

# Potable Water Element

*Data, Inventory & Analysis*

*Approved August 12, 1991 • Amended June 8, 2009*

SUPPORT DOCUMENT

# **POTABLE WATER ELEMENT**

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# POTABLE WATER ELEMENT

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# POTABLE WATER SUPPORT DOCUMENT

## 1. INTRODUCTION

The purpose of the Potable Water Element is to protect the supply of fresh water; ensure that sufficient water is available for current needs and future growth; and estimate the capital facility needs for the water system, including the transmission, distribution, and plant components. The City has analyzed the water supply and water needs through 2030.

Water is supplied to the City of Orlando by the Orlando Utilities Commission (OUC), which also services other municipalities and unincorporated areas surrounding Orlando. Since all plants and storage tanks are interconnected by large transmission lines, the OUC water system is best analyzed as one large integrated network. Therefore, analysis of the City's portion of the OUC water system cannot be done without considering the remainder of the OUC system.

OUC has recently analyzed its facilities to determine the following elements:

- Forecast of future water demand.
- Determination of future supply, storage, pumping and transmission main improvements based upon established level of service standards.
- Analysis of treatment plants and determination of future treatment plant needs based on estimated demands as analyzed by current water use records.
- Development of a Capital Improvement Plan for the next 10 years and estimates of the facility requirements through the year 2023. The program will identify projects needed to upgrade existing facilities and to expand the system to meet growth projections. The program will contain estimated costs for the 10 year Capital Improvement Plan, implementation schedules and priorities for each project.

However, the OUC analysis did not separate demands and recommended system improvements between "inside City" and "outside City" components. Therefore, the City's Planning Division has prepared projections for the City's portion of the OUC service area and compared them to the historical percentage of the OUC demand. In addition, the OUC analysis goes only to 2023, the date that the currently approved Consumptive Use Permit (CUP) expires. The City's analysis projects demand and supply through 2030.

The City's adopted Water Supply Plan has further details regarding projected water demand by user type, detailed descriptions of projects proposed to meet projected demand, and a conservation strategy.

## 2. PROBLEMS AND OPPORTUNITIES

**Problem** – As the service provider for the City of Orlando, OUC has fiscal responsibility for maintaining and improving the potable water system, but the City has responsibility for approving development.

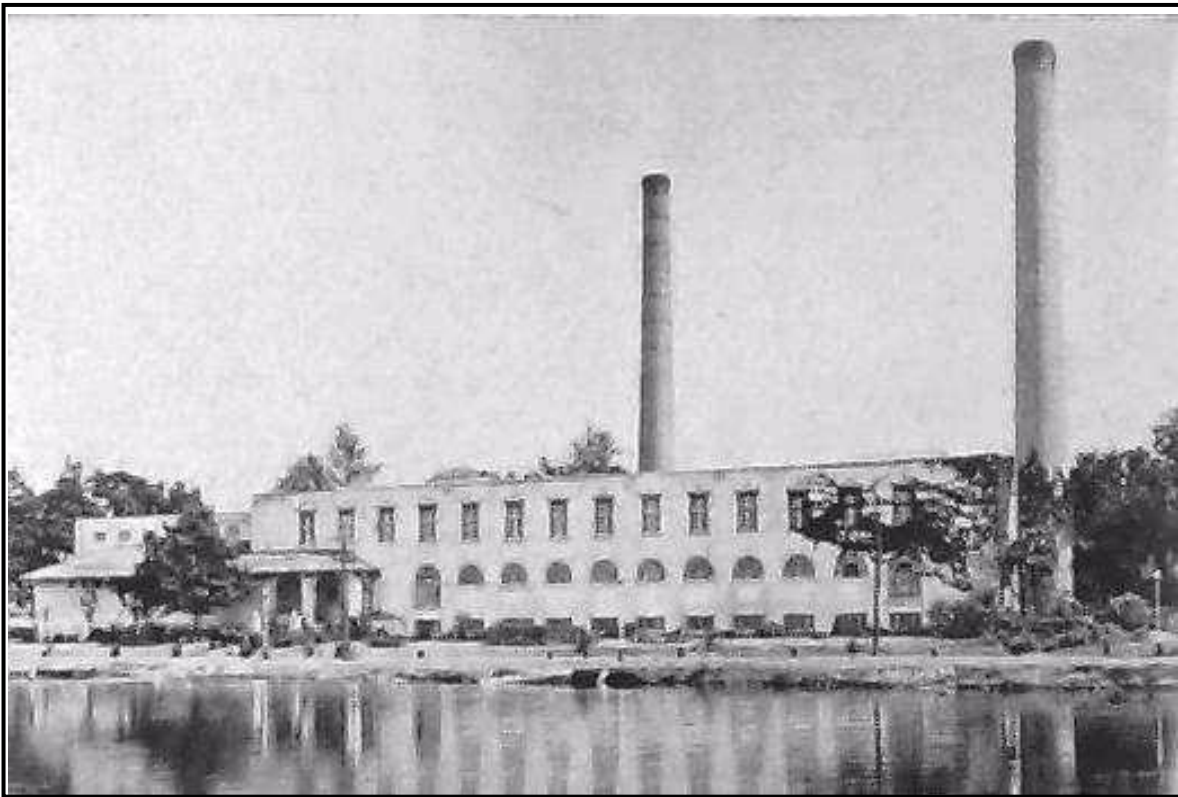
**Opportunity** – The City should continue to coordinate closely with OUC to ensure that the needs of existing and future development are met.

**Problem** – Orlando’s water resources have the potential to be contaminated from surface land uses.

**Opportunity** – The City should implement a Wellhead Protection Plan that will include supply and drainage wells.

**Problem** – Demand on the City’s water resources are projected to increase.

**Opportunity** – The City should implement strategies to reduce water demand and increase water efficiency. This should include use of Xeriscape on private and public property, installation of water efficient appliances, and increased use of reclaimed water.



*The Original OUC Electric and Water Plant on the shore of Lake Ivanhoe. Built in 1923, the photo includes the first addition made in 1926.*

*Source: OUC*

### **3. REGULATORY AND PROGRAM ASSESSMENT**

#### **3.A. FEDERAL LEGISLATION**

The Safe Drinking Water Act (PL 93-523) establishes minimum drinking water standards. These standards are divided into primary (public health) and secondary (aesthetic) standards.

### **3.B. STATE LEGISLATION**

The Florida Safe Drinking Water Act (Chapter 403 FS) is modeled after the Federal act. It makes the primary and secondary standards mandatory for potable water systems. The Florida Department of Environmental Protection (FDEP) is responsible for implementing the act. Chapter 62-550 FAC gives FDEP the statutory authority to enforce FS 403.

Chapters 40C-2 and 40E-2 empower the St. John's River and the South Florida Water Management Districts, respectively, to manage water supplies. Regulation of consumptive use is achieved through a permitting system.

The Wekiva Parkway and Protection Act (Chapter 369 FS) requires local jurisdictions within the Wekiva River Basin to adopt a 10 year Water Supply facility work plan for building potable water facilities necessary to serve existing and new development.

### **3.C. LOCAL REGULATIONS**

The County Department of Health is responsible for enforcement of programs required by FDEP regulations. They inspect water well installations and check surface water for possible contamination.

## **4. WATER MANAGEMENT DISTRICTS**

The state of Florida is divided into five water management districts which were created to preserve and manage water resources. The City of Orlando falls within two water management district jurisdictions, the St. Johns River Water Management District (SJRWMD) and the South Florida Water Management District (SFWMD).

### **Saint Johns River Water Management District**

The Saint Johns River Water Management District (SJRWMD) encompasses all or portions of 18 counties, and includes a population of 3.9 million. Water demand within the District is projected to increase from 1.49 billion gallons per day in 2000 to 1.79 billion gallons per day in 2025. During the same period, the population is projected to increase from 3.9 million to 5.9 million.

The District estimates that in many locations, the rate of groundwater withdrawal is at or near the maximum rate that can be sustained over time without negatively impacting the aquifer or related natural systems. Approximately 39% of the District, including all of the City of Orlando, has been identified as a priority water resource caution area (PWRCA). In these areas, water resources may not be adequate to supply projected water demands and at the same time reliably sustain water resources and related natural systems.

### **South Florida Water Management District**

The South Florida Water Management District (SFWMD) encompassed all or portions of 16 counties, and includes a population of more than 6 million residents. For planning purposes, SFWMD divides the district into four planning areas. The City of Orlando is located within the Kissimmee Basin Planning Area, which includes portions of 6 counties and has a population of approximately 450,000. Water demand within the Kissimmee Basin is projected to increase from 263 million gallons per day (MGD) in 2000 to 430 MGD in 2025. During that same period, the population is projected to increase from 450,000 to 1.1 million.

Both the Saint Johns River Water Management District and the South Florida Water Management District project that an insufficient quantity of fresh groundwater will be available to meet drinking water needs in Central Florida within the next 10 to 20 years. The water management districts are working with local partners to identify alternative water supply sources and construct the necessary infrastructure to access these sources.

## **5. EXISTING CONDITIONS**

### **OUC Service Area**

Figure PW-1 in the Policy Document shows the existing OUC service area, which encompasses approximately 200 square miles and includes the Cities of Orlando, Edgewood, and Belle Isle and portions of unincorporated Orange County. OUC's total service population is approximately 400,000 residents. As of 2004, average daily demand was approximately 84.08 MGD. By 2025, OUC expects average daily water demand to grow to 132.4 MGD.

The OUC service area is defined by the Water Service Territorial Agreement between OUC and Orange County. This agreement was established to avoid and eliminate duplication of water service facilities and needless and wasteful expenditures of capital and water resources. OUC's policy has been to extend pipelines in response to growth, as opposed to using them as a means to encourage growth. All or a portion of the costs of line extensions must be paid by the developer. In addition, OUC's territory is contained within Orange County's Urban Service Area. These factors tend to minimize any urban sprawl.

