with Conservation and Reuse



As previously discussed, this projected supply contribution does not necessarily assume any specific contribution from a given wastewater facility. The projected contribution reflects a combined beneficial reuse supply that is expected to be available to 2030 from the municipal wastewater facilities in Lake County.



Water Resource Associates, Inc.
Engineering ~ Planning ~ Environmental Science
4260 West Linebaugh Avenue
Phone: 813-265-3130
Fax: 813-265-6610
www.wraconsultants.com

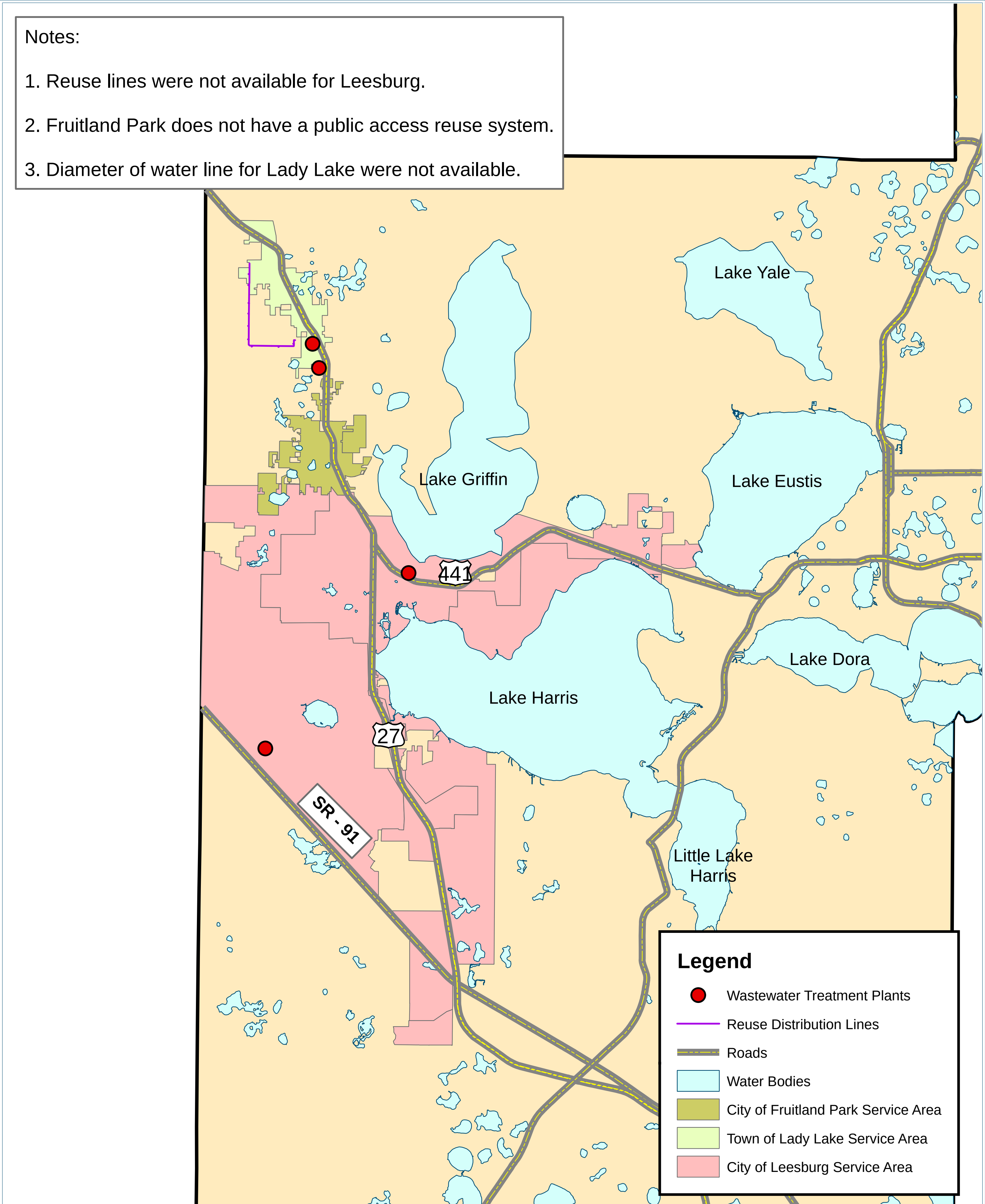
PROJECT: 0407- Lake County Water Supply Plan Authority

Figure 3-1
Northeast Lake County
Reuse Distribution Systems

ORIGINAL DATE: 05-30-07
REVISION DATE: 07-26-07
JOB NUMBER: 0407
FILE NAME:0407_Region 1 Reuse.mxd
GIS OPERATOR: JAC

N W E S

1 Inch = 3 Miles

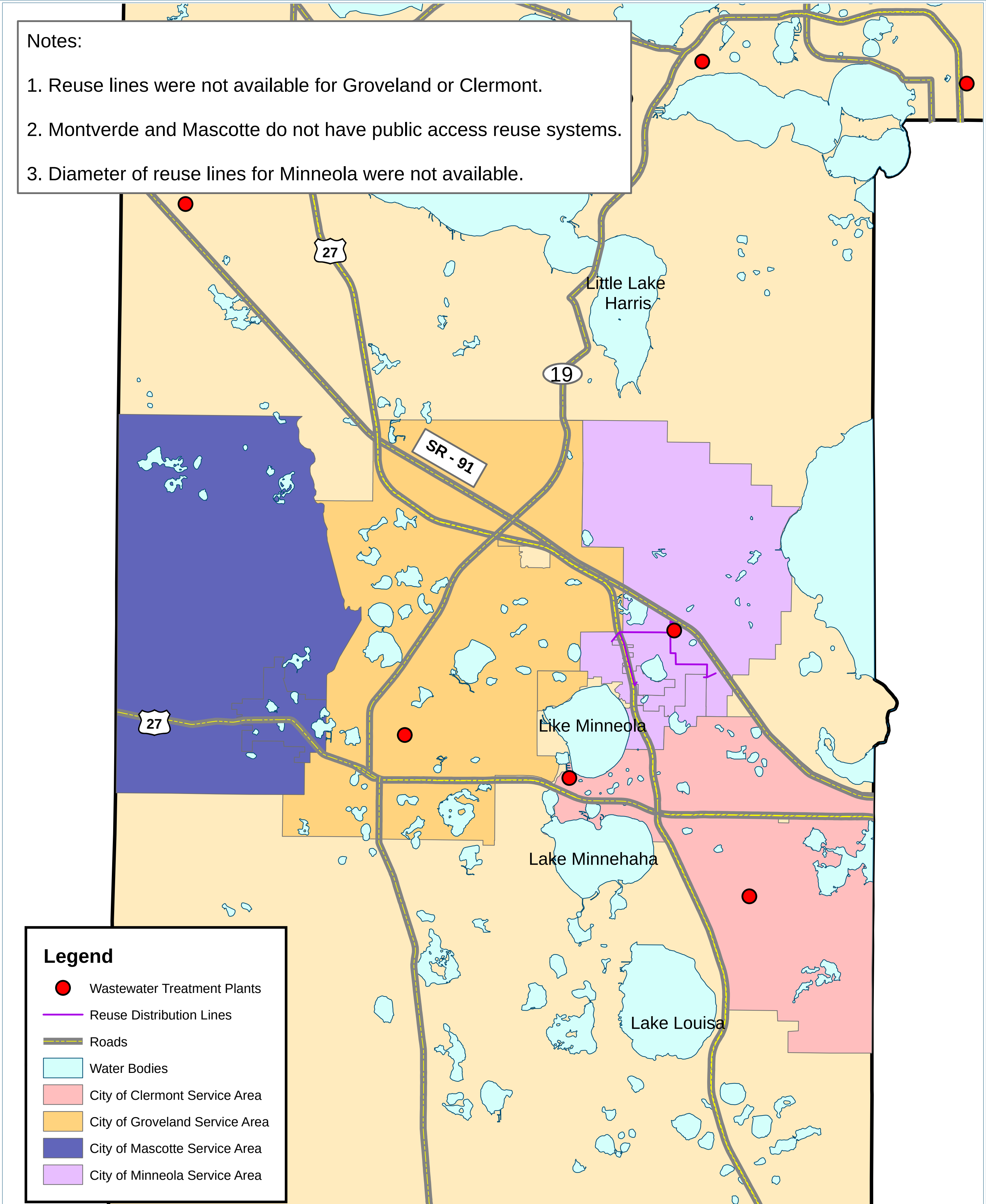


Water Resource Associates, Inc.
Engineering ~ Planning ~ Environmental Science
4260 West Linebaugh Avenue
Phone: 813-265-3130
Fax: 813-265-6610
www.wraconsultants.com

