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I. INTRODUCTION

A. Purpose and Organization of the Document. Consistent with Florida Administrative Code section 9J-5.011, the purpose of the Potable Water Element (PWE) it to assure that necessary public potable water facilities and services correlate to future land use projections. The PWE support documents provide the data and analysis used as the basis for the goals, objectives and policies included in the PWE.

In 2002, the Florida State Legislature expanded upon the requirements of the local government comprehensive plan to include the development of a 10-Year Water Supply Facilities Workplan (Chapter 163, F.S.), with the purpose of increasing the coordination of future land use and water supply planning. The Broward County Environmental Protection and Growth Management Department (EPGMD) and the Broward County Water and Wastewater Services (WWS) partnered in the development of the County's first 10-Year Water Supply Facilities Workplan in 2004. Additional requirements to strengthen the link between land use and water supply planning were made by the 2005 Legislature, including the requirement for identification of any traditional and alternative water supply projects, as well as conservation and reuse programs necessary to meet projected water demands. Also included were the requirements that local governments: (a) revise their comprehensive plans within 18 months after the approval of a regional water supply plan or its update; (b) prepare a minimum 10-year work plan for building water supply facilities to serve existing and new development within the local government's jurisdiction; and (c) adopt the work plan into the comprehensive plan within 18 months after the water management district approves the regional water supply plan or its update. On February 15, 2007, the South Florida Water Management District's (SFWMD) Governing Board approved the 2005-2006 Lower East Coast Water Supply Plan Update. The potable water element goals objectives and policies, this support document, and the information presented in Appendix C, "Broward County 10-Year Water Supply Facilities Workplan", are intended to meet these requirements.

In preparation of these documents, the role of the EPGMD was to identify the future water supply needs of unincorporated areas of Broward County, to assess the provider utility's ability to meet those needs, and to partner with provider utilities in plan development. The role of WWS was to accomplish the necessary planning for the County operated retail utility and regional raw water system.

In order to better understand the information provided herein, the sections of the document are divided into three major subsections:

A. Broward County Operated Retail Utility
B. Broward County Operated Regional Raw Water Supply
C. City of Fort Lauderdale

The City of Fort Lauderdale is the primary municipal water utility that provides potable water to unincorporated areas of Broward County. In accordance with the statutory requirements, the updates provided in this support document (2008) are provided to ensure consistency between

the 10-Year Water Supply Facilities Workplan and the water elements of the County's Comprehensive Plan, including the Potable Water Element.

B. Planning Horizon. The long-term planning horizon for the unincorporated areas is to the year 2018. By 2010, all unincorporated areas are expected to be annexed by municipalities. The long-term planning horizon for the Broward County Operated Retail Utility and Broward County Operated Regional Raw Water Supply is to the year 2030. Both planning horizons are consistent or exceed rule 9J-5.005(4). WWS decided to use the year 2030 planning horizon because: a) new population projections were available to the year 2030; b) decisions regarding source of supply and treatment processes might change when a longer term is considered; and c) given the 40 to 50 year service life of distribution/ transmission system piping, sizing of those facilities should be based on long term flow projections.

C. Definitions

Average Daily Flow. Total flow for a one year period averaged over a 365 day basis.

Distribution System. Piping that receives water from the transmission system and delivers it to customers. By definition, distribution system piping is 12 inches in diameter and smaller.

Maximum Daily Flow. The total flow for the one highest flow day of the year averaged over a 24 hour basis.

Nanofiltration. A water treatment process utilizing membranes that retain solute molecules ranging from 100 to 1,000 molecular weight.

Peak Hour Flow. The total flow for the one highest flow hour of the year averaged over a 60 minute basis.

Service Area. The combination of the geographic area currently served by a utility and the geographic area the utility intends provide service to potential customers.

System Uses. The difference between the amounts of water pumped into the transmission/distribution system and the sum of all customer meters. System use includes differences in calibration of meters, water lost to leaky pipes, water used in construction and water used in maintenance of the transmission/ distribution system.

Transmission System. Piping that moves large volumes of water from one point in the potable water piping system. By definition, transmission system piping is larger than 12 inches in diameter. Usually customers are not permitted to connect directly to the transmission system.

II. DATA REQUIREMENTS

A. Broward County Operated Retail Utility

1. **Service Area and Customer Base**. The Broward County Operated Retail Utility is one of the twenty-eight utilities that provide potable water service within the urbanized area of the County. The Retail Utility was created on January 31, 1962 with the County's purchase of a small, investor-owned water and wastewater utility. Between 1962 and 1975 the County acquired a number of investor-owned systems. Under the County Code of Ordinances, the Broward County Board of County Commissioners exercises exclusive jurisdiction, control and supervision of the Utility system. The WWS is the County organizational unit directly responsible for the Retail Utility.

The Retail Utility supplies potable water to retail customers in several sections of the County and to one significant bulk water user. Over the past ten years, the Utility has grown from 49,693 customers to its year 2006 retail base of 56,546 customers, representing an estimated population of 178,000. Including the City of Coconut Creek, the bulk water user, the Retail Utility serves about 13 percent of the County's total population. For the year 2006, treated water sold to retail customers equaled about 22.9 Millions of Gallons per Day (MGD) on an annual average basis. Metered water sales to Coconut Creek equaled an additional 5.7 MGD.

The Retail Utility operates four non-contiguous service districts know as District 1, District 2, District 3A and District 3BC. These four service districts are shown on Figure 1, and cover about 41 square miles. The four service districts are operated as independent entities, but are managed as a single entity. The District 1 service area contains all of Lauderdale Lakes and portions of the cities of Fort Lauderdale, Lauderhill, North Lauderdale, Oakland Park, Plantation, Pompano Beach, and Tamarac. The District 2 service area contains portions of the cities of Deerfield Beach, Lighthouse Point and Pompano Beach; and provides water to portions of the City of Coconut Creek as described below. The District 3A service area contains portions of the cities of Dania Beach, Davie, Fort Lauderdale and Hollywood; and provides water to the Fort Lauderdale-Hollywood International Airport. The District 3BC service area contains portions of the cities of Hollywood, Miramar, West Park, Pembroke Park and Pembroke Pines. All four service areas also include unincorporated areas.

The Retail Utility supplies water primarily to retail customers, but also provides water to the City of Coconut Creek under a resale agreement. Presently, there is no practical or economic incentive for the City to pursue development of its own treatment facilities. Without prior approval from the County, the City is prohibited from buying or otherwise providing water within its service area from any source other than the County.

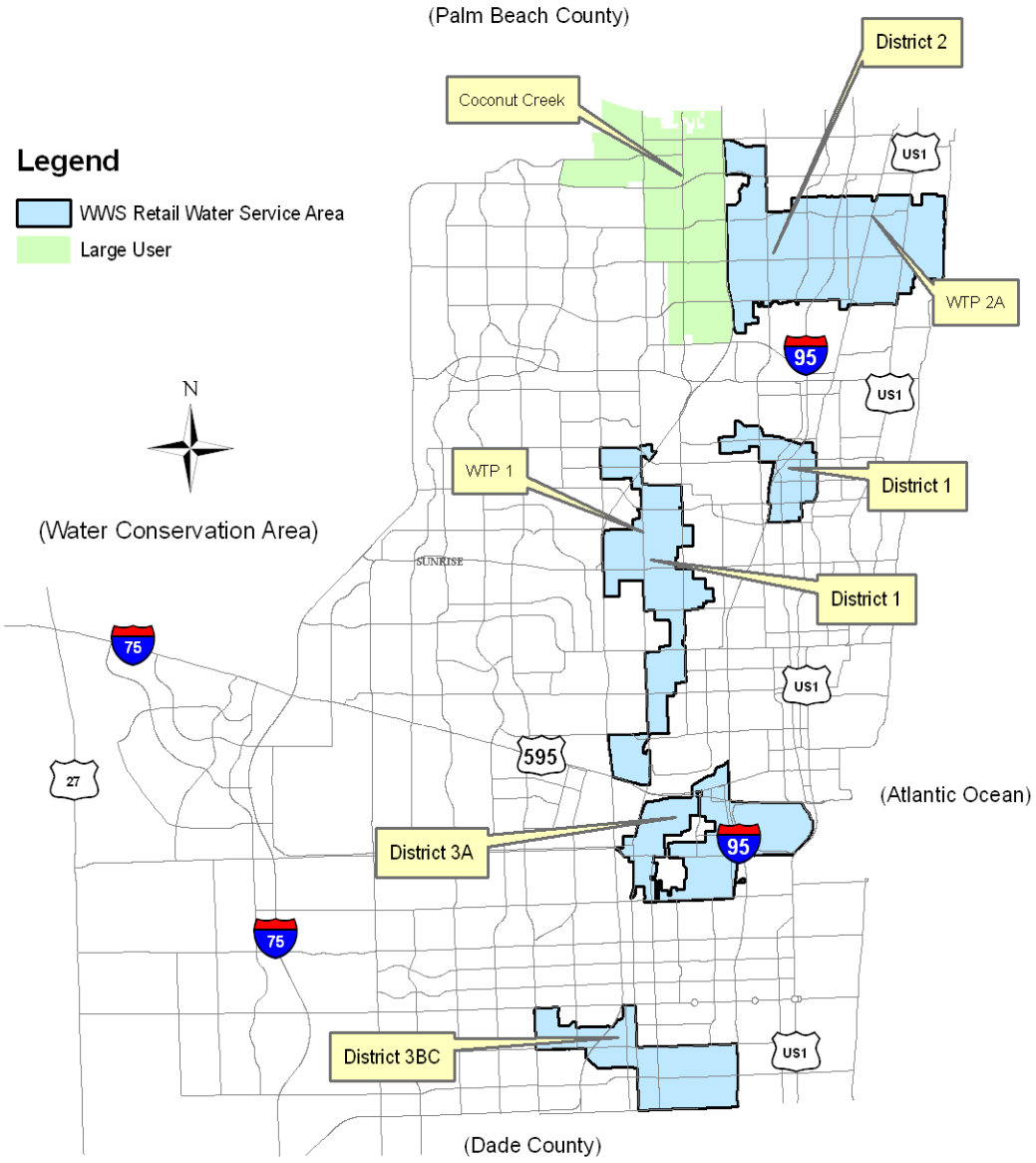

Figure 1
Broward County
WWS Retail Water Service Areas

2. **Level of Service Standards**. WWS has the responsibility to determine if it can adequately serve existing and potential customers. To that end, BCWWS has set potable water level of service standards as shown by Table 1.

Table 1
BCWWS Retail Potable Water Level of Service Standards

Facility	Level Of Service Standard
Raw Water Supply	Maximum Day Plus In-Plant Uses
Treatment Plant	Maximum Day
Finished Water Storage	40% of Maximum Day demand to cover operational (10%) and emergency (30%) storage; plus fire protection storage of 630,000 gallons (3500 GPM for 3 hours)
Transmission/ Distribution System	The most stringent of: (1) Peak Hour at 45 psi residual pressure, or (2) Maximum Day Plus Fire Flow at 25 psi residual pressure.

APPENDIX A contains the methodology currently used to determine if the level of service standard can be met. WWS changes the methodology administratively from time to time as new information becomes available.

3. **Existing Raw Water Supply**. Raw water for District 1 is supplied by the WWS District 1 Wellfield which draws raw water from the Biscayne Aquifer. Raw water is treated at the District 1 Water Treatment Plant prior to distribution to retail customers. The wellfield is comprised of nine wells, all of which are currently in service. The total design capacity of the wellfield is approximately 23.5 MGD. The total firm capacity of the wellfield is approximately 19.6 MGD, with the largest well out of service. Pursuant to the SFWMD CUP, No. 06-00146-W issued in April 2008 for a 20 year permit duration, the maximum daily and average annual daily withdrawals allowed from the District 1 wellfield are 12.4 MGD and 9.8 MGD, respectively.

