6.0 *SANITARY SEWER, SOLID WASTE, DRAINAGE, POTABLE WATER AND NATURAL GROUNDWATER AQUIFER RECHARGE*

6.1 SANITARY SEWER SUB-ELEMENT

6.1.1 Introduction

6.1.2 Sanitary Sewer Data Summary

The SANITARY SEWER sub-element is required to be included within the Comprehensive Plan-per requirements of State planning law and rule criteria. Specifically, Chapter 163.3177(6) (c), Florida Statutes, established the SANITARY SEWER Sub-element requirement and Chapter 9J5.O11, Florida Administrative Code, established minimum criteria to guide its preparation.

This sub-element contains a summary of the data, analyses and support documentation necessary to form the basis for the future sanitary sewer Goal, Objectives and Policies.

In keeping with the requirements of Chapter 9J5.005 and 9J5.006 Florida Administrative Code, the SANITARY SEWER sub-element is structured according to the following format:

- Sanitary Sewer Data; and
- Sanitary Sewer Analysis; ~~and~~
- ~~City Goal, Objectives and Policies~~

Initial sanitary sewer data are presented on a system-wide basis; however for the purposes of defining City specific service levels -and needs, the Sub-system level may be utilized.

6.1.2 Sanitary Sewer Data Summary

The Federal Water Pollution Control Act (PL-92-500), as amended, is the controlling national legislation related to the provision of wastewater service. The goal of this Act is the restoration and/or maintenance of the chemical, physical and biological integrity of the nation's waters. The Act established the national policy of implementing area wide waste treatment and management programs to ensure adequate control of various sources of pollutants. ~~Under Section 201 and 208 of PL 92-500, grants have been made available to local governments to plan and construct wastewater facilities~~. The U.S. Environmental Protection Agency is responsible for implementing the Act.

The Florida Department of Environmental ~~Regulation~~ Protection (~~FDER~~ FDEP) is responsible for ensuring that the State implements responsibilities assigned to it under PL 92-500. ~~FDER~~ FDEP has adopted rules for the construction and operation of wastewater facilities under Chapter 17-6, Florida Administrative Code. These rules apply to all facilities which treat flows exceeding 5,000 gallons per day for domestic establishments, 3,000 gallons per day for food service establishments, and instances where wastewater contains industrial, toxic or hazardous chemical wastes.

The Florida Department of Health and Rehabilitation Services (FDHRS) regulates septic tank and drain field installation within the State. These requirements have been adopted by rule in Chapter 100-6, Florida Administrative Code.

To ensure economic efficiency in the operation of the regional facilities which it provides, Palm Beach County has adopted regulations which require establishments to connect to a wastewater system where service is available. Municipal and privately owned wastewater systems have also adopted design standards and review procedures to ensure that all connections are compatible with the overall system design. The Palm Beach County Health Department is responsible for assuring that State and federal requirements are met.

The Palm Beach County Health Department, under a Local Program Agreement with ~~FDER~~ FDEP, oversees permitting, set-up and operation of septic tank and package plant systems in accordance with County and State rules and regulations. Palm Beach County also has adopted local rules and regulations for septic tank installation consistent with Chapter 1OD-6, Florida Administrative Code (i.e. Environmental Control Rule #3).

6.1.2.1. Operational Entity and Service Area

~~The Palm Beach County Area-wide Waste Treatment Management Plan, prepared under Section 208 of PL 92-500, as amended, was completed and adopted by Palm Beach County in 1979. Although somewhat dated at this time, basic regional wastewater service area designations and responsibilities remain relatively current. Regional and sub-regional service area designations under this program are illustrated on Figures 6.1-1 and 6.1-2. Under the 208 Plan, the City of West Palm Beach was designated as the service agent for the East Central Region Sub-region.~~

FIGURE 6.1-1

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FIGURE 6.1-2

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The South Bay wastewater collection system is owned, maintained and operated by the City of South Bay and is financed by user charges and connection fees. However, wastewater is treated by the City of Belle Glade at their treatment facility. The City used to own and operate its own wastewater treatment plant until it was taken out of service in 2008.

The wastewater system includes collection, pumping, transmission, metering, treatment and disposal facilities. The City continues own, operate and maintain its collection and transmission lines, lift stations and retains the responsibility of billing its customers. The service area of the City of South Bay wastewater system includes all of the incorporated areas of the City.

6.1.2.2 Design Capacity

In 1973, South Bay completed construction of a 0.5 million gallons per day (MGD) capacity wastewater collection, treatment and disposal system to serve residential, commercial and industrial users within the City. The system ~~is~~ was operated by the City Public Works Department and is financed by user charges. Prior to that time, wastewater service to the City was provided by individual septic tanks and limited area package wastewater treatment plants. As a result of frequent septic tank failures and improper operation of the limited area plants, the City decided to construct its own municipal facility which was completed in 1973, alleviating the problem and providing the City with adequate central wastewater collection, treatment and disposal facilities.

Between the years and 1980 and 1984, the wastewater treatment plant was expanded to a 1.42 MGD facility. Also, an additional pumping station was added to serve the area along the northeasterly side of U.S. Highway 27. Further, additional percolation ponds and a new office and maintenance building were constructed and force mains were upgraded. In general, the system was greatly improved by these improvements.

Treatment and Disposal Facilities

As described previously, the City wastewater treatment plant was taken out of service in 2008. Therefore, treatment and disposal of wastewater is provided at the Belle Glade facility.

~~The South Bay wastewater treatment plant is designed as an air-driven rotating biological contractor (RBC) secondary treatment facility. Treatment facilities consist of metering, comminuting and screening, primary clarification, biological treatment, secondary clarification, effluent filtering, post-chlorination, surface percolation ponds, sludge handling pumps, aerobic digestion and sludge drying beds. The treatment plant is rated at 1.42 MGD at average daily flow and has hydraulic capacity of 2.16 MGD at peak hourly~~

flows. Design characteristics and capacities of the various treatment components are listed on TABLE 6.1-1 below. As a result of an FDER order to cease surface discharge of effluent, in 1991 South Bay and the City of Belle Glade jointly constructed a deep well disposal system designed to accommodate effluent from both municipal systems.

Wastewater Treatment Plant

The City of South Bay Wastewater Treatment Plant (WWTP) was initially a 0.5 mgd activated sludge (contact stabilization) process, field erected, steel tank treatment plant. In 1981, the City completed construction of a parallel 1,42 mgd secondary treatment plant, utilizing Rotating Biological Contactors (RBC). This plant also features primary and secondary clarification followed by an automatic backwash filter and disinfection. The treated effluent initially was discharged to four percolation ponds. In 1981, in response to an order from the Florida Department of Environmental Regulation to cease discharging treated effluent to local canals, through the originally designed percolation ponds, the City completed construction of a 1.42 mgd effluent pumping station and a 10-inch diameter force main to transmit the effluent to an injection well located at the Belle Glade Wastewater Treatment Facility.

Currently, the South Bay WWTP consists of only the 1.42 mgd Rotating Biological Contactors (RBC) secondary treatment system described above. The 0.5 mgd contact stabilization steel tank plant was disconnected from the treatment system. Effluent disposal is normally accomplished by filtering and then pumping and transmitting the treated wastewater to the injection well located at the Belle Glade Wastewater Treatment Facility and sludge is disposed by landfill. The effluent disposal method has been adopted in 1991 to replace the original method of filtration, disinfection and disposal by percolation pond. However, the original filtration, disinfection and land disposal facilities remain operable and are to be used as a standby method for effluent treatment and disposal.

Collection System

Gravity collection lines are available to essentially 100 percent of the citizens of the citizens of South Bay. Most of the system was constructed in the early 1970's and consists of vitrified clay pipe. Sub-system No. 8 was constructed in 1977 and Sub-system No. 9 was constructed in 1979. Both sub-systems consist of polyvinyl chloride of 51,945 feet of gravity sewers of which 45,475 feet are 8-inches diameter, 2215 feet are 10-inches diameter, 33042 feet are 12-inches diameter and 1210 feet are 15-inches diameter. There are an estimated 195 pre-cast concrete manholes in the gravity system. FIGURE 6.1-3 illustrates the City's existing wastewater collection system.

FI GURE 6.1-3

Existing Wastewater Collection System

(Delete in Update)

Pumping and Transmission System

The South Bay wastewater system is comprised of 9 sub-systems. Each of these sub-systems is serviced by a pumping station and force main which redirect the sewage flow to another area and/or interceptor gravity sewer. The sewage from Sub-Systems 1,2, 3 and 7 terminates at the Pump Station No.1 where it is pumped to the ~~City's~~ Belle Glade's wastewater treatment facility. The sewage from Sub-Systems 4,5,6 and p terminates at Pump Station No. 9 where it is pumped to the treatment plant. Sub-System No.8 pumps directly to the treatment plant.

Each of the pump stations are equipped with pump run time meters to monitor the flows and pump performance.

Standby Power

Each of the nine pump stations in the wastewater system are equipped with emergency power receptacles. The City has one portable engine driven electric generator set for powering any of the lift stations during a power outage.

TABLE 6.1-~~2~~ 1

EXISTING PUMPING STATIONS AND FORCE MAINS

Lift Sta. Number	Lift Station Type	Pumping Capacity	F.M. No.	Material of Const.	Diameter Inches	Length/ Feet
1	WW/DW/PKG(1)	3@ 500 gpm ea.	1	CIP	10	5770
2	WW/S (2)	2@ 620 gpm ea.	2	CIP	8	1530
3	WW/S	2@ 270 gpmea.	3	CIP	6	1380
4	WW/S	2@ 360 gpm ea.	4	DIP	6	980
4	--	---	4-By-Pass	CIP	6	1290
5	WW/S	2@ 225 gpm ea.	5	CIP	6	3350
6	WW/S	2@ 120 gpm ea.	6	DIP	4	1705
6	--	---	6-By-Pass	CIP	4	770
7	WW/S	2@ 120 gpm ea.	7	CIP	4	1315
8	WW/S	2@ 170 gpm ea.	8	PVC	4	2250
9	WW/DW/PKG	3@500 gpm ea.	9	PVC	12	5105

(1) Abbreviated for wetwell/drywell/package type
(2) Abbreviated for wetwell submersible type.