PROJECT: 0407- Lake County Water Supply Plan Authority

Figure 3-2
Northwest Lake County
Reuse Distribution Systems

ORIGINAL DATE: 05-30-07
REVISION DATE: 07-26-07
JOB NUMBER: 0407
FILE NAME:0407_Region 2 Reuse.mxd
GIS OPERATOR: DR

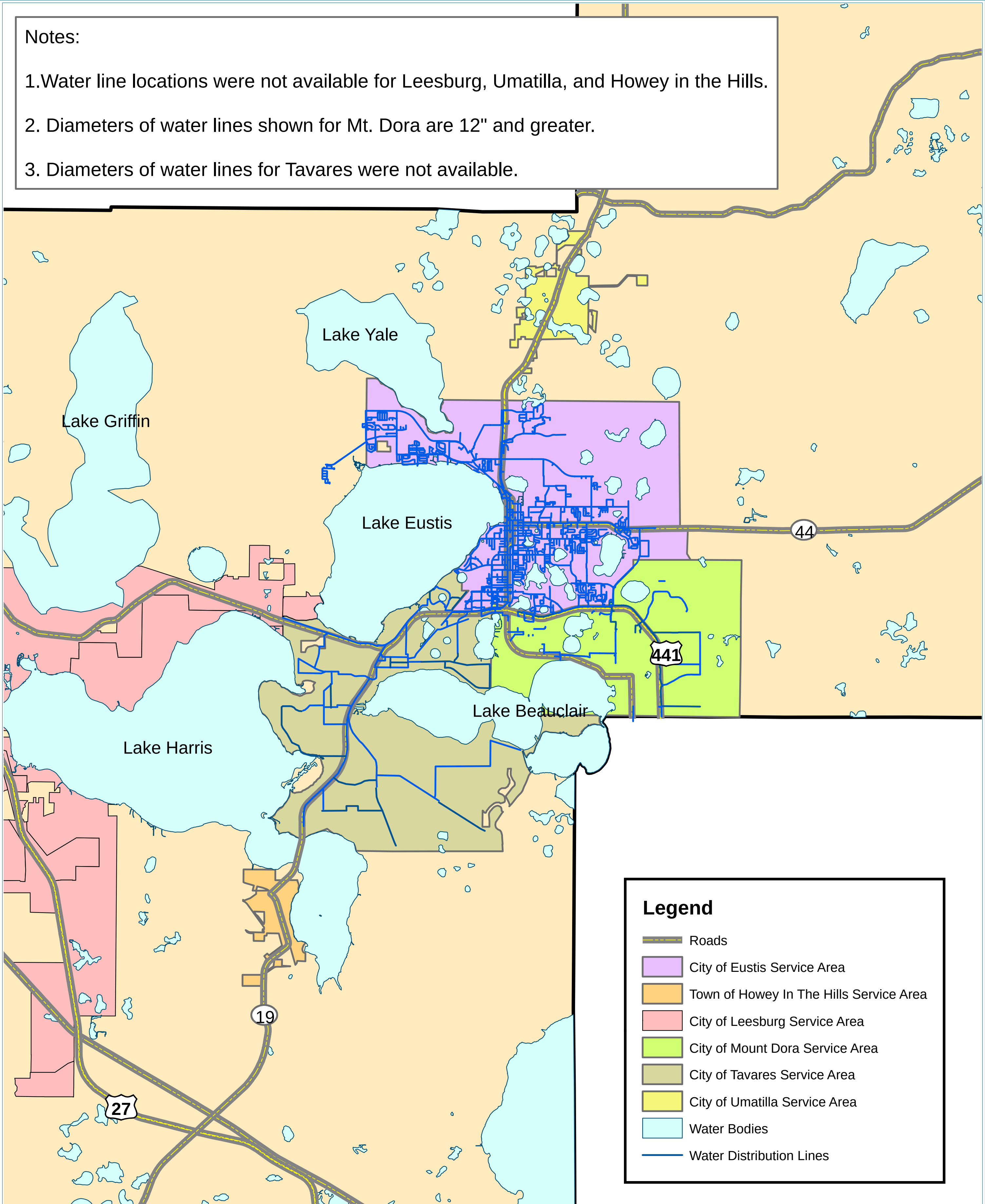


Water Resource Associates, Inc.
Engineering ~ Planning ~ Environmental Science
4260 West Linebaugh Avenue
Phone: 813-265-3130
Fax: 813-265-6610
www.wraconsultants.com

PROJECT: 0407- Lake County Water Supply Plan Authority

Figure 3-3
Southern Lake County
Reuse Distribution Systems

ORIGINAL DATE: 05-30-07
REVISION DATE: 07-26-07
JOB NUMBER: 0407
FILE NAME:0407_Region 3 Reuse.mxd
GIS OPERATOR: DR



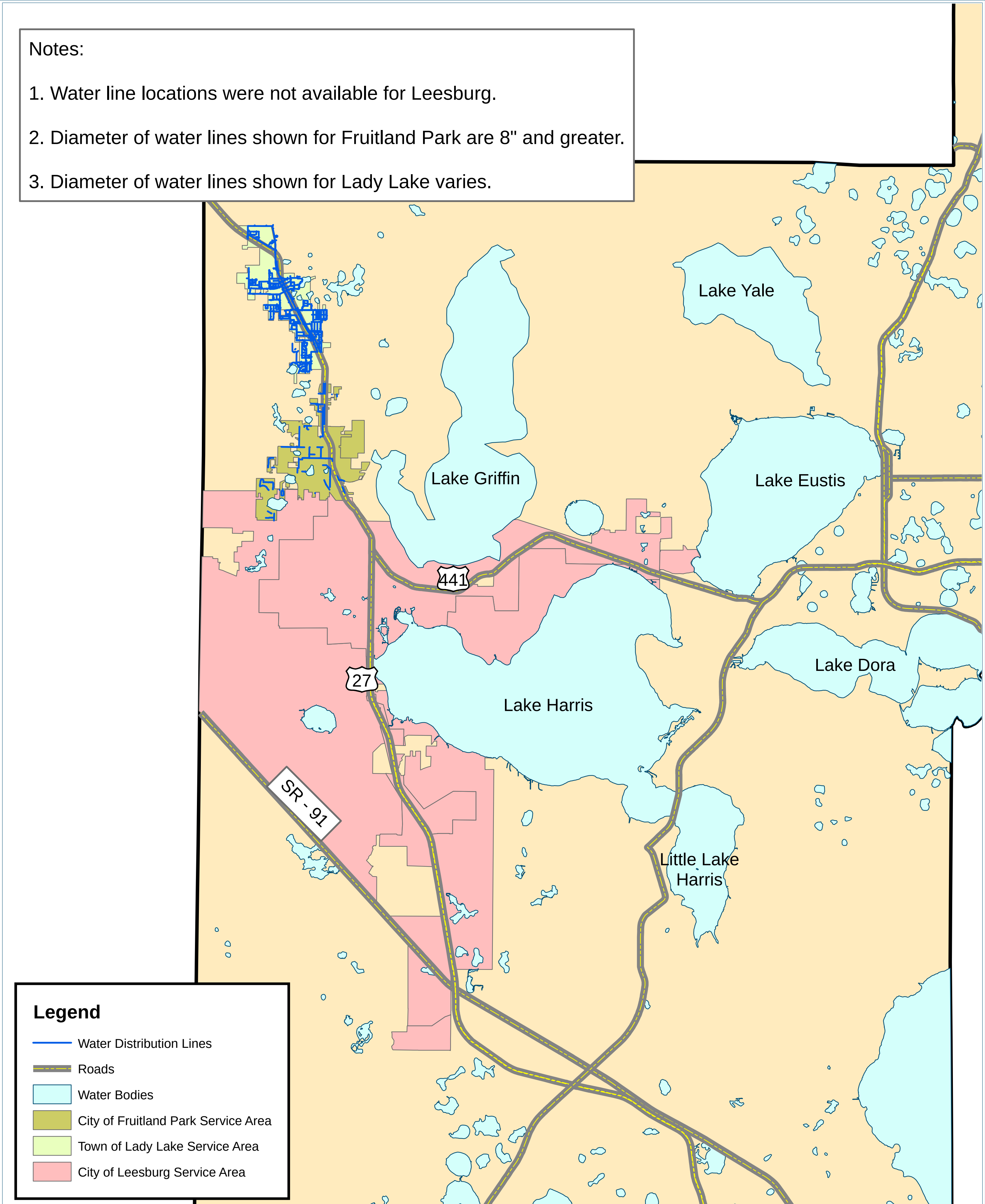
Water Resource Associates, Inc.
Engineering ~ Planning ~ Environmental Science
4260 West Linebaugh Avenue
Phone: 813-265-3130
Fax: 813-265-6610
www.wraconsultants.com

PROJECT: 0407- Lake County Water Supply Plan Authority

Figure 3-4
Northeast Lake County
Water Distribution Systems

ORIGINAL DATE: 05-30-07
REVISION DATE: 07-26-07
JOB NUMBER: 0407
FILE NAME:0407_Region 1 .mxd
GIS OPERATOR: DR

N
W E
S
1 Inch = 3 Miles



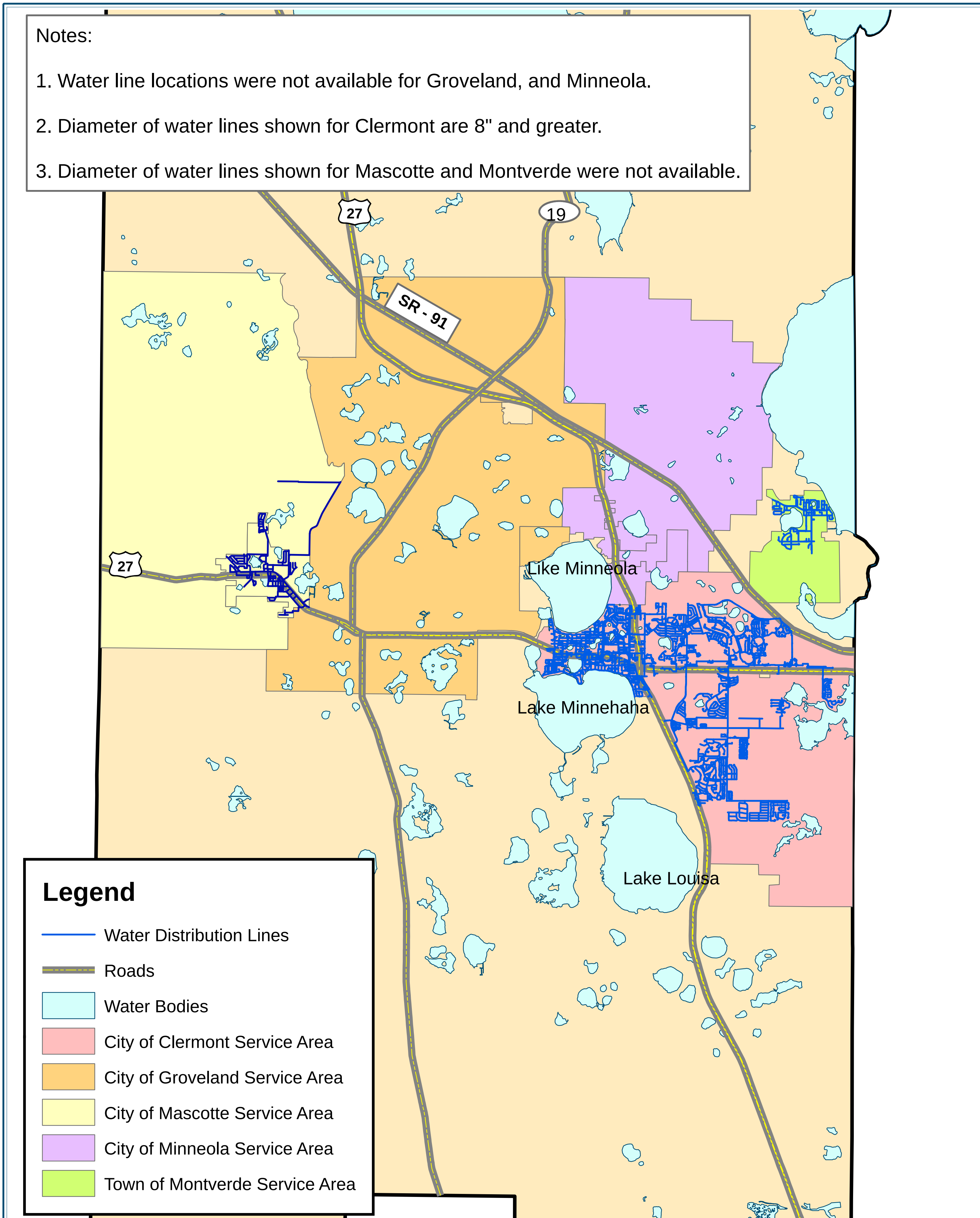
Water Resource Associates, Inc.
Engineering ~ Planning ~ Environmental Science
4260 West Linebaugh Avenue
Phone: 813-265-3130
Fax: 813-265-6610
www.wraconsultants.com

PROJECT: 0407- Lake County Water Supply Plan Authority

Figure 3-5
Northwest Lake County
Water Distribution Systems

ORIGINAL DATE: 05-30-07
REVISION DATE: 07-26-07
JOB NUMBER: 0407
FILE NAME:0407_Region 2.mxd
GIS OPERATOR: DR

N W E S
1 Inch = 3 Miles



Water Resource Associates, Inc.
Engineering ~ Planning ~ Environmental Science
4260 West Linebaugh Avenue
Phone: 813-265-3130
Fax: 813-265-6610
www.wraconsultants.com

