CHAPTER 6 (C)

ST. LUCIE COUNTY
COMPREHENSIVE PLAN

DRAINAGE AND NATURAL GROUNDWATER
AQUIFER RECHARGE SUB-ELEMENT

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St. Lucie County
Board of County Commissioners

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ST. LUCIE COUNTY
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ST. LUCIE COUNTY
DRAINAGE AND NATURAL GROUNDWATER
AQUIFER RECHARGE SUB-ELEMENT

INTRODUCTION

This sub-element of the Infrastructure Element addresses issues related to drainage and natural groundwater aquifer recharge for St. Lucie County as outlined in Rule 9J-5.011, F.A.C. The drainage and aquifer recharge issues are interrelated to such an extent that they have been combined in this one sub-element.

The sub-element begins with a background description of the drainage and aquifer recharge issues in the County, followed by a description of specific existing conditions. A needs assessment is presented, followed by goals, objectives and policies.

BACKGROUND

A. SURFACE WATER

Prior to man•s alteration, the areas that presently comprise St. Lucie County had drainage patterns that were controlled by the County•s primary topographic feature, the Atlantic Coastal Ridge and the more subtle features such as the Green Ridge (south/central County); the Osceola Plain (southwest County); and Ten-Mile Ridge (north/central County). Overall, the County gently slopes from west to east. Elevations range from about 60 feet, in the western portion, to sea level along the Atlantic coastal beaches, with scattered peaks associated with the above described ridges. The alignment of these surface ridges parallels the existing coastline and serves to impede east/west sheetflow.

The St. Johns Marsh, Allapattah Flats, and the Savanna areas are wetlands formed by these natural impediments. The Allapattah Flats area is located in the southwestern portion of the County. This area drains, predominantly, to the south/southeast, discharging into the area now occupied by the C-23 Canal. Portions of the St. Johns Marsh drain to the south into what is now the C-25 Canal basin. Water entering the Savannas normally percolated through the Atlantic Coastal Ridge to the Indian River, but during extremely high water stages there could be overflow to the North Fork of the St. Lucie River (NFSLR), through Platts Creek and several small sloughs. These wetland marshes store water and are believed to provide recharge to the shallow aquifer. The remaining central portions of the County serve as the watershed for the upper reaches of the North Fork of the St. Lucie River.

There are other minor drainage ways where the Atlantic Coastal Ridge has been breached, such as Moores Creek in Ft. Pierce, but the areas drained are not very large and of no major significance on the overall drainage system for the County.

The areas east of the Atlantic Coastal Ridge and along the barrier island are not included within any of the major drainage basins of the County. Stormwater discharge in these areas is essentially direct to the primary receiving body, the Indian River Lagoon or Atlantic Ocean.

The stormwater detention time for most of St. Lucie County, prior to mans alteration, was extremely long. The natural features and drainage ways are still apparent on satellite imagery. However, today, the North Fork of the St. Lucie River still serves as the major, and least altered, natural drainage feature in the County.

B. MAN-MADE DRAINAGE SYSTEMS

Major surface drainage modifications to St. Lucie County commenced with the formation of the North St. Lucie River Water Control District (1917) and the Ft. Pierce Farms Water Control District (1919). These Districts were created for the purpose of agricultural drainage and irrigation, with a secondary purpose being flood control activities.

During the 1940's, the U. S. Army Corps of Engineers (COE) channelized portions of the North Fork of the St. Lucie River in an effort to improve its water carrying capacity and to accelerate its speed or discharge into the Atlantic Ocean. During the 1960's, the COE constructed Canals C-23, C-24, and C-25, along with their control structures. With the construction of this Primary Canal system for the South Florida Water Management District, the County was then divided into a series of Sub-Basins. Figure 6-C-1, indicates these basins.

The **C-25 Basin** (Figure 6-C-1) is located in the northwestern St. Lucie County and extends into parts of Okeechobee and Indian River County. This area is dominated by agricultural uses consisting of either citrus or ranching activities. The canal system in this area was designed to support agricultural activities. Although not the case in St. Lucie County, the western portions of this overall basin do not have any significant flood control protection, which could in times of extreme rainfall have detrimental effects in the downstream areas. With the absence of any significant urban development, local flooding is not presently a major problem in that on-site design requirements meet the current need. However, as elaborated further in this element, there is a need for a countywide review of this community's future drainage management requirements and this review will have to include the portions of this that lie outside of the County.

The **C-24 Basin** (Figure 6-C-1) is located in the Central and West-Central portions of the County. This basin may further be divided into three subgroups: emerging urban (east 1/3), citrus (central 1/3) and ranching (west 1/3). One of the primary purposes of this basin is to regulate the level of ground water, through the controlling effects of the S-49, structure and to prevent the intrusion of saltwater into the

local groundwater supplies (Figure 6-C-1). When initially constructed, this basin was designed to accommodate the agricultural needs of the area. The emergence of significant urban development may possibly cause a negative downstream impact, affecting the ability to efficiently move the water from the upper reaches of the Basin.

The **C-23 Basin** (Figure 6-C-1) is located in the south and southwestern portion of the County. This basin serves the agricultural needs of the southwest area. However, a significant portion of the basin is located in Martin County. This area is, at present, used for agricultural purposes, although, its eastern edges face the potential impacts of future urban development. These emerging areas will have to be accommodated for through the development of interlocal agreements between all effected parties addressing the issue of urban discharge.

The **North Fork of the St. Lucie River Drainage Basin** (Figure 6-C-2) is located in the most populous part of St. Lucie County. This drainage basin includes within it the North St. Lucie River Water Control District, along with portions of the City of Port St. Lucie. As mentioned previously, in the 1940's the main river course was channelized by the Army Corp Of Engineers. This channelization was effective in increasing the rate of water removal from the basin, but it also allowed for the increased collection and transmission of silt and other debris, affecting not only the long term carrying capacity of the North Fork itself, but also contributing to the accelerated siltation of the lower reaches of the St. Lucie River.

The North Fork basin can be characterized as dominated by urban uses. What agricultural activities remain are in the western reaches of the district. However, it should be noted that although the basin serves an urban environment, the drainage design of this basin is based upon agricultural needs. This area has been the focus of several studies, evaluations and demonstration projects in recent years, attempting to improve upon its overall efficiency. As discussed later in this element, these efforts need to be continued and expanded.

FIGURE 6-C-1. BASIN LOCATION MAP

The **Taylor Creek - Nubbins Slough (C-59 Basin)** (Figure 6-C-1) basin area is located in extreme southwestern St. Lucie County. This basin affects only 9.5 square miles of the County. Activities in this area are ranching with the remaining property being undeveloped/vacant. There is effectively no impact upon the balance of the County by this basin since its flows are to the west and the Lake Okeechobee area. However, as addressed in the goals, objectives and policies portion of this element, attention to this area is needed on water quality issues.

Except for those efforts in Ft. Pierce and Port St. Lucie, almost all of the surface drainage modifications that have taken place have been designed for agricultural land uses, or approximately a 10-year-24-hour storm event. As these agricultural lands have become more urbanized, the volumes of stormwater have increased and run-off times have decreased, resulting in more frequent periodic local flooding.

Figures 6-C-3 and 6-C-4, indicate the drainage district boundaries and major water conveyance facilities in the County. Because the more urbanized areas of the community are located in the downstream areas of much of the drainage system, the potential for urban area flooding has increased.