6.1.2.3 Current Demand and Level of Service

The following three system-wide wastewater flow characteristics are important for assessing the capability of wastewater treatment, pumping and transmission facilities to service customers according to industry standards.

- Annual Average Day Flow (AADF) – total system wastewater flow for the year divided by 365 days.

- Maximum Monthly Daily Flow (MMDF) – the largest monthly wastewater flow in the year of interest divided by the number of days in that month.

- Maximum Daily Flow (MDF) – the largest wastewater flow during a single 24-hour day in the year of interest.

~~TABLE 6.1-3 represents the 1987 wastewater flows for the City of South Bay service area.~~

~~TABLE 6.1-3~~

~~1994 WASTEWATER TREATMENT FLOW DATA~~

~~Average Daily Flow~~	~~750,000 gpd~~
~~Average Maximum Daily Flow~~	~~1,119,000 gpd~~

~~LOS – 186 Gallons Per Capita Day/Maximum 260~~

~~Source: City of South Bay, 1996 Adopted EAR, per South Bay Utility Department.~~

~~The 1994 service area population (Ref: FUTURE LAND USE element) is 4027 residents with an additional seasonal population of 287 persons. Since the seasonal population is in residence only for a portion of the year, it is assumed for this analysis that two seasonal residents equates to one permanent resident. Therefore, the estimated 1994 service population, including seasonal residents is 4314 persons.~~

~~From TABLE 6.1-4, the average annual daily flow of 750,000 gallons per day (gpd) was determined for 1994 with an average maximum daily flow of 1,119,000 gpd during the same period.~~

~~On this basis, f~~ For planning purposes, the following levels of service should be used when planning for additional wastewater service in the City; Average Daily Flow – 186 gallons/capita/day; and, Maximum Daily Flow – 260 gallons/capita/day. Maximum Daily Flow (MDF) should be used for sizing facilities that must accommodate short term peak loads.

In addition, an analysis is required to estimate the projected impacts to wastewater facilities to be generated by the new prison. In 1997, there maximum number of beds at the prison is 1318. Prisons typically generate approximately 95 gallons per bed per day (GPBD). Therefore, the wastewater needs for the prison are .125 mgd. For planning purposes, the projected impacts for the prison have been added to the following TABLE 6.1-4.

TABLE 6.1-4

City of South Bay Wastewater Flow Projections

Year	Perm. Res.	Population Seasonal	Equivalent Population 1	ADF (MGD) 2	MDF (MGD) 3
1994	4027	287	4314	0.800	1.190
2000	4650	300	4800	1.015	1.370
2005	4916	300	5066	1.065	1.442

1. 2 season people equal one permanent resident plus permanent resident population.
2. Average Daily Flow – equivalent resident population X 186 gallons/day.
3. Maximum Daily Flow – equivalent resident population X 260 gallons/day.
4. Impacts from prisoners at the correctional facility which came on line in 1997 are calculated using the following formula (total number of beds X 95 GPBD) and are added to projected ADF and MDF as calculated above (TABLE 6.1-4) for the years 2000 and 2005.

1997 – 1318 Beds X 95 GPBD = .125 mgd

Source: Craig A. Smith & Associates, Inc., 1997

6.1.3 Sanitary Sewer Systems Analysis

6.1.3.1 Facility Capacity Analysis

The City's wastewater treatment plant is no longer in use. Wastewater treatment and disposal services are provided by the City of Belle Glade at their plant.

Although the City of South Bay wastewater treatment plant has a hydraulic capacity of 2.16 MGD, this analysis will be based upon a rated capacity 1.42 MGD of average daily flow. Future demands and analyses of system capacity are based upon an equivalent resident population projections and wastewater use factors expressed on a resident per capita per day basis. Average Daily Flow, based upon 1987 wastewater flow figures from

~~the previous section, is 163 gallons per capita per day, while maximum daily flow is 252 gallons per capita per day. Inherent in the use of these figures for projection purposes is~~

~~the assumption that the mix of residential versus commercial and other land uses will remain consistent with that evidenced in 1987 throughout the South Bay service area. According to the FUTURE LAND USE element, land use projections indicate that this is a relatively valid assumption. TABLE 6.1-4 presents an average and maximum daily flow projections for the City of South Bay.~~

~~Utilizing the plan capacity of 1.42 MGD and the year 2005 maximum daily flow projections, it is concluded that 93 percent of the plant capacity will be required by the City over the 10-year planning period (79% ADF).~~

~~Based upon the above projections, it is concluded that the South Bay wastewater treatment plant has the capacity (i.e. currently 1.42 MGD) to accommodate projected growth within the City for both the five and ten year projection periods.~~

6.1.3.1 General Performance Evaluation

All components of the wastewater ~~treatment~~ system are maintained in good condition and with continued good operation and maintenance, may be expected to provide in excess of twenty years of continued service to the City. ~~The deep well effluent disposal system constructed in 1991, is designed to address the issues of surface effluent disposal. The 1995 discharge from the City is 791,000 gpd while the City's allotment is 2.84 mgd. The total deep well design capacity is 8.94 gpd with an expansion to over 13 mgd planned in the future.~~ According to Chapter 31-3.021, Florida Administrative Code, Palm Beach County could provide wastewater service to the City under either of the following conditions: (1) "that 50% or more of the record owners of property to be served by such localized sewerage system shall desire and consent to the construction…; or (2) "that health hazard or emergency situation exists which would justify the construction of…said localized system".

6.1.3.2 Septic Tank Suitability

A few septic tanks may still be in service within the City. ~~although an exact number is not known.~~ The primary reason the City became involved in providing wastewater service was the frequent failure of septic tanks. ~~as well as, the improper operation of the limited area plants~~. As a result, the majority of the septic tank use in the City has been eliminated ~~by providing a municipal system of wastewater collection, treatment and disposal.systems~~ Property owners are responsible for the construction, operation and maintenance of these individual systems. Soil survey and soil limitations data for septic tank uses are exhibited on FIGURE 3-3 and TABLES 3-1 and 3-2 (Ref: FUTURE LAND

USE element). Soil limitations to septic tank development appear to be in the "severe" category; however, due to the limited number, low density of use and the elevation of drainfields to create percolation, no pollution problems have been noted by City officials.

Further, the City has an Ordinance which requires the owner of any lot or parcel within the City opting to develop a residential, commercial or industrial use to connect to the central ~~municipal~~ sewer system. ~~within three months of being notified by the City.~~

6.2 SOLID WASTE SUB-ELEMENT

6.2.1 Introduction

The SOLID WASTE sub-element is required to be included within the Comprehensive Plan per requirements of State planning law and rule criteria. Specifically, Chapter 163.3177(6) ©, Florida Statues, establishes the SOLID WASTE sub-element requirement and Chapter 9J5.011 Florida Administrative Code, establishes minimum criteria to guide its preparation.

This sub-element contains a summary of the data, analyses and support documentation necessary to form the basis for the future SOLID WASTE Goal, Objectives and Policies.

In keeping with the requirements of Chapter 9J5.005 and 9J5.006 Florida Administrative Code, the SOLID WASTE sub-element is structured according to the following format:

- Solid Waste Data Summary
- Solid Waste Analysis~~; and~~
- ~~City Goal, Objectives and Policies~~

The following is provided as a brief overview of the laws and requirements by various levels of government that currently have jurisdiction in the regulation of solid waste.

Potential environmental impacts of solid waste facilities have led to the development of an extensive network of permitting requirements at the federal and State levels. Impacts on air and water quality are reviewed by the U.S. Environmental Protection Agency (EPA) at the federal level. For processing plants, which will generate electrical power or require tall emission stacks, Federal Aviation Administration (FAA) review may be required. Additionally, U.S. Army Corps of Engineers (COE) review will be required where dredging-and filling might be necessary.

The National Resource Conservation and Recovery Act (RCRA) of 1976 directed EPA to develop a national program to regulate and manage hazardous wastes and provide incentives for states to adopt consistent programs. The National Comprehensive Emergency Response and Compensation Liability Act (CERCLA) enacted in 1980,

provided EPA with authority and funds to respond to incidents requiring site clean-up and emergency mitigation (the EPA "Superfund" Program). This Act also defined the liability of business engaged in hazardous waste generation, transport and disposal and provided enforcement processes.

At the State level, the Florida Department of Environmental ~~Regulation~~ Protection (~~FDER~~ FDEP) has the review and permitting authority for air and water quality impacts, as well as, projects that require dredging and filling. Further, ~~FDER~~ FDEP has delegated authority to the regional water management districts to provide State level review forwater quality and quantity impacts. Actual construction and operation of solid waste facilities require further permits and review by ~~FDER~~ FDEP. Further, the Florida Resource Recovery and Management Act (Section 403.7, F.S.), passed in 1980, adopted Federal guidelines and directed ~~FDER~~ FDEP to develop and implement a hazardous waste management program.

The Solid Waste Authority of Palm Beach County was created in 1974 by Special Act to preserve the aesthetic qualities, conserve natural resources, and protect the public health, safety and welfare of residents of Palm Beach County through a Countywide resource recovery and waste management program.

It should be understood that the Solid Waste Authority is a State agency functioning under a Special Act, even though its jurisdictional boundaries are that of Palm Beach County, and it is not, as often misconstrued, a County agency.

The purpose of the Authority is to provide a coordinated Countywide program for the control of solid waste processing and disposal in cooperation with federal, State and local agencies responsible for the prevention, control or abatement of air, water and land pollution, and to otherwise provide for the safe and sanitary processing and disposal of solid waste in the district over which the Authority exercises sole jurisdiction in Palm Beach County.

6.2.2 Solid Waste Data Summary

Solid waste collection and disposal is one of the many problems that local governments must cope with today. Since it is the responsibility of local government to provide for the public health, safety and welfare of its residents, it is essential that Palm Beach County and its municipalities deal effectively with this pressing problem. Urban development in the County is situated primarily along the coastal areas.

6.2.2.1 Solid Waste Collection

The City of South Bay has granted the right, privilege, or franchise to collect residential garbage, trash and other solid waste within the corporate limits to a private hauler. Under

the terms of this contract, the contractor collects residential garbage twice weekly. Collection of garbage from commercial establishments, industrial sites and institutional facilities within the City occurs twice weekly and on demand. Trash collection in the South Bay is performed by the City on a once per week basis.