PROJECT: 0407- Lake County Water Supply Plan Authority

Figure 3-6
Southern Lake County
Water Distribution Systems

ORIGINAL DATE: 05-30-07
REVISION DATE: 07-26-07
JOB NUMBER: 0407
FILE NAME:0407_Region 3.mxd
GIS OPERATOR: DR

N W E S
1 Inch = 3 Miles

Table 3-1. Alliance Current and Projected Reuse and Non-Potable Flows

	Current and Projected Wastewater Flow			Current or Proposed Reuse Flow and Distribution[(1), (2)]			Projected Reuse Flow and Distribution[(3)]				Regionalized AWS Scenario: Potential Non-Potable Water Flows and Distribution						
	2005	2030	2005 to 2030	2005	2005	2005	2030	2030	2030	2005 to 2030	2030	2030	2030	2030	2005 to 2030	2030	2005 to 2030
Municipality / Utility	Estimated Wastewater Flow (mgd)	Projected Wastewater Flow (mgd)	Increase in Wastewater Flow (mgd)	Estimated Non-Beneficial Reuse Flow (mgd)	Estimated Beneficial Reuse Flow[(4)] (mgd)	Reuse Beneficial Utilization (%)	Projected Non-Beneficial Reuse Flow (mgd)	Projected Beneficial Reuse Flow (mgd)	Reuse Beneficial Utilization (%)	Available Increase in Beneficial Reuse Flow (mgd)	Projected Non-Beneficial Reuse Flow (mgd)	Projected Beneficial Reuse Flow (mgd)	Reuse Beneficial Utilization (%)	Suppl. Surface Water Flow (mgd)	Increase in Beneficial Reuse Flow (mgd)	Projected Beneficial Non-Potable Flow (mgd)	Increase in Beneficial Non-Potable Flow (mgd)
Clermont[(a)]	1.99	2.79	0.80	0.99	1.00	50%	1.39	1.39	50%	0.39	0.70	2.09	75%	0.69	1.09	2.78	1.78
Eustis[(b)]	1.26	3.49	2.23	0.70	0.56	44%	1.75	1.75	50%	1.19	0.87	2.62	75%	0.86	2.06	3.48	2.92
Groveland[(c)]	0.15	0.39	0.24	0.10	0.05	33%	0.20	0.20	50%	0.15	0.10	0.29	75%	0.13	0.24	0.42	0.37
Leesburg[(d)]	3.40	6.90	3.50	2.90	0.50	15%	3.45	3.45	50%	2.95	1.73	5.18	75%	1.71	4.68	6.88	6.38
Minneola[(e)]	N/A	0.60	0.60	N/A	0.30	N/A	0.30	0.30	50%	0.00	0.15	0.45	75%	0.15	0.45	0.60	0.60
Mount Dora[(f)]	1.19	3.10	1.91	0.44	0.75	63%	1.55	1.55	50%	0.80	0.78	2.33	75%	0.77	1.58	3.09	2.34
Mascotte[(g)]	N/A	0.70	0.70	0.10	0.10	50%	0.35	0.35	50%	0.25	0.18	0.53	75%	0.17	0.43	0.70	0.60
Montverde[(h)]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tavares[(i)]	1.39	2.31	0.92	0.70	0.70	50%	1.15	1.15	50%	0.46	0.58	1.73	75%	0.57	1.04	2.30	1.61
Umatilla[(j)]	0.20	0.40	0.20	0.20	0.00	0%	0.20	0.20	50%	0.20	0.10	0.30	75%	0.10	0.30	0.40	0.40
Fruitland Park[(k)]	N/A	0.10	0.10	N/A	N/A	N/A	0.05	0.05	50%	0.05	0.03	0.08	75%	0.02	0.08	0.10	0.10
Lady Lake[(l)]	N/A	0.45	0.45	N/A	0.15	N/A	0.23	0.23	50%	0.08	0.11	0.34	75%	0.11	0.19	0.45	0.30
Howey-in-the-Hills[(m)]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	**9.58**	**21.23**	**11.65**	**6.13**	**4.11**	**40%**	**10.61**	**10.61**	**50%**	**6.51**	**5.31**	**15.92**	**75%**	**5.29**	**11.81**	**21.21**	**17.40**

(1) Beneficial reuse water is defined as water that offsets potable water demands. Example of beneficial reuse include golf course and public access area irrigation. Sprayfields and RIBs are considered non-beneficial reuse.
(2) Includes reuse waters currently planned for capture and/or treatment to public access reuse standards, and beneficial distribution of these waters to existing demands.
(3) Surface water is not considered a feasible reuse supplementation source for individual Alliance members, due to the cost of treatment required and potential resource availability constraints.
(4) From FDEP's 2005 Reuse Inventory.

(a) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 40% increase in served population.
(b) Wastewater flow projection linear to 2030 from 2025 by WRA based on SJRWMD's 9% increase in served population. Flow projection to 2025 based on City of Eustis response to SJRWMD CUP RAI#2 Application #2634, (2006).
(c) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 260% increase in served population. Surfacewater augmentation of reclaimed system currently planned.
(d) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 105% increase in served population.
(e) Wastewater flow projection at 2030 by WRA based on residential flow of 50 gpcd (AWWA, 1998) and SJRWMD's 9,168 person increase in served population from 2005 to 2030.
(f) Wastewater flow projection linear to 2030 from 2025 by WRA based on SJRWMD's 12% increase in served population. Flow projection to 2025 based on City of Mount Dora Water Supply Facilities Work Plan (2006).
(g) Wastewater flow projection at 2030 by WRA based on residential flow of 50 gpcd (AWWA, 1998) and SJRWMD's 14,800 person increase in served population from 2010 to 2030.
(h) Email correspondence, Arthur Nix.
(i) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 66% increase in served population.
(j) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 100% increase in served population.
(k) No available reuse data per FDEP's 2005 Reuse Inventory. No correspondence received.
(l) Wastewater flow projection linear to 2030 from 2025 by WRA based on SJRWMD's 1% increase in served population. Flow projection to 2025 based on Town of Lady Lake CUP application (2004), using a 2025 served population of 26,352 and a residential flow of 50 gpcd (AWWA, 1998).
(m) No available reuse data per FDEP's 2005 Reuse Inventory. No correspondence received.

Table 3-2. Private Utility Current and Projected Reuse and Non-Potable Flows

	Current and Projected Wastewater Flow			Current Reuse Flow and Distribution[1]			Projected Reuse Flow and Distribution			
	2005	2030	2005 to 2030	2005	2005	2005	2030	2030	2030	2030
Municipality / Utility	Estimated Wastewater Flow (mgd)	Projected Wastewater Flow (mgd)	Increase in Wastewater Flow (mgd)	Estimated Non-Beneficial Reuse Flow (mgd)	Estimated Beneficial Reuse Flow[2] (mgd)	Reuse Beneficial Utilization (%)	Projected Non-Beneficial Reuse Flow (mgd)	Projected Beneficial Reuse Flow (mgd)	Reuse Beneficial Utilization (%)	Available Increase in Beneficial Reuse Flow (mgd)
Lake Correctional Institute[a]	0.13	0.26	0.13	0.13	0.00	0%	0.26	0.00	0%	0.00
Lake Groves Utilities STP[b]	0.31	0.49	0.18	0.31	0.00	0%	0.49	0.00	0%	0.00
Mid-Florida Lakes[c]	0.16	0.17	0.01	0.16	0.00	0%	0.17	0.00	0%	0.00
Pennbrooke WWTF[d]	0.09	0.10	0.01	0.00	0.09	100%	0.00	0.10	100%	0.01
Plantation @ Leesburg[e]	0.20	0.23	0.03	0.04	0.16	80%	0.05	0.19	80%	0.03
Quail Valley[f]	0.03	0.06	0.03	0.03	0.00	0%	0.06	0.00	0%	0.00
Southlake Community[g]	0.56	1.83	1.27	0.56	0.00	0%	0.91	0.91	50%	0.91
St. Johns - Astor Park[h]	0.11	0.17	0.06	0.11	0.00	0%	0.17	0.00	0%	0.00
Sunshine Parkway[i]	0.08	0.16	0.08	0.08	0.00	0%	0.16	0.00	0%	0.00
Thousand Trails[j]	0.02	0.04	0.02	0.02	0.00	0%	0.04	0.00	0%	0.00
Villages[k]	1.48	1.69	0.21	0.70	0.78	53%	0.84	0.84	50%	0.06
Water Oak Estates[l]	0.06	0.07	0.01	0.06	0.00	0%	0.07	0.00	0%	0.00
Clerbrook RV Resorts[m]	0.05	0.05	0.00	0.05	0.00	0%	0.05	0.00	0%	0.00
Oak Spring MHP[n]	0.04	0.05	0.01	0.04	0.00	0%	0.05	0.00	0%	0.00
TOTAL	**3.21**	**5.20**	**1.98**	**2.18**	**1.03**	**32%**	**3.16**	**2.04**	**39%**	**1.01**

(1) Beneficial reuse water is defined as water that offsets potable water demands. Example of beneficial reuse include golf course and public access area irrigation. Sprayfields and RIBs are considered non-beneficial reuse.
(2) From FDEP's 2005 Reuse Inventory.

(a) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 103% increase in County-wide population.
(b) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 58% increase in served population for Lake Groves / Lusi South.
(c) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 9% increase in served population.
(d) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 6% increase in served population.
(e) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 17% increase in served population.
(f) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 103% increase in County-wide population.
(g) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 326% increase in served population.
(h) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 56% increase in served population.
(i) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 103% increase in County-wide population.
(j) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 103% increase in County-wide population.
(k) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 14% increase in served population.
(l) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 14% increase in served population.
(m) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 0% increase in served population.
(n) Wastewater flow projection linear to 2030 from 2005 by WRA based on SJRWMD's 28% increase in served population.

4.0 Potential Reuse and Alternative Water Supplies Development

Since beneficial reuse replaces or offsets potable water use, it can serve future water demands. Over a given planning horizon, an increase in the availability of beneficial reuse can decrease the traditional groundwater supply requirement, or decrease the (potable) alternative water supply requirement. Since irrigation demands decrease significantly during the wet season and reuse supplies generally remain steady, the use of storage, supplemental sources, and interconnects between reuse systems can increase the quantity of reuse or non-potable water available for beneficial use.

- Storage - Storage of wet season reuse flows and distribution to beneficial applications can increase the availability of beneficial reuse. However, the development of significant wet season storage capacity (reservoir, mine pit, etc) requires major capital outlays and is generally not a feasible option for smaller, individual utilities.

- Supplemental Sources - By matching peak irrigation demands, augmenting reuse supplies with supplemental non-potable sources can also increase the amount of potable water that is replaced or offset by non-potable supplies. Supplemental sources such as surfacewater or stormwater are subject to the permitting and withdrawal constraints established by the SJRWMD. The development of these supplemental sources – which must be treated to public access standards when blended with treated wastewater – requires significant capital outlay, and is generally not a feasible option for smaller reuse systems.

- Interconnects - Interconnects between adjacent reuse systems can also increase beneficial reuse availability by helping to manage daily fluctuations in irrigation demand and reuse supply. However, the effectiveness of interconnects is limited by the overall supply and storage capabilities of the connected systems. Interconnect opportunities may also be limited by pipeline distances between adjacent systems, or hydraulic considerations that would require capital improvements to the recipient system, thereby increasing the cost of interconnection.

Cooperation between smaller utilities can lower costs by providing economies of scale to capital-intense reuse projects such as reservoirs, supplemental sources, and interconnects. Where feasible, these projects can substantially increase beneficial reuse availability and reduce or offset the associated potable water demands. Since the beneficial reuse quantities potentially developed during a cooperative effort would not be otherwise feasible, this type of non-potable supply project is considered an alternative water supply (AWS) by the WMDs.