C. GROUNDWATER

There are two distinct sources of groundwater in St. Lucie County: the shallow unconfined or semi-confined aquifer, and the deep artesian floridan aquifer. These aquifer systems are separated by a layer of relatively impermeable green clay known as the Hawthorne Formation, which is about 400 feet thick and starts at approximately 150-180 feet below the average land surface.

The shallow aquifer system is comprised of one (1) to five (5) feet of fine-grained sands and silts of the Pimlico Sand that overlie the Anastasia Formation. The Anastasia Formation consists of interbedded layers and lenses of sand, shell beds, sandy limestone, and sandstone. Beds and lenses tend to be elongated in a direction that parallels the coast. Most of the permeable zones, which are primarily shell beds, are thin and, as a result, well yields are low to moderate. (USGS, 1972).

Water quality is variable in the shallow aquifer due to natural and artificial causes. Water quality ranges from fair in the southeast mainland part of the County to brackish in the northwestern part of the County. The poorer water quality has been associated with the use of the brackish artesian aquifer for irrigation of citrus. However, drilling records and well water analysis indicate that there is also an area of connate saltwater that extends from the vicinity of St. Lucie Village to the northern and eastern shores of Lake Okeechobee. The concentration of minerals in the connate water increases with depth to the base of the shallow aquifer and at that point it exceeds the mineral content of the artesian aquifer.

The artesian aquifer system is part of an extensive carbonate rock aquifer system that underlies most of Florida. In St. Lucie County, the artesian floridian aquifer has three distinct producing zones of different hydrologic properties and water quality separated by semi-permeable zones. The upper producing zone, or Zone I, has the best water quality, but it is too brackish for domestic or public water supply. The water from Zone 1 is suitable for stock watering and some crops, most notably citrus. Most of the estimated 1,300 artesian wells in the County are developed in Zone I of the floridan aquifer. There is no natural groundwater recharge to the floridan aquifer in St. Lucie County. Producing zones, water quality, and other technical data are more extensively described in the SFWMD Technical Map Series 70-1. (SFWMD, 1979)

Agricultural drainage projects between the urbanized coastal areas and Canals C-23 and C-24 have impacted the major sources of groundwater recharge to the shallow aquifer and lowered the water table. Areas such as the St. Johns Marsh and the Allapattah Flats, which previously stored a large amount of water above the land surface to provide the hydraulic gradient needed to recharge the slightly permeable surficial aquifer have, in recent years, been drained for agricultural purposes. The Allapattah Flats west of the SFWMD canals and the remaining portions of the St. Johns Marsh still provide some degree of recharge, but the major sources for St. Lucie County are the St. Johns Marsh in Indian River County and the Orlando Ridge extension of the Osceola Plain (a marine terrace) in southwestern St. Lucie County and eastern Okeechobee County. The impacts of the construction of the canal drainage system on the groundwater contour levels in the County are illustrated in Figures 6-C-5 through 6-C-7.

From inspection of these diagrams it can be seen that the groundwater flow from the western half of the County is effectively being intercepted by these major canals. This interception is then depriving the wellfields in the central and eastern regions of the County from a source of replenishment. As a result, recharge areas will need to be located and protected near the centers of the drainage basins to optimize their effects.

Construction of new drainage works by General Development Corporation, farms, and other developments have been completed since the groundwater contour maps used in this plan were compiled in 1968. The Upper East Coast Water Supply Plan was completed by the South Florida Water Management District and accepted by the Board of County Commissioners in February 1998. The purpose of the planning document is to provide a framework for future water use decisions to provide adequate water supply for urban areas, agriculture, and the environment through the year 2020.

The distance between water-level contours, when matched with the hydraulic gradient of topographic relief, indicates the relatively permeability of the surficial aquifer: the greater the distance between contours, the higher the permeability. This is exemplified in the area bounded by SFWMD C-23 and C-24 canals, where the land surface has little relief and the water level contours are miles apart.

Many secondary drainage systems have been constructed for agricultural drainage. However, most of these secondary systems are shallow and their impacts on groundwater are by way of preventing ponding.

Because of the lack of recharge and the low permeability of the soils, the shallow aquifer provides insufficient water for irrigation during the extended dry season. SFWMD Canals C-23, C-24 and C-25 serve as linear storage reservoirs and provide irrigation supply for many areas although, in extreme periods of drought, they too may only be used in a minimal capacity due to the lack of surface water (Figure 6-C-5 - Intermediate Water Level Contour Map).

To compensate for this, many agricultural operations will use the floridan aquifer for much of their irrigation demand. The problem associated with the use of this aquifer areas is that irrigation return (excess) flows from the floridan aquifer water are mineralized. These flows in turn mineralize the receiving canals.

Currently, there are no defined aquifer recharge areas in the County. The South Florida Water Management District through the Upper East Coast Water Supply Plan, is attempting to identify the aquifer recharge areas in the County, in addition to identifying the areas where existing problems are occurring and area that may have future problems. The County will continue to monitor the Water Management District as they work to define these areas.

Additionally, the Floridan aquifer is not recharged within St. Lucie County, but rather primary recharge of that aquifer occurs in the more central portions of the State.

LOCAL DRAINAGE ISSUES

A. GENERAL

On the average, St. Lucie County receives about 53 inches of rain per year, most falling during the period from June to October. It is recognized that from time to time, portions of the county will experience flooding problems as a result of heavy rainfall. Much of the local flooding that occurs can be attributed to development

FIGURE 6-C-2. THE NORTH FORK OF THE ST. LUCIE RIVER BASIN

FIGURE 6-C-3. WATER CONTROL DISTRICTS

FIGURE 6-C-4. MAJOR WATER CONVEYANCE FACILITIES

carried out before the advent of contemporary stormwater management practices. Most of the drainage problem areas are located in the North Fork Drainage Basin. However, there are documented problems in other parts of the County as well.

St. Lucie County has continued to work on drainage improvement projects that are designed to provide relief to small areas of the community. These improvements are not intended to be a comprehensive cure for the problem because they are limited in the areas they impact. The improvements are not system-wide and as such will have little wide-ranging impact. However, if successful, they should provide a degree of intermediate relief of limited scope and duration to the afflicted area.

B. TEN MILE CREEK REGIONAL ATTENUATION FACILITY

The intent of the Ten Mile Creek Water Preserve Area project is to attenuate summer stormwater flows into the North Fork of the St. Lucie River Estuary which originate in the Ten Mile Creek basin by capturing and storing the passing stormwater. The sedimentation of suspended solids that occurs in the storage reservoir will reduce sediment loads delivered to the estuary. In addition, it is the intention that the captured stormwater be passed through a polishing cell for additional water quality treatment before being released into the North Fork. Stored water can be released in the drier winter months to augment current insufficient flows. Stabilizing the salinity concentration will greatly enhance the Estuary♠s ability to support sea grasses, oysters, and nursery grounds for marine fish.

Ten Mile Creek is the largest sub-basin delivering water to the North Fork of the St. Lucie River Estuary, which has been established as an Outstanding Florida Water (OFW). The St. Lucie Estuary discharges into the Indian River Lagoon, which is also an OFW. The Indian River Lagoon is the most biologically diverse estuary in North America. The entire Lagoon is endangered from increased runoff from watershed drainage enhancements. Excess stormwater due to drainage improvements is causing radical fluctuations of the salinity concentration in the St. Lucie Estuary. Storage of excess water will allow its measured release, and hence a more natural salinity regime.