Raw water for District 2 is supplied by the WWS District 2 Wellfield, which draws raw water from the Biscayne Aquifer, and the North Regional Wellfield described in another section. Raw water is treated at the District 2 Water Treatment Plant prior to distribution to retail customers, and the City of Coconut Creek. The District 2 wellfield contains 11 wells with a total design capacity of approximately 34.7 MGD. The total firm capacity of the wellfield is approximately 28.9 MGD, with the largest well out of service. Wells 1, 2, 3 and 5 are currently on stand-by. Pursuant to the SFWMD CUP no. 06-00142-W, issued in March 2008 for a 20 year permit duration, for this wellfield, the maximum daily and average annual daily withdrawals allowed are 13 MGD and 11 MGD, respectively.

Districts 3A and 3BC do not have raw water supply. The County has entered into an agreement with the City of Hollywood whereby the City provides treated water to these two districts. See the "Existing Treatment Facilities" Section for more information.

4. **Existing Treatment Facilities.** Broward County operates two water treatment plants.

The District 1 water treatment plant was originally constructed in 1960 with a treatment capacity of 3.0 MGD and was expanded to 10.5 MGD in 1979. The plant was expanded again in 1994 to a capacity of 16.0 MGD. The facility's operating permit number is 06-58-00009. The plant uses upflow clarifiers and multimedia filtration to provide lime softening of the raw water supply. Per WWS' 2006 Annual Report, the plant is in very good condition and all equipment was operating in a satisfactory manner. The plant operates 24 hours a day and meets current water quality standards. The level of service standard for treatment plants is the maximum day. Per the 10-Year Water Supply Facilities Workplan, the projected year 2007 maximum day is 12.9 MGD, or 80% of plant capacity (not including demand for Broadview Park, which obtains its potable water from the City of Plantation).

The District 2 water treatment plant was originally constructed in 1972 with a treatment capacity of 20.0 MGD and was expanded to a physical capacity of 40.0 MGD in 1994. The plant's permitted capacity is 30.0 MGD. The facility's operating permit number is 06-58-00010. The plant uses upflow clarifiers and multimedia filtration to provide lime softening of the raw water supply. Per WWS' 2006 Annual Report, the plant is in very good condition and all equipment was operating in a satisfactory manner. The plant operates 24 hours a day and meets current water quality standards. The level of service standard for treatment plants is the maximum day. Per the 10-Year Water Supply Facilities Workplan, the projected year 2007 maximum day is 24.4 MGD (13.9 MGD for District 2 and 10.5 MGD for Coconut Creek), or 81% of permitted plant capacity and 61% of physical plant capacity.

Districts 3A and 3BC do not have treatment facilities. The County has entered into an agreement with the City of Hollywood whereby the City provides treated water to these two districts. The City is responsible for ensuring adequate raw water supply and treatment facilities. The City's existing CUP was issued by SFWMD on December 12, 2002 and expires December 12, 2007. The permit contains sufficient allocation to meet demands through the year 2007. WWS is coordinating closely with the City during its CUP renewal process to ensure that future demands for Districts 3A and 3BC are adequately addressed. The 10-Year Water Supply Facilities Workplan projected a year 2007 maximum day of 5.0 MGD for District 3A and 5.5 MGD for District 3BC.

5. **Existing Treated Water Storage Facilities**. District 1 has water storage facilities at the treatment plant site and four at remote locations. Including the 0.65 MG of clearwell storage that can be pumped directly to the distribution system, total District 1 storage equals 6.25 MG. All but one of the storage facilities are ground storage tanks, meaning the storage facilities use pumps to feed the distribution system. The level of service standard for storage is 40% of the maximum day demand to cover operational and emergency storage; plus fire protection storage of 630,000 gallons (3500 GPM for 3 hours). Based on the projected year 2007 maximum day demand of 12.9 MGD; required storage equals 5.8 MG, or 93% of available storage.

District 2 has its treated water storage facilities at the treatment plant site. Including the 2.00 MG of clearwell storage that can be pumped directly to the distribution system, total District 2 storage equals 7.5 MG. The level of service standard for storage is 40% of the maximum day demand to cover operational and emergency storage; plus fire protection storage of 630,000 gallons (3500 GPM for 3 hours). Based on the projected year 2007 maximum day demand of 13.9 MGD (for WWS District 2 only, Coconut Creek is obligated to provide its own storage); required storage equals 6.2 MG, or 82% of available storage.

District 3A has treated water storage facility equaling 2.0 MG. The level of service standard for storage is 40% of the maximum day demand to cover operational and emergency storage; plus fire protection storage of 630,000 gallons (3500 GPM for 3 hours). Based on the projected year 2007 maximum day demand of 5.0 MGD; required storage equals 2.6 MG, or 130% of available storage. WWS has funded a capital project in FY2006 to increase storage to a total of 5.3 MG. The project is scheduled for completion in FY2009.

District 3BC has two treated water storage facility equaling 3.0 MG. The level of service standard for storage is 40% of the maximum day demand to cover operational and emergency storage; plus fire protection storage of 630,000 gallons (3500 GPM for 3 hours). Based on the projected year 2007 maximum day demand of 5.5 MGD; required storage equals 2.8 MG, or 93% of available storage.

6. **Existing Transmission/Distribution System.** The District 1 transmission and distribution system contains approximately 237 miles of pipe. The capacity of the system to handle existing and projected demands was determined by WWS using water distribution system hydraulic modeling. To correct identified deficiencies, WWS is implementing a major water system rebuilding effort in District 1, which includes rebuilding substantial portions of the water and wastewater systems and providing wastewater service to those on septic tanks. The projects are anticipated to be completed by the year 2011 at an estimated cost of $320 million. WWS maintains water system interconnections with the systems of the City of Fort Lauderdale, the City of Tamarac, and the City of Lauderhill. These interconnects are used for emergency purposes.

The District 2 transmission and distribution system contains approximately 240 miles of pipe. The capacity of the system to handle existing and projected demands was determined by WWS using water distribution system hydraulic modeling. To correct identified deficiencies, WWS is implementing a major water system rebuilding effort in District 2, which includes rebuilding substantial portions of the water and wastewater systems and providing wastewater service to those on septic tanks. The projects are anticipated to be completed by the year 2012 at an estimated cost of $167 million. WWS maintains water system interconnections with the systems of the Cities of Pompano Beach and Deerfield Beach; the Town of Hillsboro Beach and Palm Beach County. These interconnects are used for emergency purposes.

The District 3A transmission and distribution system contains approximately 95 miles of pipe. The capacity of the system to handle existing and projected demands was determined by WWS using water distribution system hydraulic modeling. To correct identified deficiencies, WWS is implementing a major water system rebuilding effort in District 3A, which includes rebuilding substantial portions of the water and wastewater systems and providing wastewater service to those on septic tanks. The projects are anticipated to be completed by the year 2013 at an estimated cost of $50 million. WWS maintains water system interconnections with the systems of the Cities of Fort Lauderdale, Hollywood and Dania Beach. These interconnects are used for emergency purposes.

The District 3BC transmission and distribution system contains approximately 113 miles of pipe. The capacity of the system to handle existing and projected demands was determined by WWS using water distribution system hydraulic modeling. To correct identified deficiencies, WWS has completed a major water system rebuilding effort in District 3BC, which includes rebuilding substantial portions of the water and wastewater systems and providing wastewater service to those on septic tanks. The projects were completed in 2006 at an estimated cost of $95 million. WWS maintains water system interconnections with the systems of the Cities of Miramar and Pembroke Pines. These interconnects are used for emergency purposes.

All transmission system/distribution system facilities have been inventoried using Geographical Information System (GIS) software. The data is updated on a continuous basis and posted to the WWS network for use once or twice a month.

7. **Regulatory Requirements**. Broward County, like any potable water utility, falls under the regulation of multiple authorities. This section discusses two of the most significant authorities, the Broward County Public Health Unit (BCPHU) and the Florida Department of Environmental Protection (FDEP). The discussion of SFWMD under the Broward County Operated Regional Raw Water Supply Section also applies to Broward County Operated Retail Utility raw water supply.

FDEP has given to the BCPHU general supervision and control over all public and private water systems in Broward County. The BCPHU regulates water treatment plants, treated water storage tanks, the transmission and distribution system and wellfields. The BCPHU utilizes standards developed by the FDEP as well as other reference material such as the "Recommended Standards for Water Works"; also known as "Ten States Standards". In addition, the BCPHU monitors water quality.

The Safe Drinking Water Act ("SDWA", 1974) and the Safe Drinking Water Act Amendments ("SDWAA", 1986) authorized the United States EPA to establish national primary and secondary drinking water regulations to regulate maximum permissible levels of contaminants in finished drinking water. These standards were incorporated into the State of Florida Water Quality Regulations in 1993.

8. **Conservation**. Potable water conservation is addressed in the Conservation element.

9. **Overview of Financial Operations**. All four operating Districts are managed financially as one utility; with one set of rates, fees and charges. Operating and general maintenance costs are recovered through service charges, connection charges, and miscellaneous fees and charges. Capital costs for system development, large maintenance project and renewal and replacement projects are funded through net revenues, bond proceeds, developer contributions, contributions from other municipalities and capital recovery charges.

User charges and fees are established by WWS and approved by the Board of County Commissioners. The Board has specific legal authority to fix charges and collect rates, fees and charges from its customers and to acquire, construct, finance and operate the Utility.

B. Broward County Operated Regional Raw Water Supply

1. **Service Area and Customer Base**. The Broward County Operated Regional Water Supply consists of two independently operated systems; know as the "North System" and "South System"; that are managed as a single entity.

The concept of "service area" does not apply to the regional water supply. Many of its customers use regional raw water to supplement their own raw water supplies.

The North Wellfield System has two customers, the City of Deerfield Beach and Broward County Retail District 2. The South Wellfield System has four customers, the City of Dania Beach, the City of Hallandale, the City of Hollywood and the Florida Power and Light Corporation. The contractual agreements with each customer are substantially similar and run for an indefinite period of time. The exception is the City of Hollywood agreement that has a four year term with an automatic renewal for four years unless otherwise terminated.

2. **Level of Service Standard**. The level of service standard for the regional water supply is the obligations of the County as described in the contractual agreements with its customers.

3. **Existing Raw Water Supply**. The North Regional Wellfield (NRW) is located in Quiet Waters Park and along Hillsboro Boulevard, just west of Powerline Road. The NRW is comprised of ten (10) wells, each with a capacity of 2 million gallons per day (MGD), providing a total design capacity for the wellfield of 18 MGD, with the largest well out of service. The NRW is operated in concert with the 2A Wellfield to supply water to its customers. The CUP (permit number 06-0146-W) has been combined with the District 2A wellfield permit under that number. It was re-issued in April 2008, for a 20 year permit duration. Pursuant to the CUP, the withdrawal allowances for the NRW is 7.1 MGD average annual daily and 10 MGD maximum daily.

The SRW is located in the southern central portion of the County. The majority of the wells are located in Brian Piccolo Park to the east of Palm Avenue and north of Sheridan Street. In addition, wells previously associated with the now decommissioned 3A Water Treatment Plants have been incorporated into the SRW. Wells 5-3A and 6-3A, which served the 3A Water Treatment Plant, are located east of State Road 441, just north of Sterling Road. The SRW includes ten (10). Eight (8) 4.0-MGD wells and two (2) 2.0 MGD wells are currently in operation, providing a total design capacity for the wellfield of approximately 32 MGD, with the largest well out of service. The CUP (permit number 06-01424-W) was due for renewal in 2007 and is in the process of being renewed. Pursuant to the Regional Water Availability Rule adopted by the SFWMD in February, 2007, the "base use condition" for the SRW is 15.2 MGD average daily withdrawal (386.1 MGM maximum monthly withdrawal).