The City's contract does not include providing collection service to construction sites. Individual developers are responsible for collecting and disposing of wstes generated on these properties.

6.2.2.2 Solid Waste Disposal

The collected solid waste material (i.e. garbage, trash and other wastes) is transported to the Palm Beach County Solid Waste Authority Belle Glade transfer station and then transported to the ~~Dyer Boulevard Landfill~~ North County ~~Regional~~ Resource Recovery ~~Center and Landfill in West Palm Beach~~ and Solid Waste Disposal Facility for disposal.

The ~~Dyer landfill is operated by the Palm Beach County Solid Waste Authority under a Countywide solid waste plan for landfill operation. Using the Palm Beach County Solid Waste Authority's Annual Report, the Dyer Boulevard Landfill received 1,117,215 tons of solid waste in 1987.~~ North County Resource Recovery and Solid Waste Disposal Facility is located next to the Dyer Boulevard Land fill. This facility contains 334 acres in total land areas; consists of Class1 (Garbage and Incinerator Residue) and Class 3 (Trash) landfill; and, is operated by the Palm Beach County Solid Waste Authority under a Countywide solid waste plan for landfill operation. The Solid Waste Authority has made provision for additional disposal capacity to replace the existing capacity upon depletion, which is projected to occur in approximately the year 2020.

A new transfer station on SR 80 one mile south of SRR 715 in Belle Glade was constructed in 1995. This facility replaced the existing Belle Glade Transfer Station. The new facility has an 800 TPD (tons per day) capacity, however, according to the Palm Beach County Solid Waste Authority (PBCSWA) in 1996 only handled approximately 118.4 TPD. Therefore, it is anticipated that this facility has sufficient capacity to meet all projected needs.

~~The "North County Regional Resource Recovery Center and Solid Waste Disposal Facility" has a design capacity to accommodate the projected refuse disposal needs for the County, in conjunction with resource recovery until the year 2021. The capacity of the landfill is 42 million cubic yards and, in 1995, approximately 38 million cubic yards were available (approximately 90% of capacity remaining).~~

6.2.3 Solid Waste Analysis

6.2.3.1 Solid Waste Generation

Normally, the generation of solid waste in all communities is influenced by two primary factors: (1) the population of the community, and (2) the amount and intensity of commercial and industrial activities.

The majority of solid waste in South Bay is generated by residential areas since the City is primarily a residential community. Since the City of South Bay is a residential community, supplemented by commercial, light industrial and other uses, obviously, then, the population of the residential sector is the primary generator of wastes in the City. Commercial, industrial and other uses in South Bay are not as significant a factor to overall solid waste generation as are the residential areas.

~~As stated in Section 6.2.1.1, residential and other garbage is collected by a private hauler, South Florida Sanitation. The private hauler also services an area outside the corporate limits of South Bay. Using population estimates from the FUTURE LAND USE element, and the total solid waste generated in 1995, a level of service standard for solid waste can be derived. Estimates and projected equivalent population figures for the City of South Bay are presented in TABLE 6.2-1~~.

~~TABLE 6.2-1~~
~~City of South Bay~~
~~Equivalent Resident And Seasonal Population Projections~~

~~Year~~	~~Permanent Resident Pop.~~	~~Seasonal* Pop.~~	~~Equivalent Resident Pop.~~	~~Total Equivalent Perm. Res. Pop.~~
~~1994~~	~~4027~~	~~287~~	~~144~~	~~4171~~
~~2000~~	~~4650~~	~~300~~	~~150~~	~~4800~~
~~2005~~	~~4916~~	~~300~~	~~150~~	~~**5066~~

~~* Seasonal population converted to permanent resident by a factor of 2 seasonal residents = 1 permanent resident.~~

~~**NOTE: Figure does not include approximately 1318 inmates at correctional facility completed in 1997.~~

~~Source: Craig A. Smith & Associates, 1997.~~

~~The total solid waste generated by South Bay in 1995 was 2765 tons, according to Solid Waste Authority records. When equated to 1994 total equivalent population of 4171 a trash generation rate of 3.76 lbs. per capita per day results. Therefore, current level of service standards for the City are as follows: 3.76 lbs./capita/day.~~

~~In addition, an analysis is required to estimate the projected impacts to solid waste facilities to be generated by the new prison. In 1997, the maximum number of beds at the prison is 1,318. In the absence of empirical information relating the typical generation rate for correctional facilities, the generation rate for the prison is anticipated to be similar to that of other institutional and group home type uses. The following generation rate will be utilized: 3.0 pounds per bed per day. Therefore, the prison is anticipated tp generate approximately 1.97 TPD (1,318 Beds X 3.0 lbs. per bed per day). For planning purposes, the projected impacts for the prison have been added to the following TABLE 6.2.2~~

6.2.3.2 Solid Waste Generation Projections

It is projected that there will be adequate capacities at the SWA disposal facilities to meet the solid waste generation needs of the municipalities, including South Bay, and unincorporated areas of Palm Beach County. Via Letter dated January 19, 2006 the SWA specifically states, "The Solid Waste Authority of Palm Beach County hereby provided certification that the Authority has disposal capacity to accommodate the solid waste generation for the municipalities and unincorporated county for the coming year of 2006. This letter also constitutes notification of sufficient capacity for concurrency management and comprehensive planning purposes. Capacity is available for both the coming year, and the five and ten year planning periods specified in 9J-5.005(4)."

~~Projected solid waste generation is obtained by applying the level of service standards developed in the previous section to the equivalent population figures presented in TABLE 6.2-1. TABLE 6.2-2 presents current estimated and projected solid waste generation for 1995 and the five and ten year planning periods.~~

~~TABLE 6.2-2~~
~~City of South Bay~~
~~Solid Waste Generation~~

Year	LOS (LBS/Cap/Day)	Equiv. Resident Population	Solid Waste Generation (Tons/yr)
~~1995~~	~~3.76~~	~~4171~~	~~2862~~
~~2000~~	~~3.76~~	~~4800~~	~~**4014~~
~~2005~~	~~3.76~~	~~5066~~	~~**4197~~

~~**NOTE: Impacts from prisoners at correctional facilities are calculated using the following formula (Total number of Beds X 3.0 lbs. per bed per day) and are added to projected solid waste generation above.~~

~~1997 = 1318 Beds X 3.0 lbs. per day = 1977 TPD (721.6 Tons/yr)~~

~~*NOTE: Seasonal Population is converted to resident population at a rate of (2) seasonal residents = (1) permanent resident.~~

~~Source: Craig A. Smith & Associates, 1997.~~

6.2.3.3 Solid Waste Disposal Projections

Minimal population increases as projected for South Bay during both the five (5) year and ten (10) year planning periods implies there will be minimal increases in the amount of solid wastes generated by the City during those time periods. The City will continue to contribute a minor share of the total amount of solid waste disposed in the County.

~~The North County Regional Resource and Solid Waste Disposal facility, in 1995, had capacity to accommodate 2000 tons of solid waste per day. Based upon the regional facility capabilities, the City will contribute a minor share of the total amount of solid waste disposed, site as shown on TABLE 6.2-3. In 1995, the City generated only approximately 7.1% of all solid waste processed at the Belle Glade Transfer Station.~~

~~TABLE 6.2-3~~
~~Solid Waste Contribution to Landfill Disposal Site~~

~~Year~~	~~South Bay SW (tons/yr)~~	~~Regional Capability* (tons/yr)~~	~~South Bay Contribution (%)~~
~~1995~~	~~2765~~	~~624,000~~	~~0.44~~
~~2002~~	~~3179~~	~~624,000~~	~~0.50~~
~~2005~~	~~3356~~	~~624,000~~	~~0.53~~

~~* Capacity based on 2000 tons/day and operating 52 wks per year, 6 days/wk.~~

~~Source: Craig A. Smith & Associates, 1997.~~

6.2.3.4 Recycling

State regulations have required Counties to reduce solid waste generation by 30% by 1994. This goal has been reached Countywide, but the City maintains an active recycling program. ~~The City has been attempting to reduce the amount of solid waste disposed at landfills by 30% through recycling activities. In June, 1995, a total of approximately 15,060 pounds of recyclables were collected from approximately 794 setouts. Average punds per setout were approximately 18.97. The Palm Beach County Solid Waste Authority monitors collection data and reported that the June, 1995 data was typical for an average month. Therefore, it is estimated that approximately 7.53 tons per month, or 90.36 tons per year, are recycled. This represents a reduction of only approximately 3.2% of total solid waste generated. During the 1995-2000 planning period, the City should analyze potential alternative programs that may be implemented to achieve the initial goal of a 30% reduction.~~

6.3 ~~DRAINAGE~~ STORMWATER MANAGEMENT SUB-ELEMENT (Continue)

6.1. Introduction

The ~~DRAINAGE~~ STORMWATER MANAGEMENT sub-element is required to be included within the Comprehensive Plan per requirements of State planning law and rule criteria. Specifically, Chapter 163.3177(6)(c), Florida Statutes, establishes the ~~DRAINAGE~~ STORMWATER MANAGEMENT sub-element requirement and Chapter 9J5.011, Florida Administrative Code, establishes minimum criteria to guide its preparation.

This sub-element contains a summary of the data, and analyses necessary to form the basis for the future ~~DRAINAGE~~ STORMWATER MANAGEMENT Goal, Objectives and Policies.

In keeping with the requirements of Chapter 9J5.005 and 9J5.006 Florida Administrative Code, the ~~DRAINAGE~~ STORMWATER MANAGEMENT sub-element is structured according to the following format:

- Drainage Data; and
- Drainage Analysis ~~and~~
- ~~City Goal, Objectives and Policies~~
- ~~—~~

Initial data are presented on a Countywide basis with further detail utilized for purposes of defining City specific service levels and needs.