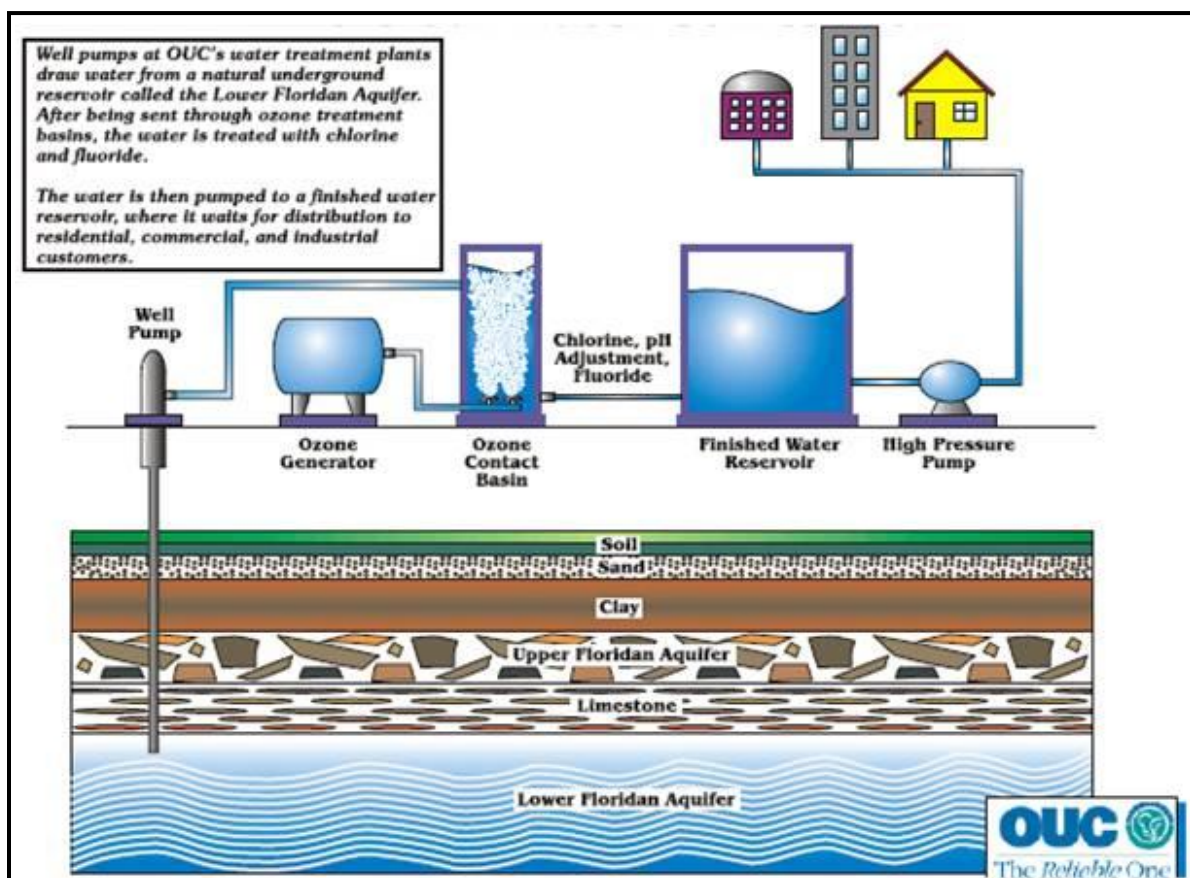
The Taft Water Association is the one franchise area enclosed by the OUC service area boundary as shown in Figure PW-1. The possibility exists that OUC may supply water to this area sometime in the future either on a retail or wholesale basis.

Figure PW-1 also shows two areas within the boundary of the OUC service area that are served by Orange County. They include an area between Lake Conway and SR 436, and the Hidden Beach subdivision near Conroy Road and the Turnpike. Orange County provides for long term service to both of these areas. OUC did not include any portion of the Orange County Service area in its analysis, but does leave open the possibility for OUC to serve areas outside its existing service area if the need arises in the future.

## OUC Water Facilities

Delivery of water to individual customers requires the construction of water supply wells, a water plant and transmission facilities. Figure PW-4 shows the generalized layout of a water treatment plant. The water plant generally consists of the well field with pumps, treatment equipment, ground storage and high service pumps. Figures PW-4 through PW-6 show the location of OUC's water production and transmission facilities and associated data. OUC operates 8 water treatment plants. These consist of the Southwest Plant, the Kirkman Plant, the Pine Hills Plant, the Highland Plant, the Sky Lake Plant, the Navy Plant, the Conway Plant and the Southeast Plant. Water is delivered through an interconnected system of transmission lines.

**FIGURE PW-4: WATER TREATMENT PLANT GENERALIZED LAYOUT**



Source: OUC

There are currently a total of 34 wells with a combined capacity of 194.8 MGD which pump water from the Floridan aquifer. Each treatment plant has from 2 to 7 wells. The raw water source is the lower Floridan aquifer for all plants. Well capacity is designed to meet peak day demand.



Water pumped from the aquifer requires little in the way treatment. The primary treatment requires the removal of hydrogen sulfide. OUC incorporates the ozone treatment process to completely remove this water soluble gas.

The Ozone process was developed to remove the hydrogen sulfide without discharging it into the atmosphere, which creates an odor problem for the surrounding property owners. Other treatment processes include fluoridation, pH control using sodium hydroxide, and chlorination before the water is discharged into the transmission system by the high service pumps.

During the period from 1995 to 2001, OUC undertook a major construction program to implement the ozone treatment process in all of its water supply/treatment facilities. The objective of the program was to convert the hydrogen sulfide treatment process from aeration, which was not effective and efficient, to ozone, which completely removes hydrogen sulfide and produces superior quality water for OUC customers. In addition to installing new ozone treatment equipment at five existing plants (Pine Hills, Kirkman, Navy, Conway and Sky Lake), these facilities were refurbished, upgraded and modernized. The capacity of some of these existing plants was increased. Three new water supply/treatment facilities utilizing ozone treatment were constructed (Southwest, Lake Highland, and Southeast). Five older aeration plants were abandoned and demolished to reduce the number of facilities that needed to be operated and maintained.

High service pumps withdraw water from each plant's ground storage tank and pump it into the transmission system for use by customers. These pumps maintain system pressure at levels sufficient for normal customer use. The combined rated pumping capacity of these pumps is approximately 273.7 MGD. The additional capacity of the high service pumps over the well capacity is due to ground storage at each plant, and is designed to meet the peak hour demand.

The transmission facilities consist of the pipes which deliver water to customers and the associated elevated storage tanks. The transmission facilities can be divided into transmission mains, which are pipes 12 inches and greater, and distribution lines, which are pipes less than 12 inches in size. As of September 30, 2006, the existing OUC transmission system consists of approximately 1,705 miles of pipe ranging in size from 2 to 48 inches. The length of all pipes by size is presented in Figure PW-7. The OUC system has 1.55 MG of elevated storage which is used to supplement plant output during peak demands. Figure PW-7 gives the pertinent data for the system's storage capabilities.

The entire water system is operated and monitored by the Facility Automation and Information Management (FAIM) system located at the OUC Operations Center on Pershing Road. The computerized control system, which was installed in 1998, allows the treatment plants, wells, and storage tanks to be controlled by a single operator from one location.

There are no private systems located within the jurisdiction of the City of Orlando. Most service to the City is provided by OUC, by far the largest system in the area. The Orange County Utilities Department provides water to approximately 8,262 City residents and the Winter Park

Utilities Department provides water to approximately 629 City residents. Impact to other systems' wells by OUC pumpage is minimal because of the semi-confining layer of the Floridan aquifer. However, future demand from all users of the Floridan aquifer may cause substantial demands upon the entire groundwater system.

**FIGURE PW-5: OUC WATER SUPPLY/TREATMENT FACILITY CAPACITIES**

| Water Supply/<br>Treatment<br>Facility<br>Designation | Wells |                   | Ozone Treatment         |                               | Ground Storage |                  |
|---|-------|-------------------|-------------------------|-------------------------------|----------------|------------------|
|   | No.   | Capacity<br>(mgd) | No. Ozone<br>Generators | Capacity<br>(mgd)<br>(Note 1) | No. Tanks      | Capacity<br>(mg) |
| Pine Hills  | 5     | 26.2              | 2                       | 40.0                          | 2              | 4.0              |
| Kirkman   | 3     | 17.3              | 2                       | 15.0                          | 1              | 2.0              |
| Southwest   | 7     | 45.5              | 3                       | 48.0                          | 2              | 6.0              |
| Lake Highland   | 7     | 35.3              | 3                       | 32.0                          | 2              | 5.0              |
| Sky Lake  | 3     | 22.5              | 2                       | 24.0                          | 1              | 3.0              |
| Navy  | 2     | 10.0              | 2                       | 20.0                          | 1              | 2.0              |
| Conway  | 5     | 31.0              | 3                       | 38.0                          | 2              | 5.5              |
| Southeast   | 2     | 7.0               | 2                       | 10.0                          | 1              | 1.0              |
| Total   | 34    | 194.8             | 19                      | 227.0                         | 12             | 28.5             |

| Water Supply/<br>Treatment<br>Facility<br>Designation | High Service Pumps |                            | FDEP Permitted<br>Capacity (Note 2) |                  | 2023 CUP<br>Allocation<br>(mgd)<br>(Note 3) |
|---|--------------------|----------------------------|-------------------------------------|------------------|---|
|   | No.                | Total<br>Capacity<br>(mgd) | Max Day<br>(mgd)                    | Avg Day<br>(mgd) |   |
| Pine Hills  | 4                  | 39.2                       | 25.00                               | 17.86            | 12.94                                       |
| Kirkman   | 4                  | 23.2                       | 15.00                               | 10.71            | 9.64  |
| Southwest   | 7                  | 58.2                       | 40.00                               | 28.57            | 26.60                                       |
| Lake Highland   | 4                  | 47.8                       | 30.40                               | 21.71            | 17.69                                       |
| Sky Lake  | 6                  | 36.2                       | 22.50                               | 16.07            | 16.59                                       |
| Navy  | 3                  | 15.1                       | 10.00                               | 7.14             | 6.08  |
| Conway  | 4                  | 40.0                       | 26.75                               | 19.11            | 18.68                                       |
| Southeast   | 4                  | 14.0                       | 5.00                                | 3.57             | 1.00  |
| Total   | 36                 | 273.7                      | 174.65                              | 124.75           | 109.22                                      |

Note 1: The capacity of the ozone treatment facilities at the Navy, Conway and Pine Hills Plants is based on the hydraulic capacity of the ozone contact tanks. The capacity of the ozone treatment facilities at the other plants is based on the retention time in the contactors.