This project is a critical restoration project, which was authorized by Congress under the Water Resources Development Act of 1996. The Project is being implemented by the U. S. Army Corps of Engineers, with the South Florida Water Management District acting as the local project sponsor. St. Lucie County is contributing local matching funds and assisting with coordination of local issues and permitting.

The reservoir will be located immediately west of the Gordy Road spillway on the south side of the Ten Mile Creek. The site is just west of the Florida Turnpike, about . mile south of Okeechobee Road (State Road 70).

The footprint of the reservoir is anticipated to be approximately 550 acres in size, with the remaining acreage of approximately 190 acres

being utilized as a polishing cell. Based upon existing topography, stored water depths average ten feet. Total storage capacity will be approximately 5,000 acre-feet. Total project cost is estimated at $33 million dollars, and construction is estimated to start in 2002-2003.

C. CENTRAL AND SOUTHERN FLORIDA ■RESTUDY•

The Central and Southern Florida Comprehensive Review Study (■Restudy•) is an ambitious Federal/State undertaking to restore and preserve South Florida•s natural ecosystems while enhancing water supplies and flood control. The Restudy Comprehensive Plan was developed by the U. S. Army Corps of Engineers and South Florida Water Management District in collaboration with more than 30 other agencies.

FIGURE 6-C-5. INTERMEDIATE WATER LEVEL CONTOUR MAP

FIGURE 6-C-6. LOW WATER LEVEL CONTOUR MAP

FIGURE 6-C-7. VERY LOW WATER LEVEL CONTOUR MAP

Under the Restudy Plan, $7.8 billion worth of construction and other implementation costs will be shared equally by the Federal government and the citizens of Florida over more than 20 years. An additional $172 million per year will be required to operate and maintain the project once fully underway. Specific funding mechanisms still must be identified, with a variety being considered.

The Restudy involves a review of the region•s water management system known as the Central and Southern Florida (C&SF) Project. Issues to be addressed include: flood control, water supply, water management, saltwater intrusion and ecosystem restoration. The original C&SF project is 50 years old and needs to be modernized. This huge, man-made system has had unintended effects on the natural environment, including the Everglades, Lake Okeechobee, the coastal estuaries and Florida Bay.

While still in the planning stages, the Restudy may involve many new components, including: reservoirs to store water (Ten Mile Creek Project),
underground barriers to slow seepage, facilities to inject fresh water underground for retrieval later, reuse of treated wastewater, removal or modification of selected canals and maintaining water levels to prevent saltwater intrusion.

The C&SF Project encompasses approximately 18,000 square miles from Orlando to the Florida Keys. Major features include: the Kissimmee River, Lake Okeechobee, the Everglades Agricultural Area, the Water Conservation Areas, Everglades National Park, Big Cypress National Preserve, the Caloosahatchee and St. Lucie Rivers and Biscayne and Florida Bays.

The Restudy will improve our natural systems ranging from Lake Okeechobee to Florida Bay. The St. Lucie Estuary will benefit from fewer regulatory releases, which send too much fresh water to tide during heavy rains and will receive needed water during drier times. Both efforts will help protect the Estuary•s delicate salt and fresh water balance. Stabilizing the salinity concentration will greatly enhance the estuary•s ability to support sea grasses, oysters, and nursery grounds for marine fish.

Additionally, large water reservoirs are planned in the C-23, C-24, C-25 C-24, North and South Fork Drainage Basins. Projects similar to the Ten Mile Creek Regional Attenuation Facility will be planned for all of the large drainage basins.

D. UPPER EAST COAST WATER SUPPLY PLAN

The Upper East Coast (UEC) Water Supply Plan was completed by the South Florida Water Management District and accepted by the Board of County Commissioners in February 1998. The purpose of the planning document is to provide a framework for future water use decisions to provide adequate water supply for urban areas, agriculture, and the environment through year 2020.

The plan estimates the future water supply needs of urban areas and agriculture, weighs those demands against historically used water sources, and identifies areas where demands cannot be met without harming the resource and environment, including wetlands. The plan evaluates the potential of several alternative water source options to meet any unmet demand and makes recommendations for their development.

The planning document is the product of a public process, which relied heavily on an advisory committee of diverse membership representing the interests and concerns of the region. The 30 member advisory committee met a total of 25 times between October 1995 and February 1998. Membership included representatives of federal, state and local agencies, including planning officials, public water supply utilities, local business community, environmental groups, and agricultural business representatives.

The Upper East Coast Plan includes Martin, St. Lucie, and a small portion of Okeechobee County. The advisory Committee developed the following regional goals to ensure that the Water Supply Plan would address the specific needs of the Upper East Coast:

- Promote the use of water supply alternatives and conservation.
- Establish water quality criteria limitations for the Floridan (Artesian) Aquifer System within the UEC.
- Protect wetland systems from significant harm due to water use drawdowns.
- Develop criteria and programs for surficial (drinking water) aquifer system protection from saltwater intrusion.
- Establish a level of certainty (drought frequency) for all permitted water uses and for the environment.
- Promote compatibility between the UEC Water Supply Plan and local land use decisions and policies.
- Protect and enhance the St. Lucie Estuary and the Indian River Lagoon.
- Promote compatibility and integration with other related regional water resource planning efforts.

The Advisory Committee developed seven water source options to address the needs of the Upper East Coast region, including:

- Surface Water Storage
- Aquifer Storage and Recovery
- Floridan (Artesian) Aquifer
- Surficial Aquifer Wellfield Expansion
- Conservation
- Wastewater Reuse
- Utility Interconnects.

Specific goals or strategies were identified for each of the seven options to be implemented as part of the implementatin of the UEC Water Supply Plan. Responsible agencies to carry out the goals were identified, along with probable sources of funding.

The UEC Water Supply Plan contains three volumes in total, including: The Planning Document, dated February 1998, 132 pages; The Support Document, dated February 1998, 129 pages, and The Appendices Document, dated February 1998, containing 351 pages. More detailed information concerning the Plan and planning process can be obtained within the referenced documents.

E. INDIAN RIVER LAGOON COMPREHENSIVE PLAN

In July 1996, the Board of County Commissioners adopted the Indian River Lagoon Comprehensive Conservation & Management Plan (CCMP). The Plan was published in May of 1996 by the members of the Indian River Lagoon National Estuary Program (NEP) Management Conference, in cooperation with SJRWMD, SFWMD, and the U.S. EPA.

With the publication of the Plan (IRLCCP) more than 100 agencies and local governments with management responsibilities for the Lagoon agreed on a unified strategy to preserve and restore the Lagoon. The Plan was formally adopted by the governor and the Environmental Protection Agency (EPA).

The Plan contains more than 69 recommended actions addressing critical problems such as the preservation of wetlands, sea grass restoration, endangered species protection, water and sediment quality improvement, land acquisition needs, and the means of funding preservation and restoration activities. All of these actions have the express purpose of protecting the integrity, diversity and productivity of the Indian River Lagoon.

According to the Indian River Lagoon (CCMP) Plan, ■Freshwater and stormwater discharges represent the largest nonpoint source of pollution to the Indian River Lagoon.•

Over the years, these discharges have resulted in muck (or ■ooze•) deposits and sedimentation in the Lagoon and its tributaries. This deposition and sedimentation has caused the loss of seagrass beds with resulting impacts to fisheries and shellfish populations. On occasions, increased loadings of nutrients from freshwater discharges have caused algae blooms and resulted in fish kills.

The formation of a Stormwater Management Program by St. Lucie County is an important first step in implementing the goals of the IRLCCMP Plan. This local government program forms the basis for funding and implementing improvements to our County stormwater management system.