This Chapter develops non-potable AWS projections relative to potential cooperative efforts among Members. Three sub-regional areas within Lake County are identified as potential project areas for the Members located in each area. The existing reuse estimates from Chapter 3 are compared with the projections to approximate the maximum non-potable supply that potentially could be available.

The potential non-potable AWS projections are based on sources only, and do not consider detailed feasibility considerations such as identification of demands, infrastructure upgrades, siting, or environmental permitting. The projections therefore do not assume that the three project areas or specific flows will be feasible. A more detailed feasibility assessment and evaluation of the three projects will be completed in Task 7 – Evaluation of Existing Facilities and Alternative Water Supply Projects.

4.1 Sub-Regional Cooperative Project Areas

Figure 4-1 shows the potential cooperative project areas. As shown, three potential project areas are identified in the northeast, northwest, and southern areas of Lake County. The project areas were developed on the basis of Member proximity to one another, and to the large surfacewater lakes in the County that may be viable supplemental sources. Stormwater can also serve as a supplemental source, particularly for project areas where lake withdrawals are not viable. The Members located within each project area are listed below in Table 4-1 below:

Table 4-1 Members Located in Cooperative Project Areas

Northeast:	Northwest:	Southern:
Eustis	Leesburg	Mascotte
Mount Dora	Fruitland Park	Minneola
Umatilla	Lady Lake	Clermont
Tavares		Groveland

Note: Howey-in-the-Hills and Montverde do not have a central wastewater treatment facility and are not included in the cooperative project areas.

Figure 4-2 shows an example project design for the northwest project area. As shown, surfacewater would be withdrawn from Lake Eustis and/or Lake Dora, treated, and stored in a central facility. Wet season reuse flows would also be stored in the central facility. The central facility would function as a distribution hub and send treated water to the Eustis, Umatilla, Mount Dora, and Tavares reuse systems for beneficial use. Each of the reuse systems would be interconnected to provide flexibility to the system.

Conceptual project designs for each of the project areas will be developed for the detailed feasibility assessment and evaluation in Task 7. These designs will include a unit cost estimate for each project.

4.2 Surfacewater Withdrawals in Lake County

Since MFLs have not been developed for the Upper Ocklawaha River, most of the current estimates of potential surfacewater yield from within Lake County are planning-level. The most recent, County-level analysis indicated that the Palatlakaha River/Haines Creek System (the approximate Upper Ocklawaha River Basin) has a cumulative total of about 31.9 mgd potentially available (CH2M Hill, 1996). This analysis was based on hydrologic data and did not consider the biological relationships to basin hydrology. MFLs to be based on biological relationships have not yet been developed for the Upper Ocklawaha River.[12]

Of the 31.9 mgd potentially available in Lake County, the SJRWMD has indicated that about 14 mgd remains available for withdrawal, due to existing permitted withdrawals within the basin. These existing permitted withdrawals were not verified, due to the difficulty in determining whether a given withdrawal is within the basin system or is isolated. The 14 mgd estimate is

[12] Preliminary biological work relative to MFLs has been conducted for the Ocklawaha River (Rogers and Allen, 2004).

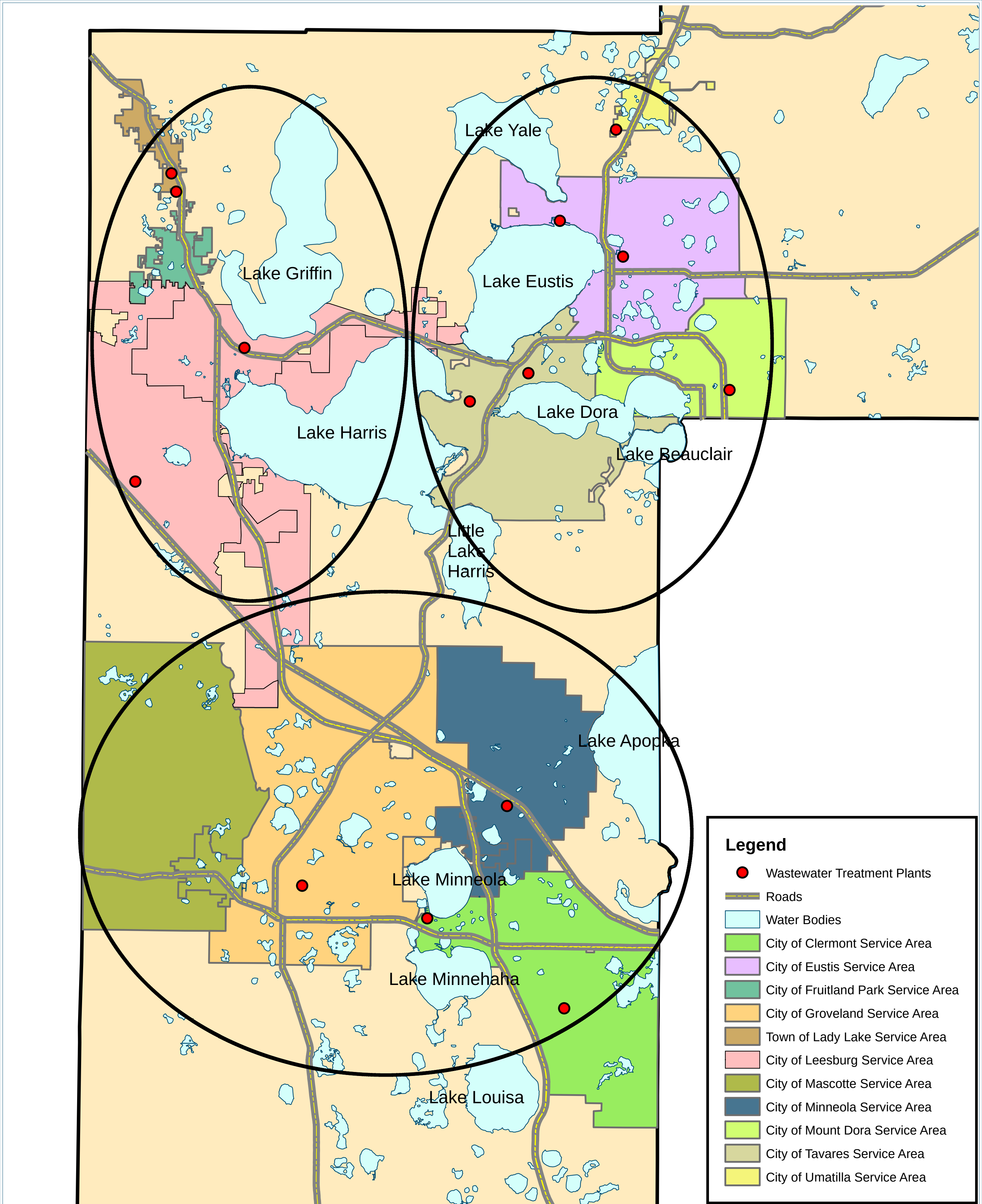
considered to be best available information for this report. However, considerable uncertainty is present within the 31.9 mgd planning estimate that was used to generate the 14 mgd estimate. Adopted MFLs for either the Upper Ocklawaha River or within its basin system will likely determine the actual yield available for withdrawal.

The spatial distribution of the potentially available surfacewater will also affect its ability to support withdrawals, because some locations that have demand may not have available surfacewater in their vicinity (and vice versa). The major lakes and their potential ability to support withdrawals are discussed below:

> Clermont Chain of Lakes: MFLs have been adopted for the Clermont Chain of Lakes – Lakes Louisa, Minnehaha, Minneola, and Cherry Lake. Current permitted withdrawals from the Chain include the Cherry Lake Tree Farm (1.3 mgd), the City of Groveland (0.1 mgd), and the Palisades Golf Course (0.8 mgd). Beyond the currently permitted withdrawals, the current SJRWMD estimate is that about 0.5 mgd remains available from the Clermont Chain (J. Hollingshead, email correspondence).
>
> Lake Apopka: MFLs have been proposed for Lake Apopka. The SJRWMD yield estimate for Lake Apopka is about 5.0 mgd, but a recently authorized withdrawal was petitioned by the Lake County Water Authority (LCWA). As a result, there is no current SJRWMD yield estimate for Lake Apopka (J. Hollingshead, pers. comm.).
>
> Lakes Harris, Griffin, Dora, and Eustis: These large lakes are not currently scheduled for MFL development. Using the 14 mgd total yield estimate for the Upper Ocklawaha River, and subtracting 5.0 mgd for Lake Apopka and 2.7 mgd for the Clermont Chain of Lakes, leaves an estimate of 6.3 mgd available from these lakes. The SJRWMD has also indicated that water is available in these lakes (B. Vergara, pers. comm.)

Structural alterations to surfacewater bodies can also affect their ability to support withdrawals. Historic channelization and dredging of Upper Ocklawaha River Basin lakes has resulted in a net reduction in streamflow, as lake stages have been artificially maintained to support navigation, recreational, and aesthetic functions (Tibbals et. al., 2004). Since current yield estimates and MFLs incorporate these historic alterations, the replacement of historic flood storage in Lake County could increase the available yield. As an example, the Lake Apopka yield estimate does not include restoration of its north shore.

For the AWS evaluation to be conducted as part of Task 7, it is assumed that the Clermont Chain will support an additional 0.5 mgd withdrawal, and that the Lake Harris, Lake Griffin, Lake Dora, and Lake Eustis system will support a withdrawal of 6.3 mgd.