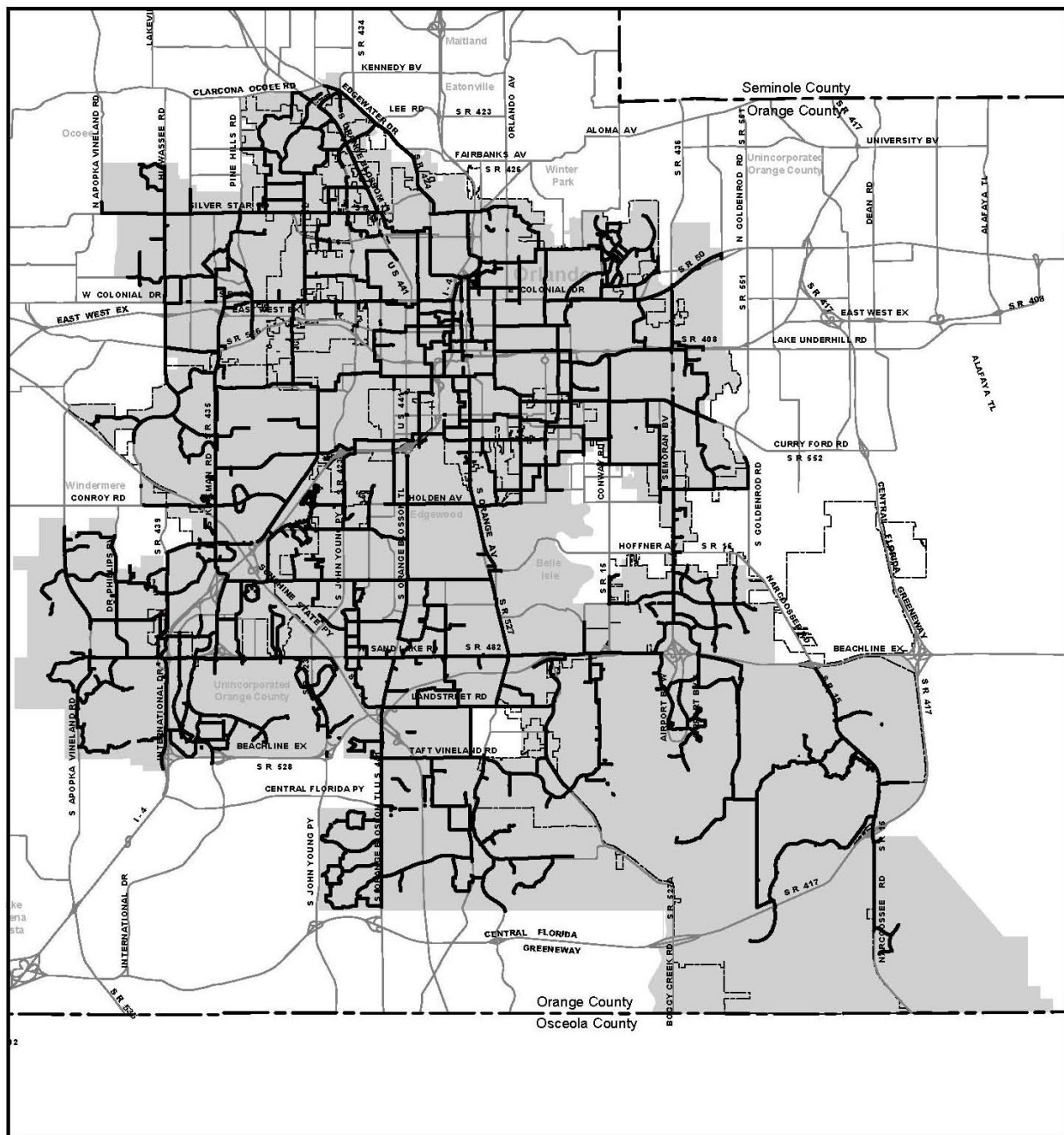
Note 2: FDEP Permitted Capacity is based on supplying Max Day demands. Avg Day capacity is calculated by dividing the Max Day capacity by the design maximum day demand/average day demand factor for the OUC system, which is 1.4.

Note 3: 2023 CUP Allocation represents how the system-wide allocation of 109.2 mgd is distributed to the eight wellfields in OUC's CUP application.

Source: OUC

**Figure  
PW-6**

# **OUC Water Transmission/Distribution Network**



## **LEGEND**



-  Orlando City Limits
-  OUC Service Area
-  OUC Water Mains 12 Inch or Greater



City of Orlando Economic Development Department  
City Planning Division August, 2008

**FIGURE PW-7: SUMMARY OF TRANSMISSION/DISTRIBUTION FACILITIES**

| <b>Pipe Length, by Size, miles</b>            |           |
|---|-----------|
| 2" Diameter                                   | 223.9     |
| 3" and 4" Diameter                            | 162.4     |
| 6" Diameter                                   | 441.0     |
| 8" and 10" Diameter                           | 443.7     |
| 12" Diameter                                  | 243.0     |
| 14" and 16" Diameter                          | 109.1     |
| 18" and 20" Diameter                          | 67.7      |
| 24" to 48" Diameter                           | 14.5      |
| Total Pipe Length, miles                      | 1,705.3   |
|   |           |
| <b>Services, Active Metered, No.</b>          | 132,512   |
|   |           |
| <b>Fire Hydrants, No.</b>                     | 9,118     |
|   |           |
| <b>Elevated Storage Tanks, Capacity</b>       |           |
| Dr. Phillips, gallons                         | 750,000   |
| Hiawassee, gallons                            | 500,000   |
| MetroWest, gallons                            | 300,000   |
| Total Elevated Storage Tank Capacity, gallons | 1,550,000 |

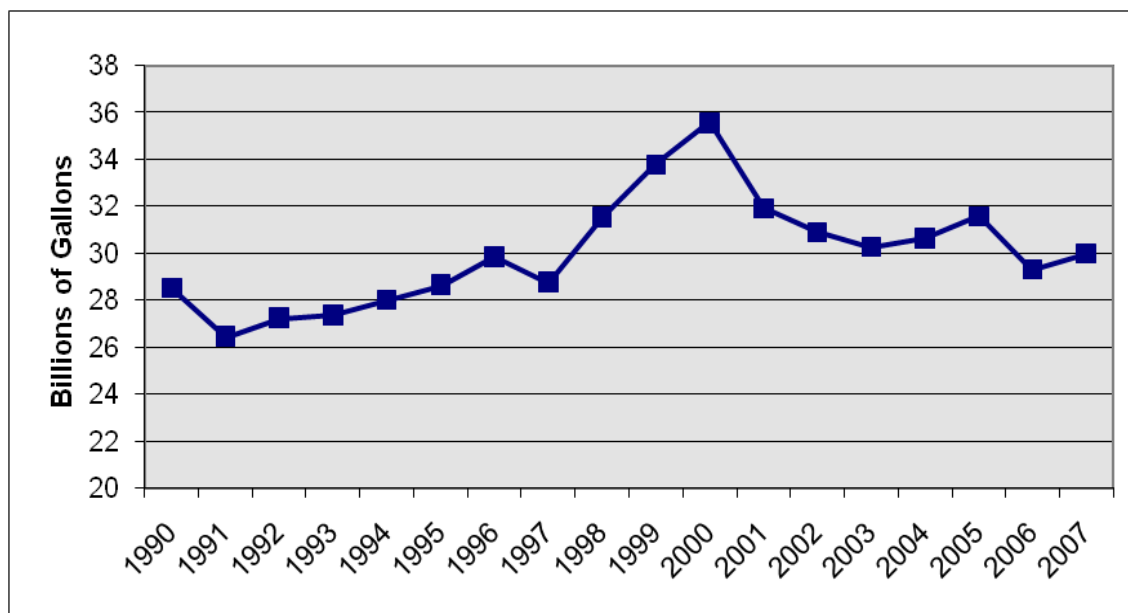
Note: Data as of September 30, 2006

Source: OUC

## 6. HISTORICAL WATER DEMAND

The Orlando Utilities Commission was created in 1923. Prior to this date, water and electric service was provided by the Orlando Water and Light Company, a private utility company owned by Judge John M. Cheney. In 1922, the population of Orlando was less than 10,000 and the utility served less than 5,000 customers. Today, the population of Orlando has increased to approximately 224,055, with OUC serving approximately 415,000 permanent residents, in addition to thousands of visitors to the Orlando area. Figure PW-8 depicts the historic water demand within the OUC service area from 1990 to 2007.

**FIGURE PW-8: HISTORICAL WATER DEMAND**



Water demand is a function of land use. Different land uses create specific demands which the system must meet. Peak conditions are caused primarily by residential by residential uses. There are maximum day and peak hour rates which must be accommodated. The maximum day rate is the largest demand for one hour throughout the entire year. The first one is in the morning lasting for about three hours beginning at 6 a.m., and the second lasting approximately 2 hours from 6 to 8 p.m.

Figure PW-9 displays the historical data from 1995 to 2006 for the number of residential connections, estimated population, and the amount of potable water pumped. Figure PW-10 shows the peak pumping from 1999 to 2007. The highest peak pumpage happened in 2000 with 181.1 MGD, prior to OUC adopting a water-conserving rate for its customers. After its new rate was implemented, the peak pumpage fell to 111.7 MGD and has continued to stay in this range.

**FIGURE PW-9: HISTORICAL WATER PUMPAGE**

| Year | Residential Connections (1) | Estimated Population (2) | Potable Water Pumped (3) (mgd) |
|------|-----------------------------|--------------------------|--------------------------------|
| 1995 | 88,710                      | 354,840                  | 79.39                          |
| 1996 | 89,786                      | 359,144                  | 82.01                          |
| 1997 | 91,006                      | 364,024                  | 78.19                          |
| 1998 | 92,290                      | 369,160                  | 88.90                          |
| 1999 | 93,521                      | 374,084                  | 92.17                          |
| 2000 | 94,492                      | 377,968                  | 100.09                         |
| 2001 | 95,090                      | 380,360                  | 84.00                          |
| 2002 | 95,657                      | 382,628                  | 84.09                          |
| 2003 | 97,020                      | 388,080                  | 81.77                          |
| 2004 | 99,228                      | 396,912                  | 85.21                          |
| 2005 | 101,660                     | 406,640                  | 86.28                          |
| 2006 | 103,509                     | 414,036                  | 91.08                          |

(1) Average active residential connections (single-family and multi-family) for calendar year based on OUC Financial Services Reports. Residential Irrigation meters are not included.

(2) Assume 4 people per residential connection based on an analysis performed for OUC by Hartman & Associates, Inc. in 2000. Residential connections include single-family and multi-family customers. Most multi-family customers are served by one master meter, thus one connection serves many multi-family customers (i.e. one meter/connection may serve several hundred people).

(3) Average flows for calendar year based on OUC Treated Water Report.

