

# **Comprehensive Plan**

## **INFRASTRUCTURE ELEMENT**

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Prepared for

**The City of Deltona**

Prepared by

**IVEY, HARRIS & WALLS, INC.**

631 S. Orlando Avenue, Suite 200

Winter Park, Florida 32789

(407) 629-8880

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Map 4-1 Potable Water System

Map 4-2 Sanitary Sewer

# **INTRODUCTION**

The Infrastructure Element consists of a series of sub-elements. These sub-elements are Potable Water, Sanitary Sewer, Solid Waste, Stormwater Management and Natural Groundwater Aquifer Recharge. The purpose of this element is to identify services being provided, the existing level of service, available capacities, and projected service needs to meet future demand.

## **POTABLE WATER SUB-ELEMENT**

Volusia County and Florida Water Services Corporation (FWSC) provide potable water service. Volusia County has a consumptive use permit for .533 million gallons per day (mgd) for consumptive use wells. FWSC has capacity for 23.7 mgd and utilizes 35 wells. The Deltona Potable Water Systems Map 4-1, shows the service areas of Deltona provided by the County and Florida Water Services Corporation.

Volusia County's service area mirrors their sanitary sewer service area. There are 3,792 residents being served by Volusia County. The current permitted water usage is .533 mgd with an available capacity of 1.0 mgd. Facilities could be expanded; however, there are no plans for expansion at this time. Because of the ability to expand, the facility anticipated life is unknown.

FWSC's service area mirrors their sanitary sewer service area. FWSC served 25,195 equivalent residential connections in 1995. The approximate average daily flow was 10.6 mgd or approximately 45% of capacity. There are no plans for expansion at this time.

### **County Owned/Operated System**

The Deltona North Treatment Plant has a capacity of 1.0 mgd. This is a community system, permitted by the Florida Department of Health and Rehabilitative Services. The number of customers in 1995 was 701 residential connections. Located in the northwest portion of the City, the predominant type of land uses served are residential (single family) and public/semi-public (schools).

### ***Level of Service Provided By System***

The Level Of Service for potable water is 300 gallons per day per connection. The Deltona North Plant average daily flow, including irrigation, was 490 gallons per day per connection. It should be noted that the Combination of Deltona High School, Galaxy Middle School and Timbercrest Elementary may skew the normal daily water usage. The plants permitted capacity is 1.00 million gallons per day. The average daily flow in 1998 was .499 mgd.

### ***Existing Service Area***

The service area consisted principally of the Deltona High School, Galaxy Middle School and Timbercrest Elementary and an adjacent new single family subdivisions (i.e. Timbercrest). Subsequently, the area of service has expanded to include other school sites, an additional phase of the Deltona Woods subdivision, another newly constructed single family development (Pinewood), as well as in-fill of the previously served subdivisions.

A significant increase in the number of customers was brought about by an agreement with FWSC. Under the terms of this agreement, approximately 300 customers located within the northern portion of the Deltona Lakes subdivision are provided potable water by the County via the Deltona North facility.

### ***Existing Condition of System***

The Deltona North Treatment Plant is a new facility, beginning service in 1990. This facility may be expanded to accommodate future growth. This facility does not provide potable water to other jurisdictions at this time. There is approximately .47 mgd available capacity.

### ***Impact of The System Upon Adjacent Natural Resources***

There are no adverse impacts identified to date as related to natural resources associated with the operation of this facility/system. The facility/system has been issued a consumptive use permit by the St. Johns River Water Management District for the use of groundwater from the Floridan Aquifer. The maximum permitted daily withdrawal is 0.533 million gallons.

## ***Privately Owned/Operated System***

Deltona Lakes Water System, is owned and operated by Florida Water Services Corporation. The treatment plant has 23.7 mgd capacity. This is a community system, permitted by the Florida Department of Health and Rehabilitative Services. The number of equivalent residential unit connections is 25,195. The predominant types of land uses served are residential (single family), commercial and public/semi-public.

### ***Level of Service Provided By System***

The Level Of Service for potable water is 300 gallons per day per connection. The average daily use per equivalent residential connection was 362 gallons per day in 1995. The average daily flow in 1995 was 9.1 mgd. The system capacity is 23.7 mgd. The presence of schools in the service area may have skewed the water usage.

### ***Existing Service Area***

The service area includes the majority of Deltona with the exception of the north central and northwest portion of the City boundary. This service boundary is the same as central sewer service area. At this time there are no plans to expand the service area. Approximately 5% of the water system serves the City of DeBary and approximately 10 to 15% serves unincorporated Volusia County.

### ***Existing Condition of System***

The Deltona Lakes Facility has excess capacity for expansion. This facility may be expanded to accommodate future growth. There was approximately 13.1 mgd available capacity in 1995.

### ***Impact of The System Upon Adjacent Natural Resources***

There have been no adverse impacts identified to date as related to natural resources associated with the operation of this facility/system. The facility/system has been issued a consumptive use permit by the St. Johns River Water Management District for the use of groundwater from the Floridan Aquifer. The maximum permitted daily withdrawal, in 1995, was 23.7 million gallons per day.

## **Projected Demands On The Potable Water Systems**

The projected population growth is approximately a 60% increase by the year 2010 and a 103% by the year 2020. Evaluating the impacts of future growth was based on existing conditions and 60% increase and a 103% increase were added to each facility's current demand. Table 4-1, identifies that even with a projected 60% increase in population, there is existing water capacity to meet this demand. Should the population projection be accurate, the Deltona North Plant will need to be expanded prior to the year 2020. The Deltona Lakes Water System should have begun to considering expansion plans by 2020.