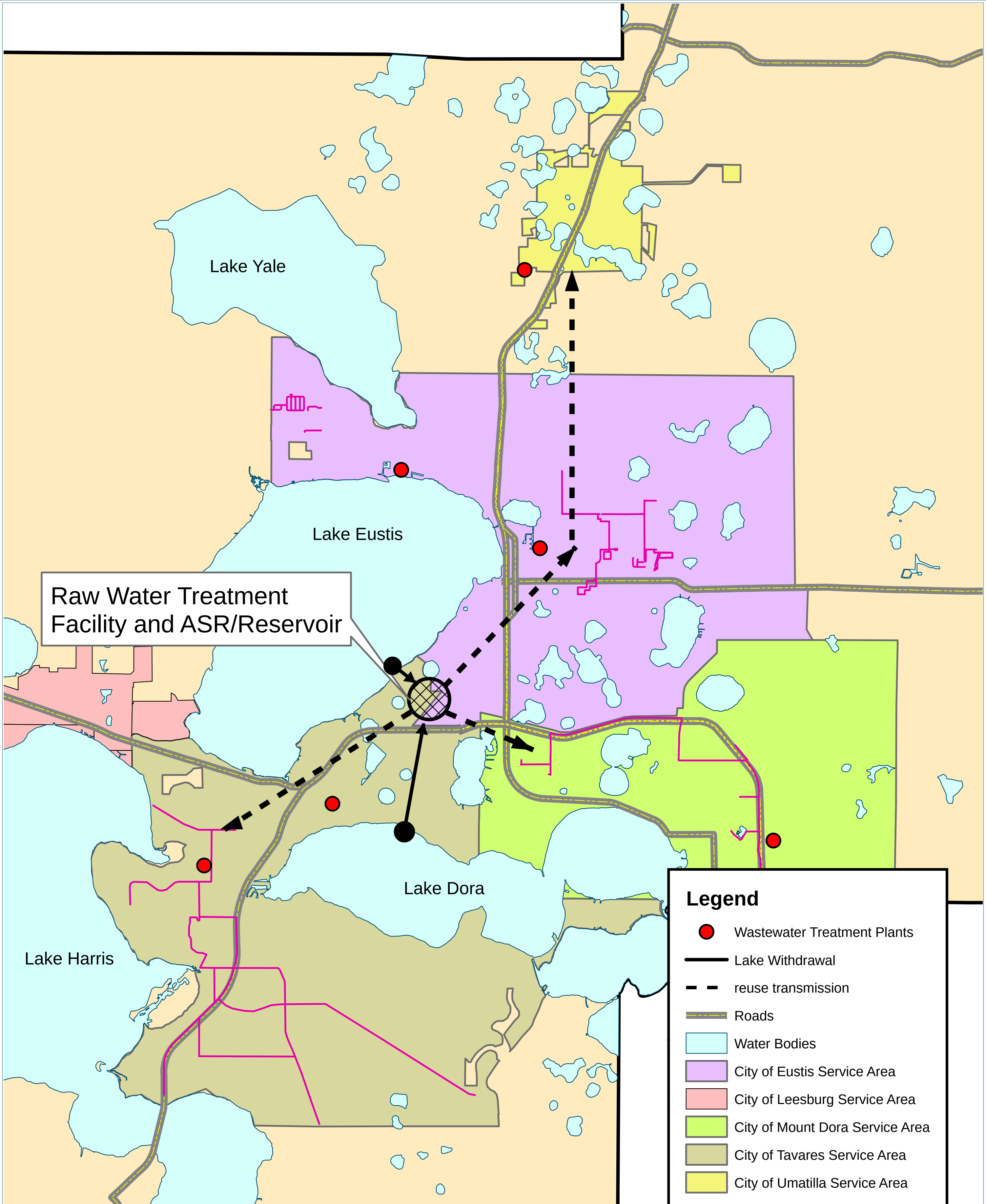


Water Resource Associates, Inc.
Engineering ~ Planning ~ Environmental Science
4260 West Linebaugh Avenue
Phone: 813-265-3130
Fax: 813-265-6610
www.wraconsultants.com

PROJECT: 0407 - Lake County Water Supply Plan Authority

Figure 4-1
Cooperative Reuse
Project Areas

ORIGINAL DATE: 05-30-07
REVISION DATE: NA
JOB NUMBER: 0216
FILE NAME: 0407_Regions...mxd
GIS OPERATOR: DR



Water Resource Associates, Inc.
Engineering ~ Planning ~ Environmental Science
4260 West Linebaugh Avenue
Phone: 813-265-3130
Fax: 813-265-6610
www.wraconsultants.com

PROJECT: 0407- Lake County Water Supply Plan Authority

Figure 4-2
Conceptual Augmentation
System For Reuse

ORIGINAL DATE: 05-30-07
REVISION DATE: 07-26-07
JOB NUMBER: 0407
FILE NAME:0407_Conceptual...mxd
GIS OPERATOR: JAC

5.0 Aquifer Storage and Recovery Alternative

The sub-regional reuse/lake augmentation alternative water supply option to meet future non-potable demands of the Alliance requires seasonal storage capacity. This storage capacity is typically created by construction of surfacewater reservoirs, but in some cases may also be created by aquifer storage and recovery (ASR) wells.

The use of ASR for the Alliance would involve deep well injection of non-potable reuse/lake augmentation water captured during periods of wet weather, and then pumping the stored water out for distribution when needed during the dry weather months. Typically, an ASR deep well is screened such that the injected water is below a defined confining unit and in higher density water, such that a water bubble is created. This water bubble contains the higher quality injected water for storage and later recovery. The advantage of ASR, if the hydrology is favorable, is the need for less land area at typically lower costs than a surfacewater reservoir.

A successful ASR system must meet several requirements, including the following.

- The injection zone should be sufficiently permeable to accept the design volumes of water to be pumped into the aquifer.
- The aquifer should be confined above and below the injection zone so that the injected water (injectate) does not migrate away from the injection zone. This is especially critical if there is a significant density difference between the native groundwater and the injectate.
- The groundwater flow system within the injection zone should not cause the injectate to drift away from the ASR injection well in order to minimize losses from storage.
- The injection zone should not include significant fractures or other physical features that allow the injectate to migrate away from the injection zone.
- Water quality of the injectate must meet state and federal standards and be chemically compatible with the host water so that scale and other deleterious chemical reactions can be minimized.
- The salinity of the host aquifer water can vary from fresh to saline as long as the mixing between the injectate and native groundwater does not cause the water quality of the injectate to deteriorate to the extent that it becomes unusable.

In the state of Florida, ASR wells have been operational since 1983, with approximately 65 ASR wells currently operating at 13 permitted sites. As shown in 5-1, the ASR sites are located south of Tampa and Cocoa Beach, Florida and generally near the coastline. The viability of using ASR for non-potable water storage is uncertain in Lake County, due to the differences in hydrogeology between Lake County and other locations in Florida where non-potable ASR is in use. since the County relies on both the Upper Florida and, to a lesser degree, the Lower Floridan aquifer as its primary potable water source.

A preliminary review of available data to evaluate the potential for ASR as a viable storage option was conducted as part of this study. The USGS, in cooperation with the Lake County Water Authority, SJRWMD, and SWFWMD, prepared a report titled "Hydrogeology and Simulated Effects of Ground-Water Withdrawals from the Floridan Aquifer System in Lake County and in the Ocala National Forest and Vicinity, North-Central Florida" in 2002 (USGS 2002). While this report focused on groundwater withdrawals in Lake County, it does provide a good geological assessment of the Floridan aquifer and confining units present. The SJRWMD also authorized R. David Pyne, ASR Systems LLC, to prepare a report titled “Aquifer Storage and Recovery Issues and Concepts” in 2005 (ASR Systems 2005) which summarizes the scientific information available to support decisions made regarding ASR viability.

In addition, the SJRWMD has provided data from four deep aquifer system monitoring wells in the vicinity of Lake County. Three wells are located within Lake County: one well at the Lake Louisa State Park, about 10 miles south of Clermont; one well in the Seminole State Forest Brantley Branch Road site in northeast Lake County; and one well is at the Carrot Barn site just east of Lake Griffin. One additional deep monitoring well is located outside Lake County at the Plymouth Fire Tower site east of Lake Apopka in Orange County. The four monitor wells reviewed were drilled to depths ranging from 1,620 feet to 2,400 feet below land surface (bls). Figure 5-2 shows the general location of these four deep wells

The available information was reviewed to determine the viability of ASR in Lake County. In summary, the geologic profile for each of the wells illustrates a surficial aquifer consisting of sand, clay, and dolostone that extends to depths of 120 to 250 feet bls. This data is consistent with Figure 5-3 (USGS 2002 report) which identifies the surficial aquifer approximately 200 feet think.

Below the surficial aquifer, a continuous carbonate formation containing predominantly limestone and dolostone is shown in the four boring logs to the remaining bore hole depth. The groundwater levels and conductivity values appear to be generally stable throughout the bore hole depth, suggesting a aquifer connectivity with depth. This data indicates a defined confining unit or semi-confining unit is not present at the monitor well locations and water quality does not change significantly to depths of 2,400 feet.

This interpretation from the monitoring well data is consistent with the USGS 2002 report. While Figure 5-2 indicates an Upper Floridan and Lower Floridan unit separated by a semi-confining layer is typically present, the report further indicates the semi-confining unit has a relative high leakance value throughout much of the County, suggesting the semi-confining unit may not serve to isolate the injection zone from the “underground source of drinking water”. As illustrated in Figure 5-4 (USGS 2002), only the southwestern portion of Lake County appears to have a middle confining unit that may provide a reasonable separation of the Floridan aquifer.

Based on the primary use of the Upper Floridan aquifer for water supply, the apparent absence of an effective confining layer between the Upper and Lower Floridan aquifer throughout much of Lake County, and the relatively stable water quality with depth indicted in the four deep monitoring wells, the viability of using ASR appears to be limited. While there may be some potential for using ASR in the southwestern portion of the County, this area is a considerable distance from the projected population increase and demands for 2025. There may also be the potential for going below the Lower Floridan aquifer where better confinement may be present, but there is currently insufficient data to access this option. Consequently, at this phase of the planning study, it does not appear to warrant a significant effort and cost to further investigate ASR in Lake County until an in-County water supply alternative requiring water storage is further evaluated.

Figure 5-1. ASR Wells in Florida (ASR Systems 2005)