Source: OUC

**FIGURE PW-10: HISTORICAL PEAK PUMPING**

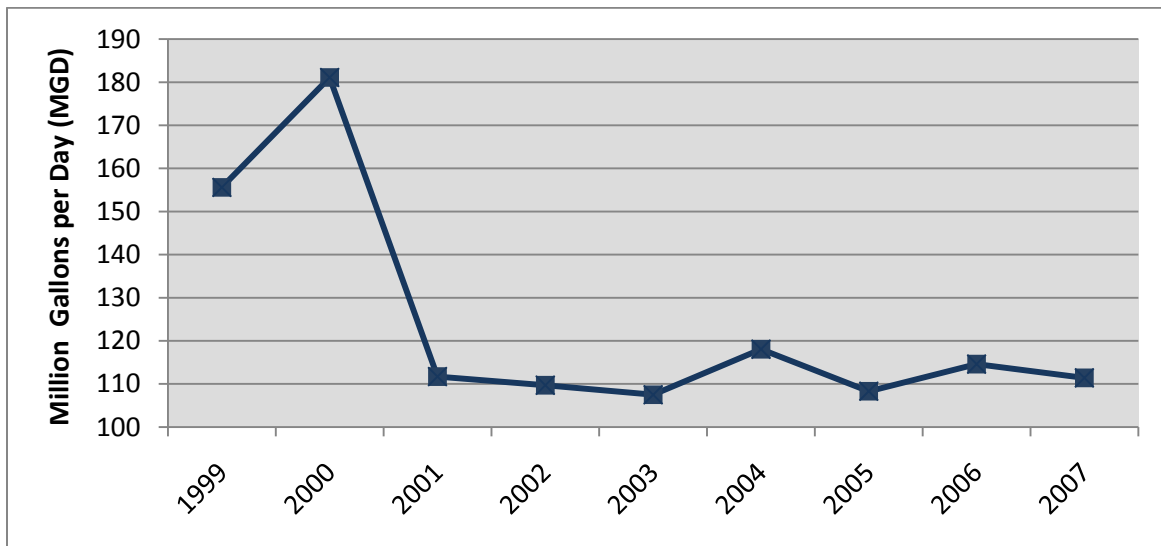


Figure PW-11 lists water pumped from each of the eight water supply/treatment facilities for the past six fiscal years, which spans October 1 through September 30 of each year. Total

system-wide pumpage from all eight plants on both an average day and maximum day basis is also presented. Average day flow is calculated by dividing the total water pumped during the year by 365 days. The maximum day flow is the highest recorded flow from all facilities for one day during the year. Since there is negligible amount of water lost between the wells and the high service pumps, the average day flows shown in the table are equal to the groundwater pumped from wells that tap the Lower Floridan aquifer. Figure PW-12 provides the quantity of water used annually at the retail level.

**FIGURE PW-11: HISTORICAL PLANT PUMPAGE**

| Water Supply/<br>Treatment Facility<br>Designation | Fiscal Year               |                  |                  |                  |                  |                 |
|--|---------------------------|------------------|------------------|------------------|------------------|-----------------|
|  | 2001                      | 2002             | 2003             | 2004             | 2005             | 2006            |
|  | Average Day Pumpage (mgd) |                  |                  |                  |                  |                 |
| Pine Hills   | 14.25                     | 12.35            | 11.82            | 10.42            | 11.47            | 11.75           |
| Kirkman  | 7.58                      | 7.45             | 7.00             | 6.76             | 6.88             | 7.27            |
| Southwest  | 20.60                     | 20.37            | 20.45            | 20.34            | 18.80            | 20.80           |
| Lake Highland                                      | 16.20                     | 16.18            | 13.31            | 15.00            | 14.14            | 16.67           |
| Sky Lake   | 8.26                      | 8.07             | 8.61             | 10.57            | 13.87            | 13.96           |
| Navy   | 3.94                      | 3.14             | 4.48             | 5.28             | 5.30             | 5.18            |
| Conway   | 16.03                     | 15.28            | 16.57            | 14.75            | 15.66            | 13.47           |
| Southeast  | 0.60                      | 1.82             | 0.70             | 0.96             | 0.89             | 0.35            |
| Total System                                       | 87.46                     | 84.66            | 82.94            | 84.08            | 87.01            | 89.45           |
| Total System Date                                  | Max Day Pumpage (mgd)     |                  |                  |                  |                  |                 |
|  | 111.72<br>May 20          | 109.74<br>May 12 | 107.49<br>May 14 | 118.04<br>May 29 | 108.33<br>May 26 | 114.64<br>May 7 |

**FIGURE PW-12: HISTORICAL RETAIL CONSUMPTION**

| Year | Total Annual Retail<br>Sales (millions of<br>gallons) |
|------|---|
| 1997 | 27,131  |
| 1998 | 29,746  |
| 1999 | 31,048  |
| 2000 | 33,185  |
| 2001 | 29,306  |
| 2002 | 28,483  |
| 2003 | 27,444  |
| 2004 | 27,902  |
| 2005 | 28,980  |
| 2006 | 29,302  |
| 2007 | 29,984  |

Source: OUC



## 7. EXISTING LEVEL OF SERVICE

The existing LOS can be computed based upon the historical water sales. The LOS is defined as the capacity per unit demand for a public facility and physical characteristics of the facility. Per unit demand factors represent the annual average day demand that must be supplied by wells, treatment plants, elevated storage tanks and transmission mains. The LOS is generally expressed in terms of gallons per capita per day (g/c/d) or gallons per unit of land use per day. Figure PW-13 presents the existing per capita LOS for the OUC service area and the City.

**FIGURE PW-13: EXISTING PER CAPITA DEMAND**

|      | Average<br>Day    | Population<br>(MGD)  | Demand<br>(g/c/d) |
|------|-------------------|----------------------|-------------------|
| City | 55.6 <sup>3</sup> | 219,563 <sup>1</sup> | 253.23            |
| OUC  | 87.0              | 406,640 <sup>2</sup> | 213.95            |

<sup>1</sup>City of Orlando Population (2005)

<sup>2</sup>OUC service area (2005)

<sup>3</sup>City-wide estimates projected from LOS multipliers; actual usage rates are expected to be consistent with OUC data

Source: OUC and Orlando Planning and Development Department

Figure PW-14A exhibits the total Water Demand within the City limits by Land Use from 2005 to 2030. Land Use projections are used as shown in Future Land Use Element Figure LU-9B. Each land use category is multiplied by the LOS to determine the total demand from that land use category. Figure PW-14B provides the resident and employment demand for the population projections shown in Future Land Use Element Figure LU-9B.

**FIGURE PW-14A: TOTAL WATER DEMAND WITHIN CITY LIMITS BY LAND USE**

| Land Use Category   | Level of Service:<br>Gallons per unit per day | Demand (MGD) |              |              |              |              |              |
|---------------------|---|--------------|--------------|--------------|--------------|--------------|--------------|
|                     |   | 2005         | 2010         | 2015         | 2020         | 2025         | 2030         |
| Single Family       | 360   | 13.48        | 15.23        | 16.12        | 16.61        | 17.05        | 17.41        |
| Multifamily         | 259   | 18.21        | 20.72        | 22.07        | 23.21        | 24.24        | 25.14        |
| Office sq. ft.      | 0.15  | 4.82         | 6.01         | 6.67         | 7.19         | 7.69         | 8.19         |
| Commercial sq. ft.  | 0.13  | 3.74         | 4.31         | 4.61         | 4.89         | 5.12         | 5.34         |
| Hotel rooms         | 187   | 3.75         | 4.48         | 5.27         | 5.93         | 6.40         | 6.78         |
| Industrial sq. ft.  | 0.22  | 8.05         | 9.05         | 9.84         | 10.71        | 11.55        | 12.25        |
| Government sq. ft.  | 0.15  | 2.44         | 3.18         | 3.45         | 3.65         | 3.80         | 3.90         |
| Hospital sq. ft.    | 0.22  | 1.17         | 1.39         | 1.43         | 1.51         | 1.56         | 1.62         |
| <b>Total demand</b> |   | <b>55.66</b> | <b>64.37</b> | <b>69.48</b> | <b>73.70</b> | <b>77.41</b> | <b>80.63</b> |

**FIGURE PW-14B: TOTAL WATER DEMAND WITHIN CITY LIMITS BY POPULATION**

|                     | Demand (MGD) |              |              |             |              |              |
|---------------------|--------------|--------------|--------------|-------------|--------------|--------------|
|                     | 2005         | 2010         | 2015         | 2020        | 2025         | 2030         |
| Residential Demand  | 31.69        | 35.95        | 38.19        | 39.82       | 41.29        | 42.55        |
| Employment Demand   | 23.97        | 28.42        | 31.27        | 33.88       | 36.12        | 38.08        |
| <b>Total demand</b> | <b>55.66</b> | <b>64.37</b> | <b>69.46</b> | <b>73.7</b> | <b>77.41</b> | <b>80.63</b> |

The physical considerations of the system must be taken into account if the LOS is to be maintained. Design criteria standards were established to define minimum acceptable performance criteria for the OUC water system. These standards are used as the basis for identifying elements of the water system that are being stressed by the assumed demand conditions, indicating a need for improvement. The design criteria standards established for OUC include:

- Design capacity
- System pressure under various demand conditions
- Pipeline velocity and head loss
- Fire flows
- Peaking factors.

The design capacity standard defines the relationship between treatment, storage and high service pumping capacities and system demand. The design capacity standards require that the capacity of wells and associated treatment be equal to maximum day demands, the capacity of high service pumps be equal to peak hour demands, and that the storage volume be determined as a function of various system demands. The required storage, located at the treatment plants, must be located between the treatment process and the high service pumps based on the selected high service pump and treatment capacities, and must be able to supply the high service pumps at the peak hour rate for a given period of time while being re-supplied at a maximum day rate. The elevated storage helps to maintain the system pressure and provide small amounts of additional storage capacity for short periods of time.

From a consumer's perspective, system pressure is the most evident of these criteria. Normal industry standards allow for a variation in pressure throughout the distribution system from a low of 30 pounds per square inches (psi) during peak domestic demand conditions, to a maximum of 90 psi during low demand periods. When the facilities have to supply water to a fire, in addition to supplying domestic water demands, system pressures should not fall below 20 psi to provide sufficient pressure to fill pumper trucks for firefighting purposes. To protect against the possibility of drawing contaminated water into the distribution system from outside sources, the Florida Department of Environmental Protection requires that pressures exceed 20 psi at all times in the distribution system. To maintain system pressure, OUC monitors and regulates pressure at the treatment plants and storage tanks from a central computerized control facility. In addition, line pressures are periodically measured to ensure adequate pressure. These line readings are also used to calibrate a computer model which predicts line pressures for the entire system. The computer model is updated throughout the year with water demand information from recent development to maintain a current database.

Based on the above discussion, the design criteria standards for pressure can be found in Figure PW-15.

**FIGURE PW-15: OUC DESIGN CRITERIA**

| <u>Minimum Pressure</u> | <u>Demand Condition</u>    |
|-------------------------|----------------------------|
| 50 psi                  | Average Day                |
| 40 psi                  | Peak Day                   |
| 35 psi                  | Peak Hour                  |
| 25 psi                  | Peak Day plus Fire Flow    |
| 100 psi                 | Maximum Desirable Pressure |

*Source: OUC*

Pipeline velocity and head loss rate generally govern the selection of pipe sizes. Velocity is of concern because of the potential for surging and scouring problems. Head loss rate (which is defined as the pressure drop per foot of pipe) is of concern because of its effect on pumping costs. The two are interrelated; as velocity increases, the head loss rate also increases. Generally acceptable flow velocities in pipes range from 5 to 10 feet per second (fps). Analysis

of velocities that did not scour or create surging while minimizing overall pumping and construction costs indicate that a velocity of up to 7 fps was acceptable.