### **Water Conservation**

There is a host of water conservation techniques that should be evaluated for continuous implementation by the City. Findings should be made available to educate the general public on water conservation. Obviously a significant reduction in water usage may prolong facility capacity by months or even years.

The utilization of "effluent reuse" water for irrigation will also lower the demand for potable water. Presently, the Deltona Lake Wastewater Treatment Plant is permitted to dispose of .887 mgd of reuse water on the Deltona Golf and Country Club. The Deltona North is permitted approximately .122 mgd of reuse as gray water recharge. Expansion of reuse water systems should be evaluated to determine, in particular, whether it would be cost effective to both service providers.

Xeriscaping, is a method of landscaping using native and drought tolerant plants to reduce irrigation needs. Using xeriscape landscaping reduces maintenance and demand for water, which would be more cost-effective for property owners.

### **Protection of Well Fields**

The raw water wells in Deltona are the sole public source of drinking water for the City and this must be safeguarded from contamination. Well fields should be located away from land uses that could inadvertently pollute the ground water. Water quality should be periodically evaluated to identified harmful contaminants. Based on the projected population of the whole

area, the City should coordinate with the County and FWSC to determine the most appropriate well field locations and protection measures.

#### Future Potable Water Effort

Within the planning period, the City of Deltona should consider owning and operating a City water and utility system to provide these services to its residents, the need for which is demonstrated in the Potable Water Sub-element. The City should require developers placing water and/or service utilities in the public right-of-way to dedicate the lines to the City at such future time as the City may request such dedication.

## **SANITARY SEWER SUB-ELEMENT**

The Sanitary Sewer Sub-Element is oriented mainly to service provisions by centralized sewer. However, recognizing that not all residential units are connected to a centralized sewer facility, on-site sewage disposal (OSSD); also known as septic tanks, will be evaluated in terms of appropriate need and locations. The City may need to evaluate areas that may be inappropriate locations for OSSD. The City should also periodically provide information and mandate a program for proper OSSD maintenance.

In 1995, there were approximately 5,500 centralized sewer users and approximately 20,000 active OSSD systems. The Sanitary Sewer Map 4-2, identifies existing sewer mains throughout the City.

Volusia County and FWSC currently provide sanitary sewer service in the City of Deltona. Their combined service provides treatment of 1.009 mgd for 13,277 residents in 1995 according to the Domestic Wastewater Treatment and Reuse Inventory in the St. Johns River Water Management District.

### **County Operated Systems**

The Deltona North Wastewater Treatment Plant is a .5 mgd extended aeration (orbital oxidation ditch type) wastewater treatment plant. The treatment plant is designed with flow equalization features, disinfection by chlorination and land application of reclaimed water via two

percolation ponds of approximately 45,090 sq. ft. In 1995, there were 263 residential connections. The predominate users are single family residential and public/semi-public (schools).

#### ***Level of Service Provided By System***

The adopted County LOS is 284 gallons per day per residential connection. For non-residential connections, the LOS is 1500 gallons per day. In 1995, the average connection was using 534 gallons per day. It should be noted that the presence of a Deltona High School, Galaxy Middle School and Timbercrest Elementary have skewed the normal per day wastewater usage. The plants permitted capacity is .5 mgd. The average daily flow in 1998 was .255 mgd.

#### ***Existing Service Area***

The service area has recently been expanded to include several adjacent, single-family residential subdivisions - Timber Crest, Deltona Woods (Phase II), and Pinewood - and other educational facilities - Timber Crest Elementary and Galaxy Middle. Sewer mains have been constructed along Howland Boulevard, to the east of the treatment facility, and westerly along Graves Avenue, crossing under Interstate 4. Aside from accommodating future development adjacent to these thoroughfares, extension of these lines has resulted in service being extended to existing land uses (i.e. Country Village in Orange City and the Food Lion Shopping Center in Deltona). Approximately 25% of this system serves Orange City.

#### ***Existing Condition of System***

This facility has approximately .245 mgd available capacity. This facility/system recently constructed does not currently present any operational problems and none are foreseen in the near future. The facility is sited at a location that presents adequate room for future physical plant expansion. A new digester has been installed at this facility. Also, State Revolving Loan Funds have been secured to upgrade the treatment level - to advanced secondary, this was to facilitate the use of re-use water.

#### ***Impact of the System Upon Adjacent Natural Resources***

There is no discharge to surface waters. The method of disposal is gray water recharge.

## ***Privately Owned/Operated Wastewater Systems***

Deltona Lakes Wastewater Treatment Plant is owned and operated by Florida Water Services Corporation. This facility was constructed for a 1.4 mgd; however, has a permit for .9 mgd. A permit is pending for the additional .5 mgd available capacity. There were 5,075 equivalent residential connections in 1995. The predominate types of land uses being served are residential (single-family), public/semi-public (schools) and commercial centers

### ***Level of Service Provided By System***

The adopted County LOS is 284 gallons per day per residential connection. For non-residential connections, the LOS is 1500 gallons per day. In 1995, the average connection was using 189.45 gallons per day. The plant's permitted capacity is .9 mgd. The average daily flow in 1995 was .887 mgd. In 1996, the maximum average daily flow was .975 mgd. There is a permit pending, and design capacity is 1.4 mgd.

### ***Existing Service Area***

The service area includes the majority of Deltona with the exception of the north central and northwest portion of the City boundary. Approximately 5% of the service area includes the City of DeBary and approximately 10% to 15% of the service area includes unincorporated Volusia County. At this time there are no plans to expand the service area.

### ***Existing Condition of System***

There is a permit pending for 1.4 mgd of capacity. Once approved, the approximate available capacity is .425 mgd. This facility/system does not currently have any operational problems. This facility has the capability to facilitate re-use water.