F. STORMWATER MANAGEMENT MASTER PLAN

In 1992, a Stormwater Management Master Plan was completed and adopted for the unincorporated areas of the County. The Master Plan addressed the needs of the major canals of the primary and secondary stormwater management system. The canals, which were analyzed, are owned and operated by either the North St. Lucie River Water Control District (NSLRWCD), the Ft. Pierce Farms Water Control District (FPFWCD), or the South Florida Water Management District (SFWMD).

The 1992 Master Plan concluded, ■St. Lucie County♠s Primary Stormwater Management System serves the County very well. Flooding within the primary drainage system is limited to only a few areas. Floodprone areas were identified in the Ten Mile Creek basin downstream of Selvitz Road and in the South 25th Street and Bell Avenue area. A reach of the Five Mile Creek basin from its confluence with Ten Mile Creek upstream to the Orange Blossom Mall is also a sensitive area. Residential dwellings in both basins have been damaged by flooding, but primarily because the houses are located in the floodplain of the creeks.•

The Master Plan concluded that generally the secondary stormwater management system serves the County well for the 10-year, 24-hour storm event. The Master Plan recommended that the County continue to use the 10-year, 24-hour storm event (approximately 6.5 inches of rainfall in a 24-hour period) as the level of service standard for flood protection for roadways. This level of service standard is incorporated in the County♠s Land Development Code.

The Master Plan recommended several capital improvement projects for the secondary stormwater management system, including: mechanically operated gates, electrically operated gates, upsizing and lowering selected culvert pipes, and installing fixed-crest weirs at

selected locations to improve water quality of stormwater discharge from the secondary drainage canals into the St. Lucie River.

All of the improvements recommended by the plan fall within the secondary canals owned by the North St. Lucie River Water Control District or the Ft. Pierce Farms Water Control District. Many of these recommendations have already been implemented.

The Master Plan confirmed, ■flooding is far more prevalent in the secondary and local network systems that drain into the primary drainage canal system. A few examples include, but are not limited to: the Carlton Road area, portions of White City, Sunland Gardens, Paradise Park, and large agricultural ownerships in the western portion of the County. Although the primary drainage system could accommodate stormwater from these areas, the secondary or local network systems have not been improved (or do not exist) to transport the runoff from these troubled areas to the primary canal system.• The Plan recognizes that ■throughout unincorporated St. Lucie County, many isolated areas have little or no real drainage improvements and no access to a primary or secondary drainage system.• Much of this was created when land was subdivided without proper planning of drainage and drainage outfalls. Other problem areas lie within the floodplain of natural creeks or streams.

Solutions to these types of problems will require extensive engineering analysis and expensive capital improvements, thus establishing a need for a dedicated funding source for Stormwater Management in the unincorporated areas of the County.

Likewise, many of the existing secondary and local network drainage systems in the County were constructed many years ago, prior to permitting requirements for water quality treatment of stormwater discharges. Consequently, there were no provisions made for treatment of stormwater for water quality improvement prior to discharge to the primary canal system.

Retrofitting of either the primary or secondary stormwater system to provide retention/detention water quality measures will be very expensive. Once again, some mechanism for funding these water quality improvements is a necessary element of the County Stormwater Management Program. Increasingly stringent state and federal regulations governing water quality improvement are likely in the near future.

The 1992 Master Plan document and the County staff have compiled a listing of problem areas that are known to be floodprone historically. More details are available in the Master Plan document.

The 1992 Master Plan document focused on the primary and secondary canal system, however, one of the recommendations was that the sub-basins be analyzed for better planning and retrofitting of the local network stormwater management system. The local network systems

consist of the swales, ditches, and piping systems that drain into the primary and secondary canals. To date, sub-basins have been analyzed only on a limited basis due to the lack of adequate funding.

Two sub-basins, which are currently being analyzed by the County, are the Citrus Avenue/White City basin, and the Indian River Estates (subdivision) basin. Both of these floodprone areas were developed prior to the establishment of regulatory standards for stormwater management, and have inadequate stormwater systems. Water quality improvements will be an important aspect in retrofitting both of these stormwater systems since Citrus Avenue/White City discharges directly into the North Fork of the St. Lucie River and Indian River Estates discharges directly into the Savannas State Preserve.

G. INDIAN RIVER ESTATES/SAVANNAS PROJECT

The County has been working with the regulatory agencies on developing a solution to the flooding and water quality problems associated with the Indian River Estates Subdivision. Currently, runoff from 1800 residential units drain directly into the Savannas State Preserve (Outstanding Florida Waters) causing impacts to the Savannas ecosystem. Septic tanks not functioning and flooded streets are other problems Indian River Estates residents have to face on a regular basis.

A task force has been established to implement a solution to this problem, including representatives from SFWMD, FDEP, St. Lucie County, St. Johns River Water Management, and Indian River Lagoon National Estuary Program.
The goal of the task force is to construct a stormwater collection and treatment system for the subdivision using a large retention pond and pump system. The County is seeking state grant funds to help implement the project. A conceptual design has been completed at this time.

H. CITRUS AVENUE/WHITE CITY BASIN

In 1995 the County performed a sub-basin study of the White City area. The study involved mapping the sub-basin boundaries of the area between Midway Road and Saeger Avenue, and between U. S. Highway 1 and the North St. Lucie River in White City. Approximately 145 sub-basins were identified within the study area. Major ditches and drainage outfalls were identified for each sub-basin, along with general topographic information and existing infrastructure. The area generally drains from east to west, towards the North Fork of the St. Lucie River. Drainage outfalls consist of open ditches that drain directly into the North Fork, across Citrus Avenue.

The 1997 Stormwater Management Master Plan study identified capital improvements necessary to improve many of these outfall ditches. These projects will be funded and implemented through the Stormwater Management (MSTU) Program.

In 1997, the Local Network canals and ditches that are owned and operated by the County were analyzed to determine their adequacy. The 10-year, 24-hour storm event was used as the level of service standard as in the 1992 Master Plan study. Although these canals and ditches are not as significant as those analyzed for the 1992 Master Plan, they are considered as part of the County•s local network stormwater management system.

This study effort was intended to supplement the Master Plan and to complete the analysis of the unincorporated County•s secondary stormwater management system for the level of service standard. This study recommended capital improvements for the County ▪maintained local network canals and ditches, including: Glades Cutoff Road canal, Orange Avenue Canal, South 7th Street ditch, Airoso Canal, White City ditches, and Whispering Creek. This study formed the basis for our current capital improvements program within the County Stormwater MSTU.

I. AQUATIC PRESERVES

From a point just north of West Midway Road the North Fork of the St. Lucie River has been designated by the State of Florida as an Aquatic Preserve, Chapter 258.59 (12), F.S., (Figure 6-C-8). With the Aquatic Preserve designation these waters also carry the classification of Outstanding Florida Waters. With the exception of the Northwest Fork of the Loxahatchee River, no other river in this region has as much of its floodplain within such a designated area. The combination of subtropical climate, unusual vegetation mixture and wilderness qualities in the midst of a major emerging urban area make this preserve distinctive.