## **8. NEEDS ASSESSMENT**

OUC has projected water demand on a five year basis to 2025, and at build-out in 2050. The analysis did not distinguish between City and non-City demand. Water demand for the City of Orlando, based on growth projections, has been estimated in order to compare anticipated growth trends. Facility capital costs for upgrading the system to meet the increased demand have been projected for the next 10 years. These projects are reviewed on an annual basis to update the plan based on growth trends. Capital costs and operation and maintenance costs could not be separated between City and non-City areas due to the interconnectedness of the water system. Therefore, the expenditure projections reflect the entire system costs.

### **Projected Demand**

The OUC analysis of projected water demands are based on measurements at customer meters. The analysis reflects total water demands as measured at customer meters, during a normal rainfall year, and at conservation levels that were being practiced by OUC customers in the 2003-2004 time period. Forecasted water demands were developed for nine separate planning regions within the water service area. Water demands were forecasted for five categories of users: single-family residential, multi-family residential, commercial, hotel and schools. OUC's service area is larger than the boundaries of the Orlando City limits. OUC currently serves a population of 364,500. OUC does not project population because it calculates demand based on land uses. OUC projects land uses by incorporating the City's growth projections inside City limits, and using Metroplan (the region's MPO) data for remaining service areas. Further details regarding OUC's methodology for projecting demand is provided in the City's Water Supply Plan as Appendix B: Evaluation of Future Water Demands, August 2005, prepared by CH2MHILL.

Figure PW-16 shows the water demand for each land use in the nine planning regions. The overall system-wide summary of forecasted water demands are found in Figure PW-17. This figure summarizes the type of water that should be used to satisfy the demand. Potable water demands must be supplied from potable water supplies only, while reclaimed water demands will be supplied from reclaimed water supplies. It also estimates the amount of future non-revenue generating water. Non-revenue generating water is attributable to un-metered usage, inaccurate meters, leaks in pipes and services, flushing for maintenance purposes and fire flows. Non-revenue generating water is estimated by multiplying the potable water demand measured at customer meters by 9%, which is a design factor derived from actual OUC historical performance. The potable water demand measured at the water supply/treatment facilities is calculated by summing the non-revenue generating water and potable water demand measured at customer meters.

**FIGURE PW-16: WATER DEMAND MEASURED AT POTABLE AND RECLAIMED WATER  
CUSTOMER METERS**

| Category    | SFR                                 | MFR  | Commercial | Hotel | School | Other (Note 1) | Total |
|-------------|-------------------------------------|------|------------|-------|--------|----------------|-------|
| <b>Year</b> | <b>Baldwin Park Planning Region</b> |      |            |       |        |                |       |
| 2004        | 0.22                                | 0.05 | 0.17       | 0     | 0.04   | 0.27           | 0.75  |
| 2010        | 0.7                                 | 0.17 | 0.29       | 0     | 0.04   | 0.27           | 1.47  |
| 2015        | 0.81                                | 0.17 | 0.29       | 0     | 0.04   | 0.27           | 1.58  |
| 2020        | 0.81                                | 0.17 | 0.29       | 0     | 0.04   | 0.27           | 1.58  |
| 2025        | 0.81                                | 0.17 | 0.29       | 0     | 0.04   | 0.27           | 1.58  |
| 2030        | 0.91                                | 0.32 | 0.33       | 0     | 0.04   | 0.27           | 1.87  |
| Build-out   | 1.32                                | 0.92 | 0.51       | 0     | 0.04   | 0.27           | 3.06  |

| Category    | SFR                             | MFR  | Commercial | Hotel | School | Other (Note 1) | Total |
|-------------|---------------------------------|------|------------|-------|--------|----------------|-------|
| <b>Year</b> | <b>Downtown Planning Region</b> |      |            |       |        |                |       |
| 2004        | 0.45                            | 0.9  | 2.04       | 0.29  | 0.08   | 0.09           | 3.85  |
| 2010        | 0.45                            | 1.27 | 3.03       | 0.29  | 0.08   | 0.09           | 5.21  |
| 2015        | 0.45                            | 1.38 | 3.22       | 0.29  | 0.08   | 0.09           | 5.51  |
| 2020        | 0.45                            | 1.48 | 3.39       | 0.29  | 0.08   | 0.09           | 5.78  |
| 2025        | 0.46                            | 1.48 | 3.54       | 0.29  | 0.08   | 0.09           | 5.94  |
| 2030        | 0.5                             | 1.48 | 3.54       | 0.29  | 0.08   | 0.09           | 5.98  |
| Build-out   | 0.67                            | 1.48 | 3.54       | 0.29  | 0.08   | 0.09           | 6.15  |

| Category    | SFR                         | MFR | Commercial | Hotel | School | Other (Note 1) | Total |
|-------------|-----------------------------|-----|------------|-------|--------|----------------|-------|
| <b>Year</b> | <b>GOAA Planning Region</b> |     |            |       |        |                |       |
| 2004        | 0                           | 0   | 1.12       | 0     | 0      | 0              | 1.12  |
| 2010        | 0.03                        | 0   | 1.48       | 0     | 0      | 0              | 1.51  |
| 2015        | 0.03                        | 0   | 1.77       | 0     | 0      | 0              | 1.8   |
| 2020        | 0.03                        | 0   | 2.07       | 0.19  | 0      | 0              | 2.29  |
| 2025        | 0.03                        | 0   | 2.07       | 0.19  | 0      | 0              | 2.29  |
| 2030        | 0.17                        | 0   | 2.23       | 0.21  | 0      | 0              | 2.61  |
| Build-out   | 0.75                        | 0   | 2.85       | 0.31  | 0      | 0              | 3.91  |

| Category    | SFR  | MFR  | Commercial | Hotel | School | Other (Note 1) | Total |
|-------------|--|------|------------|-------|--------|----------------|-------|
| <b>Year</b> | <b>International Drive Planning Region</b> |      |            |       |        |                |       |
| 2004        | 0  | 0    | 0.66       | 1.96  | 0      | 0.01           | 2.63  |
| 2010        | 0  | 0.28 | 0.76       | 3.07  | 0      | 0.01           | 4.12  |
| 2015        | 0  | 0.28 | 0.91       | 3.07  | 0      | 0.01           | 4.27  |
| 2020        | 0  | 0.28 | 0.91       | 3.07  | 0      | 0.01           | 4.27  |
| 2025        | 0  | 0.28 | 0.91       | 3.07  | 0      | 0.01           | 4.27  |
| 2030        | 0  | 0.28 | 0.91       | 3.07  | 0      | 0.01           | 4.27  |
| Build-out   | 0  | 0.28 | 0.91       | 3.07  | 0      | 0.01           | 4.27  |

| Category    | SFR                         | MFR   | Commercial | Hotel | School | Other (Note 1) | Total |
|-------------|-----------------------------|-------|------------|-------|--------|----------------|-------|
| <b>Year</b> | <b>Main Planning Region</b> |       |            |       |        |                |       |
| 2004        | 18.29                       | 11.54 | 18.51      | 3.86  | 0.76   | 1.64           | 54.6  |
| 2010        | 19.37                       | 12.63 | 21.77      | 6.38  | 0.76   | 1.64           | 62.55 |
| 2015        | 20.08                       | 13.05 | 23.68      | 6.38  | 0.76   | 1.64           | 65.59 |
| 2020        | 20.39                       | 13.83 | 23.68      | 6.38  | 0.76   | 1.64           | 68.68 |
| 2025        | 20.61                       | 13.83 | 26.7       | 6.38  | 0.76   | 1.64           | 69.92 |
| 2030        | 20.61                       | 13.83 | 26.7       | 6.38  | 0.76   | 1.64           | 69.92 |
| Build-out   | 20.61                       | 13.83 | 26.7       | 6.38  | 0.76   | 1.64           | 69.92 |

| Category    | SFR                                 | MFR  | Commercial | Hotel | School | Other (Note 1) | Total |
|-------------|-------------------------------------|------|------------|-------|--------|----------------|-------|
| <b>Year</b> | <b>Dr. Phillips Planning Region</b> |      |            |       |        |                |       |
| 2004        | 5.2                                 | 0.24 | 0.57       | 0.11  | 0.14   | 0.08           | 6.34  |
| 2010        | 5.64                                | 0.24 | 0.79       | 0.25  | 0.14   | 0.08           | 7.14  |
| 2015        | 5.72                                | 0.24 | 0.81       | 0.25  | 0.14   | 0.08           | 7.24  |
| 2020        | 5.72                                | 0.24 | 0.85       | 0.25  | 0.14   | 0.08           | 7.28  |
| 2025        | 5.72                                | 0.24 | 0.96       | 0.25  | 0.14   | 0.08           | 7.39  |
| 2030        | 5.83                                | 0.24 | 0.97       | 0.25  | 0.14   | 0.08           | 7.51  |
| Build-out   | 6.25                                | 0.24 | 1.01       | 0.25  | 0.14   | 0.08           | 7.97  |

| Category    | SFR                               | MFR  | Commercial | Hotel | School | Other (Note 1) | Total |
|-------------|-----------------------------------|------|------------|-------|--------|----------------|-------|
| <b>Year</b> | <b>Pine Hills Planning Region</b> |      |            |       |        |                |       |
| 2004        | 4.49                              | 2.29 | 2.46       | 0.06  | 0.16   | 0.06           | 9.52  |
| 2010        | 4.67                              | 2.42 | 2.88       | 0.11  | 0.16   | 0.06           | 10.3  |
| 2015        | 4.7                               | 2.47 | 2.97       | 0.11  | 0.16   | 0.06           | 10.47 |
| 2020        | 4.71                              | 2.58 | 3.05       | 0.11  | 0.16   | 0.06           | 10.67 |
| 2025        | 4.72                              | 2.58 | 3.1        | 0.11  | 0.16   | 0.06           | 10.73 |
| 2030        | 4.73                              | 2.58 | 3.14       | 0.11  | 0.16   | 0.06           | 10.78 |
| Build-out   | 4.78                              | 2.58 | 3.29       | 0.11  | 0.16   | 0.06           | 10.98 |