### ***Impact of The System Upon Adjacent Natural Resources***

Direct discharge into surface waters no longer occurs. However, reuse water may find its way into surface water bodies through runoff and seepage. This facility is permitted to up .887 mgd for reuse to the Deltona Golf and Country Club.

## ***Projected Demands On The Wastewater Systems***

The projected population growth is approximately a 103% increase by the year 2020. The 2020 population is projected to be 114,700 persons. Evaluated impacts of future growth are based on existing conditions, a 60% increase (2010) and a 103% increase (2020) were added to each facility's current demand. Table 4-2, identifies that the Deltona North facility based upon current conditions and consistent population growth will not have a deficiency. However, the Deltona Lakes Wastewater Treatment Plant need to consider expanding the existing facility before the year 2010.

### ***Development of The Southwest (Volusia) Activity Center***

The projections in Table 4-2 do not account for the potential development of the southwest (Volusia) activity center or other development that may occur along the Howland Boulevard corridor. Coordination with the County will be needed to ensure that facilities are available at the time of development.

### ***Areas Served By On-site Sewage Disposal (OSSD) Systems***

Approximately 80% of City residents utilize OSSD systems. If this percentage were maintained consistently, a study should be considered to determine if the natural topography can accommodate another 30,000 residents without harming surface and ground water bodies.

The areas OSSD systems are utilized where centralized sewer mains do not exist, as shown (sewer lines) on the Sanitary Sewer Map 4-2. It should be noted that the Generalized Development Suitability Map in the Future Land Use Element also portrays areas considered to have soils with severe limitation for OSSD systems. It is in these areas where limitations exist that should be given priority for centralized sewer connection.

In Section 9J - 5.011(f)4 - which requires an analysis of soil surveys for areas served by septic tanks and an explanation of suitability of those soils for such facilities shall be included, based upon best available data from the United States Department of Agriculture, Soil Conservation Service. The Development Suitability Map in the Future Land Use Element contains generally the suitability of the soils within the City of Deltona for septic tanks and other development.

Soils can be improved on-site; however, some areas may require large amounts of fill to solve these problems. Areas with poor soil suitability for OSSD should be given priority for future sewer installation or be retrofitted with a central wastewater collection/treatment system.

The City should study the effectiveness of long term use of OSSD and the impact to ground water quality. The potential health risks of poorly functioning OSSD should also be evaluated. The City should provide educational information about proper maintenance of OSSD systems.

#### **Targeting Areas For Centralized Sewer**

Areas should be targeted that can be identified as an environmentally sensitive resource; containing poorly draining soils; having a significant number of OSSD failures and identified health hazard(s). Where OSSD systems are being utilized a study should be conducted to determine if certain areas of the City are no longer suitable for OSSD system. If these areas are identified, they should be recommended for priority connection to a wastewater collection facility that is suitable for that area.

#### **Future Sanitary Sewer Effort**

As with potable water, within the planning period, the City of Deltona should consider owning and operating a City sanitary sewer and utility system to provide these services to its residents, the need for which is demonstrated in the Sanitary Sewer Sub-element. The City should require developers placing water and/or service utilities in the public right-of-way to dedicate the lines to the City at such future time as the City may request such dedication.

## **SOLID WASTE SUB-ELEMENT**

The City of Deltona utilizes Volusia County's Solid Waste Management Department to handle and dispose of all discarded trash and debris. This solid waste collection does not include hazardous materials. Materials are first taken to the Solid Waste Transfer Station for sorting. Those materials suitable for recycling or yard waste that can be mulched are separated from those materials will be disposed of in the Tomoka Farms Landfill.

### **Solid Waste Stream**

In 1995, approximately 1,300 tons a day were disposed of in the landfill. This figure is down from the 2,200 tons a day in 1990. In addition, the County accepts 100-120 tons a day of raw (not construction or demolition related) trash from Flagler County. The County currently recycles white goods (old appliances), metal, (including steel cans), aluminum, glass, and plastics. A significant portion of these materials are collected through the County's curbside recycling program. The curbside recycling program was initiated in 1992. Essentially, the curbside recycling program collects from households recyclables in plastic recycling bins. Items that are recycled through the curbside program include aluminum, glass, newspaper print, steel cans, and plastic vessels.

Pursuant to State mandate, yard trash is no longer deposited in the landfill. However, the County solid waste operation still accepts yard waste. The yard waste is mulched and trammed (sifted) and piled into large mulch hills. The mulch is given away or used for County projects.

The County has launched an aggressive public information program to further reduce the solid waste stream.

### **Littering and Illegal Dumping**

Illegal dumping still occurs; however, this practice has been reduced since mandatory garbage pick up. The County employs five (5) Solid Waste compliance officers to enforce State litter laws. Enforcement of state littering laws by the County is expected to continue into the future as long as a littering/illegal dumping problem exists.

### **Location of Solid Waste Facilities**

The County's Solid Waste Transfer Station and the Tomoka Farms Landfill are currently sited in areas that are considered convenient to transportation arterials and are compatible with surrounding land uses. Neither the Solid Waste Transfer Station or the Tomoka Landfill are located in the City of Deltona.

There are no private solid waste facilities in the City of Deltona.

### ***Solid Waste Facility Capacity***

Volusia County operates one solid waste landfill site known as the Tomoka Farms Landfill. The Tomoka Farms Landfill is located in eastern Volusia County. The landfill complex consists of approximately 3,500 acres. Most of this land is intended to buffer the landfill. Because of Tomoka Farms landfill's proximity to the Daytona Beach International Airport the landfill is restricted to a maximum of 125 feet above sea level. The current landfill phase or "cell" has about 10 more feet of height left before it will be closed. However, the County is about to open a 38 acre cell that will be on line well before the closing of the existing cell. Based on solid waste stream projections, the next cell will last until the year 2040. The level of service standard established by the County is 8.5 pounds per person per day.