6.3.2 Drainage Data Summary

The following information is provided as a brief overview of the laws and requirements of government that currently have jurisdiction over the regulation of drainage. ~~Section 208 of t~~The Clean Water Act, formally the Federal Waper PollutionControl Act (PL92-500, 1972), as amended over the years, is the directing Federal law with respect to water pollution abatement. In implementing the Act, the Environmental Protection Agency (EPA) identified pollutants carried in stormwater runoff as a major source of water contamination. ~~To achieve the pollution abatement goals of the Act, EPA provided assistance to State and local governments to develop Areawide Water Quality Management Plans. The Clean Water Act addresses a broad range of potential water pollution sources, including stormwater, and focused on identifying pollutant sources and abatement needs, as well as development of regulatory programs to ensure implementation~~. The City is currently participating in the Palm Beach County Joint Municipal National Pollutant Discharge Elimination System (NPDES) Permit. The requirements for the permit consist of the use of pollutant retardant structures in the City's storm drainage system as well as other water quality parameters for stormwater runoff. The purpose of the NPDES permit is to reduce pollution due to urban run-off. FDEP is the administering agency for the NPDES (National Pollution Discharge and Elimination System) Stormwater Permitting Program. Palm Beach County has established a Countywide program to meet the requirements of NPDES. There is a 40-member co-permit for the County including participation in the overall permit by the municipalities of Palm Beach County, the County, FDOT, Northern Palm Beach County Improvement District and other Special Districts. This Countywide NPDES Stormwater Permitting Program is in the 7th Year of the Second 5- Year Term of the co-permit. All participants are required to prepare Annual Reports that asses their stormwater management systems and which monitor the quality of surface water discharges into State and federally owned water bodies. A major goal of the program is to continue to meet established State Water Quality Standards.

The Florida Department of Environmental ~~Regulation~~ Protection (~~FDER~~ FDEP) has adopted a Stormwater Rule (Ch, 17-25, Florida Administrative Code) to fulfill part of the State's responsibilities under ~~Section 208~~ of the Federal Water Pollution Control Act. The basic objective is to achieve eighty to ninety-five percent removal of stormwater pollutants before discharge to receiving waters. This rule requires treatment of the first inch of runoff for sites less than one-hundred acres in size and the first one-half inch of runoff for sites one-hundred acres or greater in size.

Implementation of the Stormwater Rule is achieved through a permitting process. FDE~~R~~P has delegated permitting responsibility to the South Florida Water Management District (SFWMD), which is the regional water management district with jurisdiction over Palm Beach County. Exemptions to the permit requirements are provided for: 1) facilities serving individual sites for single-family, duplex, triplex or quadruplex units; 2) facilities serving dwelling units on sites which are less than ten acres in total land area, have less than two acres of impervious area, and which comply with local stormwater management regulations or discharge to a permitted regional facility; and, 3) facilities for agricultural or silvacultural lands which have approved management plans.

The Central and Southern Florida Flood Control District (CSFFCD) was created, by Special Act of the Florida Legislature in 1949 to operate and maintain the Central and Southern Florida Flood Control Project. (Note: The Project was designed and constructed by the U.S. Army Corps of Engineers.) Originally, CSFFCD programs were designed to prevent damage to life and property from storm floods.

~~Recently~~, Later, however, priorities have become more oriented to alleviating the problems associated with water as a resource for consumptive use. The Water Resources Act of 1972 (Chapter 373, Florida Statutes) changed the name of the District to the South Florida Water Management District (SFWMD) and greatly expanded its scope of responsibilities to include water management and resource preservation and conservation. Essentially, the SFWMD is charged with the responsibility to manage all waters, both surface waters and ground waters, within its jurisdictional area.

The General Drainage Laws of Florida (Chapter 293, Florida Statutes) allows the ~~FDER~~ FDEP, or the majority of the owners of any contiguous body of wet or over-flooded land or lands subject to overflow, to form a Drainage/Water Control District. These districts are distinguished from the SFWMD in that they are formed by landowners for the purpose of providing drainage or irrigation services for their own lands. Normally, these districts are dependent upon SFWMD project works for disposal of excess surface waters or to provide irrigation water. Therefore, it can be said that these small Districts provide "secondary" drainage and irrigation services that are dependent upon the "primary" system, operated by the SFWMD. As such, each District is subject to the Surface Water Management Permit System administered by the SFWMD.

The General Drainage Laws grant a rather wide range of powers to Drainage Districts in relation to the provision of drainage, irrigation, and water management services. The laws are open-ended, in that provision is made for Drainage Districts to be granted the authority to provide virtually any additional municipal service (i.e. by Special Act of the Florida Legislature).

Each District is required to prepare a ~~Water Management~~ Plan of Reclamation, which is a full and complete plan for draining and reclaiming lands, including specifications for the length, width and depth of any canals, ditches, dikes, levees or other works proposed. No related improvement can be undertaken that is not consistent with this Plan.

The City of South Bay is within portions the following two Districts: (1) the South Shore Drainage District and (2) the South Florida Conservancy District. District boundaries are illustrated on FIGURE 6.3-1.

Through the City Public Works Department, regulation of new development is accomplished by the application of local ordinances and cooperation with other regulatory agencies.

6.3.2.1 Climatological Conditions

The climate within the County is generally influenced by the warm waters of the Gulf Stream and the Atlantic Ocean. The range of temperatures throughout the year is comparatively small, with the average (mean) annual temperature being approximately 75 F.

Annual rainfall for the area averages approximately sixty inches. The average wind speed is 9.4 miles per hour and the prevailing direction is from the east-southeast.

6.3.2.2 Primary Drainage Features

Palm Beach County is only one of sixteen Counties being served by a major project designed and constructed by the U.S. Army Corps of Engineers to prevent damage of life and property from storm floods. The SFWMD is the local agency charged with the responsibility to operate and maintain the project canals, structures and associated facilities. The surface water hydrology of the project are is characterized by an extensive, heavily-managed canal network, a series of large capacity, low head pumping installations and several surface water impoundment areas that comprise more than one-thousand miles. The major systems are the Kissimmee Lakes and River; Lake Okeechobee; the Everglades region, including the Everglades Agricultural Area, Water Conservation Areas and Everglades National Park; the Lower East Coast Canal System

Drainage Districts/Water Control Districts

(To be Inserted in Update)

FIGURE 6.3-1

(Dade, Broward and Palm Beach Counties); the Upper East Coast Canal System (Martin and St. Lucie Counties); and the Caloosahatchee Canal Basin.

The Lower East Coast Canal network is the system that has the most direct effect on the City of South Bay. Four major canals (i.e. the West Palm Beach, Hillsboro, North New River, and Miami Canals) serve as primary drainage outlets for excess water from the Everglades Agricultural Area and the Water Conservation areas, and as secondary outlets for excess water from Lake Okeechobee. Stages in these canals are maintained at established levels that vary with the season. During the wet season, canal stages are generally maintained at a low level to provide additional water storage capacity for runoff. During the dry season, canal stages are usually maintained at higher levels to provide additional ground water recharge and to prevent salt water intrusion along the coastal areas.

The coastal canals allow transfer of water from the Everglades Water Conservation Areas to coastal communities during times of drought. This water recharges major wellfields that are located near the canals and raises the ground water levels in coastal areas to provide additional water to self-supplied water systems. Water stages in the eastern reaches of these canals are controlled by a series of water control structures, most of which are automatically operated (i.e. with manual overrides) to open and close in response to the water level in the canals.

6.3.2.3 Local Drainage System

Primary and secondary drainage facilities in South Bay consist of a series of canals which border upon or run through the City. The South Shore Drainage District owns, operates and maintains drainage canals along the City's western corporate limits and also running east-west trough the City along the S.W. 3rd Street right-of-way from the western corporate limits to the North New River Canal. The South Florida Conservancy District owns, operates and maintains drainage canals along the City's eastern corporate limits. These canals discharge into the North New River Canal which is owned, operated and maintained by the South Florida Water Management District (SFWMD) and which runs through the City along 1st Avenue. FIGURE 6.3-2 identifies canal locations and illustrates the City's existing local drainage system.

Prior to 1979, the only drainage facilities within the City limits were the above described primary or secondary canals and the local roadway drainage systems along State Road 80 and State Road 25 (U.S. 27) which are owned, operated and maintained by the Florida Department of Transportation (FDOT). At that time, many areas of the City were subject to flooding during a stormwater event because there were no local drainage facilities to collect runoff and transport it to their primary or secondary drainage systems.

Commencing in 1979, the City began an aggressive program which included reconstruction of roadways together with the construction of local drainage facilities

constructed since that time. ~~A recent inventory of local drainage pipes which are owned and maintained by the City is summarized in TABLE 6.3-1.~~ An annual assessment of the drainage/stormwater management system is performed as part of the annual reporting requirements of the NPDES Stormwater Permitting Program. Monitoring of the system and updates to the facilities are also reported and records maintained in the Annual NPDES Report.

~~TABLE 6.3-1~~

~~EXISTING SECONDARY DRAINAGE FACILITIES~~

~~Pipe Size, Inches~~	~~Approximate Length, Feet~~
~~12~~	~~3922~~
~~15~~	~~6237~~
~~18~~	~~2091~~
~~21~~	~~1372~~
~~24~~	~~1398~~
~~27~~	~~360~~
~~36~~	~~1470~~

~~Additionally, the City's drainage facilities include 114 inlets, 34 manholes and 8 outfalls.~~

6.3.3 Drainage Analysis

6.3.3.1 Capacity Assessment

The City's existing drainage/stormwater management system has been built in a piecemeal fashion over time with the majority of the system being constructed since 1979. According to the City's consulting engineers, the major portion of the local drainage system was designed similar to a Florida Department of Transportation (FDOT) system using FDOT three year rainfall duration-intensity curves for the area. This equates to a rainfall depth of between 4.5 and 5.0 inches in a given 24-hour period.

A review of South Florida Water Management District rainfall data collected from the nearest station to the City indicates that over the past ~~ten~~ several years, several storm events approximating, or exceeding, the three year, one day design storm event have occurred. However, according to the City's engineer, drainage has not been a problem since system improvements were implemented. Further, the maximum ponding time within developed drainage or swale areas is generally less than forty minutes.

Existing Drainage System

(To be Inserted in Update)

FIGURE 6.3-2

During the 1989-1994 planning period, localized improvements ~~have been~~ were made to the City's drainage system in conjunction with roadway improvements and normal maintenance improvements. The City established a routine drainage inspection schedule and has repaired, replaced or modified various deteriorated and clogged drainage structures in some older areas of the City. Also, all of the pump stations in the South Shore Drainage District (SSDD) were rehabilitated during the planning period according to the District superintendent. The entire State of Florida was ravaged by hurricanes in 2004. Hurricanes Frances and Jean devastated the South Florida area in particular, including South Bay, during September and October of 2004. Then in 2005, Hurricane Wilma also swept across the southern part of Florida, again including South Bay, heaping additional damage on the area. All of these Hurricanes were "wet" hurricanes causing extreme flooding and ponding which constrained the drainage and stormwater system beyond its normal design storm capabilities. Fallen debris slowed normal drainage, but not to the point of creating damage to the system. In fact, the system held up remarkably well and eventually was able to drawn down surface water levels in the City.