4. **Existing Treatment Facilities**. Treatment of the raw water to render it in compliance with water quality standards is the responsibility of the entity receiving the raw water.

5. **Existing Transmission/Distribution System**. The NRW raw water transmission system consists of about 5 miles of pipeline ranging in size from 12 inches to 48 inches in diameter.

The SRW raw water transmission system consists of about 15 miles of pipeline ranging in size from 20 inches to 42 inches in diameter.

6. **Regulatory Requirements**. WELLFIELD PROTECTION ORDINANCE**.** In 1984, Broward County adopted a Wellfield Protection Ordinance (Ordinance Number 84-60), which was revised in 1993 (Ordinance Number 93-17). The Wellfield Protection Ordinance is administered by EPD and established criteria for the regulation of storage, handling, use or production of hazardous or toxic substances within zones of influence of water supply wells.

CONSUMPTIVE USE PERMITS (CUPS). The Biscayne Aquifer is one of the most productive aquifers in the world and is the primary source of fresh water to residents of Broward County, Miami-Dade County, and southeastern Palm Beach County. In 1979 it was designated a sole source aquifer by U.S. Environmental Protection Agency (EPA), under the Safe Drinking Water Act (1974). The South Florida Water Management District (SFWMD) is the state agency responsible for water supply planning in the Lower East Coast Planning Area, which includes all of Broward County. Withdrawals (both volume and rate) from the Biscayne Aquifer are managed by the SFWMD through the issuance of CUPs. In order to secure and maintain a CUP, applicants must meet the criteria of the "three-prong test". This test requires: 1) Reasonable and beneficial use of the resource; 2) Consistency with public interest, including compliance with minimum flows and levels (MFLs) established for surface water and groundwater sources; and 3) Demonstration of no adverse impact to existing legal users (Chapter 373, F.S.). The MFLs outlined in the Florida State Statutes are defined as the "limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area" (section 373.042(1),

F.S.). They serve to protect the Biscayne Aquifer from saltwater intrusion, ensure adequate groundwater levels for maintenance of natural systems, and prevent excessive groundwater seepage or surface water flows from the regional (Everglades) system. CUPs are typically issued for five year durations. With the adoption of the Regional Water Availability Rule in February, 2007, the SFWMD set "base condition use" criteria. Any additional water supplies over and above the base condition use must come from alternative water supplies.

Broward County takes an integrated approach to raw water supply, drainage and aquifer recharge. See the Drainage and Natural Aquifer Groundwater Recharge element for more information.

7. **Conservation**. Water conservation is addressed in the Conservation Element.

8. **Overview of Financial Operations**. The wellfields were constructed using general County revenues and the assets were contributed to the Utility.

Service is provided pursuant to individual, contractual agreements between the County and each large user. The agreements provide for a method to set fees, rates and charges, bill for use of the system, collect for improvements, repairs and replacements and adjust charges at year end to reflect the actual number of gallons used and actual operation and maintenance expense.

C. City of Fort Lauderdale

1. **Service Area and Customer Base**. The municipal utility owned and operated by the City of Fort Lauderdale is the single largest purveyor of potable water in Broward County, in terms of total water delivery, providing service to approximately 238,725 Broward County residents in 2005. This includes approximately 6,127 retail customers residing in the Roosevelt Gardens, Franklin Park, Washington Park, and Boulevard Gardens communities of unincorporated Broward County. These communities are expected to become incorporated by the end of the planning period. The utility's service area encompasses a total area of 43 square miles, approximately one-tenth the total area of urban Broward County. Other retail customers include residential, commercial, and industrial properties within the City of Fort Lauderdale, Lazy Lake, and a portion of Lauderdale-by-the-Sea. The utility also maintains wholesale agreements for potable water supply with the City of Oakland Park, the City of Wilton Manors, the City of Tamarac (east of 34th Avenue), the Town of Davie, and Port Everglades. Emergency potable water interconnections are maintained with the City of Dania Beach, the City of Pompano Beach, the City of Plantation, and Broward County Water and Wastewater Services.

2. **Level of Service Standard**. Fort Lauderdale has adopted their level of service for potable water at 230 gallons per capita per day. In 2005, the average demand throughout their service area was 206 gallons per capita per day.

3. **Existing Raw Water Supply**. Raw water for the City of Fort Lauderdale is supplied by the Peele-Dixie and Prospect wellfields, which draw from the Biscayne Aquifer. The raw water is treated at two lime softening water treatment facilities, the Peele-Dixie and the Fiveash Water Treatment Plants (WTPs). There are a total of 29 active wells between the two well fields and 18 wells in operation at a given time. The Peele-Dixie and Prospect Wellfields have a combined pumping capacity of approximately 107 MGD. Wholesale customers receive finished water from the Fiveash WTP.

The City of Fort Lauderdale's Consumptive Use Permit (CUP), (no 06-00123-W) expired on May 8, 2007. This permit allows the City to pump a combined average daily allocation for the two wellfields of 50.6 MGD, and a maximum daily allocation of 67.3 MGD. The City is awaiting a new CUP from the SFWMD and has requested an increase to 59 MGD, but anticipates that it will receive a CUP allocation from the Biscayne Aquifer of 53.6 MGD.

In 2005, the combined pumpage from the Peele-Dixie and Prospect Wellfields averaged 46.76 MGD (3.8 MGD below the permitted allocation). More recently, in 2006, the City's total wellfield pumpage averaged 48.9 MGD.

4. **Existing Treatment Facilities**. In 1926, the 6 million gallon per day capacity Peele-Dixie lime softening water treatment plant was opened in western Fort Lauderdale. Over the years, the plant has been expanded and modernized, increasing its capacity to 20 MGD (Table 2). The plant is currently being converted from a lime-softening facility to a state-of-the-art membrane facility, scheduled to begin operation by mid 2008.

Built in 1954, the Fiveash lime softening WTP was designed to treat 8 MGD. Through a series of expansions, the plant has been able to keep pace with the rapid growth experienced in Fort Lauderdale and today has a capacity of 70 MGD (Table 2). The Fiveash WTP is supplied by the Prospect wellfield.

Although the Peele-Dixie and Fiveash WTPs have a combined design capacity of 82.0 MGD, hydraulic constraints at the Fiveash WTP are suspected to limit its operating capacity to 55.0 – 60.0 MGD. The Peele-Dixie WTP has recently been converted to a nanofiltration facility with a 12 MGD operating capacity.

5. **Existing Treated Water Storage Facilities**. The Peele-Dixie WTP storage facilities include a 2.3 MG. Two additional 4 MG ground storage tanks will be available when the new facility begins operation.

The Fiveash WTP has onsite storage of 21.76 MG, provided by two 5 MG tanks, one 4 MG tank, one 7 MG tank, and seven clearwells totaling 0.76 MG.
The City also has two distribution system storage sites providing an additional 3.0 MG of storage.

Table 2
Summary of Statistics for the City of Fort Lauderdale Water Treatment Plants

Water Treatment Plant	Treatment Type	Treatment Capacity* (MGD)	Storage Capacity** (MG)	Source Water
Peele-Dixie	Lime Softening	12.0	10.3	Peele-Dixie Wellfield
Fiveash	Lime Softening	70.0	21.76	Prospect Wellfield

*Treatment capacity is in millions of gallons per day (MGD)
**Storage capacity is in millions of gallons (MG). Includes 8 MG for Peele-Dixie scheduled to come on-line in mid-2008.

6. **Existing Transmission/Distribution System**. The City of Fort Lauderdale's transmission and distribution system contains approximately 750 miles of pipe. Ongoing infrastructure improvements under the current Waterworks 2011 program are anticipated to significantly improve water delivery flows and system pressures in many areas served by the City. The City most recently updated their Water and Wastewater Master Plan in 2006. The Master Plan is updated every five years. The City of Fort Lauderdale maintains a total of 10 water system interconnections with BCWWS District 1A/1B (3), City of Plantation (1), City of Dania Beach (1), City of Tamarac (3), Town of Davie (1), and the City of Pompano Beach (1).

7. **Conservation**. The City of Fort Lauderdale practices an active water conservation program based on Objective 9 of its Comprehensive Plan. The policies and practices are discussed in the Broward County 10-Year Water Supply Facilities Workplan (Appendix C).

III. DATA ANALYSIS

A. Broward County Operated Retail Utility

1. **Projected Flows**

a. *Broward County Population Forecasting Model.* Population from the decennial Census of Population and Housing, collected by the United States Bureau of the Census, is considered to be the definitive base for population modeling in the United States. New data from the 2000 Census was published in 2001. Based on that data, Broward County Environmental Protection and Growth Management Department (EPGMD), Planning and Redevelopment Division (PRD) staff projected future population for 2001 to 2030 using the Broward County Population Forecasting Model (BCPFM). This model has been certified by the

State of Florida's Department of Community Affairs for use in the Broward County Comprehensive Plan.

The BCPFM is a cohort survival model which consists of two major parts, natural increase and net migration. Natural increase is the difference between the number of births and the number of deaths for a given period. Net migration equals the number of people moving into the County minus the number of people moving out of the County. The BCPFM shows an increase in population from 1.6 million in 2000 to 2.3 million in 2030.

After preparing Broward County's forecast, PRD staff assigned that population to the County's 921 traffic analysis zones (TAZ). TAZs are the smallest level of geography that allow for both a measure of accuracy and flexibility. First, the population forecasts are translated into households by household size. The implication in this is that population change over time is determined by the number of housing units in an area, the occupancy rate, and the distribution of households by size.

Second, the base distribution of housing units for the year 2000 is determined. While Census 2000 is an adequate base for the County-wide distribution, there are instances of misplacement of units that cause error in both the base population and the forecasts. To set the base, a variety of sources were utilized with checks and cross-checks designed to identify problem areas. The problem areas were then resolved individually.

Third, measures of growth potential and of the pressure for change are calculated. These forces and their interaction will cause the number, the occupancy, and household-size distribution to change over the forecast period. Factors such as available vacant residential parcels, platted lands, and land use plan capacity all play a role in the growth of an area. Combining these elements into a cohesive computer application is then performed. The final product results in a series of worksheets showing the number of households, vacant units, total units, and total population for individual years 2000 through 2010 and for years 2015, 2020, 2025, and 2030 for each of the 921 TAZs.

Based upon the numbers provided and subsequent briefings by PRD staff, WWS service areas are expected to be impacted by two phenomena in the future: (1) A redevelopment corridor loosely defined as bordering and to the east of State Road 7; and (2) An increase in the number of people living in each dwelling unit, both new and existing.

b. *Methodology Used to Determine Projected Flows.* WWS uses utility analysis zones (UAZ) to plan and coordinate utility activities within its service areas. The UAZ defines the boundaries of the utility's service areas within each TAZ. WWS service areas encompass 150 of the 892 TAZs, which are then

divided into 130 UAZs. Retail customers in each UAZ are categorized as "single family residential", "multi-family residential", "commercial" and "other".

Finished water usage for each of the four customer categories listed above was determined for each UAZ using year 2000 WWS billing records. System uses and losses were calculated on a District by District basis and allocated to each UAZ to determine a total potable water demand per UAZ. The percentage of a TAZ in each UAZ was also determined. Adjustments were made to account for UAZ's where WWS does not provide potable water service (i.e. those UAZ's or portions of UAZ's where WWS provides services for sewer only, not water) and for UAZ's that contained a portion of a TAZ that did not include single or multi-family residential land use.