There are 21 other privately operated landfills in Volusia County. All of the landfills are considered class III and open only to construction and demolition debris and land clearing material.

### ***Hazardous Waste***

The County currently has a hazardous waste collection facility at the Tomoka Farms Landfill. The hazardous collection program accepts waste from private residences only. The hazardous materials collected are cataloged and disposed of properly. These hazardous materials ~~are~~ include but are not limited to: drying paint, other household materials, used motor oil and any materials not suitable for the landfill. Large volumes of hazardous waste are shipped out of the County by private, licensed haulers. The licensed haulers truck the hazardous materials to out of state disposal sites. Finally, the County does have a hazardous materials response management program. This program is intended to respond to hazardous materials emergencies.

### ***Future Solid Waste Effort***

#### ***Solid Waste Stream***

The City should continue to encourage the reduction of the solid waste stream. To do so, the City should encourage recycling efforts.

### ***Littering and Illegal Dumping***

The City should adopt and enforce a no tolerance ordinance concerning littering and illegal dumping. The City should assist the County by enforcing State littering laws and maintain an educational presence to reduce littering and illegal dumping.

### ***Location of Solid Waste Facilities***

The location of the County's Solid Waste Facilities are not expected to change during the next planning phase. There is enough land at the Tomoka Landfill site to accommodate landfill cell expansion for the foreseeable future. Private landfill sites will continue to be managed through the review process of the County's Zoning Ordinance.

### ***Solid Waste Facility Capacity***

The County has landfill capacity that should be available through the planning horizon.

### ***Hazardous Wastes***

The City should help encourage the County to expand its hazardous waste collection to the Solid Waste Transfer Station to serve West Volusia residences. The County should continue to educate citizens about proper disposal of hazardous materials.

## **STORMWATER MANAGEMENT SUB-ELEMENT**

The purpose of this Element is to properly manage stormwater runoff, to protect ground and surface water quality, protect individuals and prevent property damage from flooding. The relationship between land use management and stormwater management is inevitably linked. The coverage of land area by impervious surfaces prevents direct natural infiltration into the ground and also allows pollutants to accumulate above ground. The rain moves these accumulated pollutants into ground and surface waters which results in reduced water quality.

Water resource management is a major concern in Florida. Both surface and ground water resources are threatened by pollution from urban and agricultural sources. The conveyance

systems used to channel the stormwater can become clogged leading to flooding and property damage. Often when natural features are converted into urban land uses that development related problems occur. The process of development disrupts the natural drainage patterns and require the controls be instituted to protect water quality and property from flooding.

In 1978, Volusia County passed a Stormwater Management Ordinance that established performance and design standards for the management of stormwater runoff. In 1986, the Volusia County Charter was amended to allow the County to enact minimum performance and design standards for the management of stormwater runoff that apply County-wide. All incorporated local governments in Volusia County are required to adopt ordinances that meet or exceed the County's minimum standards for the regulation of stormwater runoff.

### **History**

Deltona Corporation, based in Miami, Florida, began development of the Deltona Lakes Community. Development started in the southwest portion of the watershed and proceeded to the east. In the early 1970s, the development of the Deltona Lakes Master Drainage Plan called for direct outfalls to Lake Monroe from each of the three major basins within the watershed; the Lake Gleason Basin, the Lake McGarity Basin and the Lake Theresa Basin. The Drainage Basins Map 4-3, illustrates the numerous drainage basins associated with the City of Deltona. Additionally, a Master Drainage Plan provided for artificial connections between many individual lakes in an effort to reduce flooding. Due to a depressed real estate market during the late 70s and early 80s, only the Lake Gleason Basin outfall was constructed. The Lake McGarity Basin outfalls to Lake Monroe through a natural channel. Attempts have been made to construct an outfall for the Lake Theresa Basin by connecting it via canal to the McGarity Basin. However, public opposition and permitting problems halted the proposed construction in the early 1980s.

### **Existing Conditions**

The Deltona Watershed is approximately 45.65 square miles in size, larger than the municipal boundaries of the City and is located in the southwest portion of Volusia County. The watershed is located within both the DeLand Ridge and the St. Johns River Valley

physiogeographic regions and is generally bordered by Interstate 4 on the west, Deep Creek on the northeast and Lake Monroe on the south. Elevations in the watershed range from a high of approximately 100 feet, NGVD (referenced to National Geodetic Vertical Datum of 1929), near the northwest corner of the watershed to a low of 5 feet, NGVD, near Lake Monroe. The topography can be defined as Karst, producing little surface runoff. Karst results when limestone is dissolved by water resulting in an irregular land surface. Features of Karst include lake or surface runoff and the presence of sinkholes, springs and circular lakes. Surface Karst features are developed in Deltona because it is high in elevation, and thus, has not been repeatedly modified by sea inundations (USGS Report 90-4069).

The soils within the Deltona Watershed are predominately well-drained sandy soils, commonly characterized as type "A" soils by the Natural Resources Conservation Service, also known as the Soil Conservation Service. Over 90 percent of the soils in the watershed are of the Orsino unit or the Astatula-Tavares unit. These soils consist of broad or undulating high ridges of excessively drained to moderately drained soils. Land use within the watershed is predominately medium and low density residential.