| Category    | SFR                          | MFR  | Commercial | Hotel | School | Other (Note 1) | Total |
|-------------|------------------------------|------|------------|-------|--------|----------------|-------|
| <b>Year</b> | <b>South Planning Region</b> |      |            |       |        |                |       |
| 2004        | 0.35                         | 0.03 | 0.2        | 0     | 0.01   | 0.03           | 0.62  |
| 2010        | 2.7                          | 0.24 | 0.98       | 0     | 0.03   | 0.03           | 3.98  |
| 2015        | 2.74                         | 0.24 | 1.85       | 0.03  | 0.04   | 0.03           | 4.93  |
| 2020        | 3.52                         | 0.33 | 2.01       | 0.13  | 0.05   | 0.03           | 6.07  |
| 2025        | 3.55                         | 0.33 | 2.01       | 0.13  | 0.05   | 0.03           | 6.1   |
| 2030        | 3.63                         | 0.33 | 2.03       | 0.13  | 0.05   | 0.03           | 6.2   |
| Build-out   | 3.95                         | 0.33 | 2.13       | 0.13  | 0.05   | 0.03           | 6.62  |

| Category  | SFR                       | MFR  | Commercial | Hotel | School | Other (Note 1) | Total |
|-----------|---------------------------|------|------------|-------|--------|----------------|-------|
| Year      | Southeast Planning Region |      |            |       |        |                |       |
| 2004      | 0.6                       | 0.01 | 0.09       | 0     | 0.12   | 0.11           | 0.93  |
| 2010      | 7.61                      | 1.28 | 1.23       | 0.26  | 0.17   | 0.11           | 10.66 |
| 2015      | 10.28                     | 1.5  | 1.52       | 0.44  | 0.22   | 0.11           | 14.07 |
| 2020      | 10.36                     | 1.59 | 1.56       | 0.44  | 0.22   | 0.11           | 14.28 |
| 2025      | 10.46                     | 1.71 | 1.57       | 0.44  | 0.22   | 0.11           | 14.51 |
| 2030      | 10.5                      | 1.76 | 1.57       | 0.44  | 0.22   | 0.11           | 14.6  |
| Build-out | 10.65                     | 1.95 | 1.59       | 0.44  | 0.22   | 0.11           | 14.96 |

| Category  | SFR          | MFR   | Commercial | Hotel | School | Other (Note 1) | Total  |
|-----------|--------------|-------|------------|-------|--------|----------------|--------|
| Year      | Total System |       |            |       |        |                |        |
| 2004      | 29.6         | 15.06 | 25.82      | 6.28  | 1.31   | 2.29           | 80.36  |
| 2010      | 41.17        | 18.53 | 33.21      | 10.36 | 1.38   | 2.29           | 106.94 |
| 2015      | 44.81        | 19.33 | 37.02      | 10.57 | 1.44   | 2.29           | 115.46 |
| 2020      | 45.99        | 20.5  | 39.81      | 10.86 | 1.45   | 2.29           | 120.9  |
| 2025      | 46.36        | 20.62 | 41.15      | 10.86 | 1.45   | 2.29           | 122.73 |
| 2030      | 46.88        | 20.82 | 41.43      | 10.88 | 1.45   | 2.29           | 123.75 |
| Build-out | 48.98        | 21.61 | 42.53      | 10.98 | 1.45   | 2.29           | 127.84 |

Note 1: These demands are not associated with the five land uses in the table. Includes existing demands on parcels labeled non-developable.

Note 2: 2030 demand interpolated from 2050 build-out date.

Source: OUC/City of Orlando

**FIGURE PW-17: SUMMARY OF FORECASTED WATER DEMANDS**

| Year        | Total System Water Demand at Meter (Note 1) (mgd) | Reclaimed Water Demand at Meter (mgd) | Potable Water Demand at Meter (mgd) | Non-Revenue Generating Water (Note 2) (mgd) | Potable Water Demand at Plants (Note 3) (mgd) |
|-------------|---|---------------------------------------|-------------------------------------|---|---|
| 2004        | 80.36   | 3.42                                  | 76.94                               | 6.92  | 83.86   |
| 2010        | 106.94  | 12.09                                 | 94.85                               | 8.54  | 103.39  |
| 2015        | 115.46  | 14.80                                 | 100.66                              | 9.06  | 109.72  |
| 2020        | 120.90  | 15.14                                 | 105.76                              | 9.52  | 115.28  |
| 2023 Note 4 | 122.00  | 15.21                                 | 106.79                              | 9.61  | 116.40  |
| 2025        | 122.73  | 15.26                                 | 107.47                              | 9.67  | 117.14  |
| 2030 Note 5 | 123.75  | 15.51                                 | 108.24                              | 9.74  | 117.98  |
| Build-out   | 127.84  | 16.51                                 | 111.33                              | 10.02                                       | 121.35  |

Note 1: Equals Potable Water Demand at Meter + Reclaimed Water Demand at Meter

Note 2: Equals 9% times Potable Water Demand at Meter.

Note 3: Equals Potable Water Demand at Meter + Non-Revenue Generating Water.

Note 4: Interpolated from 2020 and 2025 data.

Note 5: Interpolated from 2050 build-out data and 2025 data.

Note: Where the term “meter” is used, it refers to customer meter.

Source: OUC/City of Orlando

### **Capacity Analysis**

For future potable water needs, it is projected that the demand will be 123.75 MGD in 2030. The Consumptive Use Permit allows OUC to withdraw up to 109.2 MGD of groundwater by 2023, and this analysis assumes that the allocation will remain at 109.2 MGD through 2030. In Figure PW-5, the system-wide total FDEP-rated capacity of OUC’s existing groundwater supply/treatment facilities is 124.75 MGD, which is based on average day demand. The CUP allocation is less than the physical capacity of the water treatment plants. On a system-wide basis, the physical capacity of the existing groundwater supply/treatment facilities is sufficient to supply future needs through the year 2030, however the limitations imposed by the CUP will mean that withdrawals are less than the physical capacity. One groundwater supply/treatment facility, the Sky Lake Plant, will need one additional well in order to withdraw the maximum allocation allowed under the CUP permit. OUC plans to construct the additional well when it is needed in the future. No other additional facilities will be needed in the future to expand capacity at any of OUC’s existing groundwater supply/treatment facilities. OUC will also continue to replace existing equipment due to normal wear to maintain the present capacity levels.

### **Projected Water Supply Needs and Sources**

Figure PW-18 shows the estimated future water supply needs and the water supply sources that OUC plans to have available to meet future needs. The future water supply needs are based on a 1-in-10 rainfall year. A 1-in-10 rainfall year is the one year out of ten years when rainfall is the lowest. Water supply needs in a 1-in-10 rainfall year are greater than they would be in an average rainfall year. Based on data provided by the St. John’s River Water Management District, water supply needs in the 1-in-10 rainfall year are 6% higher than the needs during an average rainfall year. Potable water supply needs will be met with a combination of sources, including traditional groundwater, alternative water supplies, and conservation. Conservation is not a true source of water, but it offsets future water supply needs just like a water supply source, and often at a much lower cost.



**FIGURE PW-18: PROJECTED WATER SUPPLY NEEDS AND SOURCES**

| Year | Needs Within OUC Water Service Area                    |   |
|------|--|---|
|      | Potable Water Supply Needs<br>Avg. Rainfall Year (mgd) | Potable Water Supply Needs<br>1-in-10 Rainfall Year (mgd) |
| 2004 | 83.86  | 88.90   |
| 2010 | 103.39   | 109.59  |
| 2015 | 109.72   | 116.30  |
| 2020 | 115.28   | 122.20  |
| 2023 | 116.40   | 123.38  |
| 2025 | 117.14   | 124.17  |
| 2030 | 117.98   | 125.06  |

Note 1

Note 1

| Year | Sources To Meet Needs Within OUC Water Service Area During 1-in-10 Rainfall Year |   |                       |                                      |
|------|--|---|-----------------------|--------------------------------------|
|      | Potable Water  |   |                       |                                      |
|      | Groundwater<br>Sources (mgd)   | Alternative Water<br>Supply Sources (mgd) | Conservation<br>(mgd) | Total Potable<br>Water Sources (mgd) |
| 2004 | 95.00  | 0.00                                      | 0.00                  | 95.00                                |
| 2010 | 104.40   | 0.00                                      | 5.19                  | 109.59                               |
| 2015 | 108.60   | 5.00                                      | 2.70                  | 116.30                               |
| 2020 | 109.20   | 5.00                                      | 8.00                  | 122.20                               |
| 2023 | 109.20   | 5.00                                      | 9.18                  | 123.38                               |
| 2025 | 109.20   | 5.00                                      | 9.97                  | 124.17                               |
| 2030 | 109.20   | 5.00                                      | 10.86                 | 125.06                               |

Note 2

Note 3

Note 1: The SJRWMD draft "Water Supply Assessment 2003" states that future water supply needs, for planning purposes, may be based on a 1-in-10 rainfall year. A 1-in-10 rainfall year is the one year out of ten years when rainfall is the lowest. Water supply needs in a 1-in-10 rainfall year are greater than they would be in an average rainfall year. Based on data provided by the District, water supply needs in the 1-in-10 rainfall year are 6% higher than the needs during an average rainfall year.

Note 2: From Condition 18, Consumptive Use Permit No. 3159 issued to Orlando Utilities Commission on May 11, 2004 for projections through 2023. 2025 and 2030 projections assume a CUP is issued for the same quantity of groundwater withdrawals.

Note 3: Conservation is treated as a potable water supply source because it stretches other supply sources by reducing needs. By showing it a supply source, the amount of conservation needed to balance needs and sourced can be calculated. The conservation quantities shown in this table are reasonable levels of conservation that are attainable based on OUC's past experience and the experience of other larger utilities in Florida.

Source: OUC/City of Orlando

### **Capital Improvement Program**

The capital improvement program provides a description of the water supply projects that the City and OUC are proposing over the next 10 years. Figure PW-3 lists the projects, funding sources, estimated cost, and construction for the 10 year Capital Improvement Program. This list includes 17 proposed projects which include but are not limited to developing an alternative water supply, replacing and upgrading water supply equipment, and installation of distribution system pipelines. New projects may be added as necessary to maintain and improve the water supply system.

Figure PW-3 is an adopted figure that is included in the Policy Document and updated as part of each Water Supply Plan update. Figure CI-14 is the Capital Improvements schedule, which is amended annually to incorporate OUC's five year capital budget. As of FY 2007/2008, 13 projects are proposed totaling \$19,075,000. For reference purposes, a summary of these projects is provided in Figure PW-19.