WWS projections utilize the year 2000 as a base year. The 2030 demands for "single family residential" and "multi-family residential" were estimated by multiplying the year 2000 demands by the change in population from 2000 to 2030 for each UAZ. The year 2030 demands for "commercial" and "other" required a slightly different approach. Because it was not reasonable to assume that a person works or even shops in the same UAZ in which they live, the overall change in population of the County was multiplied by year 2000 "commercial" and "other" demands for each UAZ.

Residential demand was calculated by dividing the service area into sub areas, then doing a traditional per capita forecast for each sub area. Therefore, when population growth rates in relatively lower per capita usage sub areas exceed population growth rates in relatively higher per capita usage sub areas, lower overall residential per capita demands occur. Overall per capita demand consists of three parts: residential demand, commercial demand and system uses and losses demand. For District 1, the projected change in residential/ commercial flow ratio (residential will increase more than commercial) accounts for about a third of the reduction in overall per capita demand; and improvement in system uses and losses accounts for the remaining reduction in overall per capita demand. For District 2, improvement in system uses and losses accounts for essentially all the reduction in overall per capita demand. For District 3A the residential component is projected to remain the same. System uses and losses are projected to decrease slightly. However, the District 3A commercial component is expected to increase significantly. While the projected commercial part averages 31% of the overall per capital demand for Districts 1 and 2, it is 56% for District 3A, predominately due to the Fort Lauderdale - Hollywood International Airport. While general commercial demand was projected to increase 43% between the year 2000 and 2030, demand for the International Airport was projected to increase 165%. The increase was based on official FAA enplanement forecasts.

Interim year demands were determined by doing the same detailed population projection as was done for the year 2030, then calculating change in demand as a

percentage of change in population. Demands for the City of Coconut Creek service area (a large user of potable water) was obtained from the City.

WWS obtained the BCPFM from PRD staff in February, 2007. PRD staff had continued to improve the model since the model was last obtained in 2003. This, along with improved analysis techniques, resulted in changes in population projections since BCWWS produced its 10-Year Water Supply Facilities Workplan in 2004. The new population projection for District 1 increased, while all the others decreased. The net change was an insignificant increase of 0.2%.

1. Projected Flows

Table 3 shows the District 1 projected population and finished water demand potential to the year 2030.

Table 3
District 1 Projected Population and Finished Water Demand Potential
2000-2030

Year	Projected Population *	Finished Water Demand Potential (Average Day in MGD)	Finished Water Demand Potential (Max. Day in MGD) **	Overall Per Capita Demand (GPD)	Residential Per Capita Demand (GPD) ***
2000	62,523	8.8	12.0	141	81
2005	70,952	10.0	13.6	141	81
2010	81,118	11.1	15.1	136	81
2015	89,643	12.0	16.3	134	80
2020	97,642	12.8	17.4	131	80
2025	104,013	13.6	18.5	131	80
2028	106,889	13.9	18.9	130	80
2030	108,807	14.1	19.2	130	80

* Based on 2000 Census estimates for WWS Utility Analysis Zones
** Based on a maximum day to average day ratio of 1.36
*** Estimated finished potable water billed to residential customers divided by population.
Service area changed in 2004 to include Broadview Park.
Service area changed in 2007 to include North Andrews Gardens south of Commercial Boulevard.

WWS currently purchases finished water from the City of Plantation for the Broadview Park portion of the service area. Broadview Park's population and demands are included in the above table. Table ~~8~~ 4 shows the Broadview Park projected population and finished water demand potential to the year 2030. Table 5 shows the projected population and finished water demand potential to the year 2030 for the remainder of the District 1 Service Area (excluding Broadview Park).

Table 4
Broadview Park Projected Population and Finished Water Demand Potential
2000 - 2030

Year	Projected Population *	Finished Water Demand Potential (Average Day in MGD)	Finished Water Demand Potential (Max. Day in MGD) **
2000	0	0.0	0.0
2005	6,743	0.9	1.2
2010	7,166	1.0	1.4
2015	7,389	1.0	1.4
2020	7,682	1.0	1.4
2025	8,145	1.1	1.5
2028	8,347	1.1	1.5
2030	8,481	1.1	1.5

* Based on 2000 Census estimates for WWS Utility Analysis Zones
** Based on a maximum day to average day ratio of 1.36

The above table shows WWS projected year average day demand for Broadview Park as 1.1 MGD. WWS obtains its water for Broadview Park from the City of Plantation. While Plantation uses a different 2030 population and per capita demand for Broadview, its population formula for the year 2030 compares favorably with the WWS projection. Additional details can be found in Appendix C.

Table 5
District 1 Projected Population and Finished Water Demand Potential
2000 - 2030 Excluding Broadview Park

Year	Projected Population *	Finished Water Demand Potential (Average Day in MGD)	Finished Water Demand Potential (Max. Day in MGD) **
2000	62,523	8.8	12.0
2005	64,209	9.1	12.4
2010	73,952	10.1	13.7
2015	82,254	11.0	14.9
2020	89,960	11.8	16.0
2025	95,868	12.5	17.0
2028	98,542	12.8	17.4
2030	100,326	13.0	17.7

* Based on 2000 Census estimates for WWS Utility Analysis Zones
** Based on a maximum day to average day ratio of 1.36
*** Estimated finished potable water billed to residential customers divided by population. Service area changed in 2007 to include North Andrews Gardens south of Commercial Boulevard.

Tables 6-8 show the District 2 projected population and finished water demand potential to the year 2030.

Table 6
District 2 Projected Population (excluding Coconut Creek) and Finished Water Demand Potential 2000 - 2030

Year	Projected Population*	Finished Water Demand Potential (Average Day in MGD)	Finished Water Demand Potential (Max. Day in MGD) **	Overall Per Capita Demand (GPD)	Residential Per Capita Demand (GPD) ***
2000	54,946	9.8	13.4	178	106
2005	57,364	10.1	13.8	177	106
2010	60,553	10.3	14.1	170	106
2015	63,659	10.8	14.8	170	105
2020	66,944	11.3	15.5	170	104
2025	70,980	11.9	16.3	168	104
2028	73,099	12.2	16.7	167	103
2030	74,512	12.4	17.0	166	103

* Based on 2000 Census estimates for WWS Utility Analysis Zones
** Based on a maximum day to average day ratio of 1.37
*** Estimated finished potable water billed to residential customers divided by population.

Table 7
Coconut Creek Projected Population and Finished Water Demand Potential 2000 - 2030

Year	Projected Population	Finished Water Demand Potential * (Average Day in MGD)	Finished Water Demand Potential (Max. Day in MGD) **	Overall Per Capita Demand (GPD)
2000	45,165	5.7	7.8	126
2005	54,252	6.8	9.3	126
2010	71,438	9.0	12.3	125
2015	71,438	9.0	12.3	125
2020	71,438	9.0	12.3	125
2025	71,438	9.0	12.3	125
2028	71,438	9.0	12.3	125
2030	71,438	9.0	12.3	125

Note: For that portion of Coconut Creek and Parkland that use WWS potable water.
* Included 0.16 MGD of WWS system uses and losses incurred in providing water to Coconut Creek.
** Based on a maximum day to average day ratio of 1.37

Table 8
District 2 and Coconut Creek Projected Population and Finished Water Demand Potential
2000 - 2030

Year	Projected Population	Finished Water Demand Potential (Average Day in MGD)	Finished Water Demand Potential (Max. Day in MGD) *	Overall Per Capita Demand (GPD)
2000	100,111	15.5	21.2	155
2005	111,616	16.9	23.1	152
2010	131,991	19.3	26.4	146
2015	135,097	19.8	27.1	146
2020	138,382	20.3	27.8	146
2025	142,418	20.9	28.6	146
2028	144,537	21.2	29.0	146
2030	145,950	21.3	29.3	146

Note: For that portion of Coconut Creek and Parkland that use WWS potable water.
* Based on a maximum day to average day ratio of 1.37

Table 9 shows the District 3A projected population and finished water demand potential to the year 2030.

Table 9
District 3A Projected Population and Finished Water Demand Potential
2000 - 2030

Year	Projected Population*	Finished Water Demand Potential (Average Day in MGD)	Finished Water Demand Potential (Max. Day in MGD) **	Overall Per Capita Demand (GPD)	Residential Per Capita Demand (GPD) ***
2000	12,492	3.1	4.1	247	95
2005	14,547	3.7	4.9	255	95
2010	15,712	3.9	5.1	251	95
2015	16,992	4.4	5.8	257	95
2020	18,173	4.7	6.2	259	95
2025	18,959	5.0	6.6	265	95
2028	19,403	5.2	6.9	268	95
2030	19,699	5.4	7.1	274	95

* Based on 2000 Census estimates for WWS Utility Analysis Zones
** Based on a maximum day to average day ratio of 1.32
*** Estimated finished potable water billed to residential customers divided by population. Not including water sold back to Hollywood.

Table 10 shows the District 3BC projected population and finished water demand potential to the year 2030.

Table 10
District 3BC Projected Population and Finished Water Demand Potential
2000 - 2030

Year	Projected Population *	Finished Water Demand Potential (Average Day in MGD)	Finished Water Demand Potential (Max. Day in MGD) **	Overall Per Capita Demand (GPD)	Residential Per Capita Demand (GPD) ***
2000	30,823	3.8	5.5	122	79
2005	32,240	3.8	5.5	117	79
2010	33,912	3.9	5.6	116	79
2015	36,163	4.3	6.2	118	78
2020	38,886	4.5	6.5	116	78
2025	42,688	4.8	6.9	113	77
2028	44,477	5.0	7.2	112	77
2030	45,670	5.1	7.3	112	77

* Based on 2000 Census estimates for WWS Utility Analysis Zones
** Based on a maximum day to average day ratio of 1.44
*** Estimated finished potable water billed to residential customers divided by population.

2. **Level of Service Standards.** The Level of Service Standards as described in Table 1 are not anticipated to change over the planning horizon. WWS has linked its level of service analysis to its developer coordination process as described in Appendix A - Determining WWS's Ability to Serve.

3. **Raw Water Supply Needs.** The level of service standard for source of supply is maximum day, meaning the system must have enough firm source of supply capacity to meet its maximum day needs. Firm capacity is the design capacity with the largest unit out of service.

The South Florida Water Management District, through its permitting process, has limited District 1's long term use of the current source of supply, the Biscayne Aquifer, to the "base condition use" of 9.5 MGD average day flow (9.31 average day finished water plus 2% in-plant treatment process use) for District 1. To meet the projected future demands as indicated in Table 9 for District 1, the withdrawal and treatment of water from the Floridan Aquifer has been proposed. A five year temporary allocation of 10.9 MGD (10.7 MGD per flow projections plus 0.2 MGD for land use amendments not included in the flow projections) of average day raw water flow above the permitted "base condition use" from the Biscayne Aquifer will provide the additional water needed while the Floridan Aquifer source is planned, designed, permitted, constructed, and brought on line.

The District 1 treatment plant currently uses approximately 2% of the Biscayne Aquifer raw water supply in its treatment process. This means it takes 102 gallons of Biscayne Aquifer raw water to produce 100 gallons of finished water. The amount of water used by the treatment process varies from plant to plant and by type of treatment process. The

raw water flows in Table 5 have been increased by 2% over the finished water flows in Table 9.

As stated earlier the firm capacity of the District 1 wellfield is 19.6 MGD and the level of service for source of supply is maximum day. District 1's maximum day to average day ratio is 1.36. Therefore the Available Facility Capacity in Table 11 is firm capacity of 19.6 divided by 1.36 to obtain available capacity in annual average day terms.