The watershed consists of interconnected, cascading or isolated lake systems, with a general direction of flow from north to south. Three separate lake systems, or basins, have been identified: the Lake McGarity System, the Lake Theresa System and the Lake Gleason System. The lakes within each system are intermittently connected during large storms and in wet years, and generally flow southward. The Lake McGarity and Gleason systems flow into Lake Monroe, which is part of the St. Johns River. The Lake Theresa system is land-locked with no direct outlet.

Approximately fourteen (14) percent of the Deltona Watershed land area consists of wetlands as indicated using the U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) Maps. Several wetland habitats are present within the watershed including: forested, scrub-shrub (thicket swamp), emergent, aquatic bed and unconsolidated bottom, which includes open water (lakes and ponds).

Wetlands are transitional habitats that occur between upland and aquatic environments where the water table is at or above the surface of land or where land is covered by shallow water that

may be up to six (6) feet deep. Wetlands are important ecosystems that provide various benefits to the environment, such as flood attenuation, groundwater recharge, pollutant removal and provide valuable habitat for fish and wildlife.

The majority of the wetlands within the watershed are lakes and emergent wet prairies. Since the Deltona Basin is an area of high recharge, lake levels fluctuate widely on a seasonal, and yearly basis. The lakes in Deltona are gently sloping, mesotrophic (clean, low in nutrients) systems with wide littoral zones. During dry periods, the lake levels decrease and the lakes take on the characteristics of wet prairies. In wet years, the surficial groundwater levels increase, replenishing the lakes. Although the watershed is described as a cascading lake system, it is only during times of extremely high water levels that the lakes may actually be interconnected.

#### ***Analysis of Deltona Watershed Study***

Volusia County's Technical Steering Committee identified many shortcomings pertaining to drainage patterns in the County and identified the need for watershed studies. Dyer, Riddle, Mills & Precourt, Inc. (DRMP) was contracted by Volusia County in January 1994, to prepare a comprehensive Watershed Management Plan for the Deltona Watershed. The plan addressed water quantity (flood control), water quality (pollutant load reduction), aquifer recharge and wetlands within the watershed.

The problems identified in the DRMP study consist of landlocked sub-basins, where no positive outfall is available, and nuisance flooding problems in the secondary stormwater system. In many cases, roads or homes were constructed within the floodplain areas because sufficient information as to flood elevations was unavailable. Within the watershed, several different types of water quantity problems exist. The following is a brief categorization and description of these problem types.

Water standing along roadsides, sidewalks and driveways, due to inadequate swale size and slope, coupled with a high groundwater table from excessive rain and a shallow confining layer under the ground surface. The soil remains saturated for long periods of time, causing road damage, inconveniences and the potential for infiltration through concrete house pads.

Subsequent rain events have the potential to cause structural flooding as a result of having no soil storage for runoff.

- Local depressions with no direct outlet fill with runoff and flood streets, yards and potentially flood house structures. These problems are caused mainly by high rainfall amounts, resulting in high runoff and groundwater flow rates into the depressions. A secondary reason for structural flooding is the low level elevation at which some houses are constructed.
- Undersized culvert(s) under roadways within the primary storm system cause road flooding during extreme storm events. Structural flooding may also be present, but is indeterminable due to the lack of finished floor elevation information.
- Excessive water flow velocities within pipes and channels of the primary storm system causes erosion and instabilities that could result in side slope and/or pipe failure.

The effect the extensive swale system has on water quality in Deltona is unknown. The swales were designed to remove a significant percentage of pollutants. No treatment factor was applied to these areas, because of the frequent failure rate of the systems. These failures are primarily due to the build-up of turf in the swales over the edge of the adjacent streets and sidewalks. This condition prevents water, in many cases, from entering the swales.

As a result of improper swale maintenance, stormwater can flow along the road without entering the swales thus bypassing any pollutant treatment provided in the swales. During wet seasons, when soils can become saturated, continual water flow can occur along the edge of roads causing excess algal growth. In summary, swales should be maintained to minimize water quality problems within the lakes.

The high water table conditions associated with nuisance flooding areas, in Deltona, could be adversely affecting the operation of septic tanks in those areas. Based on complaints from residents, and field inspections by DRMP staff, it appears that numerous septic tanks failed during the wet summer of 1994. These failures caused septic tank effluent to seep across lawns and to run into the stormwater conveyance systems via sidewalks, swales and roads.

Potentially contaminated water was also observed standing in the driveways of many homes in these areas. The City should consider an inventory of finished floor elevations. The presence of large amounts of standing water alone presents a potential health risk from increased mosquito breeding. These flooded urban areas can breed more mosquitoes than natural aquatic habitats due to the absence of natural predators (primarily fish). Also, more aggressive species of mosquitoes typically breed in polluted or stagnant waters. When this standing water is contaminated with septic effluent, the risk for bacterial and viral infections is also increased.

In addition to the potential health risks, septic tank failures could increase the loading of bacteria and nutrients to the lakes in the Deltona area. This increase in pollutant loading could have deleterious effects on the water quality and recreation value of the lakes. In addition to degrading a valuable natural resource, decreased water quality could adversely affect the value of surrounding properties.

#### **Alternative solutions**

Four regional alternatives developed for the Deltona Watershed were proposed within the DRMP Study and are designed to give the City of Deltona and Volusia County a desired level of service for water quantity and water quality within the primary storm system. Areas of concern include stormwater runoff washing over the top of roadways during major storm events such as the 100-year storm event; lake water inundating homes; and older conveyance structures which no longer perform at an acceptable level. A brief summary of the four alternatives is presented below.