The Florida Department of Environmental Protection (FDEP) has prepared a Resource Management Plan for this area. This plan was adopted by the State in May of 1984. This plan contains programs oriented to the enhancement of water quality. The Aquatic Preserve Management Plan prepared by the FDEP includes major program policy directives that describe the maintenance of water quality. This plan, though noble in its goals, may be in conflict with some of the objectives of the small water management and control districts that discharge to the North Fork of the St. Lucie River. The areas of greatest conflict are relative to the design of the local drainage systems, which utilize the North Fork as the only discharge route available, and the objective of the management plan to preserve the quality and character of the River. All water collected in this district must pass through this preserve in order to be discharged to the Atlantic, the ultimate receiving body. Stormwater discharges to the North Fork of the St. Lucie River carry sediment, nutrients and pesticides into the aquatic preserve where deposition of fine clays and organic materials may create environmental problems. Although sedimentation of rivers and estuaries is a natural process, it is being accelerated by urbanization and artificial drainage (SFWMD, 1988a). An objective of this element should be that St. Lucie County, while recognizing the need for preservation and enhancement of the North Fork, should

remain in a position to utilize the river as a point of discharge for its up stream development. The use of the North Fork should be planned and executed in a manner that will allow improvement in the water quality consistent with the goals and objectives of the Aquatic Preserve Management Plan. Water quality issues related to this discharge are a separate concern that is addressed further in the Conservation Element.

The Indian River Lagoon in St. Lucie County, north and south of the corporate limits of the City of Ft. Pierce, has been designated as part of the ■Indian River Lagoon Aquatic Preserve• (Figures 6-C-9 and 6-C-10). The lagoon is a long shallow estuary important in this region for its value to recreational and commercial fishing, boating and prime residential development. The preserve is located in a rapidly growing urban area affected by both agricultural and residential drainage. The majority of the shoreline is mangrove fringed, with development being mostly residential. The lagoon is bounded on the west by the Florida mainland and on the east by the barrier islands. The Intracoastal Waterway runs the length of the lagoon, which is designated as a Estuary of Natural Significance. Water quality studies by the FDEP, SFWMD (SFWMD, 1987a) and others, indicate that inland drainage discharges in areas of the Indian River with poor circulation (i.e., between inlets) result in the degradation of water quality in the lagoon, especially along the western shore.

In May 1996, the Indian River Lagoon National Estuary Program (NEP) in conjunction with the SJRWMD, SFWMD and the U. S. EPA, formulated the ■Indian River Lagoon Comprehensive Conservation & Coastal Management Plan (CCMP)•. The CCMP addresses critical problems affecting the Indian River Lagoon, including but not limited to preservation of wetlands, sea grass restoration, endangered species protection, water and sediment quality improvement, land acquisition needs and funding needs. In July 1996, the Board of County Commissioners adopted the Indian River Lagoon Comprehensive Conservation & Management Plan.

100-YEAR FLOODPLAIN

Figure 6-C-11 depicts the 100-year floodplain, as identified and discussed in the Future Land Use Element.

LEVELS OF SERVICE

A. EXISTING LEVEL OF SERVICE

When considering the establishment of levels of service for drainage, it is first necessary to define the basic structure of the drainage system. The recommended definitions to be used are:

Primary Network: The primary network would be those surface waters, including natural water courses, which serve as the final path of conveyance from the secondary and local drainage network to the ocean or other major inland receiving area, i.e., Lake Okeechobee. Examples of the primary network would be the South Florida Water Management District canals and the North Fork of the St. Lucie River.

Secondary Network: The secondary network would be those facilities that serve as transmission ways from the local or tertiary network into the primary network. Examples of the secondary system would be the local drainage canals of the local water control districts.

FIGURE 6-C-8. NORTH FORK, ST. LUCIE AQUATIC PRESERVE

Local Network: The local network would consist of those canals, drainage swales, detention/retention ponds that serve to collect/store the local rainfall before it is discharged into the secondary system. These systems typically have little or no intermediate or long-term storage capacity and must be maintained for maximum efficiency. These facilities should be designed in such a manner that they provide for the ■first flush• treatment of sediments and pollutants, keeping them from the secondary and primary system. If possible, no local network system should discharge directly into a primary network or ultimate receiving body.

As outlined in the 1992 Stormwater Management Master Plan, when viewed as a whole, stormwater drainage is not presently a significant problem in the primary drainage system in St. Lucie County. Within St. Lucie County, pollution and other environmental factors have become a major concern. As mentioned, it is acknowledged that certain areas of the County are experiencing flooding problems during periods of heavy rain. These problems are more the result of a failed local system or construction that is not in accordance with current design standards, than with overall system failure. However, St. Lucie County is rapidly approaching the crossroads where definitive action must be taken in regard to a county-wide stormwater review so that, as urbanization continues, the present marginally adequate, agriculturally designed, secondary system can be expanded and upgraded.

B. FUTURE LEVEL OF SERVICE

The level of service standard as defined by the 1992 Stormwater Master Plan is outlined below:

TABLE 6-C-1

Stormwater Master Plan ■ Level of Service Standards

Structure/Facility	10 yr., 24 hr.	10 yr., 72 hr.	100 yr., 72 hr.
Houses/Building	<FFE[1]	<FFE	<FFE
Evacuation Routes[2]	1/2W[3]	<0.5 ft.	<1.0 ft.
Arterial Roads[4]	1/2W	<0.5 ft.	<1.0 ft.
Other Roads[5]	<0.5 ft.	<0.75 ft.	<1.5 ft.

1 Peak flood stages less than first (finished) floor elevation based on available data.
2 Evacuation routes as defined by the County and the Treasure Coast Regional Planning Council
3 Flooding limited to each side of the road such that . of the roadway width (W) or one travel lane is not flooded.
4 Roads with four or more travel lanes, or roads that are only access to a respective area/development (secondary evacuation routes).
5. Other roads which are not critical for evacuation, but which will be used to estimate encroachment on FFEs.

NEEDS ASSESSMENT

The primary and secondary drainage systems (South Florida Water Management District, Ft. Pierce Farms Water Control District and North St. Lucie River Water Control District have the capability of inter-basin and inter-district transfer of stormwater. The needs are outlined in the County Stormwater Master Plan.

FIGURE 6-C-9. INDIAN RIVER LAGOON AQUATIC PRESERVE

FIGURE 6-C-10. INDIAN RIVER LAGOON AQUATIC PRESERVE

FIGURE 6-C-11. GENERALIZED 100 YEAR FLOOD PLAIN

A. STORMWATER MANAGEMENT PROGRAM

In June of 1997, the Board of County Commissioners adopted the Stormwater Management Municipal Service Taxing Unit (MSTU) as part of the County ■Investment for the Future• Program. This MSTU allows the County to levy an annual ad valorem assessment in the unincorporated areas of the County, with the funds generated to be used solely for providing stormwater management services. This was a major step in developing a Stormwater Management Program for the unincorporated area of the County.

The mission of the County Stormwater Management Program is: to manage County Stormwater systems to prevent flooding and property damage and to protect water quality for the safety and enjoyment of the citizen•s of St. Lucie County, and the preservation of the environment and enhancement of wildlife habitat. The goals of the program are as follows:

- To minimize the hazards of flooding attributable to stormwater runoff.
- To minimize the degradation of water quality attributable to stormwater runoff.
- To develop a public education program to aid in gaining understanding of stormwater issues and to minimize personal non-point source pollution.

Initially, the County Stormwater Management Program is providing four major functions:

- Master planning and GIS mapping of the overall local network, primary and secondary drainage systems.
- Capital improvements to the County-owned and maintained primary canal system.
- An enhanced maintenance program to provide a higher level of service for swale system maintenance throughout the County.
- A public education program to aid in gaining understanding of stormwater issues.