Table 11
District 1 Comparison of Biscayne Aquifer Source of Supply
Facility Capacity and Permitted Capacity

Year	2000	2005	2010	2015	2020	2025	2030
Population Served	62,523	64,209	73,952	82,254	89,960	95,868	100,326
Avg. Daily Demand MGD*	9.0	9.3	10.3	11.2	12.0	12.8	13.3
Demand per Capita* (overall)	144	144	139	137	134	134	133
Available Facility Capacity (MGD)	14.4	14.4	14.4	14.4	14.4	14.4	14.4
**Facility Capacity Surplus(Deficit)	5.4	5.1	4.1	3.2	2.4	1.6	1.1
Permitted Amount (MGD Annual Avg.)	9.8	9.8	10.9****	9.5	9.5	9.5	9.5
***Permitted Surplus(Deficit)	0.8	0.5	0.6	(1.7)	(2.5)	(3.3)	(3.8)

* Raw water
**Calculated by subtracting Avg. Daily Demand from Available Facility Capacity
*** Calculated by subtracting Avg. Daily Demand from Permitted amount.
**** Assumes a CUP issued by 2010 with this temporary allocation.

After the five year temporary allocation of water above the "base condition use" amount, an alternative water supply will provide any additional water needed for the future. WWS has elected to use the Floridan Aquifer as its alternative source of supply to provide the additional water supply required to meet demands to the end of the planning period. Use of this brackish water from the Floridian aquifer will require a significantly different treatment process than the type currently used for Biscayne Aquifer raw water. Treatment plants using the Floridan Aquifer as the source of supply use approximately 25% of the raw water in the treatment process. This means it takes 125 gallons of Floridian aquifer raw water to produce 100 gallons of finished water.

Tables 12 and 13 show the combination of Biscayne and Floridan Aquifer sources of supply proposed to be used to meet future needs. A subsequent section describes the proposed Floridan Aquifer source of supply project.

Table 12
District 1 Biscayne Aquifer Source of Supply Future Needs

Year	Raw Water Withdrawal from Biscayne Aquifer Annual Average Flow (MGD)	Finished Water Produced Annual Average Flow (MGD)	Firm Maximum Day Physical Capacity Required (MGD)
2010	10.3	10.1	14.0
2012	10.7	10.5	14.6
2013	9.5	9.3	12.9
2015	9.5	9.3	12.9
2020	9.5	9.3	12.9
2025	9.5	9.3	12.9
2028	9.5	9.3	12.9
2030	9.5	9.3	12.9

Note: Finished water produced is 2% less than raw water withdrawn

Table 13
District 1 Floridan Aquifer Source of Supply Future Needs

Year	Raw Water Withdrawal from Floridan Aquifer Annual Average Flow (MGD)	Finished Water Produced Annual Average Flow (MGD)	Firm Maximum Day Physical Capacity Required (MGD)
2010	0.0	0.0	0.0
2012	0.0	0.0	0.0
2013	1.6	1.3	2.2
2015	2.1	1.7	2.9
2020	3.1	2.5	4.2
2025	4.0	3.2	5.4
2028	4.4	3.5	6.0
2030	4.6	3.7	6.3

Note: Finished water produced is 25% less than raw water withdrawn. Does not include water required for testing.

The South Florida Water Management District, through its permitting process, has limited the long term use of District 2's current source of supply, the Biscayne Aquifer, to the "base condition use" of 17.5 MGD average day flow (16.84 average day finished water plus 3.8% in-plant treatment process use). To meet the projected future demands as indicated in Table 8 for District 2 and Coconut Creek's service area, the withdrawal and treatment of water from the Floridan Aquifer has been proposed. A five year temporary allocation of 20.7 MGD (20.3 MGD per flow projections plus 0.4 MGD for land use amendments not included in the flow projections) of average day raw water flow above the permitted "base condition use" from the Biscayne Aquifer will provide the additional water needed while the Floridan Aquifer source is planned, designed, permitted, constructed, and brought on line.

The District 2 treatment plant currently uses approximately 3.8% of the Biscayne Aquifer raw water supply in its treatment process. This means it takes 103.8 gallons of Biscayne Aquifer raw water to produce 100 gallons of finished water. The amount of water used by the treatment process varies from plant to plant and by type of treatment process. The raw water flows in Table 18 have been increased by 3.8% over the finished water flows in Table 12.

As stated earlier the firm capacity of the combined North Regional/2A wellfield is 39.0 MGD, with 0.6 MGD reserved for Deerfield Beach. District 2's maximum day to average day ratio is 1.37. Therefore the Available Facility Capacity in Table 14 is firm capacity less Deerfield Beach of 0.6 divided by 1.37 to obtain available capacity in annual average day terms.

Table 14
North Regional/2A Wellfield Comparison of Biscayne Aquifer Source of Supply
Facility Capacity and Permitted Capacity
Not Including Deerfield Beach

Year	2000	2005	2010	2015	2020	2025	2030
Population Served	100,111	111,616	131,991	135,097	138,382	142,418	145,950
Avg. Daily Demand MGD*	16.1	17.6	20.0	20.6	21.1	21.7	22.2
Demand per Capita* (overall)	161	158	152	152	152	152	152
Available Facility Capacity (MGD)	28.0	28.0	28.0	28.0	28.0	28.0	28.0
**Facility Capacity Surplus(Deficit)	11.9	10.4	8.0	7.4	6.9	6.3	5.8
Permitted Amount (MGD Annual Avg.)	18.1	18.1	20.7****	16.9	16.9	16.9	16.9
***Permitted Surplus(Deficit)	2.0	0.5	0.7	(3.7)	(4.2)	(4.8)	(5.3)

* Raw water
**Calculated by subtracting Avg. Daily Demand from Available Facility Capacity
*** Calculated by subtracting Avg. Daily Demand from Permitted amount.
**** Assumes a CUP issued by 2010 with this temporary allocation.

Tables 15 and 16 show the combination of Biscayne and Floridan Aquifer sources of supply proposed to be used to meet future needs. A subsequent section describes the proposed Floridan Aquifer source of supply project.

Table 15
District 2 Biscayne Aquifer Source of Supply Future Needs

Year	Raw Water Withdrawal from Biscayne Aquifer Annual Average Flow (MGD)	Finished Water Produced Annual Average Flow (MGD)	Firm Maximum Day Physical Capacity Required (MGD)
2010	20.0*	19.3	27.4
2012	20.3	19.5	27.8
2013	16.9	16.3	23.2
2015	16.9	16.3	23.2
2020	16.9	16.3	23.2
2025	16.9	16.3	23.2
2028	16.9	16.3	23.2
2030	16.9	16.3	23.2

Note: Finished water produced is 3.8% less than raw water withdrawn.
Table does not include Deerfield Beach withdrawal from North Regional Wellfield.
*2010 raw water withdrawal could be reduced by 0.125 MGD if Floridan blending well is still in use

WWS is also implementing a reclaimed water irrigation project. It is anticipated that by 2015, this project will result in 0.1 MGD less demand. Demand reduction will increase to 0.3 MGD by 2020 as more customers utilize the reclaimed water for irrigation. Table 20 incorporates these anticipated reductions in demand .

Table16
District 2 Floridan Aquifer Source of Supply Future Needs

Year	Raw Water Withdrawal from Floridan Aquifer Annual Average Flow (MGD)	Finished Water Produced Annual Average Flow (MGD)	Firm Maximum Day Physical Capacity Required (MGD)
2010	0.0	0.0	0.0
2012	0.0	0.0	0.0
2013	4.1	3.3	5.6
2015	4.3	3.4	5.9
2020	4.6	3.7	6.3
2025	5.4	4.3	7.4
2028	5.8	4.6	7.9
2030	5.9	4.7	8.1

Note: Finished water produced is 25% less than raw water withdrawn. Does not include water required for testing. Includes 0.1 MGD of demand reduction by 2015 and 0.3MGD of demand reduction by 2020 due to reclaimed water irrigation.

Districts 3A and 3BC do not have raw water needs managed by the County as finished water for the Districts is provided by the City of Hollywood. The City is responsible for ensuring adequate raw water supply and treatment facilities. The City's existing CUP

was issued by SFWMD on December 12, 2002 and expires December 12, 2007. The permit contains sufficient allocation to meet demands through the year 2007. WWS is coordinating with the City during its CUP renewal process to ensure that future demands for Districts 3A and 3BC are adequately addressed.

4. **Treatment Facilities Needs.** The level of service standard for treatment is maximum day, meaning the system must have enough firm treatment capacity to meet its maximum day needs. The type of treatment is dependent on the source of supply. Since WWS intends to have two different sources of supply, two different treatment processes will be required.

Tables 17 and 18 show the combination of Biscayne and Floridan Aquifer treatment processes proposed to be used to meet District 1's future needs.

Table 17
District 1 Biscayne Aquifer Treatment Plant Future Needs

Year	Finished Water Produced Annual Average Flow (MGD)	Firm Maximum Day Physical Capacity Required (MGD)
2010	10.1	13.7
2012	10.5	14.3
2013	9.3	12.6
2015	9.3	12.6
2020	9.3	12.6
2025	9.3	12.6
2028	9.3	12.6
2030	9.3	12.6

Note: Treatment production capacity is the capacity to make finished water available to the system on a maximum day basis, which equals 1.36 times average day demand. Treatment capacity required to generate water used by the treatment process is not included.

Table 18
District 1 Floridan Aquifer Treatment Plant Future Needs

Year	Finished Water Produced Annual Average Flow (MGD)	Firm Maximum Day Physical Capacity Required (MGD)
2010	0.0	0.0
2012	0.0	0.0
2013	1.3	1.8
2015	1.7	2.3
2020	2.5	3.4
2025	3.2	4.4
2028	3.5	4.8
2030	3.7	5.0

Note: Treatment production capacity is the capacity to make finished water available to the system on a maximum day basis, which equals 1.36 times average day demand. Treatment capacity required to generate water used by the treatment process is not included.

Tables 19 and 20 show the combination of Biscayne and Floridan Aquifer treatment processes proposed to be used to meet District 2's future needs.

Table 19
District 2 Biscayne Aquifer Treatment Plant Future Needs

Year	Finished Water Produced Annual Average Flow (MGD)	Firm Maximum Day Physical Capacity Required (MGD)
2010	19.3	26.4
2012	19.5	26.7
2013	16.3	22.3
2015	16.3	22.3
2020	16.3	22.3
2025	16.3	22.3
2028	16.3	22.3
2030	16.3	22.3

Note: Treatment production capacity is the capacity to make finished water available to the system on a maximum day basis, which equals 1.37 times average day demand. Treatment capacity required to generate water used by the treatment process is not included.

Table 20
District 2 Floridan Aquifer Treatment Plant Future Needs

Year	Finished Water Produced Annual Average Flow (MGD)	Firm Maximum Day Physical Capacity Required (MGD)
2010	0.0	0.0
2012	0.0	0.0
2013	3.3	4.5
2015	3.5	4.7
2020	4.0	5.1
2025	4.6	5.9
2028	4.8	6.3
2030	5.0	6.4

Note: Treatment production capacity is the capacity to make finished water available to the system on a maximum day basis, which equals 1.37 times average day demand. Treatment capacity required to generate water used by the treatment process is not included.

5. **Storage Facilities Needs.** The level of service standard for finished water storage is 40% of maximum day demand for meeting peak demands during the day and routine operational purposes, plus 0.63 million gallons (MG) for fire protection purposes.

Table 21 shows District 1's future storage needs. Since existing storage capacity is 6.25 MG. BCWWS needs to increase its storage capacity by 2010.