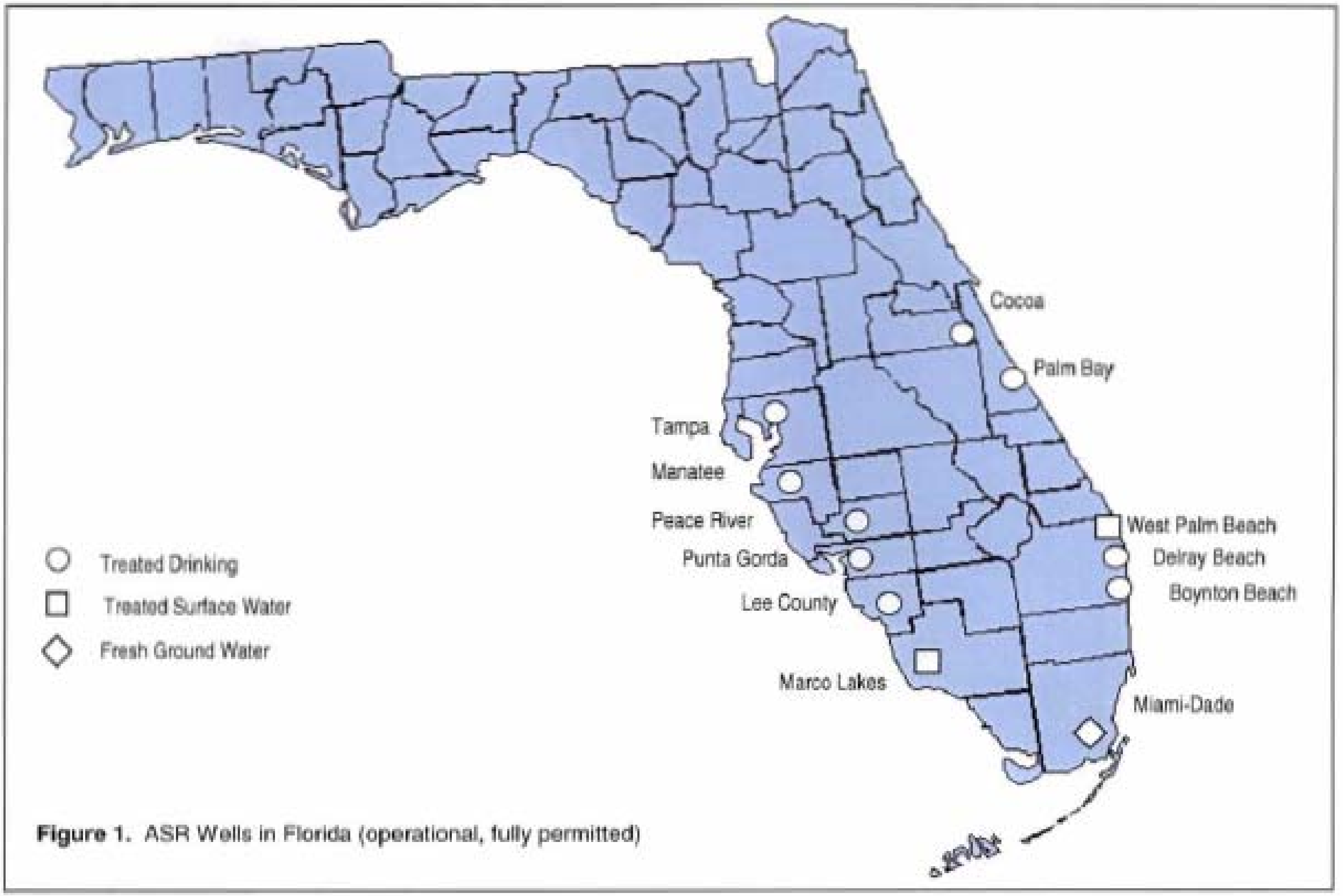
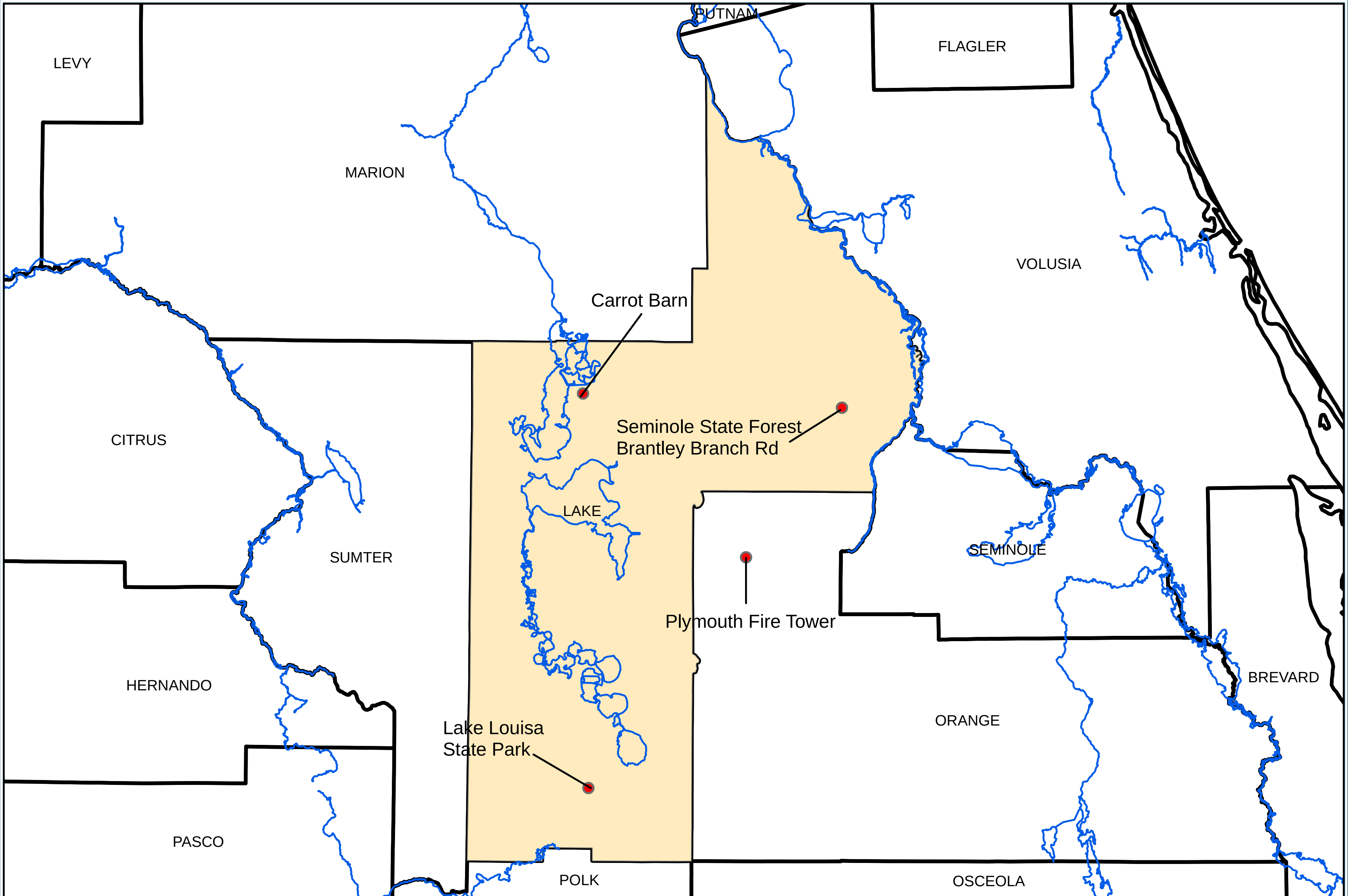


Figure 1. ASR Wells in Florida (operational, fully permitted)



Water Resource Associates, Inc.
Engineering ~ Planning ~ Environmental Science
4260 West Linebaugh Avenue
Phone: 813-265-3130
Fax: 813-265-6610
www.wraconsultants.com

PROJECT: 0407 - Lake County Water Supply Plan Development

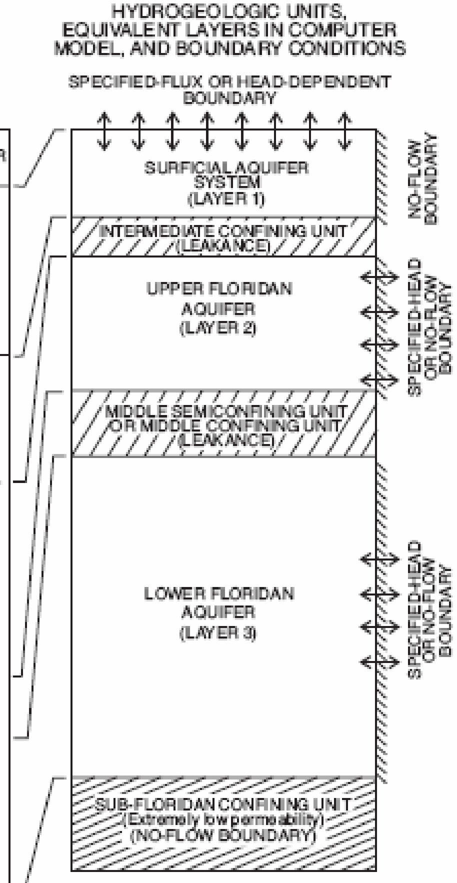
Figure 5-2
Deep Aquifer Monitoring Well Locations

ORIGINAL DATE: 06-27-07
REVISION DATE: none
JOB NUMBER: 0407
FILE NAME: 0407_Deep Wells.mxd
GIS OPERATOR: DR

Figure 5-3. Geologic units, hydrogeologic units, and equivalent layers

GEOLOGIC UNITS

ERA	SYSTEM		SERIES		STRATIGRAPHIC UNIT	THICKNESS (feet)	LITHOLOGY	AQUIFER
CENOZOIC	QUATERNARY		HOLOCENE		UNDIFFERENTIATED DEPOSITS	0 - 150	Alluvium, freshwater marl, peats and muds in stream and lake bottoms. Also, some dunes and other windblown sand.	SURFICIAL AQUIFER SYSTEM
CENOZOIC	QUATERNARY		PLEISTOCENE		UNDIFFERENTIATED DEPOSITS	0 - 150	Mostly quartz sand. Locally can contain organic deposits and thin beds of clay.	SURFICIAL AQUIFER SYSTEM
CENOZOIC	TERTIARY	LATE	PLIOCENE		UNDIFFERENTIATED DEPOSITS	0 - 200	Interbedded deposits of sand, silty sand and clay, shell fragments; phosphatic clay sometimes present at base of formation.	SURFICIAL AQUIFER SYSTEM
CENOZOIC	TERTIARY	LATE	MIOCENE		HAWTHORN GROUP	0 - 300	Interbedded quartz, sand, silt, shell, and clay; green to gray and white, phosphatic, cemented alluvial conglomerate, sandstone, dolostone, and limestone; typically silicified and fractured near base of formation.	
CENOZOIC	TERTIARY	EARLY	OLIGOCENE		SUWANEE LIMESTONE	0 - 140	Limestone, sandy limestone, fossiliferous	FLORIDAN AQUIFER SYSTEM
CENOZOIC	TERTIARY	EARLY	EOCENE	UPPER	OCALA LIMESTONE	0 - 200	White to cream to tan, soft to hard, granular, porous, marine foraminiferal limestone, often dolomitic; sometimes sand, sandy or cherty limestone at top of formation.	FLORIDAN AQUIFER SYSTEM
CENOZOIC	TERTIARY	EARLY	EOCENE	MIDDLE	AVON PARK FORMATION	600 - 1,600	Light brown to brown, soft to hard, porous to dense, granular to chalky, fossiliferous limestone and brown, crystalline dolomite.	FLORIDAN AQUIFER SYSTEM
CENOZOIC	TERTIARY	EARLY	EOCENE	LOWER	OLDSMAR FORMATION	300 - 1,350	Alternating beds of light brown to white, chalky, porous, fossiliferous limestone and porous crystalline dolomite; minor amounts of anhydrite and gypsum.	FLORIDAN AQUIFER SYSTEM
CENOZOIC	TERTIARY	EARLY	PALEOCENE		CEDAR KEYS FORMATION	500 - 2,200	Dolomite, with considerable anhydrite and gypsum, some limestone.	