~~In addition, t~~The SSDD has entered into a consent agreement with the Florida Department of Environmental Protection (DEP) which ~~will~~ required the diversion of 80% of flowwaters to new Stormwater Treatment Areas (STAs). ~~The STAs will be constructed by the South Florida Water Management District (SFWMD) as part of the Everglades Forever Act. This is proposed to occur by year 2002.~~ This will effect the City drainage as the City will be at the "backend" of the revised drainage network. Also, quarterly water quality sampling has been instituted recently as part of the agreement. No agency has identified specific water impact problems by the City. The sampling will identify any water quality concerns.

The design capacity and the level of service is estimated to be at least satisfactory to meet the three (3) year, one (1) day storm event. Therefore, the City has adopted a three (3) year, one (1) day duration design storm Level of Service Standard for its drainage and stormwater management system. Since the City is approximately ninety-one percent (91%) developed, this system appears to be capable of handling the current demand, as well as, the five-year and ten year run-off demand, provided proper maintenance, inspection and repairs are performed as necessary.

Needs Assessment

Most of the stormwater drainage problems occur within the older sections of the City. Deteriorated or clogged structures in these areas need to be monitored routinely and repaired, replaced or modified. Deficiencies are primarily related to routine maintenance requiring unclogging of conduits, driveways or streets, regarding portions of drainage swales or improving existing swale areas. Maintenance is required to prolong the service

life of the existing facilities and routine inspection will ensure that the system is functioning properly and problem areas are identified.

The City inspects all major drainage facilities (catch basins, outfalls, roadway swales) at least twice per year as part of its responsibilities under its NPDES Stormwater Permitting Program and Annual NPDES Report requirements.

Any roadway widening or improvements should continue to be coordinated with the responsible jurisdiction in order to evaluate the need for supplementary improvements and included with all local drainage projects in the 5-Year Schedule of Improvements adopted in the City of South Bay Comprehensive Plan..

~~Further, the City should investigate the feasibility of funding an engineering study to develop an overall master drainage plan, including the establishment of a routine inspection and maintenance schedule if financially feasible. The plan would also establish a more technically based level of service standard for the local drainage system.~~

~~The funding of and schedule for a drainage study should be included within the CAPITAL IMPROVEMENTS element of this the Comprehensive Plan at such time that the feasibility is confirmed by the City.~~

6.3.3.2 Expected Life of the Drainage System (Continue

The local drainage system has an indefinite life expectancy. When problems occur, the system will be repaired on an as-needed-basis. Further, preventative maintenance performed should continue be performed to maintain system effectiveness.

6.3.3.3 Drainage System Impacts on Natural Resources

Local drainage system impacts upon adjacent natural resources are considered to be minimal. Since the City is currently over 91% developed, it is reasonable to assume that the future development will have a minor impact on the surrounding natural resources provided proper planning and current regulations are implemented.

6.3.3.4 Major Natural Drainage Features

Due to the City's inland location, elevation and soil types, South Bay has not been identified as a special flood hazard area by the U.S. Department of Housing and Urban Development, Federal Insurance Administration under the authority of the National Flood Insurance Act. ~~of 1968, as amended and the Flood Disaster Protection Act of 1973.~~

6.3.3.5 Existing Regulations

The regulation of new development is accomplished by local ordinances and cooperation with other regulatory agencies. City ordinances requiring permits prior to construction and development include the following:

1. Subdivision Ordinance
2. ~~Standard~~ Florida Building Code
3. NPDES ~~permit conditions~~ Ordinance

~~The Palm Beach County 208 Plan recommended that s~~Several non- structural stormwater related Best Management Practices (BMP's) are being implemented on a County-wide basis. As identified previously in this section, the City is a participant in the Palm Beach Countywide NPDES Stormwater Permitting Program by virtue of its membership in the 40-member co-permit for the County. Many BMP's are being implemented as a result of this program. These BMP's are designed to be a cost effective approach to reduce the detrimental impacts of pollution from stormwater runoff. ~~The City should consider the adoption of these BMP's for inclusion into its site plan review process.~~

The Palm Beach County Joint Municipal NPDES permit requires all new development located within the City of South Bay to be subject to all requirements contained within the requirements of the permit. Such requirements include, but are not limited to, utilization of BMPs.

In addition, the City remains receptive to the consideration of additional regulations that further protect the environment and the quality of South Bay residents.

6.4 POTABLE WATER SUB-ELEMENT

6.4.1 Introduction

The POTABLE WATER sub-element is required to be included within the Comprehensive Plan per requirements of State planning law and rule criteria. Specifically, Chapter 163.3177(6) (c), Florida Statutes, establishes the POTABLE WATER sub-element requirement and Chapter 9J5.011, Florida Administrative Code, establishes minimum criteria to guide its preparation.

The sub-element contains a summary of the data, analyses and support documentation necessary to form the basis for the future potable water Goal, Objectives and Policies.

In keeping with the requirements of Chapter 9J5.005 and 9J5.006 Florida Administrative Code, the POTABLE 'WATER sub-element is structured according to the following format:

- Potable Water Data; and
- Potable Water Analysis ~~and~~
- ~~City Goal, Objectives and Policies~~

6.4.2 Potable Water Data Summary

The Federal government has established quality standards for, the protection of water for public use, including operating standards and quality controls for public water systems. These regulations are provided in the Safe Drinking Water Act, Public Law 93-523. This law directed the Environmental Protection Agency (EPA) to establish minimum drinking water standards. The EPA standards are divided into "primary" (those required for public health) and "secondary" (recommended for aesthetic quality) categories.

In accordance with Federal requirements, the Florida Legislature has adopted the Florida Safe Drinking Water Act, Sections 403.850 - 403.864, Florida Statutes. The Florida Department of Environmental Protection. FDEP is the State agency responsible for implementing this Act. In this regard, FDEP has promulgated rules classifying and regulating public water systems under Chapter 17-22, Florida Administrative Code. The primary and secondary standards of the Federal Safe Drinking Water Act are mandatory in Florida.

The South Florida Water Management District (SFWMD) is responsible for managing water supplies to meet existing and future demands. Regulation of consumptive use is achieved through a permitting system, through which water resources are allocated among the permitted consumers. The SFWMD rules pertinent to Palm Beach County are contained in Chapter 40E, Florida Administrative Code. The Environmental Sciences and Engineering Division of the Palm Beach County Health, Department is responsible for enforcement of rules adopted by the FDER regulations. Water quality and production records are submitted by each public water system supply operator to the Environmental Sciences and Engineering Division for determination of compliance with FDER regulations.

6.4.2.1 Operational Entity and Service Area

~~There has been no centralized, countywide potable water systems planning effort in Palm Beach County. Regional wastewater planning in Palm Beach County was promoted by grant programs under the Federal Water Pollution Control Act; however, such programs were not made available for water supply system planning. As a result, without the~~

~~impetus of funding assistance, similar Countywide or regional planning for water supply systems has not been performed. Rather, system planning has been accomplished by individual operators (i.e. County or municipal governments and privately-owned utilities).~~

~~The South Bay water system is owned and operated by the City and is financed by user charges and connection fees. The service area of the South Bay Water System includes all the incorporated areas of the City. Also, the City provides service (i.e. under a bulk sale agreement) to the unincorporated area west of the City presently served by the South Shore Water Association.~~

After October 1, 2009, the City of South Bay will relinquish the ownership, operation and maintenance of it's entire potable water system, including the transmission and distribution lines, to the Glades Utility Authority (GUA). Water treatment has been recently transferred to the GUA and operated by the Palm Beach County Utilities Department (PBCWUD). The City used to own and operate its own water treatment plant until it was taken out of service in 2008. Through cooperative agreement with Palm Beach County, water was subsequently treated at the Belle Glade Water treatment plant, which is a regional facility that serves the Cities of South Bay, Belle Glade and Pahokee, as well as certain unincorporated areas. Earlier in 2009, the GUA was established to manage and operate the treatment facility. After October 1, 2009 the GUA will assume ownership and operation of the City's distribution lines and the billing function, as well. As part of this transfer of responsibility, the GUA assumes all of the outstanding bonded indebtedness related to the City's water system. The entire potable water system is being evaluated to determine future status of the system.

6.4.2.2 Design Capacity

In 1963, South Bay completed construction of a .576 million gallon per day (MGD) capacity water supply, treatment and transmission facility to serve residential, commercial and industrial users within the City and to provide improved fire protection service. Prior to that time , water to the City was supplied through a single six inch diameter water main extending to South Bay, a distance of one and one-half miles, from the southwest portion of the City of Belle Glade. During this period, both water volume and pressure were inadequate and, on occasion, the City was totally without public water supply. Completion of the municipally-owned waterworks facility in 1963 alleviated this problem and the City was provided with an adequate public water supply for domestic consumption and fire protection purposes. However, population growth in South Bay between 1963 and 1980 caused the system to exceed its permitted capacity. The system had to be expanded to meet the increased demand. During the 1980 to 1984 period, the water treatment plant was further expanded from 0.576 MGD to 2.2 MGD. A 1.0 million ground water storage tank and repump facility was also constructed.