Additionally, the County has been successful in acquiring grant funds to complete several large -scale water quality improvement projects in the St. Lucie River Basin.

The Platt•s Creek Restoration Project will provide stormwater treatment for the Platt•s Creek Basin and will establish the County•s first mitigation bank.

B. ORGANIZATIONAL ASSESSMENT

Drainage in St. Lucie County is the responsibility of many entities. In 1992, the St. Lucie County Stormwater Master Plan was adopted. Close cooperation exists among organizations which will result in the creation of the 10-Mile Creek attenuation facility.

C. PERFORMANCE ASSESSMENT

The Master Drainage Plan defines flooding problems on a basin by basin basis. Solutions to the flooding problems include the completion of the 10-Mile Creek attenuation facility. The performance and success of this facility will guide future attenuation facility efforts. Once

the problems, if any, are defined, it will then be possible to develop model solutions. These solutions could, as one option, propose that a variable level of service ratio be employed for each basin, recognizing that certain basins may have topographic conditions that are more conducive to ground water absorption than others, resulting in reduced rates of run-off and high rates of aquifer recharge.

1. Stormwater Drainage Facilities:

The St. Lucie County Engineer has documented isolated drainage problems in many areas of the County. The apparent causes for many of these problems are: inadequate conveyance systems; pumped drainage at the upstream reaches of creeks and canals; urbanization; and inadequate floodplain planning.

These apparent problems may have different causes. Inadequate conveyance can be caused by overgrowth of canals/ditches, inadequate canal depths and/or cross-sections or shoaling from sedimentation, as in the North Fork of the St. Lucie River. In addition, pumped drainage from farms can drastically shorten concentration times and may surcharge the receiving drainage way. Also, urbanization increases run-off and decreases concentration times. In general, floodplain planning has not kept pace with the changes in hydrology in St. Lucie County.

The original design of the primary drainage systems that the U. S. Army Corps of Engineers used was thirty percent of the one-day/100-year project storm, or approximately a one day/10-year storm, as the conveyance capacity for canals C-23, C-24 and C-25 (SFWMD, 1988a) to serve agricultural drainage needs. However, the eastern parts of the drainage basins are becoming urbanized and the SFWMD design standard for urban areas is presently a three day/25-year storm.

Agricultural drainage of marshes and wetlands has removed the stormwater storage capacity of these areas and thereby has added to the overall volume of stormwater discharged through the urbanized areas. Concurrently, removal of this storage capacity has removed the major sources of groundwater recharge with a resultant increase in dry season irrigation demand.

Surface water quality in the modified natural systems has been acceptable, but there is little data concerning flood flows. Man-made drainage systems contain nutrients from agricultural and urban run-off as documented by the SFWMD (SFWMD, 1988b). Canal C-25 has seasonal high levels of dissolved minerals from floridan aquifer irrigation return flows. The issue in this regard is that this canal serves as a recharge source for one of the City of Ft. Pierce's primary wellfields.

2. Groundwater Systems:

Abandoned free flowing or leaking artesian wells are a source of contamination for the shallow aquifer. To abate this problem, St. Lucie County, in a cooperative effort with the SFWMD, is engaged in a program to plug these free-flowing or damaged wells.

Deeper zones of the floridan aquifer have cavernous regions, or boulder zones of extremely high transmissivities that are generally considered suitable for deep well injection of domestic secondary wastewater effluent and some industrial wastes. The injection zones, at depths of 2,500-3,500 feet, have a system of confining layers above them that severely limit or prevent migration of injected fluids to upper parts of the aquifer. A domestic waste injection well is presently in service in Port St. Lucie and additional injection wells are being considered at other locations.

D. FACILITY REPLACEMENT, EXPANSION AND NEW FACILITY SITING

The following programs are being undertaken by St. Lucie County:

1. Ten Mile Creek Attenuation Facility: This $50 million project is designed to improve water quality in the North St. Lucie River Water Control District, and reduce the likelihood of flooding. The facility will be completed during the next five years. Monitoring the results will guide the design and construction of future attenuation facilities.

2. **Platt•s Creek Mitigation Area:** This is a $3.6 million project that will remove 100 acres of citrus grove adjacent to the North Fork of the St. Lucie River and restore the historic elevations and vegetation. 15 acres of the land will be used as a water attenuation facility. Water quality will be monitored before and after construction to guide design and construction of future projects.

3. **Engineering Studies:** St. Lucie County is currently conducting a $150,000 mapping survey using the County•s Geographic Information System. This study will enhance the County•s ability in directing water flow county-wide to reduce flooding in floodprone areas and to facilitate the placement of water control structures and water quality improvements.

   Equipment: Maintenance and replacement of large equipment is needed on a continuous basis.

4. **Master Drainage Plan:** The County•s Master Drainage Plan was completed in 1992 and updated in 1997.

E. EXISTING ORDINANCES AND REGULATIONS WHICH GOVERN LAND USE AND DEVELOPMENT OF NATURAL DRAINAGE FEATURES

Following are the current ordinances and regulations that govern land use and development of natural drainage features in St. Lucie County:

1. Standard Specifications for Paving, Sidewalk and Drainage Construction

In August 1990, the Board of County Commissioners adopted the St. Lucie County Land Development Code. The standards set forth in Resolution 78-49 were incorporated into the Land Development Code, under the following sections:

- Section 7.05.07 Provisions for Access to New Development Activities
- Section 7.05.02 Streets
- Section 7.07.00 Stormwater Management

These sections of the Land Development Code identify the specifications for minimum design and construction criteria for roads, sidewalks and drainage. As development industry standards and technologies evolve, the Land Development Code will be amended periodically to reflect the changes.

2. Driveway Ordinance

In August 1990, the Board of County Commissioners adopted the St. Lucie County Land Development Code. The standards set forth in Resolution No. 87-13 were incorporated into the Land Development Code, under Section 7.05.06.
This section states that all residents must get a permit to install a culvert. The purpose of this standard is to monitor elevations at which culverts are set to assure that existing flow lines are maintained. As development industry standards and technologies evolve, the Land Development Code will be amended periodically to reflect the changes.

3. Subdivision Regulations

In August 1990, the Board of County Commissioners adopted the St. Lucie County Land Development Code. The former Chapter 1-19, ■Subdivision Regulations,• St. Lucie county Code and Compiled Laws was repealed in Part C of Ordinance 90-36, adopted on July 26, 1990, and became effective on August 1, 1990. This ordinance enacted a new Land Development Code for the County and the standard of Chapter 1-19, ■Subdivision Regulations•, were incorporated as part of the overall County site planning process and the standards and regulations were set forth in the Land Development Code. As development industry standards and technologies evolve, the Land Development Code will be amended periodically to reflect the changes.

These regulations contain the technical requirements for subdivisions and the definitions for what constitutes a subdivision. As the area continues to urbanize, these regulations need to be updated.

4. Flood Damage Prevention (Chapter 1 - 8.5, St. Lucie County Code)

In August 1990, the Board of County Commissioners adopted the St. Lucie County Land Development Code. The former Chapter 1-8.5, ■Flood Damage Prevention•, St. Lucie County Code and Compiled Laws, was repealed in Part C of Ordinance 90-36, adopted on July 26, 1990 and became effective on August 1, 1990. This ordinance enacted a new Land Development Code for the county and the standards of Chapter 1-8.5, ■ Flood Damage Prevention•, were incorporated as part of the overall County site planning process and the standards and regulations were set forth in the Land Development code. As development industry standards and technologies evolve , the Land Development Code will be amended periodically to reflect the changes.