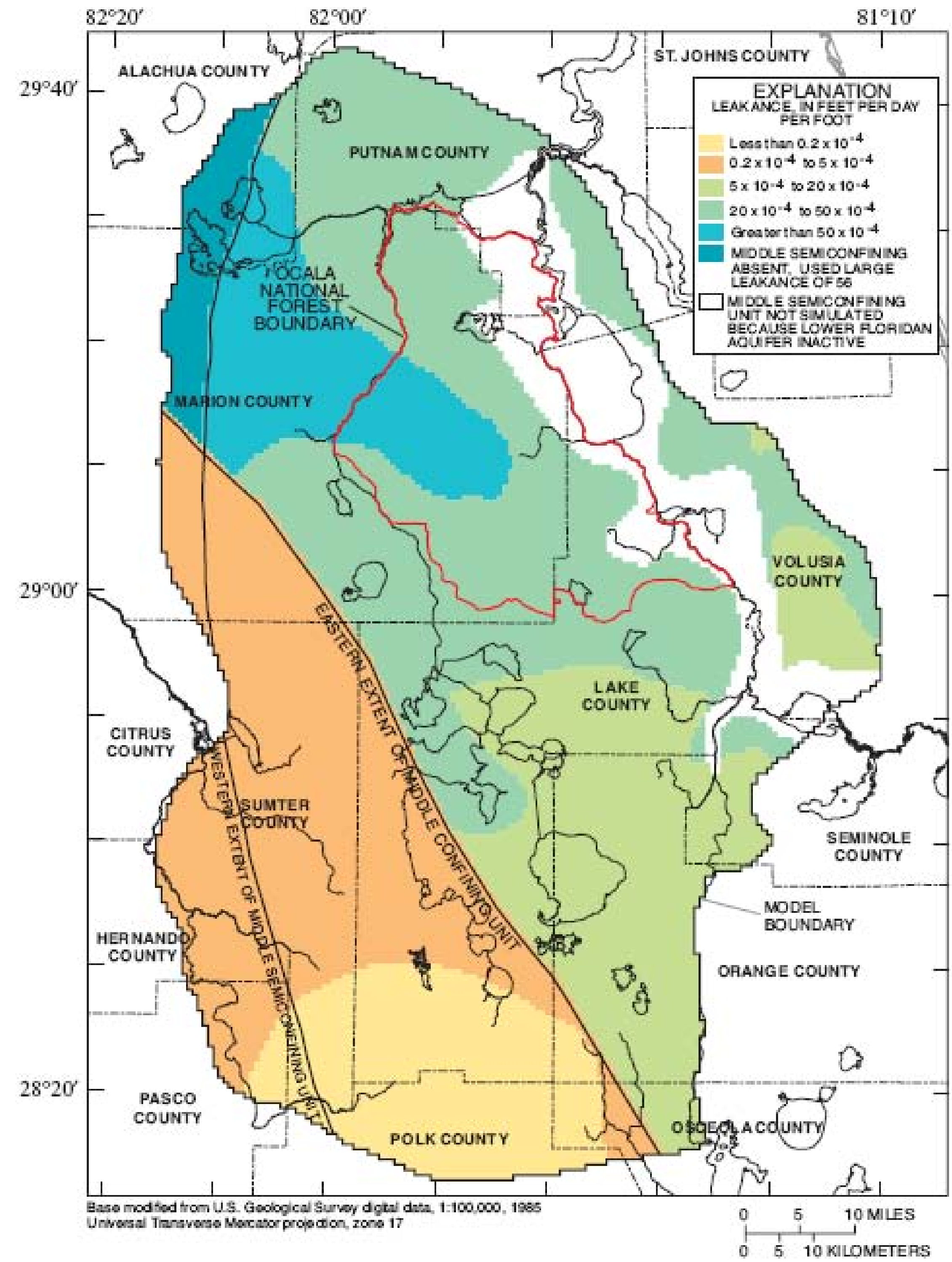


Figure 5-4. Leakance of the middle semiconfining and middle confining units based on confining thickness and vertical hydraulic conductivity (USGS 2002)

References

Florida Department of Environmental Protection. 2003. Reuse Coordinating Committee and the Water Conservation Initiative Water Reuse Work Group. Strategies for Effective Use of Reclaimed Water.

CH2M Hill. 1996. Water Supply Needs and Sources Assessment Alternative Water Supply Strategies Investigation Surfacewater Withdrawal Sites. SJRWMD Special Publication SJ96-SP4.

Florida Department of Environmental Protection. 2001. 2005 Reuse Inventory.

Hazen and Sawyer. 2007. Evaluation of Public Supply Utility Water Use Measurements. Technical Memorandum for the Southwest Florida Water Management District, Brooksville, FL.

Lake County, Florida, 2006. Proposed 2025 Comprehensive Plan as recommended by the LPA.

Lake County, Florida, 2006. School Facilities Element: Data Inventory Analysis, Lake County, Florida. http://www.lakecountyfl.gov/pdfs/2025/DraftSchool_Facilities_Element_DIA_8_21_06.pdf

Lake County Department of Growth Management, 2005. Population Projections Memorandum. http://www.lakecountyfl.gov/pdfs/2025/Population_Projections.pdf.

Marella, Richard, 2004. Water Withdrawals, Use, Discharge, and Trends in Florida, 2000. Scientific Investigations Report 2004-5151. United States Geological Survey.

Rogers, M. W. and M.S. Allen, 2004. Relationships Between River Surface Levels and Fish Assemblages in the Ocklawaha and Withlacoochee Rivers, Florida and the General Implications for Setting Minimum Flows and Levels. SJRWMD Special Publication SJ2004-SP18.

Southwest Florida Water Management District. 2002. Tampa Bay Area Regional Reclaimed Water Initiative.

Tibbals, C. H., R.S. Fulton III and L.A. Bradner, 2004. Hydrologic Implications of Reductions in Streamflow at Haines Creek at Lisbon and at Ocklawaha River at Moss Bluff, Florida. SJRWMD Special Publication SJ2004-SP2.

Whitcomb, John B. 2005. Florida Water Rates Evaluation of Single-Family Homes.

APPENDIX A

LAKE COUNTY CONSERVATION MEASURE INVENTORY

Table 2-1 summarizes the existing or anticipated conservation programs for the Alliance Members. This section provides more detail on some of these programs[1] and was generated from information provided by Alliance Member and the SJRWMD Technical Staff Reports for Consumptive use Permits.

CLERMONT

Dedicated Conservation Staff

The City currently employs as full-time conservation coordinator. A second employee will be hired in the near future.

Landscaping

The City, in cooperation with Florida Yards and Neighborhoods, offers seminars on low maintenance and water efficient landscaping. The conservation coordinator also gives these seminars to Home Owner Associations.

Rain Sensor Ordinance

The building code requires that a rain sensor be installed on irrigation systems installed or modified after 1991. Under the City of Clermont Code of Ordinances all automatic systems must be equipped with a working rain sensor set to shut off at no more than 1/2" of rainfall. This Ordinance requires the retrofitting of those systems installed prior to 1991, if used in the automatic mode. Rain sensors are required on all irrigation systems within the City of Clermont Utility District. Homes constructed prior to May 1991 were not required to have a rain sensor, but under the current City Ordinance and the most recent order from SJRWMD, all automatic irrigation systems must be equipped with a rain sensor. Residents residing within the City Utility District that do not have a rain sensor on their irrigation system may fill out a request to receive a free rain sensor. Assistance is provided to customers for programming irrigation controllers/timers. This service is free to all City of Clermont water customers.

Watering Restriction Enforcement

Watering restrictions are enforced in the City of Clermont. Irrigation enforcement, with the following fees charged per household for each consecutive violation: warning, $50, $250, and $500. If violations continue, the water is cut off if the household is on city water, or the household must install a separate irrigation meter if not on city water. All homes built after April 2004 must have irrigation meter installed. A record of homes with repeated violations is maintained. Commercial users may not use city water for irrigation.

Water Audits

The conservation coordinator tracks outdoor irrigation and how much should be used. The City is in the process of replacing utility water budget software to track the water budget on a house-by-house calculation basis (currently this is done manually right now).

---

[1] The categories listed under each Alliance Member may not all be covered by the summary table (Table 2.1), or may be categorized differently than in Table 2-1. Alliance Members may have additional BMPs than detailed in this section.

The conservation coordinator also audits irrigation system to check for leaks and missing heads.

Rate Structure

Tier	RANGE (GALLONS)	COST IN SERVICE AREA (COST/1000 GALLONS)
1	1,000 - 10,000	$1.10
2	10,001 - 20,000	$1.43
3	20,001 - 30,000	$2.20
4	30,001 - plus	$3.00

EUSTIS

Watering Restriction Enforcement

The City's Water Conservation Ordinance was approved on May 19, 2005, which provides for codification requirements and enforcement and penalty mechanisms available to the City to enforce compliance with SJRMWD watering restrictions and water shortage emergency rules. The City-declared water shortage emergency may be more restrictive than the SJRWMD's to support resource protection objectives and the City CUP compliance. The ordinance applies to all users of city potable water; city reclaimed water, private wells, lake pumps, as well as other suppliers of water. The water conservation ordinance includes a penalty matrix for violation of any provision of the City's water conservation code. Fines imposed are added to a user's water bill.

Landscaping

The Water Conservation Xeriscape Landscape Ordinance establishes minimum standards for the development, installation, and maintenance of landscaped areas on a site with efficiency as a goal without inhibiting the use of creative landscape design. The intent of these codes is to recognize the need for and the protection of groundwater as a natural resource through the application of enhanced landscape practices. Water-efficient landscaping maximizes water conservation by using site adapted plants and efficient watering methods that will generally result in a reduction of irrigation requirements, costs, energy, and maintenance. Seven basic principles of water-efficient landscaping are incorporated into the ordinance and apply to construction or development activity requiring a planting within buffers or other associated landscaping. A list of recommended plants is also included.

Dual line ordinance All new homes must be served reuse when available. Properties with existing irrigation systems must connect to the city reuse water service when available.

Water Audits

The City of Eustis performs a water audit of all its facilities every two years. Audits are performed on the entire water system, including treatment facilities and water distribution system. It is the City's policy to review the findings of water audit, perform annual leak detection activities to further define the causes of water losses, and make repairs to the system to address water losses. Repairs to the system are prioritized in accordance to the magnitude of water loss. The city also proactively schedules the replacement of older unreliable sections of the water distribution system in its 5-year capital improvement plan, and updates and completes these projects on an annual basis.

Unmetered Water Usage

Unmetered water usage (such as fire fighting, water hydrant/main flushing and construction, utility plant operation and maintenance use and line leaks and breaks) is tracked monthly by the City, and a monthly report is generated to monitor this water usage.

Metering Requirements

A separate water meter for irrigation is required for all new developments. The use of master meters for multi-family or multi-unit structures are prohibited (except for hospitals and hotels). The installation of individual meters for all service connections, including schools, municipal buildings and irrigation systems is required.

Mechanical and Technical Improvements

The City has implemented programs to improve the physical condition of the system and has implemented internal policies to improve the accountability of the system. The efforts include: Leak detection, testing of supply well and WTP water meters, testing of master meters and water meter change-out, fire hydrant maintenance, water saving devices and fixtures.

Rate Structure

Tier	RANGE (GALLONS)	COST IN SERVICE AREA (COST/1000 GALLONS)
1	0 - 8,000	$1.53
2	8,001 - 20,000	$1.91
3	20,001 - 50,000	$2.68
4	50,001 - plus	$3.04

FRUITLAND PARK

The City has proposed a water conservation program that will promote efficient and economical use of water within the service area. A water audit of the City's utility system found that unaccounted for water and water utility losses are less than 4% (combined) of total water use

Water Audits

The water conservation program incorporates water audits provided to residential and commercial customers.

Education

The City has an education program that includes water conservation information provided with customer invoices.

Ordinances

The City has proposed a landscape ordinance with significant water conservation features. And City building code contains a plumbing code that requires low volume fixtures in new construction, water conservation, and water conserving landscaping requirements for new construction.

Rate Structure

Tier	RANGE (GALLONS)	COST IN SERVICE AREA (COST/1000 GALLONS)
1	0 - 3,000	$0.00
2	3,001 - 5,000	$0.77
3	5,001 - 9,000	$1.10
4	9,001 - 14,000	$1.47
5	14,001 - 18,000	$2.00
6	18,001 - plus	$2.47

GROVELAND

Education

The City has proposed a customer and employee water conservation education program that meets District criteria. The City has committed to participating in the District's Water Conservation Partnership Campaign and to constructing a water efficient demonstration project by March 30, 2008.

Ordinances

The City has adopted a landscape irrigation ordinance that limits irrigation to two days per week and excludes irrigation between 10:00 am and 4:00 pm daily.