Extensive improvements were made to the distribution system including the replacement of mains, valves and appurtenances. Additional fire hydrants were also placed on line throughout the City. ~~As of 1995, the plant remains rated at 2.2 mgd.~~

Source of Supply

South Bay's raw water supply consists of surface water withdrawn from the Rim Canal inside the Herbert Hoover dike which forms the perimeter of Lake Okeechobee. Raw water is transmitted to the Belle Glade (GUA) regional facility for treatment. ~~pumped from the Rim Canal to the water treatment plant, approximately 1500 feet, by three vertical turbine pumps rated at 750 gallons per minute (gpm) each. The pumps and related equipment are housed in a piling supported intake structure which extends approximately 50 feet into the Rim Canal from the shore.~~

~~The City's withdrawal permit, issued by the South Florida Water Management District permits an annual withdrawal allocation of 141.7 million gallons per year (MGY), or 0.936 MGD, with a maximum daily withdrawal of 1.98 MGD.~~

~~Treatment and Pumping~~

As previously identified, treatment of the potable water supply is facilitated at the Belle Glade (GUA) regional water treatment plant

~~Water treatment facilities consist of aeration, pre-chlorination, chemical addition and rapid-mix, floculation, softening, clarification, filtration, ozonation, post-chlorination, metering and pumping. The design characteristics and capacities of the various treatment units are listed on TABLE 6.4-1.~~

~~The treatment plant underwent an expansion and improvements program in 1982 and all components of the system are in good working order, according to the City's consulting engineer. In 1995, the system has adequate capacity to meet with current needs, however, the plant is in need of several maintenance type improvements due to aging components of the system. In the past, the City's ability to complete needed maintenance improvements to the plant has been restricted to the City's limited financial means, however, it should be noted that the City has been able to obtain funds from a variety of sources and complete small maintenance repairs. During the 1990-1995 planning period through a $50,000 FEEWP matching grant, a $100,000 series of improvements were made including new pumps, motors and piping to reduce the energy cost of providing service. Also, the construction of the new prison is expected to significantly increase the demand for potable water. In 1995, the City has secured grant funds to construct an additional storage tank and install high speed pumps to offset the anticipated demand from the prison. In conclusion, the City's water plant currently has adequate capacity to meet the current demands of the City, however, due to aging components, the plant and~~

system are in need of on-going maintenance rehabilitation and/or repairs. During the 1995-2001 planning period, the City should continue to complete needed maintenance/rehabilitation/repairs to the water plant and distribution system, to the extent feasible. In addition, the City should continue to solicit grant or other funds to allow for construction of additional needed improvements.

TABLE 6.4-1

WATER TREATMENT PLANT
DESIGN CHARACTERISTICS

Design Flow		1500 gpm 2.16 MGD
Aeration:	1. Type	Flat Tray
	2. No. of Trays	7
	3. Area per Tray	45 sq. ft.
	4. Tray Loading	4.76 gpm/sq. ft.
	5. Tray Separation	16 inches
Rapid Mix:	1. Type	Mech. Mixer
	2. Volume of Tank	760 gallons
	3. Detention Time	30 Seconds
Floculation:	1. Type	Mech. Mixer
	2. No. of Chambers	3
	3. Volume of Chamber	15,000 gallons
	4. Total Volume	45,000 gallons
	5. Detention Time @ Max. Flow	30 Minutes
	6. Tip Speed	Variable 307 fps
	7. Type of Mixer	Constant pitch, variable angle impeller
Settling Basin (Existing Clarifier):		
	1. Type	Solids Contact Unit
	2. Volume	115,100 gallons
	3. Retention Time	1.25 hours
Softening:	1. Type	Solids Contact Unit
	2. Size	60’ Diameter
	3. Volume	373,635 gallons

	4.	Detention Time @ 1500 gpm	4.15 hours
	5.	Rise Rate	0.60 gpm/sq. ft.
Filtration:	1.	Type	Dual Media
	2.	No. of Cells Exist.	3
		Addition	3
	3.	Total Existing Area	420 sq. ft.
	4.	Total Additional Area	495 sq. ft.
	5.	Total Filter Bed Area	915 sq. ft.
Oxidation:	1.	Type	Ozonation
	2.	Feed Rate	230 lbs./day
Disinfection:	1.	Type	Chlorination
	2.	Maximum Rate	1000 lbs./day
Emergency Power:		300 KW Diesel Generator Set with Automatic Transfer Switch, 100% Stand-By Power	
Filter Backwash Pump:		1 @ 3000 gpm	
High Service Pumps:		1 @ 750 gpm	
		1 @ 1300 gpm	
		2 @ 1500 gpm	

In addition to the water treatment plant, the City has an emergency interconnecting watermain with the City of Belle Glad. The watermain is an 8-inch diameter pipe which runs approximately 7300 feet along the south side of State Road 80 from the east corporate limits of the City to the intersection of State Road 715 where it connects to the Belle Glade system. This interconnection is available for use on an emergency basis.

Water Storage

Total storage in the system consists of 1.0 million gallon (MG) ground level water storage tank constructed of pre-stressed concrete. A 100,000 gallon steel elevated storage tank enables the peak cycling rates of the high service pumps to be regulated. The storage facilities are centrally located in the downtown area of the City. The existing storage facilities are adequate to satisfy the estimated maximum day domestic and fire demands.

Transmission and Distribution

As previously identified, the ownership, operation and maintenance of the City of South Bay potable water transmission and distribution lines will be transferred to the GUA after October 1, 2009. Alternatives to the future status of the transmission, distribution, treatment and pumping facilities are currently being examined.

~~The water transmission and distribution system provides reliable water service to all areas of South Bay. A 12-inch diameter transmission main extends southerly along the Herbert Hoover dike from the eater treatment plant to U.S. 27 (State Road 25) and continues southeasterly along this highway a total distance of 10,000 feet to the City of South Bay. An 8-inch diameter transmission main, owned by the South Shore Water Association extends westerly from the 12-inch diameter main along U.S. 27 to the City of Clewiston.~~

~~Connecting the water treatment plant, the water storage and repump facility and the elevated water storage tank are 8-inch and 12-inch diameter transmission mains. From these transmission mains and distribution system extends in all directions and is relatively well looped with 2, 4, 6 and 8 inch mains. Valves are located at strategic points in the system. FIGURE 6.4-1 illustrates the City's existing water distribution system.~~

~~An inventory of the distribution system has been completed and is displayed on TABLE 6.4-2:~~

~~TABLE 6.4-2~~

~~WATER MAIN INVENTORY~~

~~Main Size Inches~~	~~Approximate Length, Feet~~
~~2~~	~~3500~~
~~4~~	~~1200~~
~~6~~	~~64,490~~
~~8~~	~~2490~~
~~12~~	~~11,300~~

~~In addition, there 154 water valves of various sizes in the system and approximately 1200 water meters and other appurtenant equipment.~~

Fire Protection

The City of South Bay recently eliminated its Fire Department and entered into agreement with Palm Beach County Fire Rescue for these services. The water distribution system and fire hydrants located throughout the City provide adequate supply and pressure for fire fighting purposes.

~~South Bay maintains its own fire fighting force with the source of water supplied by the City's water distribution system. There are approximately 101 fire hydrants located within the system.~~

6.4.2.3 Current Demand and Level of Service

The following three system-wide water demand characteristics are important for assessing the capacity of water treatment, pumping and transmission facilities to serve customers according to industry standards.

- Annual Average Daily Flow (AADF) – total system water demand for the year divided by 365 days.

- Maximum Daily Flow (MDF) – the largest water demand during a single 24-hour day in the year of interest.

- Peak Hour Flow (PHF) – the largest demand over a 1-hour period in the year of interest.

TABLE 6.4-~~3~~ 1 presents recorded maximum day and average day demand data ~~obtained over the twelve month period in 1995.~~

TABLE 6.4-~~3~~ 1

CITY OF SOUTH BAY WATER FLOW DATA, ~~1995~~

Year	Maximum Daily Demand (GPCD)	Average Daily Demand (GPCD)	Peak Factor
1995	140	88	1.5 over Max. Daily Demand

Source: City of South Bay, ~~1996~~ 2009 EAR.

These LOS standards should be maintained by the City until such time the GUA evaluates the entire potable water system can be reassessed.

~~Included in the City's water flow data shown in TABLE 6.4-3 is the contracted water flow provided to the South Shore Water Association. During the 1995 period, the flow demands were created by an estimated 4207 equivalent City residents together with an estimated 1179 persons served by the South Shore Water Association. This is a total of 5386 equivalent persons, reflecting a maximum day demand of approximately 140 gallons per capita. The computed average daily demand is estimated at 88 gallons per capita per day. For purposes of this analysis, a peaking factor of 1.5 is assumed over the maximum day demand which is reasonable for the service area. During the planning period closing of South Bay Growers, Inc. significantly reduced the demand for potable water.~~

6.4.3 Potable Water System Analysis

6.4.3.1 Facility Capacity Analysis

In considering the projections of water consumptions it is not reasonable to assume that domestic water consumption will cease during fire demand periods. Therefore, it is necessary that fire demand be added to the domestic demand as determined on a maximum day basis.

~~For purposes of this analysis, the National Board of Fire Underwriters (NBFU) requirements for fire flow will be used. These NBFU fire flow requirements are based upon population and type of fire hazard. The fire flow in gallons per minute is obtained using the following formula:~~

~~G = 1020 F (1-0.01 P), where~~
~~G = required fire flow in gallons per minute~~
~~P = population in thousands~~

~~Projections of water consumption, for South Bay, based upon per capita consumption rates developed in Section 6.4.2.3 are presented on TABLE 6.4-4 2 for the five and ten year projection periods.~~

~~TABLE 6.4-4 2~~

~~POTABLE WATER CONSUMPTION (Projected Flows)~~

~~Year~~	~~Population South Bay~~	~~South Shore~~	~~Total~~	~~Avg. Daily Demand (MGD)~~	~~Max. Demand~~	~~Daily (MGD)~~	~~Fire Demand (GPM)~~	~~Total Demand (GPM)~~
~~1987~~	~~3808~~	~~1100~~	~~4908~~	~~0.85~~	~~1.52~~	~~1056 (GPM)~~	~~2210~~	~~3266~~
~~1994~~	~~4207~~	~~1179~~	~~5206~~	~~0.46~~	~~.73~~	~~507 (GPM)~~	~~1061~~	~~1568~~
~~2000~~	~~4800~~	~~1245~~	~~6045~~	~~0.53~~	~~.84~~	~~583 (GPM)~~	~~1220~~	~~1803~~
~~2005~~	~~5060~~	~~1300~~	~~6360~~	~~0.55~~	~~.89~~	~~618 (GPM)~~	~~1293~~	~~1911~~

~~* 1994 data may be misleading because of closure of agricultural/industrial uses.~~

~~Source: City of South Bay Utility Department, 1995~~
~~Craig A. Smith and Associates, Inc., 1997~~

~~Based upon the above projections, it is concluded that the South Bay potable water treatment facility has the current capacity to accommodate projected growth within the City for both the five and ten year projection periods.~~