The purpose of flood damage prevention is to control the alteration of natural floodplains, stream channels, and natural protective barriers which are involved in the accommodation of flood waters; control filling, grading, dredging and other development which may increase erosion or flood damage; and prevent or regulate the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards to other lands.

5. Drainage and Erosion Control Ordinance (Chapter 1 - 7.5, Article II, St. Lucie River, St. Lucie County Code)

In 1980, the Board of County Commissioners adopted Chapter 1-7.5, Article II, ■St. Lucie River•, St. Lucie County Code and Compiled Laws that established the St. Lucie River protection zone. The purpose of the St. Lucie River Code is to improve the quality of surface water run-off by limiting the amount of natural vegetation removed within 50' of the water. This 50' is not a setback. Construction is allowed if a permit is obtained. This code also assists the natural drainage features by cutting down on the erosion and siltation.

In addition to the St. Lucie River regulations found in the St. Lucie County Code and Compiled Laws, the Board of County Commissioners approved an amendment to the Land Development Code in August 1990, which established more stringent shoreline protection regulations. Section 6.02.02, ■Shoreline Protection,• outlines these regulations and standards. As development industry standards and technologies evolve, the Land Development Code will be amended periodically to reflect the changes.

In the Future Land Use Element of this Comprehensive Plan, new distances have been proposed. A 75' setback for all construction, as proposed, would improve on the existing code.

6. St. Lucie County Land Development Code

In August 1990, the Board of County Commissioners adopted the St. Lucie County Land Development Code. The Land Development Code was created in order to have all development standards and regulations in one document that can be accessible. The Land Development Code addresses such things as zoning district establishment, adequate public facility standards, environmental protection and preservation standards, development design and improvement standards, accessory temporary structure and use standards, sign standards, hardship relief standards, etc, As development industry standards and technologies evolve, the Land Development Code will be amended periodically to reflect the changes.

F. EXISTING ORDINANCES AND REGULATIONS WHICH GOVERN LAND USES AND DEVELOPMENT OF GROUNDWATER AQUIFER RECHARGE AREAS

Following are the current ordinances and regulations that govern land use and development of groundwater aquifer recharge areas in St. Lucie County:

1. Wellfield Ordinance

In August 1990, the Board of County Commissioners adopted the St. Lucie County Land Development Code. Section 6.03.00 of the Land Development Code provides standards and regulations for wellfield protection. As development industry standards and technologies evolve, the Land Development Code will be amended periodically to reflect the changes. Prior to the adoption of the County•s Wellfield Protection Ordinance, the County utilized the ■Interim St. Lucie County Public Wellfield Protection Ordinance.• This ordinance provided the following regulations:

- Criteria for regulating deleterious substances and contaminants that impair public water supply wells that are operated by utilities with a minimum permitted withdrawal capacity of 100,000 gallons per day.

- No development approval may be issued for any nonresidential activity which stores, handles, produces or uses any regulated substance within one thousand (1,000') feet of any public utility public water supply.

- Regulated substances generally include those on Federal and State hazardous, toxic, and restricted use pesticide lists. Special exemptions may be issued for activities which provide precautionary measures such as inventories, containment, and monitoring.

This ordinance was drafted by a countywide committee and adopted by the City of Ft. Pierce, City of Port St. Lucie and St. Lucie Village.

2. Florida Administrative Code (Chapter 10D-6, Standards for Onsite Sewage Disposal Systems)

An Onsite Sewage Disposal System Construction Permit is required prior to the installation of a septic tank or other onsite sewage disposal system. There is a 5' setback from all property lines and a 10' setback from other septic tanks. This Code requires a 75' separation from private potable water wells, a 200' separation from public potable water systems, and a 50' separation from non-potable water wells. The Code lists criteria concerning size and location of septic tanks.
Chapter 10D-6 is administered by the St. Lucie County Public Health Unit, Environmental Health Section and is currently being revised.

3. Florida Administrative Code (Chapter 10D-4, Water Systems)

This Code requires a 75' separation between private water systems and septic tank or drainfields (also in Chapter 10D-6). This Code lists criteria concerning construction, operation and maintenance of water systems.

The St. Lucie County Public Health Unit, Environmental Health Section administers this Code. Currently, a permit is not required to install private water wells. However, the Environmental Health Section verifies the separation distance required when inspecting the septic tank.

SUMMARY AND RECOMMENDATIONS

Projects by the SFWMD could have a wide range of impacts in the County and a framework for the County Master Plan is available to properly assess these impacts. A better inventory of discharge data needs to be developed for the interconnected drainage systems.

Small area drainage studies need to be conducted followed by implementation plans that include funding, permitting, right-of-way acquisition and construction plans. Funding, which has always been the constraining factor, may be necessary from a variety of sources that may include the following: Stormwater MSTU, SFWMD; special assessments districts; special taxing districts; State and federal grants or matching funds; and public bonds.

A supply of fresh water for irrigation and aquifer recharge is needed to replace the brackish water presently being withdrawn from the floridan aquifer. Continued use of the floridan aquifer will mineralize the shallow aquifer to the extent that agricultural productivity will decline and the City of Ft. Pierce wellfield along the C-25 Canal may not be usable. The SFWMD needs to assess the impact of irrigation return flows as part of the well permitting process.

The proposed SFWMD Taylor Creek-Nubbin Slough Diversion Project (formerly the C-131 Flow-way Project) may be a viable means of providing the needed water supply. Locating this project•s storage reservoirs in St. Lucie County would provide a groundwater recharge source that would help to displace mineralized groundwater. Since increased freshwater discharges into the Indian River Lagoon via the C-25 Canal have some negative environmental impacts, consideration should be given to the possibility of ■pulsing• releases of drainage from this canal into the Lagoon, in the same manner as has been done successfully for the St. Lucie Canal by the South Florida Water Management District. By doing this, natural freshwater releases are more closely mimicked. Another possibility to be considered in order to avoid detrimental impacts to the Lagoon from the C-25 Canal drainage is the timing of drainage releases coinciding with the outgoing tides of Ft. Pierce Inlet. This issue will be addressed in the Central and South Florida ■Restudy• Project.

The use of treated domestic wastewater effluent to supplement irrigation supplies and recharge the shallow aquifer should be further investigated. The seasonal irrigation requirements necessitate the use of storage or disposal of unneeded effluent. However, facilities using

deep well injection for effluent disposal are, in fact, storing the effluent and a significant portion of the effluent could be recovered for irrigation use.

In addition to conserving the use of groundwater by using irrigation quality (IQ) sewage effluent or surface water supplies, aquifer recharge through stormwater retention and/or detention needs to be considered for both area-wide and individual project applications. Retention by impoundment may be used for future irrigation needs by agricultural facilities and retention lakes in urban areas will reduce the volume of stormwater run-off.

GOALS, OBJECTIVES AND POLICIES

The following Comprehensive Plan Goals, Objectives, and Policies are modifications of the portions of the Element as adopted in 1990.

DRAINAGE SUB-ELEMENT
GOALS, OBJECTIVES AND POLICIES

GOAL 6C.1: **IT IS THE GOAL OF ST. LUCIE COUNTY TO ENSURE THE PROVISION OF AN ADEQUATE STORMWATER DRAINAGE AND MANAGEMENT SYSTEM THAT IS BOTH TECHNICALLY AND ECONOMICALLY FEASIBLE IN MEETING THE EXISTING AND FUTURE NEEDS OF THE COMMUNITY.**

Objective 6C.1.1: **By January 31, 2003, the County shall complete the Geographic Information System based Stormwater Mapping System.**

Policy 6C.1.1.1 Upon the completion of the Stormwater Mapping System master plan for the County, the County shall revise minimum levels of service for each defined drainage basin and shall incorporate those levels of service into this Comprehensive Plan.