Rate Structure

Tier	RANGE (GALLONS)	COST INSERVICE AREA(COST/1000 GALLONS)
1	FLAT RATE	$2.75

These rates will apply to both potable water and non-potable water, including reclaimed water. Furthermore, the City has committed to reviewing the rates on a continuing basis and providing annual reports regarding the effectiveness of the water conservation rate structure

HOWEY IN THE HILLS

Education

The Town has a water conservation education program in place pursuant to section 12.2.5.1(e). Water conservation information is distributed to the community in the water bills.

Rate Structure

Tier	RANGE (GALLONS)	COST IN SERVICE AREA (COST/1000 GALLONS)
1	5,001 - 9,000	$1.77
2	9,001 - 14000	$1.95
3	14,001 - 20,000	$2.11
4	20,001 - 30,000	$2.50
5	30,001 - 60,000	$2.89
6	60,001 - plus	$3.60

LADY LAKE

Landscaping

The Town amended the “Landscaping and Tree Protection” chapter of its Land Development Code to incorporate water conserving landscape standards. The water conserving landscape standards limit high water use plants to a maximum of 40% of the landscaped area of each lot and incorporate standards for efficient watering design and practices.

Watering Restriction Enforcement

The Town also enforces watering restrictions. A warning is first issued. Following the first warning, \$50, \$125, \$475 fees are issued and added to the utility water bill. After 3rd and 4th offenses, water is shut off with a \$25 reconnect fee.

Rate Structure

Tier	RANGE (GALLONS)	COST IN SERVICE AREA (COST/1000 GALLONS)	COST OUTSIDE SERVICE AREA (COST/1000 GALLONS)
1	0	\$1.95	\$2.44
2	0 - 3,000	\$1.95	\$2.44
3	3,001 - 7,000	\$2.40	\$3.00
4	7,001 - plus	\$2.85	\$3.56

Where potable water is used for irrigation, it is charged at the highest block rate for all levels of use.

LEESBURG

The City has a detailed conservation plan in place. Some elements of this plan are as follows:

General water use accounting

To assure water use accountability and efficient use of water throughout the distribution system the water utility department maintains records on:

Water pumped from supply wells each month and water entering the distribution system each day.

Number of connections served and number of meters installed and replaced. And daily records of water used by the fire department and utility maintenance.

Education

The City participates with the University of Florida/IFAS Florida Yards and Neighborhoods program.

The City provides water conservation information in billing inserts, school programs and presentations to civic organizations and home owners associations and community functions.

The City provides indoor and outdoor water audit information for customers to evaluate their water efficiency.

The City identifies high water use customers and offers assistance to determine reason.

Building and Planning and Zoning Departments

Water conservation elements are required by state and local ordinances include:

- Automatic irrigation system require working rain sensor shut-offs.
- New developments are required to install dual line systems to utilize reclaimed water.
- Requires the landscape and irrigation designs meet the requirements of the water management district and promote the use of Xeriscaping.
- Requires the installation of water-saving plumbing fixtures and fittings in all new buildings and remodelings.

Rate Structure

Tier	RANGE (GALLONS)	COST IN SERVICE AREA (COST/1000 GALLONS)
1	0	$0.89
2	0 - 8,976	$0.89
3	8,977 - 15,708	$1.21
4	15,709 - 33,660	$1.59
5	33,661 plus	$2.20

MONTVERDE

Landscaping

The City passed a new landscape code in 2005 that is modeled on strong conservation ordinances adopted by other towns in Lake County. The City has adopted a Florida Friendly Landscaping ordinance. Under the ordinance, the irrigated portion of any residential lot shall not exceed 40% of the lot are excluding the home, driveway and sidewalk. St. Augustine grass is not allowed in any portion of a residential or commercial lawn. High water use plants are limited to a maximum of 40% of the landscaped area of each lot.

Education

The City has proposed a customer and employee water conservation education program that meets District criteria.

Rate Structure

Tier	RANGE (GALLONS)	COST IN SERVICE AREA (COST/1000 GALLONS)
1	3,000-8,999	$3.50
2	9,000-19,999	$4.25
3	20,000 - Plus	$5.00

MINNEOLA

The City of Minneola has proposed to implement all available water conservation measures that are economically, environmentally or technologically feasible during the time frame of the requested permit. All residential and commercial water use connections are metered and billed. The City has an inclining block rate structure to encourage water conservation.

Landscaping

The City has adopted a landscape ordinance that District staff have concluded is one of the best such ordinances in the District. The ordinance incorporates an Extensive 'Approved Plant List' that will serve as a guide and precedent for site adaptable and site-appropriate species. High water use plants are limited to a maximum of 40 percent of the landscape area. St. Augustine grass is allowed on residential sites, but limited by the 40 percent maximum or otherwise used in low-lying areas that retain moisture naturally.

Water Conservation Handbook

The City has produced a water conservation handbook designed to be a reference for water conservation initiatives.

Education

The City participates in programs to promote, water conservation education to the public through public service announcements, bill stuffers, school education programs and civic organization meetings.

The City promotes the use of water efficient landscape and rain sensor shutoffs and the University of Florida/IFAS Florida Yards & Neighborhoods programs

Water Restriction enforcement

The City enforces watering restrictions by issuing citations.

Water Audits

The City will provide outdoor and indoor water audits upon customer request.

Dual Distribution Systems

The City requires that new developments install dual distribution systems and that individual service connections be metered. The water conservation ordinance requires that reclaimed or non-potable water shall be used for irrigation if a source is available.

Rate Structure

Tier	RANGE (GALLONS)	COST IN SERVICE AREA (COST/1000 GALLONS)
1	2,000 - 4,999	$1.85
2	5,000 - 11,999	$2.00
3	12,000 - 19,999	$2.50
4	20,000 - 29,999	$3.00
5	30,000 - plus	$3.50

MOUNT DORA

Education

The City has several customer and employee education on programs including conservation materials distributed in customer bill, schools and information booths. Specific water conservation literature is targeted to different user categories.

Water Audit

The City has conducted a water audit of the amount of water used in the production and treatment facilities, transmission lines, and distribution system. This audit indicated a combined unaccounted for water loss and water utility use of 5.82%. This was less than the 10% threshold set by the district for the requirement of additional water conservation measures.

Rate Structure

Tier	RANGE (GALLONS)	COST IN SERVICE AREA (COST/1000 GALLONS)
1	0 - 10,472	$0.86
2	10,473 - 12,716	$1.32
3	12,717 - 15,708	$1.67
4	15,709 - 18,700	$1.99
5	18,7001 - 21,692	$2.33
6	21,693 - 24,684	$2.66
7	24,685 - plus	$2.99

TAVARES

Watering Restrictions

City Land Development Regulations details a 5 level plan for water conservation during water shortages. These restrictions are scaled in restrictions from Condition 1 which initiates voluntary water use cutbacks to Condition 5 which is mandatory reduction in water use to only vital needs. Watering restrictions are not however enforced at this time.

Meter Replacement

The City has and ongoing meter replacement program and regularly tests meters for accuracy.

Water Conservation Handbook

The City has produced a water conservation handbook designed to be a reference for water conservation initiatives. Contents include: Participation in education programs provided by the SJRWMD, Lake County Water Authority and University of Florida/IFAS Florida Yards & Neighborhoods programs, water conservation education to the public through public service announcements, bill stuffers, school education programs and civic organization meetings, promotion of water efficient landscape and rain sensor shutoffs and the updating of ordinances to require the installation on water saving plumbing fixtures, and more.

Rate Structure

Tier	RANGE (GALLONS)	COST IN SERVICE AREA (COST/1000 GALLONS)	COST OUTSIDE SERVICE AREA (COST/1000 GALLONS)
1	0	$0.93	$1.16
2	0 - 3,000	$0.93	$1.16
3	3,001 - 7,000	$1.35	$1.68
4	7,001 - 14,000	$2.20	$2.75
5	14,000 - plus	$2.95	$3.68

UMATILLA

Education

The City has an ongoing water conservation plan that involves educating the public through bimonthly conservation statements on billing notices. Additionally, the City provides educational information on water conservation to employees and local residents via newsletters.

Landscaping

The City has incorporated xeriscape principles of landscape design into the City Land Development Regulations. The City has begun ordinance development to address water efficient landscaping for new developments. The applicant has identified a site to implement a xeriscape demonstration project and is coordinating with District staff for funding and technical advice on landscape design.

Water Audits

The City documents for all unmetered water use such as fire fighting, sewer cleaning, main flushing, street cleaning and construction use.

Rain Sensors

The City has begun ordinance development to require final site inspection checklists to have a line item for rain sensor placement on automatic sprinkler systems.

Rate Structure

Tier	RANGE (GALLONS)	COST IN SERVICE AREA (COST/1000 GALLONS)
1	1,000 - 4,000	$1.60
2	4,001 - 9,000	$1.95
3	9,001 - 14,000	$2.30
4	14,001 - 19,000	$2.65
5	19,001 - plus	$3.00

APPENDIX B

Summary of Florida Rule Chapter 62-610 Reuse of Reclaimed water and land application.

Type of Reuse System	Reuse Activities	Rule Part	Treatment & Disinfection Requirements	TSS	Nitrate
Agricultural Irrigation	Irrigation of feed, fodder & pasture crops	II	Secondary treatment and basic disinfection	10 mg/l	
	Irrigation of edible crops	III	Secondary treatment, filtration & high-level disinfection	5 mg/l	
Urban Irrigation and Other Public Access Uses	Irrigation of: Residential properties Golf courses Parks, athletic fields, schools Other landscaped areas Toilet flushing Fire protection Vehicle washing Decorative water features Construction dust control Commercial laundries Flushing of sewers Cleaning roads and sidewalks Making ice for ice rinks Other urban uses	III	Secondary treatment, filtration & high-level disinfection	5 mg/l	
Industrial Applications	Cooling water	VII	Secondary treatment and basic disinfection. Shall meet rule part III if open tower system. If filtration and high-level disinfection are provided setback distances are not required.	5 mg/l	
	Process water	VII	Secondary treatment and basic disinfection (additional treatment may be needed to meet the needs of a particular industrial application)		
	Wash water	VII	Secondary treatment and basic disinfection		
	Use at wastewater plant	VII	Secondary treatment and basic disinfection		

APPENDIX B

Wetlands	Use of reclaimed water to create, restore, or enhance wetlands	--	Secondary treatment with nitrification and basic disinfection (some types of wetland systems require higher levels of treatment or disinfection)		
Ground Water Recharge	Rapid infiltration basin (RIBs)	IV	Secondary treatment and basic disinfection	10 mg/L	Nitrate <12 mg/L
	Rapid infiltration basins in unfavorable conditions (including areas in SE Florida overlying the Biscayne Aquifer).	IV	Secondary treatment, filtration & high-level disinfection. Meet drinking water standards	10 mg/L	TN < 10 mg/L
	Create barriers to control saltwater intrusion	V	Secondary treatment, filtration and full treatment disinfection. Multiple barriers for control of pathogens & organics. TOC (<3.0 mg/L) & TOX (<0.2 mg/L) limits. Meet drinking water standards. (reduced levels of treatment allowed for injection to high TDS ground water)	5 mg/L	TN < 10 mg/L
	Use of wetlands that percolate to ground water	---	Secondary treatment & basic disinfection. Meet ground water standards. (additional treatment and/or disinfection may be needed)		
Indirect Potable Reuse	Augmentation of Class I surface waters	V	Secondary treatment, filtration & full treatment disinfection. TOC (<3.0 mg/L) limit. Meet WQBELs	5 mg/L	TN < 10mg/L