Table 21
District 1 Future Finished Water Storage Needs

Year	Required Minimum Finished Water Storage (MG)
2010	6.7
2015	7.2
2020	7.6
2025	8.0
2028	8.2
2030	8.3

WWS has two projects in its five year capital improvement program to provide the required finished water storage (additional storage is to be constructed at two different locations). One project received its initial funding in FY2008 and is scheduled for completion in FY2010. The other will receive its initial funding in FY2009 and is scheduled for completion in FY2012.

Table 22 shows District 2's future storage needs. Since Coconut Creek is required to have its own finished water storage, the maximum day demand is the WWS portion of the

overall maximum day demand. Since existing storage capacity is 7.5 MG, WWS does not need to increase its storage capacity within the foreseeable future.

Table 22
District 2 Future Finished Water Storage Needs

Year	Required Minimum Finished Water Storage (MG)
2010	6.3
2015	6.6
2020	6.8
2025	7.2
2028	7.3
2030	7.4

Table 23 shows District 3A's future storage needs. Since existing storage capacity is 2.0 MG, WWS needs to increase its storage capacity by 2010.

Table 23
District 3A Future Finished Water Storage Needs

Year	Required Minimum Finished Water Storage (MG)
2010	2.7
2015	3.0
2020	3.1
2025	3.3
2028	3.4
2030	3.5

WWS has a project in its five year capital improvement program to provide the required finished water storage. This project received its initial funding in FY2006 and is scheduled for completion in FY2009.

Table 24 shows District 3BC's future storage needs. Since existing storage capacity is 3.0 MG, WWS needs to increase its storage capacity by 2015.

Table 24
District 3BC Future Finished Water Storage Needs

Year	Required Minimum Finished Water Storage (MG)
2010	2.9
2015	3.1
2020	3.2
2025	3.4
2028	3.5
2030	3.6

WWS has a project in its five year capital improvement program to provide the required finished water storage. This project received its initial funding in FY2006 and is scheduled for completion in FY2010.

6. **Transmission/Distribution Facilities Needs.** The 2002 Master Plan did not contain significant transmission system recommended improvements. Distribution system recommended improvements were to "loop" some dead end water mains and replace piping less than 6 inches in diameter. Piping made of asbestos-cement, a once acceptable pipe material, was not addressed. Piping that might reach the end of its useful life during the planning period was also not addressed as WWS had started implementation of its NIP program as described below.

Simultaneous with Master Plan development in the late 1990s, WWS implemented a program to address drainage issues in certain areas. This program was quickly expanded by the County to include street improvements, sidewalks and neighborhood landscaping. WWS decided to upgrade a substantial portion of its piping system in the area covered by the program. Water and sewer system were planned to be repaired/replaced as necessary and service (mostly sewer service) extended to those that did not have it. These programs are called Neighborhood Improvement Projects (NIPS) and have grown into significant efforts requiring a substantial portion of WWS's retail utility resources, in terms of money and staff effort. From about 1997 to 2004, WWS' retail utility capital improvement program focused on the NIPS as its major component.

District 1 contains the Central County NIP, Riverland Village NIP, North Central County NIP, North Andrews Gardens NIP and the Broadview Estates NIP. These NIPS are anticipated to be completed by the year 2011 at an estimated cost of $320 million (the estimated cost includes a substantial amount of non-utility costs like drainage, sidewalks and landscaping). When completed, about 53% of the District 1 utility system (by area) will have been addressed.

District 2 contains the North County NIP which is anticipated to be completed by the year 2012 at an estimated cost of $167 million. When completed, about 28% of the District 2 utility system (by area) will have been addressed.

District 3A does contain a NIP.

District 3BC contains the South County NIP which was completed in 2006 at an estimated cost of $95 million. About 34% of the District 3BC utility system (by area) was been addressed.

The NIPS described above constitute a major commitment on the behalf of WWS to upgrade and improve its water transmission/distribution system. All totaled, they will address about 32% of the combined districts utility system (by area).

However, WWS realizes that the effort can not stop with the previously identified NIPS. In 2001 WWS developed a Capital Projects Prioritization methodology that is described more fully in the Capital Improvements Section. This methodology provides a systematic approach to continued upgrading of the WWS systems. WWS's proposed FY2007 five year capital improvements program envisions additional millions of dollars spent to continue the improvement effort started via the NIPS. As District 3A does not have any NIPS it was given special consideration so the needs of all four districts are addressed.

7. **Changing Regulatory Requirements.** Please see the Section on Broward County Operated Regional Raw Water Supply Changing Regulatory Requirement for information that applied to the Broward County Operated Retail Utility and its raw water sources.

Probably the most significant new regulatory requirement was the SFWMD adoption of the Regional Water Availability Rule in 2007 which limits the Biscayne Aquifer as a source for future increases in water supply. This document explains how WWS intends to meet future needs through alternative water supplies. In addition, the Florida legislature passed a bill in 2008 requiring all facilities that discharge domestic wastewater through ocean outfalls to meet higher treatment standards by 2018. By 2025 they are required to achieve at least 60% reuse of the wastewater and cease discharge to the ocean outfalls except in emergency situations. The Broward County North Regional Wastewater Treatment Facility has an ocean outfall and will be required to comply with the new regulations. The implementation of these requirements will have an impact on alternative water supplies in the future.

8. **Alternative Water Supply.** WWS plans to meet its future source of supply and water treatment needs by obtaining raw water from the Floridan aquifer.

WWS will continue to permit and operate its District 1 Biscayne Aquifer facilities at base condition use of 9.5 MGD average annual flow for source of supply and 12.6 MGD maximum day demand for treatment plant.

WWS plans to construct a treatment plant that uses the Floridan Aquifer as its alternative water supply. The treatment plant is planned to be located at the existing District 1 treatment site. WWS want the treatment plant and its source of supply to last at least 10

years before a subsequent expansion is required. WWS also wants to construct the treatment plant and its source of supply large enough to be able to accommodate 0.5 MGD maximum day flow (0.4 MGD average day flow) of land use amendments, which are by definition, not included in the previous flow projections. Therefore the first phase of the treatment plant will be designed to produce a minimum 4.5 MGD of finished water (maximum day basis), and will be designed so that it is expandable to a minimum of 5.5 MGD. According to demand projections, the initial Floridan treatment plant combined with the Biscayne treatment plant should meet demands to the year 2023. The expansion would meet demands until after 2030. If the actual increase in flow is slower than projected, the expansion can be delayed. If the actual increase in flow is faster that projected the expansion would be required sooner.

The alternative water supply project will include enough Floridan well capacity to power the treatment plant. Using a 1.36 maximum day to average day factor and 25% in plant process use of raw water, Floridan wells with an average annual day withdrawal of 4.1 MGD will be required for the first phase of the treatment plant. The plant expansion would require an additional 0.9 MGD of average annual day withdrawal. The initial phase of the Floridan wellfield will be designed for its eventual expansion. The well field should have enough physical capacity to insure delivery of raw water with the largest well out of service.

WWS plans to meet its District 2 future source of supply and water treatment needs by obtaining raw water from the Floridian aquifer. WWS will continue to permit and operate its Biscayne Aquifer facilities at base condition use of 17.5 MGD average annual flow for source of supply (including 0.6 MGD for Deerfield Beach) and 22.3 MGD maximum day demand for treatment plant.

WWS is also implementing a reclaimed water irrigation project. It is anticipated that by 2015, this project will result in 0.1 MGD less demand. Demand reduction will increase to 0.3 MGD by 2020 as more customers utilize the reclaimed water for irrigation. Current plans are for the reclaimed water to be constructed in three parts. Part one will be constructed in North County Neighborhood Improvement Program bid packages 9 and 12. Bid packages 9 and 12 are scheduled to be constructed simultaneously with construction starting in early 2009 and completed in 2011. Part two will be constructed in North County Neighborhood Improvement Program bid package 10, which will follow bid packages 9 and 12 by approximately a year. Part three will be constructed in North County Neighborhood Improvement Program bid package 11, which will follow bid package 10 by approximately a year.

WWS plans to construct a treatment plant that uses the Floridan Aquifer as its alternative water supply. The treatment plant is planned to be located at the existing District 2 treatment site. WWS want the treatment plant and its source of supply to last at least 10 years before a subsequent expansion is required. WWS also wants to construct the treatment plant and its source of supply large enough to be able to accommodate 1.1 MGD maximum day flow (0.8 MGD average day flow) of land use amendments, which are by definition, not included in the previous flow projections. Therefore the first phase

of the treatment plant will be designed to produce a minimum 6.7 MGD of finished water (maximum day basis), and will be designed so that it is expandable to a minimum of 7.5 MGD. According to demand projections, the initial Floridan treatment plant combined with the Biscayne treatment plant should meet demands to the year 2023. The expansion would meet demands until after 2030. If the actual increase in flow is slower than projected, the expansion can be delayed. If the actual increase in flow is faster that projected the expansion would be required sooner.

The alternative water supply project will include enough Floridan well capacity to power the treatment plant. Using a 1.37 maximum day to average day factor and 25% in plant process use of raw water, Floridan wells with an average annual day withdrawal of 6.1 MGD will be required for the first phase of the treatment plant. The plant expansion would require an additional 0.8 MGD of average annual day withdrawal. The initial phase of the Floridan wellfield will be designed for its eventual expansion. The well field should have enough physical capacity to insure delivery of raw water with the largest well out of service.

WWS has $92.6 million as two separate projects (one for District 1 and one for District 2) in its five year capital improvement program to provide the required first phase of the Floridan Aquifer production capacity. This project received its initial funding in FY08. The anticipated schedule is:

Planning and Design	January, 2008 – September, 2010
Permitting and Procurement	October, 2010 – June, 2011
Construction and Startup	July, 2011 – January, 2013

Planning and design includes any necessary Floridan test wells and final production well consumptive use permitting.

WWS will continue to pursue demand reduction practices. This will not impact the sizing of the initial Floridan Aquifer project, but may delay the need for the subsequent expansion.

9. **Capital Improvement Program.** The Broward County Board of County Commissioners is the authority responsible for approving WWS capital improvement program budgets. Each year the Board approves an encumbrance budget for the next fiscal year and a five year capital improvement plan. See the Capital Improvements Element for information on WWS' capital improvement program.

B. Broward County Operated Regional Raw Water Supply

1. **Level of Service Standards.** The level of service standards for the regional wellfields is the Base Condition Use as per the SFWMD adopted Regional Water Availability Rule. Table 25 contains the base condition use values.

Table 25
Regional Wellfield
Base Condition Water Use and Large User's Allocations

	Broward County WWS	**Deerfield Beach**	**Hallandale Beach**	**Hollywood**	**Dania Beach**	**FPL**
	MGD	MGD	MGD	MGD	MGD	MGD
Base Condition Water Use (Wellfield Withdrawal)	6.51	0.59	2.87	5.99	1.13	1.85
Adjustment to Base Condition Use*	NA	NA	3.4	NA	NA	NA
Adjusted **Total Wellfield Withdrawal	6.51	0.59	6.27	5.99	1.13	1.85

* The water availability rule provides for an increase to the base condition water use to account for the additional volume used in Hallandale Beach's conversion of it's water treatment process. (SFWMD BOR, Section 3.2.1.E.(3)(a), page WU-BOR-64, September 2007.)
** Includes line flushing & water losses between withdrawal point and User's meter.
NA - Not Applicable

2. **Capital Improvement Program.** As both NRW and SRW facilities have adequate capacity to provide service to the year 2028, there is no capital improvement program associated with these facilities.

C. Other Water Providers.

1. City of Fort Lauderdale. Future water demands for the Fort Lauderdale water utility service area~~s~~ was estimated based on per capita rates of consumption measured in 200~~0~~5 and the projected increase in the number of wholesale and retail customers. Distribution losses were also taken into account. For the unincorporated areas of the County supplied water by Fort Lauderdale, the 2005 water use was increased by the projected percent increase in population associated with the area served by the water supply and as presented in population forecasts. Utilizing data from the 2000 Census, as updated by Broward County PRD, the Broward County Population Forecasting Model was used to generate population projections for each of the utility service areas.