**FIGURE PW-19: CAPITAL IMPROVEMENTS FUND SCHEDULE, WATER – OUC PROJECTS**

| <b>Project</b>                             | <b>2006-2007</b>  | <b>2007-2008</b>  | <b>2008-2009</b>  | <b>2009-2010</b>  | <b>2010-2011</b>  | <b>5 Year Total</b> |
|--|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------|
| Production Plant Modifications & Equipment | 300,000           | 300,000           | 300,000           | 300,000           | 300,000           | 1,500,000           |
| Ozone Process Equipment/Upgrade            | 75,000            | 75,000            | 75,000            | 75,000            | 75,000            | 375,000             |
| Well & High Service Pump Rehabilitation    | 150,000           | 150,000           | 250,000           | 300,000           | 300,000           | 1,150,000           |
| Pipeline Renewal & Replacement             | 1,500,000         | 1,500,000         | 1,500,000         | 1,500,000         | 1,500,000         | 7,500,000           |
| Consumptive Use Compliance                 | 23,710,000        | 0                 | 0                 | 0                 | 0                 | 23,710,000          |
| System Reliability Upgrades                | 2,000,000         | 0                 | 140,000           | 0                 | 200,000           | 2,340,000           |
| Project Renew                              | 3,090,000         | 5,650,000         | 16,010,000        | 16,010,000        | 16,010,000        | 56,770,000          |
| Alternative Water Supply                   | 220,000           | 250,000           | 2,150,000         | 4,290,000         | 12,090,000        | 19,000,000          |
| Ozone Generator Replacements               | 0                 | 0                 | 0                 | 2,000,000         | 2,000,000         | 4,000,000           |
| Renewal and Replacement                    | 1,850,000         | 1,850,000         | 1,850,000         | 1,850,000         | 1,850,000         | 9,250,000           |
| Inter-Agency Projects                      | 2,000,000         | 2,000,000         | 2,000,000         | 2,000,000         | 1,500,000         | 9,500,000           |
| Loop Closures/Tools & Equipment            | 200,000           | 200,000           | 200,000           | 200,000           | 200,000           | 1,000,000           |
| Developer Initiated Projects               | 250,000           | 400,000           | 755,000           | 1,200,000         | 500,000           | 3,105,000           |
| Back Flow Devices – (CIAC)                 | 500,000           | 500,000           | 500,000           | 500,000           | 500,000           | 2,500,000           |
| Future Projects                            | 0                 | 0                 | 0                 | 500,000           | 1,600,000         | 2,100,000           |
| Donated Water Plant                        | 3,000,000         | 3,000,000         | 2,000,000         | 2,000,000         | 2,000,000         | 12,000,000          |
| Constructed Water Plant                    | 3,200,000         | 3,200,000         | 2,500,000         | 2,500,000         | 2,500,000         | 13,900,000          |
| <b>Total</b>                               | <b>42,045,000</b> | <b>19,075,000</b> | <b>30,230,000</b> | <b>35,225,000</b> | <b>43,125,000</b> | <b>169,700,000</b>  |

## 9. PERFORMANCE ASSESSMENT

The performance of a potable water system is evaluated based on the quality of the delivered water, the pressure at which it is delivered, and the physical condition of the water facilities. The physical condition of the system can have a direct impact upon the quality of the water and the pressure at which it is delivered.

The Insurance Services Office (ISO) is an agency that rates water systems and fire departments for insurance rating purposes. The ISO evaluates almost all water systems in the United States on a periodic basis. The ISO performs rigorous on-site inspections and tests, and reviews records to develop its ratings. Sixty percent of the rating score is based on an evaluation of the

fire department and communication system. Forty percent of the rating score is based on the condition and performance of the water system. The City of Orlando currently has an ISO rating of 1 which is the highest rating. In October 2004, the OUC water system was graded 38.93 points out of a possible 40.

Also in 2004, OUC retained an independent consultant to perform a water accountability audit. The primary function of the audit was to estimate the difference between the volume of water that is metered at the discharge of the water supply/treatment facilities and the volume of water that is metered at all the customer meters. This difference is properly called “non-revenue generating water” because it does not produce revenue for OUC. The results of the study determined that OUC has a very low amount of non-revenue generating water, amounting to only 8.2% of potable water consumption as measured at customer meters. In fact, OUC ranks in the top 5% of North American water utilities with the lowest percentage of non-revenue generating water.

OUC’s multiple supply facilities increase reliability. All water supply/treatment facilities have some form of standby power. At some facilities, emergency generators provide a source of power to operate equipment for extended periods of time if permanent power is lost as a result of a natural disaster, such as a hurricane. At other facilities, two independent electrical power circuits deliver power to the facility. In the event one circuit is out of service, the other circuit can provide power to operate the facility.

## **10. ENVIRONMENTAL IMPACTS & WATER QUALITY**

Central Florida’s drinking water supply is primarily obtained from groundwater withdrawn from the Floridan aquifer. Aquifers can be described as huge underground, porous rocks that hold and allow water to move through the gaps within the rock. Aquifers can be composed of different types of materials, such as sand, shell and limestone. Fresh and salt water fill the various sized holes in the rock. Freshwater can be found in the uppermost part of aquifers while salt water can be found much deeper.

In some areas, water in an aquifer is kept in place by a thick layer of clay and then by more sandy soil extending up to the land’s surface. Where water in an aquifer is confined, the water is under pressure. The pressure allows water to rise in a well above the top of the aquifer and, in some places, water rises above the land’s surface without a pump, resulting in an artesian free-flowing well.

The water quality within the aquifer varies. In some areas, water in the aquifer is not suitable for drinking without some type of chemical treatment because it contains various minerals or salts. Salt water, which is heavier than freshwater, can escape into drinking water wells. This process is known as saltwater intrusion, thus making the water too salty to drink. Even though salt water is present everywhere in the aquifer deep below the freshwater, saltwater intrusion occurs when wells are drilled too deep or when too much freshwater is pumped from the aquifer, allowing salt water to replace freshwater.

The aquifer in Central Florida is impacted daily by human activities. Changes in the landscape, such as paved roads, parking lots, shopping centers, housing developments and other buildings, tend to alter the quality and quantity of water that seeps into an aquifer. An aquifer's water quality is increasingly vulnerable to sources of pollutants, such as nutrients in lawn fertilizers, pesticides and other chemicals, and by animal wastes, that run off backyards or other developed areas and seep into the ground. Contaminants that may be present in water include:

- Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
- Inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
- Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff and residential uses.
- Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production and also can come from gas stations, urban stormwater runoff and septic systems.
- Radioactive contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the EPA prescribes regulations that limit the amount of certain contaminants in water provided by public water systems. All drinking water may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk.

Water quality monitoring is required by state law. Water must meet or exceed state primary and secondary drinking water standards and other parameters set by the Safe Drinking Water Act. Orlando has a clean source of drinking water. The characteristics of untreated groundwater from the Floridan Aquifer are relatively stable. The only undesirable component is from hydrogen sulfide which is easily removed through ozonation or activated carbon processes.

To ensure the quality and safety of drinking water, OUC performs more than 20,000 chemical and bacteriological tests annually. Figure PW-20 outlines the water quality test results which were conducted between January 1 and December 31, 2007.

**FIGURE PW-20: WATER QUALITY DATA**

| Primary Regulated Substances | Date of Sampling | MCL/AL Violation | Range Detected | Highest Detected | MCL     | MCLG | Possible Sources   |
|------------------------------|------------------|------------------|----------------|------------------|---------|------|--|
| <b>Barium</b> (ppm)          | 6/06-7/06        | No               | 0.017-0.063    | 0.063            | 2       | 2    | Erosion of natural deposits  |
| <b>Fluoride</b> (ppm)        | 6/06-7/06        | No               | 0.61-0.86      | 0.86             | 4       | 4    | Erosion of natural deposits; water additive that promotes strong teeth |
| <b>Lead</b> (ppb)            | 6/06-7/06        | No               | ND-3           | 3                | AL (15) | 0    | Erosion of natural deposits  |
| <b>Nitrate</b> (ppm)         | 6/06-7/07        | No               | ND             | ND               | 10      | 10   | Runoff from fertilizer; erosion of natural deposits                    |
| <b>Sodium</b> (ppm)          | 6/06-7/06        | No               | 8.64-14.4      | 14.4             | 160     | N/A  | Salt water intrusion; leaching from soil                               |

| Radiological Contaminants               | Date of Sampling | MCL/AL Violation | Range Detected | Highest Detected | MCL | MCLG | Possible Sources            |
|---|------------------|------------------|----------------|------------------|-----|------|-----------------------------|
| Radiological Gross Alpha (pCi/L) (2002) | 10/02            | No               | ND-1.1         | 1.1              | 15  | 0    | Erosion of natural deposits |

| TTHMs and Stage I Disinfectant/Disinfection By-Product (D/DBP) Parameters |                  |                  |                |                           |           |          |   |
|---|------------------|------------------|----------------|---------------------------|-----------|----------|---|
| Disinfection By-products  | Date of Sampling | MCL/AL Violation | Range Detected | Highest Detected          | MCL       | MCLG     | Possible Sources                          |
| <b>Bromate</b> (ppb)  | Monthly 2007     | No               | ND-11          | 11* (annual average 5)    | 10        | 0        | By-product of drinking water disinfection |
| <b>HAA5</b> (ppb)<br><b>Haloacetic Acids</b>                              | Quarterly 2007   | No               | 7-37           | 37* (annual average 21)   | 60        | N/A      | By-product of drinking water chlorination |
| <b>TTHMs</b> (ppb)<br><b>Trihalomethanes</b>                              | Quarterly 2007   | No               | 29-96          | 96* (annual average 52)   | 80        | N/A      | By-product of drinking water chlorination |
| <b>Chlorine</b> (ppm)   | 1/07-12/07       | No               | 0.2-2.2        | 2.2* (annual average 1.2) | (MRDLG=4) | (MRDL=4) | Water additive used to control microbes   |
| *Compliance levels are based on running annual averages                   |                  |                  |                |                           |           |          |   |

**Figure PW-20 (cont.)**

| Microbiological Contaminant   | MCLG | MCL  | Level Detected  | Violation | Likely Sources                       |
|---|------|--|---|-----------|--------------------------------------|
| Total Coliform Bacteria   | 0    | Presence of Coliform Bacteria in more than 5% of month samples | OUC's highest monthly percentage of positive samples was 1.2%, in Jan. & March 2007 | No        | Naturally present in the environment |
| During 2007, a minimum of 248 water samples per month were collected throughout OUC's water distribution system and analyzed for Total Coliform Bacteria. |      |  |   |           |                                      |

| Results of Copper and Lead Sampling at Customer Taps   |               |  |                                  |                 |  |
|--|---------------|--|----------------------------------|-----------------|--|
| Contaminant and Unit of Measure  | MCL Violation | Level Detected                         | MCL                              | MCLG            | Likely Source of Contamination   |
| <b>Copper</b><br>(tap water) (ppm)   | No            | 0.77<br>(90 <sup>th</sup> percentile)* | AL=1.3<br>(One site exceeded AL) | 1.3             | Corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives |
| <b>Lead</b><br>(tap water) (ppb)   | No            | 2<br>(90 <sup>th</sup> percentile)*    | AL=15<br>(One site exceeded AL)  | 0<br>(Zero ppb) | Corrosion of household plumbing systems; erosion of natural deposits                                   |
| *In 90 percent of the homes sampled, the level of copper was 0.77 ppm or less and the level of lead was 2 ppb or less. |               |  |                                  |                 |  |

**Abbreviations**

**MCL: Maximum Contaminant Level.** The highest level of a contaminant that is allowed in drinking water.

**MCLG: Maximum Contaminant Level Goal.** The level of a contaminant in drinking water below which there is no known or expected risk.