Policy 6C.1.1.2 To ensure that St. Lucie County maintains sufficient stormwater runoff , the following level-of-service standard shall be utiltized in determining the appropriate amount of runoff for a project:

Stormwater Master Plan
Level of Service Standards

Structure/Facility	10 yr., 24 hr.	10 yr., 72 hr.	100 yr., 72 hr.
Houses/Building	<FFE[1]	<FFE	<FFE
Evacuation Routes[2]	1/2W[3]	<0.5 ft.	<1.0 ft.
Arterial Roads[4]	1/2W	<0.5 ft.	<1.0 ft.
Other Roads[5]	<0.5 ft.	<0.75 ft.	<1.5 ft.

1 Peak flood stages less than first (finished) floor elevation based on available data.
2 Evacuation routes as defined by the County and the Treasure Coast Regional Planning Council
3 Flooding limited to each side of the road such that . of the roadway width (W) or one travel lane is not flooded.
4 Roads with four or more travel lanes, or roads that are only access to a respective area/development (secondary evacuation routes).
5 Other roads which are not critical for evacuation, but which will be used to estimate encroachment on FFEs.

Policy 6C.1.1.3 When the level of service standards are revised for drainage subsequent to the completion of the County-wide Stormwater Mapping System(as indicated in Policy 6C.1.1.1), the level of service standard shall include performance standards for water quality and flood control for each basin. Appropriate local and state regulations specifying stormwater quality standards shall be incorporated by reference into the drainage level of service standard to measure performance of systems, which are designed to remove pollutants from run-off. Appropriate regulations specifying ambient water quality standards shall be referenced to prevent further degradation of surface and groundwaters by run-off from stormwater facilities built prior to stormwater quality regulations taking effect in 1982.

Policy 6C.1.1.4	The level of service standard in Policy 6C.1.1.2 shall be applicable to all commercial, industrial and residential development activities within the Unincorporated St. Lucie County.
Policy 6C.1.1.5	The County shall continue to coordinate efforts with all appropriate authorities in regard to water storage and capacity enhancements for the North Fork of the St. Lucie River, including those portions within the designated aquatic preserve.
Objective 6C.1.2	**The County will maintain an inventory of floodprone areas located within its jurisdiction.**
Policy 6C.1.2.1	The County shall maintain an inventory of flooding complaints
Policy 6C.1.2.2	The County shall request the South Florida Water Management District, North St. Lucie River Water Control District and Ft. Pierce Farms Water Control District establish system-wide water level monitoring stations in order to provide the data base necessary for the development of adequate stormwater management programs.
Objective 6C.1.3	**The County shall enforce existing Land Development Regulations which support the protection and maintenance of the natural functions (flow and storage) of the 100-year floodplain and other natural drainage features.**
Policy 6C.1.3.1	The County shall continue to enforce the Land Development Regulations regulating construction standards within the 100 year flood plain.
Policy 6C.1.3.2	The County shall provide direction and guidance to the general public on stormwater and floodplain management issues.
Objective 6C.1.4	**The County, in conjunction with the South Florida Water Management District, shall review and evaluate existing drainage studies and plans within the County•s jurisdiction to determine their relevance to the current stormwater regulations.**
Policy 6C.1.4.1	The County shall request that the South Florida Water Management District continue to update the inventory of groundwater levels within the County.
Policy 6C.1.4.2	All development will be specifically conditioned on the availability of services necessary to maintain level of service standards as adopted within this Comprehensive Plan.
GOAL 6.C.2	**IT IS THE GOAL OF ST. LUCE COUNTY TO IMPLEMENT A COUNTY-WIDE DRAINAGE SYSTEM FOR URBAN AND NONURBAN AREAS.**

Objective 6C.2.1 **The County will continue to implement the master drainage plan.**

Policy 6C.2.1.1 The County will continue to seek funding from State/federal grants and/or assessments in the area served by drainage improvements.

Policy 6C.2.1.2 No development authorizations shall be issued unless there is provided to St. Lucie County assurance that all required drainage improvements will be provided for both on-site and off-site.

Policy 6C.2.1.3 No final certificate of occupancy, as may be further defined in the Land Development Regulations, shall be issued until all drainage improvements, both on-site and off-site, for the particular development have been inspected and approved by St. Lucie County, or other appropriate authority.

GOAL 6C.3 **IT IS THE GOAL OF ST. LUCIE COUNTY TO ENSURE THAT THE SURFICIAL GROUNDWATER QUALITY IS THE HIGHEST POSSIBLE FOR POTABLE PURPOSES.**

Objective 6C.3.1 **To improve the water quality level of areas that fail to meet potable standards, and to prevent the further contamination of the surficial aquifer.**

Policy 6C.3.1.1 The County shall continue to enforce the Land Development Regulations, including regulations governing the protection of potable wellfields from possible sources of contamination.

Policy 6C.3.1.2 The Land Development Regulations shall require wastewater reuse plans for new sewage treatment plants operating above 250,000 gallons per day. Any new reuse plan shall be approved by FDEP.

Policy 6C.3.1.3 The County shall develop a series of stormwater attenuation areas to reduce the impacts of agricultural fertilizers and other related chemical applicants on the existing potable wellfields in the eastern portion of the County.

Policy 6C.3.1.4 The County shall continue to cooperate with the South Florida Water Management District in the identification and closure of free flowing artesian wells.

Policy 6C.3.1.5 The County Land Development Regulations shall continue to include comprehensive stormwater management including consideration of the following:

1. the use of stormwater detention and/or retention;
2. streambank and shoreline buffer zones;
3. general design and construction standards for onsite stormwater management.

Policy 6C.3.1.6	The County shall assist the Federal Government, State of Florida and the South Florida Water Management District•s in their effort to improve the water quality of the primary drainage systems through the implementation of Chapter 17-40, FAC and Chapter 17-25 FAC.
Objective 6C.3.2	**The County shall enforce the Land Development Regulations for regulating land use and development to protect the functions of natural groundwater recharge areas.**
Policy 6C.3.2.1	The County will protect the functions of natural groundwater aquifer recharge of designated public potable water supply wells by enforcing the Wellfield Protection Ordinance contained within the Land Development Code.
Policy 6C.3.2.2	The County will continue to work with the St. Lucie County Public Health Unit, Environmental Health Section, by verifying the issuance of the septic tank permit before a building permit is issued.
Policy 6C.3.2.3	The County will continue to assist the St. Lucie County Public Health Unit, Environmental Health Section, with the Hazardous Waste Verification Program by continuing to require all Occupational License applicants (except Home Occupations) to receive Public Health Unit approval prior to issuance of an Occupational License.
Policy 6C.3.2.4	No Conditional Uses for sand mining and no rezonings to Industrial, Extraction (IX) will be granted within public potable water supply recharge areas designated through the Wellfield Protection Ordinance.
Policy 6C.3.2.5	The County shall continue to cooperate with the South Florida Water Management District in the identification and closure of free flowing artesian wells.
Policy 6C.3.2.6	The County shall cooperate with the South Florida Water Management District in the implementation of the Upper East Coast Water Supply Plan.