1. **Projected Flows.** The population projections and projected water demands for the unincorporated areas provided water by the City of Fort Lauderdale were estimated based on per capita rates of water consumption measured in 2005 and the projected increase in the number of retail customers. The per capita water demand in these areas was conservatively estimated to be 221 GPD. The total projected demands on the City of Fort Lauderdale water utility for all areas provided water are summarized in Table 26. Table 27 shows the projected populations for the City of Fort Lauderdale Retail and Wholesale

Service Areas, including the unincorporated populations serviced by the City of Fort Lauderdale utility.

2. **Ability to Meet Future Needs.** The City of Fort Lauderdale water utility has adequate wellfield capacity (85.2 MGD) to meet the projected water supply demands of the unincorporated areas of 1.88 MGD in 2025. The City also has sufficient treatment capacity (82.0 MGD) to meet this projected demand, based on the current treatment technology, through 2025. While wellfield capacity might limit the utility's ability to meet peek demands of 91 MGD, on-site storage of 24.0 MG will likely mediate these deficiencies. Although the City of Fort Lauderdale appears to have sufficient wellfield and treatment capacity to meet the projected demands, the utility's current consumptive use permit limits withdrawals from the Biscayne Aquifer, the sole source of water for both the Peele-Dixie and the Fiveash WTPs, to an average of 50.6 MGD. Although the City is expecting to soon receive an increase in its CUP to 53.6 MGD, with demands expected to reach almost 55 MGD by 2015, and considering the limitations on the Biscayne Aquifer imposed by the Regional Water Availability Rule, an alternative source of raw water will be needed to meet new demands. The City has proposed that this additional demand be met by the development of the Floridan Aquifer, and is in the process of converting the Peele-Dixie treatment facility to a system that will be able to treat this water. By 2015, the utility's water supply needs are projected to reach 54.8 MGD and exceed current expected CUP allocations by 1.24 MGD.

Table 26
Projected Population and Water Demands for the
City of Fort Lauderdale Water Utility

Year	Projected Population	Average Daily Flow (MGD)	Maximum Daily Flow (MGD)
2005	238,725	49.1	68.7
2010	252,100	51.8	72.5
2015	269,554	54.9	76.9
2020	287,592	58.2	81.5
2025	306,193	62.4	87.3

Note: Demands are estimated from the projected water needs of retail and wholesale customers and are in millions of gallons per day (MGD). Calculation of the average daily flow (ADF) was based on per capita water demands measured in 2005 and population projections for each of the service areas. The maximum daily flow (MDF) was calculated as the ADF multiplied by a peaking factor of 1.4. Demands presented for 2005 were the actual rates of consumption measured in that year and provided the baseline condition for projected demands.

Table 27
Population Projections for the City of Fort Lauderdale
Retail and Wholesale Service Areas

	2005	2010	2015	2020	2025
Fort Lauderdale	180,876	190,408	202,257	214,992	229,112
Oakland Park	29,863	32,077	35,289	38,549	41,604
Wilton Manors	12,390	13,152	14,134	15,030	15,832
Tamarac	7,069	7,490	8,060	8,513	8,712
Davie – Hacienda Village	2,400	2,400	2,400	2,400	2,400
Unincorporated Broward	6,127	6,573	7,414	8,108	8,533
Total	238,725	252,100	269,554	287,592	306,193

3. **Capital Improvement Projects.** The City of Fort Lauderdale plans to develop a Floridan wellfield and treatment facility in order to meet the projected water supply needs of approximately 62 MGD in 2025. Major capital improvement projects currently underway include the construction of new wells at the Peele-Dixie wellfield to replace 19 wells that are being abandoned due to wellfield contamination issues and transitioning from lime softening to nanofiltration at the Peele-Dixie WTP. While nanofiltration will enhance the quality of finished water by removing discoloration associated with high levels of dissolved organics, the replacement of lime softening processes with membrane treatment will also increase the total raw water demand. Since membrane treatment has a finished water recovery equal to 80% of raw water treated, compared to 96% with lime softening, the utility will need to increase pumpage and treatment to provide the same amount of finished water. Since the utility's current CUP limits total pumpage to just 50.6 MGD, the utility also plans to seek an increase in its CUP to provide for the increase in raw water withdrawals required by the upgraded treatment technology, and, a request for permitted withdrawals from the Floridan Aquifer to provide for the projected increase in consumptive use demands. Additional information on the City's plans can be found in Appendix C, the 10-Year Water Supply Facilities Workplan.

2013 - The City will complete its Floridan reverse osmosis facility at the Peele-Dixie WTP, providing for 12 MGD of finished water. The total cost of improvements at the Peele-Dixie wellfield and WTP are estimated at $30 Million.

2018 – Planned upgrade of the Peele-Dixie WTP will provide finished water via nanofiltration. Continued use of the Fiveash WTP for treatment by lime softening will, in conjunction with the Peele-Dixie facility, provide water for the City's wholesale and retail customers. There will be continued system improvements through the WaterWorks 2011 program and additional transmission system infrastructure improvements will be required

IV. IMPLEMENTATION

A. Authority. The Broward County Health Department, Florida Department of Health (BCHD) is responsible for licensing and monitoring water treatment plant operation; and issuing approvals for private wells. BCHD issues permits for the operation of water plants subject to compliance with state water quality standards.

While the EPGMD does not implement adequacy or concurrency for potable water nor regulates potable water treatment plants, is responsible for assuring the continuing availability of adequate water supplies for competing uses, while maintaining the functions of natural systems.

The South Florida Water Management District (SFWMD) regulates withdrawals from the Biscayne Aquifer and Floridan Aquifer. The SFWMD issues general and individual water use permits for any use, diversion, or withdrawal of any surface or groundwater in the District.

WWS is concerned with the treatment and distribution of water to retail customers, and through agreements with large users and municipal systems.

The Development Management Division (DMD) administers the Land Development Code. All development permits issued in Broward County, whether incorporated area or the unincorporated areas must be in compliance with the Land Development Code. The Broward County Land Development Code provides that for new developments potable water service must be available before a certificate of occupancy is issued, where WWS is the service provider and when the service provider to the development is a municipality.

The Broward County Land Development Code (LDC) Section 5-182 (e), regulates the potable water requirements and level of service standards. This process conditions the issuance of a development permit on the availability of adequate potable water service prior to occupancy in accordance with Chapter 5, Article IX, "Board County Land Development Code," Section 5-182 (f) for the Unincorporated Area and Section 5-198 (e) for municipalities.
The Broward County Health Department (BCHD) assesses availability of facilities by applying a gallons per day design flow demand rate to the proposed development and then determining whether the proposed development's demand will exceed the licensed capacity of the treatment plant considering the existing utilized and "committed" capacity.

The WWS, will use the potable water design flow rates in Table A-1 to assess concurrency at the time of application for site plan approval or building permit for properties within the WWS utility district service areas. The WWS retains the authority to require appropriate information to be submitted to settle any dispute. WWS utilizes Equivalent Residential Units (ERUs) to monitor committed and reserve capacities of its facilities as part of the ongoing permitting process.

The BCHD will use the following potable water design flow rates in Table 28 which were adopted by the Board of County Commissioners to assess adequacy of service at the time of plat approval for all properties that are required to be platted and for those properties within the

Unincorporated Area that are not required to be platted, at the time of site plan approval.

Table 28
Potable Water Demand Rates

Facility Type	Water Use in Gallons per Day
Residential	
per capita per day	100
per single family unit	350
Retail per square foot	0.1
Office per square	0.2
Other non-residential per capita	20

In the case where the type of connection is not listed, then the most suitable one is to be used.

The Broward County Health Department, Florida Department of Health, (BCHD) uses the development review process of the Land Development Code to assure adequate potable water services are available prior to occupancy consistent with the potable water design flow rates adopted by the Board of County Commissioners. Applicants for development permits are required to utilize existing potable water facilities if lines are "available" as defined by Rules 62-550, 62-555, and 62-560, Florida Administrative Code (FAC). Chapter 10D-6, "Standards for Onsite Sewage Disposal Systems," Section 10D-6.041 (2), Florida Administrative Code, states that "It is the policy of the State of Florida to require all buildings served by onsite sewage disposal systems [to] connect to a publicly owned or investor-owned permitted sewerage system within 365 days after notification that such a system is available."

The Wellfield Protection Ordinance, No. 93-17, was revised in 1993 to establish criteria for the regulation of storage, handling, use or production of hazardous or toxic substances within the zones of influence of water supply wells. EPGMD continues to implement this ordinance.

The BCHD will reduce potential groundwater pollution sources by continuing to implement Chapter 34, "Water and Sewers," Article II, "Water and Sewer Connection Ordinance," Broward County Code of Ordinances. The Board of County Commissioners adopted Ordinance 71-5 creating this chapter which states that all premises used for human habitation or occupancy shall be connected to a sanitary sewer main within 180 days of the availability of said sewer main for use. This applies to premises within an area served by a public or private sanitary sewer treatment and disposal utility system and which abuts a sanitary sewer main owned by the utility system.

The BCHD will continue to protect the groundwater supply from potential sources of contamination pursuant to Chapter 34, "Water and Sewers," Article II ½, "Water and Septic Tank Ordinance," Broward County Code of Ordinances. The Board of County Commissioners adopted Ordinance 78-50 creating this article which requires proposed subdivisions of three or more homes to connect to a public water supply which is located within 1/4 mile of the subdivision. This regulation also prohibits the installation of a septic tank discharging greater than 1,500 gallons of wastewater per day per acre where there exists an approved public water

distribution system. In instances where there is no approved public water distribution system, no septic tank shall be permitted which discharges over 750 gallons of wastewater a day per acre.

The EPD protects groundwater quality by implementing Chapter 27, Water Pollution Control,"Potable Water Supply Wellfield Protection Ordinance," Broward County Code of Ordinances, which regulates the storage, handling, usage or production of regulated or toxic substances within designated zones of influence as identified in the Code.

Broward County continues to implement Chapter 36, "Water Resources and Management," Article II, "Water Emergencies," Section 36-55, "Restrictions on landscape irrigation," Broward County Code of Ordinances, which imposes year-round, county-wide landscape irrigation restrictions. The Board of County Commissioners adopted Ordinance 91-8 on February 19, 1991, creating this section which restricts landscape irrigation for new and existing installations to the hours of 5:00 p.m. to 9:00 a.m. seven days per week; low-volume irrigation systems or low-volume hand watering using a self-canceling nozzle shall not be restricted. This section also provides that in the event the South Florida Water Management District imposes restrictions on landscape irrigation for new and existing installations which are more restrictive than those imposed by this section, such more restrictive regulations shall apply. The County is in the process of amending Chapter 36, Broward County Code of Ordinances, to provide for further restrictions on landscape irrigation, to mirror the anticipated adoption of district-wide, year-round water conservation measures by the South Florida Water Management District in spring 2008.

The Broward County Permitting, Licensing, and Consumer Protection Division enforces Chapter 39, "Zoning," Article VIII, "Functional landscaping and xeroscape code," Broward County Code of Ordinances, which addresses landscaping and incorporates xeroscape guidelines of the South Florida Water Management District. Broward County adopted the SFWMD Model Landscape Code for South Florida as a guide in the development of xeriscape requirements applicable in the Unincorporated Area. The Functional Landscaping and Xeriscape Code shall complies with Section 125.568, "Conservation of water; Xeriscape," Florida Statutes, requiring local governments to adopt a xeriscape ordinance by October 1, 1992, in order to conserve water.
The Broward County Permitting, Licensing, and Consumer Protection Division enforces Chapter 46, "Plumbing," Section 46-14.13, Table 46R2, The South Florida Building Code, Broward Edition, which contains standards for ultra-low volume plumbing fixtures to be used in all new construction. See Table 29 Plumbing Standards.