6.4.3.2 General Performance Evaluation

~~In regards to the water supply, the Rim Canal intake structure is located approximately 6000 feet southwest of a major storm water back-pumping station owned by the South Florida Water Management District. During normal operation conditions, major inflow into Lake Okeechobee is from the Kissimmee River on the north side of the Lake with excess water discharged through several outlets, including the North New River Canal on which the pumping station is located. However, during wet weather conditions this pumping station is operated to transfer excess rainwater drainage from the North New River Canal northward into the Lake, and the intensity if pollutants in the Lake waters near the South Bay intake structure increases. Since the primary intake in the Rim Canal cannot be used during wet weather because of deterioration in the water quality, and the quality of the alternative source, the rock pit adjacent to the water plant, became unusable because of high salinity in the groundwater; another means of obtaining freshwater had to be found.~~

~~Because the discharges from Kissimmee River, Fisheating Creek, Tylor Creek and Nubbin Slough into Lake Okeechobee from the north and pumping excess rainwater from~~

~~the south present a complicated water quality problem, a location for an alternative intake in the Lake itself would at best provide an interim solution to the City's potable water problem. And, since wells are all but out of the question in the Glades area, it became obvious that the solution would have to be out of the ordinary. Various alternatives are being explored and a procedure called post-ozonation has proven to be effective in the final removal of color and odor.~~

~~The existing water treatment facility serving the City of South Bay provides complete treatment including aeration, pre-chlorination, chemical precipitation and softening in a conventional solids contact unit, rapid sand filtration, post- ozonation and post-chlorination prior to high service pumping to transmission and distribution facilities. The Palm Beach County Health Department's categorizes the South Bay water system as Class 1-A system that utilizes coagulation and filtration. The water treatment plant and high service pumping facility is located on a five acre land parcel acquired by the City for this purpose, approximately 600 feet outside the toe of Herbert Hoover dike surrounding Lake Okeechobee and approximately 2000 feet north of State Road 25 connecting the City of South Bay and City of Clewiston.~~

Treated water storage capacity includes clearwell storage at the treatment plant, a 1.0 million gallon (MG) groundwater storage and repump facility, and a 0.1 MG elevated water storage tank located near the center of the City. The repump facility is used to maintain the elevated tank water levels, thereby providing sufficient residual pressure throughout the distribution system. This has resulted in a greatly improved insurance rating which is reflected in reduced insurance rates.

The existing water distribution system serving the City is generally satisfactory. However, ~~as discussed previously,~~ due to the presence of old components of the system, various components are in need of rehabilitation and repair. The City is able to complete improvements based only on the availability of funds and should continue to solicit funds from various sources to accomplish needed improvements during the ~~1996-2001~~ short and long term planning periods of the Comprehensive Plan.

6.4.3.3 Individual Water Wells

~~It is not known whether or not t~~There are no individual wells in use in the City at this time. ~~However, t~~The shallow groundwaters in the area are known to contain high chloride and other mineral levels making them unuseable for public water supply. This is characteristic of the shallow groundwater quality in the western Palm Beach County area. ~~Therefore, it is concluded that if there are any in service, the number is minimal. On this basis it is concluded that that there is minimal, if any, impact upon the water supply caused by individual wells in South Bay.~~ It is anticipated that any additional development within the City will be served by the City system.

Even though the City is not a water supplier, it is required to prepare and maintain a 10-Year Water Supply Facilities Work Plan and adopt revisions to this Comprehensive Plan that specific water supply projects to meet the City's future demands. The South Florida Water Management District approved (on February 15, 2007) its 2005-2006 Lower East Coast Water Supply Plan Update for the Lower East Coast Planning Area. The City of South Bay is located within the Lower East Coast Planning Area. All local governments within the Lower East Coast Planning Area, were required to adopt amendments to its Comprehensive Plan within eighteen (18) months of the South Florida Water Management District Governing Body's approval of the 2005-2006 Lower East Coast Water Supply Plan Update (Section 163.3177(6)(c), Florida Statutes). The City adopted it's Plan in 2009.

Due to the limited potential for future development in the City, it is anticipated that future growth and development in South Bay will be provided potable water by the central system.

The City of South Bay has minimal impacts on the adjacent natural resources. Due to the City's inland location, elevation and soil types, the City's impacts upon adjacent natural resources are considered minimal. Since the Town is currently ninety-one percent (91%) developed, it is reasonable to assume that future development will have an insignificant or minor impact on the surrounding natural resources, provided proper planning and current regulations are followed.

Without inventorying each dwelling and commercial entity in City, an analysis of existing water conservation, use and protection cannot be analyzed and assessed. This local analysis has not been performed (and is not required to be performed), however, the South Florida Water Management District Staff was consulted to determine what water conservation practices could be reasonably implemented in South Bay. As a result of this consultation, an Objective and Policies have been established in the Potable Water sub-element of the Comprehensive Plan document that address participating in the South Florida Water Management District Water Shortage Plan, and which enforce water emergency provisions; promote the use of xeriscape materials; and, promote the use of low volume fixtures when reviewing building permit applications. At a minimum, Policies should be established in the Comprehensive Plan to address these concerns.

6.5 NATURAL GROUNDWATER AQUIFER RECHARGE AND NATURAL GROUNDWATER AQUIFER RECHARGE SUB-ELEMENT (Continue)

6.5.1 Introduction

The NATURAL GROUNDWATER AQUIFER RECHARGE sub-element is required to be included within the Comprehensive Plan per requirements of State planning law and rule criteria. Specifically, Chapter 163.3177(6)(c), Florida Statutes, establishes the NATURAL GROUNDWATER AQUIFER RECHARGE sub-element requirement and Chapter 9J5.011 Florida Administrative Code, establishes minimum criteria to guide its preparation.

This sub-element contains a summary of the data, analyses and support documentation necessary to form the basis for future NATURAL GROUNDWATER AQUIFER RECHARGE Goal, Objectives and Policies.

In keeping with the requirements of Chapter 9J5.005 and 9J5.006 Florida Administrative Code, the NATURAL GROUNDWATER AQUIFER RECHARGE sub-element is structured according to the following format:

- Regulatory Framework Summary;
- Existing Conditions; and
- Natural Groundwater Aquifer Recharge Analysis; ~~and~~
- ~~City Goal, Objectives and Policies~~

6.5.2 Natural Groundwater Aquifer Recharge

The following is provided as a brief overview of the laws and requirements by various levels of government that currently have jurisdiction in the regulation of groundwater resources or aquifer protection.

In 1986, the Federal Safe Drinking Water Act (PL 93-523) was amended to strengthen protection of public water system wellfields and aquifers that are the sole source of drinking water for a community. The amendments for wellfield protection require states to work with local governments to map wellfield areas and develop land use controls that will provide long-term protection from contamination for these areas. The aquifer protection amendments require Environmental Protection Agency (EPA) to develop criteria for selecting critical aquifer protection areas. The program call~~s~~ed for State and local governments to map these areas and develop protection plans, subject to EPA review and approval. Once a plan ~~is~~ was approved, EPA ~~may~~ entered into an agreement with' the local government to implement the plan. ~~As of this writing, EPA has not completed development of the criteria needed to implement this program.~~

In implementing the Florida Safe Drinking Water Act (Chapter 403, Florida Statutes), ~~FDER~~ Florida Department of Environmental Protection (FDEP) has developed rules classifying aquifers and regulating their use (Chapter 17-22, Part III, F.A.C.). FDEP has also established regulatory requirements for facilities which discharge to groundwater (Section 17-4.245, Florida Administrative Code) and which inject materials directly underground (Chapter 17-28, Florida Administrative Code). The task of identifying the nature and extent of groundwater resources available within the State has been delegated to the regional water management districts. Each district must prepare and make available to local governments a Ground Water Basin Resource Availability Inventory (GWBRAI), which the local governments are to use to plan for future development in a manner which reflects the limits of available resources. The criteria for the inventories, and legislative intent for their use, are found in Chapter 373. Florida Statutes, which reads: "Each water management district shall develop a groundwater basin resource availability inventory (GWBRAI) covering those areas deemed appropriate by the governing board". This inventory shall include, but not be limited to, the following:

1. A hydro geologic study to define the groundwater basin and its associated recharge areas.
2. Site specific areas in the basin deemed prone to contamination or overdraft resulting from current or projected development.
3. Prime groundwater recharge areas.
4. Criteria to establish minimum seasonal surface and groundwater levels.
5. Areas suitable for future water resource development within the groundwater basin.
6. Existing sources of wastewater discharge suitable for reuse, as well as the feasibility of integrating coastal wellfields.
7. Potential quantities of water available for consumptive uses.

Upon completion, a copy of the groundwater basin availability inventory shall be submitted to each affected municipality, county, and regional planning agency. This inventory shall be reviewed by the affected municipalities, counties, and regional planning agencies for consistency with the local government comprehensive plan, and shall be considered in future revision of such plan. It is the intent of the Legislature that future growth and development planning reflect the limitations of the available groundwater or other available water supplies (Section 373.0395, Florida Statutes).

The Florida Legislature has also directed local governments to include topographic maps of areas designated by the water management districts as prime recharge areas for the Floridian or Biscayne aquifers in local comprehensive plans, and to give special consideration to these areas in zoning and land use decisions (Section 163.3i.77(6)(c), Florida Statutes). ~~As of this writing, The South Florida Water Management District (SFWMD) has not completed the GWBRAI for Palm Beach County. Further, the SFWMD has not adopted or designated any areas as prime recharge areas within Palm~~

~~Beach County. However, t~~The SFWMD regards all undeveloped and open space areas in Palm Beach County as high recharge areas due to the Shallow Aquifer/Surficial Aquifer supporting the County.

The Board of County Commissioners of Palm Beach County, under the authority granted in the Palm Beach County Charter has adopted a Countywide Ordinance known as the Palm Beach County Wellfield Protection Ordinance. This Ordinance ~~will be~~ is used for the protection of wells and wellfields by providing criteria for regulating and prohibiting the use, handling, production and storage of certain deleterious substances which may impair present and future public potable water supply wells and wellfields. All provisions of this Ordinance are to be effective within both the incorporated and unincorporated areas of Palm Beach County, Florida. Palm Beach County has ~~recently~~ established an Environmental Resource Management Department whose responsibility ~~it will be~~ is to administer this Ordinance within the County The Ordinance will have no effect in South Bay since potable water supply is drawn from a surface source..