Alternative 1 is designed to give the City a first-step solution to the flooding problems being experienced within the Deltona Watershed by improving structure maintenance. This alternative includes such items as cleaning silted piping systems, clearing debris from channels, recommending swale improvements and/or storm sewer installations and repairing or replacing dilapidated headwalls and piping systems. Implementing these steps will enable the public to see that the City is taking positive steps toward the solution of their individual stormwater problems. This alternative is not designed to solve all the flooding problems within Deltona, but it is an initial step to gain public support for the proposed future improvements and the stormwater utility itself.

Alternative 2 focuses on specific major flooding areas within the primary storm system. This alternative recommends upgrading those structures which have a level of service of 'D', which are those piping systems that fail during the 100-year, 24-hour storm event. This failure is evidenced by the roadway above a particular primary system culvert being flooded.

Alternative 3 is a regional approach to lower flood elevations and increase recharge to the aquifer. This alternative will operate in tandem with Alternative 2.

Alternative 4 presents a conceptual design and cost to retrofit the entire watershed with structural best management practices for flood reduction and water quality improvements. This scenario is designed to ensure that cost-effective solutions have been developed in the preceding alternatives.

The amount of land to be served by dry retention and wet detention was calculated from the SCS soil survey. These areas were then divided into forty (40) acre parcels, the St. Johns River Water Management District's typical permitting threshold. These calculations yield that a total of 646 ponds, 535 dry retention ponds and 111 wet detention ponds, would be needed to serve the entire watershed. Of these 646 ponds, 246 would be constructed by new developments in the basin, thus, alleviating the construction responsibility and cost from the city or county.

## **Recommendations**

Recommendations from the Deltona Watershed Management Plan (DWMP) for stormwater management were the result of the investigations performed by DRMP. This DWMP provides recommendations on structural and non-structural stormwater controls, operation and maintenance, monitoring and additional studies/investigations necessary within the Deltona Watershed.

### **The recommendations presented for alternatives:**

Alternative 1: Enhance performance of the system through *operation and maintenance improvements*.

Alternative 2: Enhance the level of service of the system through water quantity and quality *structural retrofits*.

Alternative 3: *Provide a regional approach* to water quantity and quality improvement.

Alternative 4: Determine conceptual cost estimate to *provide complete water quality retrofit of the entire watershed and flood reduction*.

All of the alternatives presented in this report provide feasible, effective, permissible solutions to problems within the Deltona Watershed. All alternatives presented are also cost-effective solutions with the exception of Alternative 4, which only provides a magnitude of cost comparison for complete retrofit of an existing development.

It is recommended that small secondary storm systems discharging directly to a lake be retrofitted to include sediment trappings devices such as sediment inlets or an initial baffle box. Another option to remove sediment is to over excavate the swale area immediately adjacent to the existing inlets. This will provide a small standing pool of water below the inlet elevation, which will help settle suspended solids in the runoff. To prevent this standing pool of water after storm events, this option should only be incorporated in soil types "A" and "B".

One way to alleviate the potential risks described above would be to provide sanitary sewer service to those areas where natural conditions compromise the operation of the septic tanks. Because of the high costs associated with providing sewer services to existing developed areas, the need for them must be adequately demonstrated. Monitoring programs and studies to determine the exact nature, and extent, of the septic tank problems are recommended, to demonstrate existing or potential hazards to the environment or potable drinking water supply. Maintenance of the existing swale system is also recommended. The results of this maintenance and the recommended studies should allow the City to determine whether sanitary sewers are required to alleviate potential problems and the extent to which they would be necessary.

### **Conclusion**

The basic objectives of stormwater management are to assure that stormwater volume, peak discharge rate and pollution loads leaving the site after development are not greater than those

occurring prior to development. When evaluating the best stormwater management technique, factors such as site limitations and physical constraints, the amount of water quantity control needed and the degree of water quality treatment desired, need to be considered. Site limitation may include the proposed use of the land, owner preferences, wetland and wildlife habitat, and potential aquifer recharge. Physical constraints, such as soil permeability rates, elevation of seasonal high groundwater table and the space available to construct the facility, need to be investigated before the Best Management Practice is chosen. Water Management District concerns over water quantity issues need to be addressed. The stormwater facility chosen must adequately control peak flow and volume discharges, while maintaining control elevations that are compatible with any adjacent wetland systems.

## **NATURAL GROUNDWATER**

### **AQUIFER RECHARGE SUB-ELEMENT**

#### ***Overview***

The overall purpose of this Sub-element is to protect both the quantity and quality of the natural groundwater. Groundwater levels and water quality are affected by many activities. Solid waste and hazardous waste facilities, underground storage tanks, and septic tanks all have the potential to contaminate groundwater quality. These issues are all influenced or affected by a variety of Comprehensive Plan Elements. The Land Use Element regulates potential contaminate sources and wellfield locations while the Transportation Element determines need (gas stations) and affects location particularly of large public facilities. The Intergovernmental Coordination Element determines effectiveness of a groundwater protection program, while the Capital Improvements Element determines funding. In addition, the Sanitary Sewer Sub-element (reuse or recharge of treated effluent), Potable Water Sub-element (mining of the groundwater to meet demand), Solid Waste Sub-element (potential contaminant sources, including hazardous and biological waste) and Drainage Sub-element (affects how much stormwater is available for recharge) all impact groundwater. The goals, objectives and

policies contained herein, provide guidelines and limitations regarding the above issues in order to protect the City's only water supply for the next twenty years and beyond.

As a contributing factor to the sole source water supply for Deltona, groundwater is an important resource, which can be depleted through over use. Natural recharge through well drained soils is the primary means of replenishing depleted groundwater levels. Natural groundwater recharge areas, because they are linked to the aquifer, are affected by the restrictions to protect groundwater quality and quantity listed above. Recharge areas must maintain their natural recharge functions if they are to continue to supply water to the aquifer.