**AL: Action Level.** The concentration of a contaminant that, if exceeded, triggers treatment or other requirements for a water system

**ppm: Parts per million.** One part per billion corresponds to 1 cent in \$10,000

**ppb: Parts per billion.** One part per billion corresponds to 1 cent in \$10 million.

**pCi/L: Picocuries per liter.** A measure of the radioactivity in water.

**ND: Not detected.** Indicates that the substance was not found by laboratory analysis.

**MRDLG: The level of a drinking water disinfectant below which there is no known or expected risk to health.**

**MRDL: The highest level of a disinfectant allowed in drinking water.**

Source: OUC 2008 Water Quality Report

## 11. WATER CONSERVATION

Groundwater (Orlando's potable water source) is sometimes seen as a virtually infinite source of potable water for the area. However, like all natural resources it is in reality a finite supply and must be managed accordingly. Rainfall and development are the primary reasons for changes in the availability of potable water. As discussed in the Stormwater & Aquifer Recharge Element, rainfall is the ultimate source of recharge to the Floridan aquifer. Drought conditions, which are starting to occur more frequently and for longer periods, have made voluntary and mandatory water restrictions a reality in the Central Florida area. Continued growth in the Orlando area has put an additional strain upon the area's water resources by placing additional demand upon the capacity of the aquifer. Water conservation is a means by which planning can effectively meet the challenges of drought and additional growth.

The need for water conservation from drought conditions is easily perceived and most people are willing to sacrifice in the short term. However, the need for long term water conservation is conceptually more difficult to perceive because of the notion of an infinite supply of groundwater and the desire for comfortable living. Public education is slowly changing this perception. Long term shortages, however, are a response more related to development demand than to lack of rainfall. The combination of both can have serious ramifications. The Aquifer Recharge Element discusses projected demand upon the available capacity of the Floridan Aquifer.

Efficient water use can result in significant benefits to the water utility and its customers. There are, however, potential disadvantages that should be considered when planning a conservation program. The advantages and disadvantages are outlined below:

### **Advantages**

- Decreased demand during drought years
- Energy savings from hot water heaters which are second largest electricity user in the home
- Wastewater flow reduction resulting in reduced need for sewage treatment and disposal capacity
- Environmental protection from excessive groundwater yields, increased stream flows, and decreased sewage disposal
- Reduction in production costs of pumping, chemicals, and heating

### **Disadvantages**

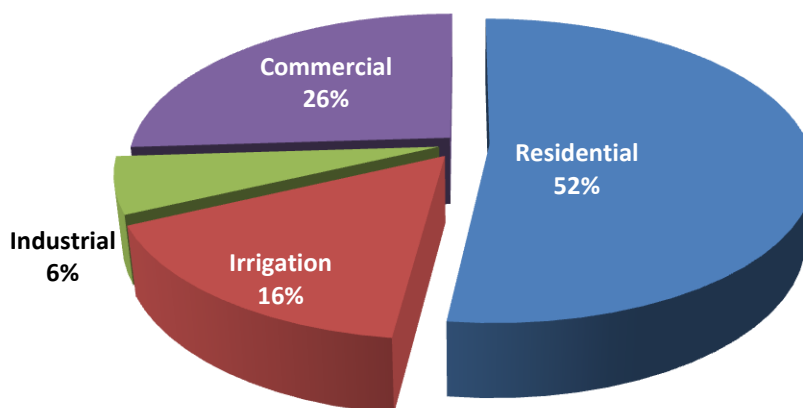
- Reduction of water and sewer utility revenues which may result in increased costs per gallon to meet debt service and O&M
- "New" surplus capacity gained from conservation may induce additional growth
- Reduction in supply of reclaimed water

Overall, water conservation is a long term commitment. The primary benefit from conservation will be from less impact on the aquifer, and lower capital improvement costs for water and sewer infrastructure.



Water conservation methods can be used in all customer categories. Figure PW-21 shows the OUC system-wide water use by customer category. By far the largest user of potable water is residential with 52% of the water use, followed by commercial and industrial uses. For this reason, reduction of residential use is critical. It is estimated that irrigation is responsible for 50% of the residential potable water demand, followed by toilet and bathing uses.

**FIGURE PW-21: SYSTEM-WIDE WATER USE BY CUSTOMER CATEGORY**



Irrigation use is highest during the summer months when evapotranspiration is the highest. Orlando is known as the City Beautiful, but the ornamental plants and grass lawns require large amounts of water. This demand can be reduced by use of efficient irrigation and/or drought tolerant landscaping (Xeriscaping).

Interior use of potable water can be reduced by using water efficient fixtures. Toilets are now designed to work efficiently with less water. Several designs using 1.5 gallons and even 0.8 gallons per flush have been developed. Studies have shown that the ultra-low-volume toilets can reduce water use by 22.6% without system blockages or increases in inconvenience.

Shower heads can be replaced with specifically designed flows which reduce volumes but not function. Water flow is then reduced from 5 - 8 gpm to 2.5 gpm, which is a significant reduction. New faucets for the kitchen and bathroom allow variable flows for different uses, such as rinsing and filling, and add aeration to increase the efficiency.

Figure PW-22 exhibits water conservation methods that can and have been used successfully to reduce water demand.

**FIGURE PW-22: WATER CONSERVATION METHODS**

| <b>Residential</b>  | <b>Non-residential</b>  |
|---|---|
| <ul style="list-style-type: none"><li>• Plumbing code changes</li><li>• Public Education</li><li>• Retrofit Programs</li><li>• Water Audit Programs</li><li>• Efficient Irrigation Programs</li><li>• Xeriscape Programs</li><li>• Water Reuse</li><li>• Inclining Rate Structure</li></ul> | <ul style="list-style-type: none"><li>• Water Audits</li><li>• Water Reuse</li><li>• Pressure Reduction</li><li>• Efficient Irrigation</li><li>• Leak Detection</li><li>• New Sources</li></ul> |

Many of these methods are best instituted by government agencies. Utility actions include leak detection, water audits, rate restructuring and public education. City actions include code revisions, retrofit programs, and xeriscape programs.

OUC currently has many of these water conservation methods in progress. Some strategies include promoting water conservation through television and radio advertising, website information and other outreach efforts, conducting landscape irrigation audits for high-volume users, conducting water audits to help customers increase efficiency, ensuring accurate metering to ensure accountability of water use, and maintaining inverted block water rates and increase over time if necessary.

OUC adopted a water-conserving rate structure in 2001. Customers who use large quantities of water each month pay a higher per gallon charge than customers who use smaller quantities of water. For example, monthly water usage in excess of 30,000 gallons is billed at \$2.931 per 1,000 gallons, whereas a customer who uses 3,000 gallons or less is billed at \$0.801 per 1,000 gallons. The total bill for a customer using 10,000 gallons of water per month would be \$9.90, whereas a customer using 40,000 gallons in a month would pay \$72.78. After this new rate was adopted in 2001, water usage decreased system-wide, and has remained below the historical norm since then. OUC is prepared to continue to use conservation rates in the future, as necessary, to curtail wasteful water usage practices, and to achieve conservation goals as dictated by the CUP.

The City also has some water conservation initiatives in progress. In terms of water efficient landscaping, the City worked in partnership with OUC and other organizations to develop an environmentally friendly demonstration house, named the “Orlando House”. It includes water efficient landscaping and irrigation, plus water saving appliances and plumbing fixtures.

Another method is landscaping requirements. The City of Orlando has minimum requirements for landscaping, shade coverage and street trees. The required landscaping must be constructed in accordance with City standards that require use of native species and conformance with xeriscape standards. One and two family homes are encouraged, but not required, to meet the standards. All other development types are required to meet the xeriscape requirements. In particular, irrigation must be managed to provide zones of water

supply based on the water needs of the plant material. Xeriscape standards have been in place since 1991 and are located in Chapter 62 of the Land Development Code.

Concurrency management is also an initiative the City uses to conserve water. The City requires sufficient capacity in its concurrency management system before an applicant may receive a building permit. This ensures that the City's level of service standards are met. If a deficiency is projected, the City has the authority to deny the permit. Although historically the City has not had to use this authority to address water shortages, it is an available solution of last resort. This strategy may be useful if temporary shortages are expected while waiting for additional capacity to be built.

The City of Orlando enforces the requirements of the Florida Building Code, including low-flow plumbing fixtures. As technology changes and the building code is amended, additional water conservation opportunities may become available.

### **Alternative Water Supplies**

Potable water may be available from sources other than the Floridan aquifer. These include surface water such as rivers and streams, brackish groundwater, or seawater. Each of these sources requires more treatment than fresh groundwater. The water management districts are working with local utilities to assess the technical and financial feasibility of these alternatives.

#### *St. Johns River/Taylor Creek Reservoir Project*

OUC has committed to develop at least 5 MGD of alternative water supplies either independently or in partnership with other regional utilities. At the present time, OUC has elected to partner with various organizations to investigate the feasibility of developing a surface water supply from the St. Johns River/Taylor Creek Reservoir Project. This project involves diverting fresh water from the St. Johns River to the Taylor Creek Reservoir. Additional facilities will be built to treat the water and transport it from the reservoir, located in the northeast portion of Osceola County, to central Orange County. The project is currently in the planning stages and is expected to be complete by 2013.

#### *Aquifer Recharge*

Aquifer recharge with reclaimed water is a water resource management strategy to avoid potentially negative impacts resulting from increased groundwater withdrawals. It is considered to be an effective way to increase the amount of available water and to potentially mitigate potential impacts of drawdowns on the surficial aquifer. OUC has examined three methods of recharge: Rapid Infiltration Basins (RIBs), direct recharge, and using stormwater for recharge.

Of the three methods, Rapid Infiltration Basins are relatively inexpensive and already in use in the City. The drawback is the large amount of land required for their use. Given the land requirement, OUC would likely need to partner with Orange County for any future RIB projects. Direct recharge, on the other hand, requires very little land. However, discharged water would

likely require additional treatment before entering the aquifer. Further studies of this method will be required before it is widely accepted. While the City's stormwater system designs have the potential to maximize removal of pollutants prior to discharge into the drainage well system, it is not currently considered a feasible alternative.

Potential pollution of aquifer recharge water presents an additional threat to continued use of groundwater for domestic consumption where drainage well water is contaminated from polluted urban runoff.

In 2008, OUC is required to submit a wetland and lake impact avoidance/mitigation contingency plan to the St. Johns River Water Management District. In the event that SJRWMD determines that the withdrawals by OUC are causing impacts to lakes and wetlands, OUC may need to provide additional recharge.