6.5.2.1 Geology

During the Ice Age of the Pleistocene period, which occurred approximately one million years ago, glacial movement created tremendous fluctuations in the levels of the seas. Intrusion and withdrawal of the seas across the peninsula greatly influenced the geology of the region by eroding much of the sand from beaches in Central Florida. These sands, mixed with shellfish, were deposited in an area extending from southern Palm Beach County north to St. Augustine. This deposit of sand and shell material called the Fort Thompson Formation, underlies the City of South Bay.

The remaining rock formations in the County are Caloosahatchee Marl, the Anastasia Formation and the Miami Oolite. (See FIGURE 6.5-1)

6.5.2.2 Hydrogeologic Divisions

Geologic formations can be divided hydrogeologically into aquifers, units which produce water, and confining zones, units which separate aquifers and retard the movement of water from one aquifer to another. They hydro geologic units underlying Palm Beach County are the Surficial Aquifer System (i.e. commonly referred to as the Shallow Aquifer), the intermediate Aquifer System (Hawthorn Confining Layer), and the Floridian Aquifer System, which are further described below:

The Surficial Aquifer System provides almost all of the ground water used in Palm Beach County. It covers the entire County and ranges from about one hundred-fifty to three hundred-fifty feet thick. FIGURE6.5-2 identifies the base of this Surficial Aquifer System. Regionally, the system is composed of unconsolidated sand and shell with dis-

Generalized Geologic Cross-Section

(To be Inserted)

FIGURE 6.5-1

BASE OF THE SURFICIAL AQUIFER

(To Be Inserted))

FIGURE 6.5-2

continuous clay and silt lenses overlying limestone and sandstone. The relative percentages of these different components vary considerably throughout the County and may change rapidly over short distances. As a result, the productivity of the system also varies considerably. Transmissivity, which is a measure of the ease with which water can move through an aquifer, ranges from less than 10,000 to greater than 1,000,000 gallons per day per foot.

The most productive portion of the Surficial. Aquifer System is the zone of secondary permeability in the eastern one-third of the County extending from Juno Beach south to the Broward County line. This zone, also referred to as the Turnpike aquifer or cavity riddled zone, is the northern extension of the Biscayne Aquifer. The zone is composed of limestone, cemented shell, and sandstone in which the cementing materials have been dissolved to varying degrees. The dissolution of the cementing material creates small holes and tubes in the rock which form passageways allowing the water to flow easily through the dissolved zones. The zone of secondary permeability is generally about ninety-two feet thick with its top averaging about forty- five feet below sea level, and its bottom averaging about one-hundred thirty-seven feet below sea level. Transmissivities of greater than 1,000,000 gallons per day per foot have been reported for the zone of secondary permeability and, in general, its productivity is up to double that of the nonsolutioned part of the system in the eastern part of the County.

The aquifer in the western two-thirds of the County is significantly less permeable than in the eastern one-third due to a higher clay and silt content and poorer sorting of aquifer materials. This portion of the aquifer is overlain by a nearly impermeable fresh water marl ranging from a few inches to several feet thick. Residual sea water is common in this part of the aquifer due to low permeabilities. Water levels in the Surficial Aquifer System range from a high of twenty-two feet NGVD in the north-central part of the County to close to sea level at the coast.

Water levels in the Surficial Aquifer System are largely controlled by the canal network, extending from Lake Okeechobee. Recharge to the system is through infiltration from rainfall, canals, the conservation area and Lake Okeechobee. Lake Okeechobee is particularly important during dry periods when water is moved from the Lake to the canals and then into the aquifer through infiltration.

Groundwater flows from areas with high water levels to areas with lower-water levels. In the Surficial Aquifer System, this causes several different regional flow patterns in the County. In the southeastern portion of the County, groundwater flows primarily eastward from Florida’s Turnpike. Groundwater flow from this mound is east toward the coast in the northeast part of the County and southeast toward the C-51 Canal in the north-central part of the County. In the western portion of the County, flow is away from both sides of major canals into groundwater depressions located between canals. The flow patterns described are regional; groundwater flow on the smaller scale may differ as a result of the influence of wells or smaller canals.

Water quality in the Surficial Aquifer System is generally best in the zone of secondary permeability. Water quality to the west is poorer due to residual sea water. Water quality is also poorer along the east coast of the County as a result of saltwater intrusion.

The Hawthorn Formation underlies the Surficial System and serves as a confining layer separating the Surficial and Floridian Systems. The formation is made up of semi permeable to impermeable green clays and silts and is several hundred feet thick. (Ref: FIGURE 6.5-3).

The top of the Floridian Aquifer System in Palm Beach County ranges from about eight-hundred feet below, land surface along the southeast shore of Lake Okeechobee, to about one-thousand feet below land surface in the Boca Raton area. It is composed primarily of limestone and dolomite, is about one-thousand feet thick, and is artesian. Artesian wells dug to the Floridian Aquifer System naturally flow to the land surface.

The water quality of the Floridian Aquifer System in Palm Beach County is poor, with chloride levels and dissolved solids generally greater than 1,000 mg/1 and 3,000 mg/1, respectively. Because the water is both highly mineralized and relatively corrosive, the Floridian Aquifer System is not generally used as a source of water in Palm Beach County. The Floridian aquifer does have potential for use either as a source of brackish water for reverse osmosis, or as a reservoir for storage and recovery of fresh water.

Dense, low permeable limestones and dolomites occur throughout the Florida Aquifer System. These low permeable units divide the Florida Aquifer System into several semi-confined aquifers. The occurrence of a regionally extensive impermeable sequence divides the Floridian Aquifer System into two parts: The upper portion, which contains water generally below 10,000 mg/1 total dissolved solids; and' the lower portion, which contains water similar to sea water. The aquifers in the lower portion are extremely cavernous and have been informally referred to as the Boulder Zone.

The Boulder Zone is a highly transmissive dolomitic limestone. It is also named because its drilling characteristics are similar to those of boulders; however, there are no actual boulders in the zone.

Water quality in the Boulder Zone is very poor and not suitable for use. The Boulder Zone is artesian, but, because of the high density of the saltwater in the zone, it does not flow to the land surface. The Boulder Zone is significant because it is extensively used for waste disposal through deep injection wells.

SUBTERRNEAN CROSS-SECTION

(To Be Inserted)

FIGURE 6.5-3

6.5.2.3 Topography

The Glades Region is divided topographically by several natural and artificial divides. The general characteristics of the land is flatness with the natural elevation varying from approximately 14 to 16 feet above mean sea level. Lake Okeechobee is a freshwater lake covering approximately 443,000 acres

Lake Okeechobee is isolated topographically from the City by the Herbert Hoover Dike which totally encircles the Lake.This was constructed in the 1030's by the U.S. Army Corps. of Engineers to serve flooding that has occurred due to hurricanes. The area is divided by numerous canals constructed by the South Florida Water Management District and local drainage districts (i.e. SFWMD L-8 Canal, West Palm Beach Canal, Hillsboro Canal and the North New River Canal).

Topographically, the City of South Bay is divided by several artificial divides. The artificial or man-made divides include State Road No. 27 which extends through the City on a general northwest-southeast axis and State Road No. 80 which extends on an east-west axis. The City is also divided by the North New River Canal of the South Florida Water Management District which extends through the corporate limits on a north-south axis.

6.5.2.4 Soils

The City of South Bay lies in the Everglades region of Palm Beach County. This region consists primarily of flat swamp lands ranging in elevation from 14 to 16 feet mean sea level (msl). The soil association present in this region is the Everglades-Pahokee association characterized by broad, level marshlands with very poorly drained, neutral to alkaline, deep alkaline soils, and lesser areas of similar soils overlaying limestone.

Soil conditions in South Bay consist of organic soils that provide 2 to 8 feet thick deposits of hydrophytic plant remains over hard limestone. Under natural conditions, water stands on the surface for months and only during extremely dry seasons is the surface exposed. However, today these soils have been drained, and water stands on the surface only a short time. Having been drained the organic soils are subject to oxidation and subsidence. Although initial subsidence is rapid and brief, the soil continues to subside at the rate of about one inch per year because of oxidation. Since land use, or cover, has little effect on the subsidence rate of drained, organic soils, the best way to slow the rate is to maintain the highest water table level possible for all uses.

Physiographic Areas

(To be Inserted)

FIGURE 6.5-4

6.5.2.5 Saltwater Intrusion

Saltwater intrusion directly impacts the coastal area of Palm Beach County. Since South Bay is in the western half of the County, saltwater intrusion is not a problem. However, Lake Okeechobee and the SFWMD water control structures play a major role in maintaining the groundwater at a level to counteract seaward hydraulic gradient which causes saltwater intrusion.

6.5.2.6 Climate

The climate encompassing the City is considered subtropical, having an average annual temperature of approximately 75 F. Rainfall is seasonal with approximately sixty-five percent of the annual rainfall occurring during the rainy season from June through October. The average annual rainfall in the City, as well as surrounding areas, is approximately sixty inches. ~~The highest yearly total rainfall recorded since 1924 was over 84 inches; the lowest was 39.5 inches.~~

6.5.3 Natural Groundwater Aquifer Recharge Analysis

Palm Beach County has ~~recently~~ adopted a Wellfield Protection Ordinance to regulate the existing and new nonresidential use, handling, storage, and production of hazardous and toxic materials within certain zones of influence of the major potable water wellfields in the incorporated and unincorporated areas of the County. A major wellfield is defined as one which produces or is planned to produce 100,000 gallons or more per day of potable water.

The City of South Bay's source of raw water comes from surface water (i.e. Lake Okeechobee) rather than groundwater withdrawal from the shallow aquifer like most municipal water supplies in the County. The shallow aquifer in the South Bay area or even the western half of the County is generally of poor quality and considered at this time too costly to treat for public consumption. Therefore, the County's Wellfield Protection Ordinance is not considered to have an impact on the City.

However, of major concern to the City are the efforts ~~currently being studied~~ to decrease the nutrient loadings to Lake Okeechobee in order to reduce the eutrodphication process in the Lake.

NORMAL HYDRAULIC CYCLE

(To Be Inserted))

FIGURE 6.5-4