#### ***Groundwater and Aquifer Recharge Conditions***

Groundwater is one of Florida's most important natural resources. Since rainwater infiltrating into the ground is the primary source of recharge for the State's aquifer systems, development processes associated with growth can increase the amount of impervious surface and alter the natural topography, vegetation, and runoff patterns, to the extent, that the amount of infiltration and many recharge functions, may be reduced. Groundwater recharge is the process of adding water to the saturated zone, which is comprised of those aquifer systems that lie beneath the water table. The source of recharge to the Florida aquifer is rainfall. Soils with high infiltration rates, gentle slopes, and poorly developed surface drainage systems have the best potential for recharging groundwater systems. Direct recharge also occurs where the Floridan aquifer is at or near the surface, and where the upper confining unit is breached by sinkhole or related (Karst) features.

Volusia County's Sole Source Aquifer, is vital to the County in that it is the drinking water source for every municipality in the County and is a major source of agricultural irrigation water. The DeLand Ridge has the highest potentiometric and topographic surfaces in the County. The top of the artesian aquifer slopes eastward from the DeLand Ridge at a rate of about three feet per mile. Natural recharge to the aquifer occurs where the water table is higher than the potentiometric surface. Areas of artesian flow, where the potentiometric surface is higher than the water table (Discharge areas), exhibit the most runoff. The City of Deltona lies along the DeLand Ridge in southwestern Volusia County. This is an area of high recharge. Deltona is estimated to receive over 12 inches of recharge per year.

The Floridan aquifer under-lying Volusia County is a federally designated “Sole Source Aquifer” which receives special protection because of its sensitive nature. A “Single Source Aquifer” means an aquifer or a portion of an aquifer that is determined by the Environmental Regulation Commission to be the only reasonably available source of potable water to a significant segment of the population. The sole source designation is warranted because the aquifer is unconfined and located close to the surface with little unconsolidated cover and material. Communities that depend upon local surficial aquifer systems exclusively as a source of drinking water would have to turn to other more expensive sources or energy intensive treatment methods, if this source were exhausted or contaminated.

Groundwater supplies are fragile and subject to pollution from a number of potential contaminants. Groundwater protection issues as they relate to aquifer recharge are primarily a function of land use. Sanitary landfills, over pumping, reduced groundwater levels, and saltwater intrusion constitute four significant threats to groundwater supplies. Other major concerns related to aquifer recharge are pollution of the groundwater and diversion of stormwater runoff to areas outside the high recharge areas. These are serious issues since no cost-effective alternative is available for providing potable water should contamination occur.

In spite of high topography and well drained soils, flooding does occur along the DeLand Ridge. These flooding problems can be linked to past landscape modifications including: alteration of natural drainage features; artificial expansion of drainage basins by an increased volume of impervious surfaces within a drainage basin; poorly designed or no stormwater management systems (i.e. development predating stormwater management and land development regulations); and the improper siting of development. In response to the flooding, some of the water is being pumped or directed to the St. Johns River. Essentially, directing the flood waters from the closed basins on the Ridge to the St. Johns River has lowered the amount of water available for recharge.

The SJRWMD identifies areas consider Priority Water Resource Caution Areas (PWRCA). This assessment is designed to identify areas where water supply problems have become critical or are predicted to become critical by the year 2010. The primary procedure used to determine the Priority Water Resource Caution Areas was to compare groundwater level and quality changes,

based on existing and future needs, with thresholds for various impact criteria. The four impact criteria used in the assessment are: impacts to natural systems, ground water quality, existing legal users, and failure to identify an adequate public water supply. Deltona, due to its location above the main recharge area, is considered a PWRCA.

### **Groundwater Quality**

Groundwater quality is another growth related issue. The City of Deltona lies atop the Volusian-Floridan Sole Source Aquifer, in an area of high recharge. Most of Florida's surface water quality problems stem from five sources: urban stormwater runoff, agricultural runoff, domestic wastewater, industrial wastewater, and hydrologic modifications. According the Department of Environmental Protection's (DEP) 1994 statewide surface water quality assessment, the majority of Deltona has fair water quality conditions.

In Volusia County, several agencies conduct studies with respect to water quality. Unfortunately, the historical pattern of water quality monitoring has been scattered and of limited use in terms of coverage and trend assessment. Improvements in this effort are presently underway through the development of a coordinated local monitoring program by the SJRWMD and Volusia County.

Traditionally, efforts to improve water quality have focused on reducing pollutants discharging from point sources, such as wastewater treatment plants and industrial processes. However, as pollution control measures have been implemented for these discharges, it has become evident that diverse sources of water pollution (non-point sources) are also major contributors to water quality degradation. Studies, including the Nationwide Urban Runoff Program (NURP) Study (EPA, 1983), have shown that stormwater runoff from urban and industrial areas typically contains the same general types of pollutants that are often found in wastewater in industrial discharges. Pollutants commonly found in stormwater runoff include heavy metals, pesticides, herbicides and synthetic organic compounds such as fuels, waste oils, solvents, lubricants and grease. These compounds can have damaging effects on both human health and aquatic ecosystems. In addition to pollutants, the high volumes of stormwater discharge from rapid urbanization have had significant impact on aquatic ecosystems due to physical modification such as bank erosion and widening of channels (EPA, 1992).

According to the DRMP Deltona Watershed study water quality issues within Deltona stem from two main areas, septic tank failures and stormwater runoff and incapacity of the stormwater system. The high water table conditions associated with the nuisance flooding areas could be adversely affecting the operation of the septic tanks in those areas. Where there is a high density of septic tank systems in an important aquifer recharge area, the potential for aquifer contamination may be high. In addition to the potential health risks, septic tank failures could increase the loading of bacteria and nutrients to the lakes in the Deltona area.