Table 29
Plumbing Standards

Fixture	Flow Rate
Toilet	1.6 gal/flush
Shower Heads	2.5 gal/minute
Faucets	2.0 gal/minute

The Broward County Board of Rules and Appeals has approved the above standards for ultra-low plumbing fixtures at 80 psi, effective September 1, 1992 in Broward County. This continues

an ongoing conservation program.

The WWS continues to implement its conservation-oriented rate structure within its WWS utility systems. The WWS implemented a progressive rate structure on June 1, 1988, applicable to all customers within the WWS utility districts. The current increasing block rates have three tiers with a rate increase of 50 percent in the second tier and 215 percent in the third tier. Additionally, during the South Florida Water Management District's declared water shortages, the second and third tier block rates are triggered at lower monthly consumption levels.

The WWS, implements a leak detection program to reduce the amount of unaccounted-for water loss within its WWS utility systems. The WWS completed a study for the investigation and reduction of unaccounted-for water use in 1988. The WWS has implemented the comprehensive recommendations and has documented a decreasing unaccounted-for water loss since then. Concurrently, the WWS has increased the frequency of meter calibration for large meters to an annual level and improved the change-out cycle for small meters so that replacement occurs every 10-15 years rather than 20 years.

The WWS conducts a year-round public information and education program promoting water conservation. During the drought in 1989-1990, the WWS reduced potable water consumption by 15.5 percent, on average, which exceeded the mandated 10 percent reduction level established by the SFWMD.

The PWE addresses only the needs of the WWS system and unincorporated areas of Broward County as the County has no control over the systems of municipal and private service providers. Data was provided in section II for completeness purposes only. Specific funding needs for municipal systems will be addressed in the Capital Improvements ~~s~~ Element of the respective government's comprehensive plan. The Capital Improvement Element applies only to improvements for which the local government has fiscal responsibility.

B. Sources.

1. Broward County Health Department (BCHD)
2. Broward County Water and Wastewater Services (WWS)
3. Broward County Planning and Redevelopment (PRD)
4. South Florida Water Management District (SFWMD)
5. Broward County Development and Environmental Regulation Division (DERD)
6. City of Hollywood Utilities Division
7. City of Ft. Lauderdale Utilities Division
8. Royal Utilities, Inc.
9. City of Pompano Beach Planning

V. APPENDICES

APPENDIX A
Determining WWS's Ability to Serve

Determining WWS's ability to serve a potential potable water customer starts with calculating average day demand for the potential customer.

Average Day Demand
Table A-1 will be used to calculate average day demand, in gallons per day (GPD).

Table 4-A-1
Specific Type of Use Potable Water Average Day Demands

Type of Use	Unit	Demand (gpd/unit)
Bar, Cocktail Lounge	1,000 SF of gross building area	346
Condominium, Apartment	each	225
Day Child Care	1,000 SF of gross building area	177
Fast Food Service	1,000 SF of gross building area	967
Gas Station (fueling only)	fuel pump	154
Hotel (with restaurant and/ or meeting rooms)	rental room	243
Hotel (without restaurant and/ or meeting rooms)	rental room	71
Laundry and/ or Dry Cleaning (staff operated machines)	1,000 SF of gross building area	776
Laundry and/ or Dry Cleaning (coin operated machines)	1,000 SF of gross building area	2425
Merchandising	1,000 SF of gross building area	154
Mobile Home	lot	157
Movie Theater	seat	3
Office	1,000 SF of gross building area	178
Place of Worship	1,000 SF of gross building area	146
Restaurant	1,000 SF of gross building area	699
School	student	12
Self Service Storage	1,000 SF of gross building area	19

Type of Use	Unit	Demand (gpd/unit)
Single Family Residential	each	280
Vehicular Repair	1,000 SF of gross building area	132
Warehouse (mixed use)	1,000 SF of gross building area	103
Warehouse (homogeneous, bulk storage)	1,000 SF of gross building area	50

Source: 1995 Usage Study of BCWWS customers,
Retail Master Plan (1995 usage) and
2003 Flow Projections of Year 2025 Demands Based on 2000 Census.
Normal landscape irrigation needs are included.
BCWWS reserves the right to develop similar values for other specific types of use not listed above.

Raw Water Supply and Water Treatment Plant

The potable water average day demand calculated above is multiplied by a factor from Table A-2 to determine maximum day demand, the level of service condition for raw water supply and water treatment plants. WWS operates four independent water systems, called Districts, and each District has its own factor.

Table A-2
Potable Water Maximum Day Factors

Factor	District 1	District 2	District 3A	District 3BC
Maximum Day To Average Demand Factor	1.36	1.37	***	***

Source: Analysis of plant flow from 1997 to 2005
Normal landscape irrigation needs are included in these maximum day factors.
Raw water supply and treatment provided by the City of Hollywood.

Any analysis of available capacity must include prior commitments to serve permitted but not yet constructed developments, as well as existing customer flow. Therefore, the sum of existing customer maximum day flow, prior commitments and potential customer maximum day flow is compared to the facility's permitted capacity.

Treatment Plant Example:

Existing customer average day flow = 4,000,000 gpd
Prior commitments average day flow = 1,000,000 gpd
Potential customer average day flow = 500,000 gpd
Total average day flow = 5,500,000 gpd

Times maximum day factor of 1.36 = 7,480,000 gpd
Facility permitted capacity = 8,000,000 gpd

Existing customer flow plus prior commitments plus potential customer maximum day demand equals 7,480,000 gpd, which is less than the facility's permitted capacity of 8,000,000 gpd. Therefore, WWS can provide the appropriate and water treatment plant level of service to this potential customer.

Raw Water Supply Example:

Raw water supply is regulated through the consumptive use permit (CUP) process. CUPs are written in terms of average day.

Existing customer average day flow = 4,000,000 gpd
Prior commitments average day flow = 1,000,000 gpd
Potential customer average day flow = 500,000 gpd
Treatment plant uses (3%) = 165,000 gpd
Total average day flow = 5,650,000 gpd
Facility permitted capacity = 5,400,000 gpd

Existing customer flow plus prior commitments plus potential customer demand plus treatment plant uses equals 5,650,000 gpd, which is more than the raw water permitted capacity of 5,400,000 gpd. Therefore, WWS can not provide the appropriate raw water supply level of service to this potential customer. Note that raw water supply must also have the physical capacity for maximum day demands. If the above example would have show raw water permitted capacity was sufficient, then physical capacity would have to be checked.

Water Distribution System

Detailed analysis of the distribution system may be done by WWS when WWS reviews detailed engineering issues with the developer as part of WWS developer coordination process. Distribution system issues are not considered in BCWWS earlier reviews, since the nature of the distribution system changes over time as improvements are made. A potential customer must make whatever distribution system improvements are necessary to provide the required level of service in order to proceed with their project.

Before the distribution system analysis can begin, the development plan must be detailed enough to be able to use Table A-1 – Specific Type of Use Potable Water Average Day Demands to calculate the potential customer's average day demand. The potential customer's average day demand will be increased by a safety factor of 50% for use in distribution system analysis and sizing. The average day demand with safety factor is then multiplied by a factor from Table A-3 to determine maximum day and peak hour demand.

Table A-3
Potable Water Peaking Factors

Factor	District 1	District 2	District 3A	District 3BC
Maximum Day To Average Demand Factor	1.36	1.37	1.32	1.44
Peak Hour To Average Demand Factor	1.73	2.27	1.58	1.86

Source: Analysis of plant flow from 1997 to 2005
Peak Hour : Master Plan Table 4-27

The distribution system must be able to provide fire protection as well as water for normal uses for. Table A-4 is WWS' fire protection goals in gallons per minute (GPM).

Table A-4
Fire Protection Goals

Type of Structure	Goal (GPM)
Single Family Residential	1000
Multi-Family Residential	2000
Mobile Home	2000
Small Commercial	2500
Medium Commercial	3000
School	3000
Large Commercial	3500

WWS recognizes that these goals are general in nature and will use a specific fire protection requirement determined by the Fire Marshall, when available. However, in any case, WWS will not be responsible for providing fire protection in excess of 3500 gpm. WWS recognizes that individual developments may elect to provide more than 3500 gpm fire protection through privately owned and maintained on-site facilities.

Any analysis of available capacity must include prior commitments to serve as well as existing customer flow. There is no "permitted capacity" for a distribution system. Determining if the distribution system can provide the appropriate level of service is accomplished by analyzing the distribution system in each of two loading conditions:

Loading Condition 1. The distribution system is loaded with peak hour demands of existing customers, prior commitments and the potential customer. Under these loading conditions the residual pressure anywhere in the system cannot be less than 45 psi.

Loading Condition 2. The distribution system is loaded with maximum day demands of existing customers, prior commitments and the potential customer; and the potential customer's fire protection demand. Under these loading conditions the residual pressure anywhere in the system cannot be less than 25 psi.

When doing the above analysis, WWS will include representative potential customer on-site piping. In doing so, WWS will determine the minimum size for on-site piping.

Further, the distribution system will be analyzed in two configurations: existing system and year 2030 system. If the distribution system (including the potential customer's on-site piping) meets the minimum residual pressure for each of the two loading conditions, in both the existing and the year 2030 configuration, then the system can provide the required level of service. If the system cannot provide the required level of service, improvements are necessary.

APPENDIX B
Summary of Statistics for Water Facilities
Serving Unincorporated Parts of Broward County

Facility Name	**Fort Lauderdale (Fiveash)** **Fort Lauderdale (Peele-Dixie)**
Facility Address	4321 N.W. 9th Ave, Ft. Lauderdale 1500 South State Road 7, Ft. Lauderdale
Permit Number and Date of Issue	06-00123-W 09-May-02 (expired)
Operational Responsibility	City of Fort Lauderdale
Design Capacity of Facilities (MGD)	70 Fiveash 20 Peele-Dixie
Combined Daily Allocation (MGD)	50.6
Maximum Daily Allocation (MGD)	67.3
Pump Capacity Total (MGD)	94.608
Pump Capacity Firm (MGD)	75.168
Number of Wells	29 (active)
Storage Capacities (MG)	2.3 Peele-Dixie, 21.8 Fiveash
Interconnects	10 water system interconnections -BCWWS District 1A/1B (3) -City of Plantation (1) -City of Dania Beach (1) -City of Tamarac (3) -Town of Davie (1) -City of Pompano Beach (1)
Current Demand on System(MGD) in 2005	Average Daily Flow - 49.1 Maximum Daily Flow - 68.7
Average Daily Flow Projections (MGD)	2005 - 49.1 2010 - 51.8 2015 - 54.9 2020 - 58.2 2025 - 62.4 2030 – 65.1
Service Area	City of Fort Lauderdale, including the City of Lauderdale-by-the-Sea, Lazy Lake, neighborhoods of unincorporated Broward County (Roosevelt Gardens, Franklin Park, Washington Park, and Boulevard Gardens. Also, wholesale agreements with the City of Oakland Park, the City of Wilton Manors, Town of Davie, and the Eastern portion of the City of Tamarac, and Port Everglades).
Populations in areas served (2005)	Unincorporated Area 6,127 City of Fort Lauderdale 180,876 Oakland Park 29,863 Wilton Manors 12,390 Tamarac 7,069 Davie-Hacienda Village 2,400

APPENDIX C

BROWARD COUNTY 10-YEAR WATER SUPPLY FACILITIES WORKPLAN

See attached Appendix C.

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