### **Recommendations**

The most significant recharge areas within Volusia County are associated with sandy well drained ridges. The sandy well drained ridges are also suitable areas for development. Because of the proximity to existing urban development and the suitable nature of the land for development most vacant land in the vicinity of Deltona is earmarked for urban type densities. Even though development converts undeveloped land into impervious surfaces, the recharge function of developed land can still be maintained by certain land development regulations including: limitation of impervious surfaces, wetlands protection, and stormwater management techniques.

Declines in the water table of the surficial aquifer may cause significant impact to native vegetation. This impact would be primarily exhibited by vegetative changes in wetland systems. Wetlands on development sites should be protected by a City wetland protection ordinance as well as state and federal regulations. The City should actively support the prudent use and, to the maximum extent feasible, the preservation of all remaining natural vegetation and wildlife resources. In addition the City should strive to recreate, restore or otherwise improve areas of former ecosystems which may not remain in their ideal pristine conditions.

Flooding has become a problem in the developed areas of southwestern Volusia County. Some have suggested that a drainage network be constructed to the St. Johns River in order to alleviate flooding on the Ridge. Retention areas on the Ridge may be an appropriate cause of action to manage flood waters and enhance recharge. Maintenance of swales and possible dredging to improve drainage flows in the event of a major rainstorm is also desirable.

Groundwater levels fluctuate in response to numerous natural and human factors. An understanding of the effects of human activities requires some knowledge of the natural hydrologic system. Groundwater levels increase with recharge from precipitation and decrease in its absence, averaging out to a dynamic equilibrium, with no net difference in the long term. Extraneous (human) influences can decrease groundwater levels. Irrigation is the biggest groundwater user, with usage varying both seasonally and annually in response to rainfall. Increasing the rate of recharge changes the ground surface to a drier condition, which is in conflict with the goal of preserving wetlands. Impervious surfaces reduce groundwater recharge and should therefore be limited to the maximum extent that is practical within a development. Borrow pit activity should be prohibited in major aquifer recharge areas.

Another threat to groundwater quality is contamination of the aquifer by the improper management of hazardous materials. Hazardous materials for the purposes of this discussion includes industrial type chemicals and common household substances such as motor oil, paints and solvents. Improper practices concerning the manner in which many chemicals and waste products are stored, handled, transported and disposed of can pose a threat to the health and safety of the general public, and can also result in serious contamination of soils, surface water and groundwater. The use, storage, transport, or disposal of certain chemicals should be prohibited within close proximity to public or private drinking water supplies.

The City should consider the implications and desirability of requiring sanitary sewer wastewater disposal as a condition of water service.

Every effort should be made to incorporate pollution control devices in drainage facilities. The City should consider developing a program to retrofit older structures or facilities with various devices or to provide alternative drainage systems designs in lieu of unrestricted positive drainage. A program to reintroduce upland or shoreline vegetation buffer strips in some locations, with the potential to cleanse pollutants prior to entering waterways, should also be considered. The Lake Watch program provides a mechanism for collecting large amounts of high quality water quality data. It is recommended that additional data collection be collected.

## **COMMUNITY VISION**

*Deltona's infrastructure in 2017 will include a water system, a sewer system or private treatment plant for commercial and high density residential development or where it has been demonstrated that existing septic systems are a detriment to the environment or community. The stormwater system will protect the quality and quantity of water for lakes, wetlands and ground water. All new commercial or residential subdivisions will have underground utilities. The City shall develop a plan to place existing overhead utilities underground.*

### **Vision Workshop Results**

Public lake access

Environment

Stormwater / Drainage

Clean Lakes

Public Transportation

Street Lighting

Town Centers

Improved Roads/Wider Main Roads

Sidewalks/bike paths/jogging trails

Water & sewer systems

Underground utilities

TABLE 4-1

PROJECTED POTABLE WATER SERVICE

	<u>95 Current</u>	<u>Available</u>	<u>'00' Projected</u>	<u>Available</u>	<u>'10' Projected</u>	<u>Available</u>	<u>'20' Projected</u>	<u>Available</u>
	<u>Demand (mgd)</u>	<u>Capacity</u>	<u>Demand (mgd)</u>	<u>Capacity</u>	<u>Demand (mgd)</u>	<u>Capacity</u>	<u>Demand</u>	<u>Capacity</u>
Deltona North (County)	0.501	0.499	0.637	0.363	0.856	0.144	1.081	(-.081)
Deltona Lakes (FWSC)	10.6	13.10	12.07	11.002	17.024	6.76	21.518	2.082

Source: Volusia County Comprehensive Plan EAR and Utilities Department

Florida Water Services Corporation

Prepared by: Ivey, Harris & Walls, Inc.

TABLE 4-2

SANITARY SEWER SERVICE

	95 Current Demand (mgd)	Capacity	'00' Projected Demand (mgd)	Capacity	Available Capacity	'10' Projected Demand (mgd)	Capacity	Available Capacity	'20' Projected Demand	Available Capacity
Deltona North (County)	0.245	0.255	0.239	0.261	0.179	3.212	0.179	0.179	0.406	0.094
Deltona Lakes (FWSC)	0.975	0.425	1.165	0.235	(-0.156)	1.566	(-0.156)	(-0.156)	1.979	(-0.579)

Source: Volusia County Comprehensive Plan EAR and Utilities Department  
 Florida Water Services Corporation  
 Prepared by: Ivey, Harris & Walls, Inc.