INFRASTRUCTURE ELEMENT
DATA, INVENTORY, AND ANALYSIS REPORT

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INFRASTRUCTURE ELEMENT
DATA, INVENTORY, AND ANALYSIS

The purpose of the Infrastructure Element is to identify and plan for public facilities and services to support the future population projections and development patterns envisioned within the Future Land Use Element of the City's Comprehensive Plan. The objective of the Infrastructure Element Data, Inventory, and Analysis (DIA) Report is to evaluate existing potable water, sanitary sewer, solid waste, stormwater management, and natural groundwater aquifer recharge resources within the City and determine whether adequate capacity exists to maintain the adopted level of service (LOS) standards through the planning period defined within this plan.

Within this DIA, each of the public facilities and/or resources mentioned above is treated as a sub-element. This information collectively serves as the foundation for the goals, objectives, and policies (GOPs) prepared to guide future development within the City of Sanford. Data and analysis for each of the five sub-elements contained within the Infrastructure Element is provided below.

POTABLE WATER SUB-ELEMENT

Potable water facilities are designed to collect, treat, and distribute potable water. Typical system facilities include water wells, treatment plants, reservoirs, and distribution mains. In a potable water supply system there is a water supply source, a treatment plant, and a distribution and storage network. The raw water used in the City's system is drawn from the Floridan Aquifer by way of wells. Treatment of the raw water is necessary prior to public consumption in order to remove impurities. After treatment, the water is supplied to individual users in the City by a network of pipes and storage facilities. Large transmission lines, called distribution mains, carry water to major demand areas and interconnect with a network of smaller lines which eventually supply individual establishments. These water lines typically run along City roads.

The City of Sanford provides high quality potable water to all land uses within the City and serves a residential population of approximately 54,000 (2007). The City's potable water system is not confined to the City's jurisdictional boundary, but encompasses a larger service area. The extent of the service area for potable water utilities is displayed in Figure 4-3. **[9J-5.011(a)(b)]**

The City's potable water service area extends beyond the jurisdictional boundary of the City to include approximately 11,482 acres of unincorporated Seminole County. A majority of the unincorporated area of Seminole County served is located east of the City and along Lake Jesup. As of 2008, the City had approximately 16,072 potable water connections within the service area. Among these connections, 1,245 connections were outside of the City's jurisdictional boundary. This is equal to roughly 7.75 percent of the City's total potable water system capacity. **[9J-5.011(c)]**

Existing and Projected Potable Water Demand

The City draws raw water from the Floridan Aquifer to supply its potable water needs. This groundwater is the primary source of potable water for the City of Sanford. The City's Consumptive Use Permit (CUP) Number 162 allocates a withdrawal of up to 3,496.7 million gallons per year (MGY), which equates to approximately 9.58 million

gallons per day (MGD). The permit is processed and managed through the St. Johns River Water Management District (SJRWMD) and will expire on February 8, 2026.

The existing potable water system has been designed to accommodate an entire service area instead of smaller individual areas that comprise the entirety of a service area. The benefit of this approach is that no one individual facility provides service to a specific area, all facilities function to serve the entire system. This system approach allows the City to deliver high quality water service to customers and allows problems to be isolated and corrected quickly. Finally, capital improvements and system upgrades affect the entire system instead increasing capacity and quality in particular areas. The total design capacity of the City's potable water system is 20.74 MGD. **[9J-5.011(e)]**

Wellfields

The City of Sanford currently maintains four operational wellfields. These wellfields are located within the jurisdictional boundary of the City and provide the raw potable water to the City's water treatment plants. Table 4.1 summarizes each wellfield.

Table 4-1
Operational Wellfields

Wellfield	Number of Wells	Number of Operational Wells	Pumping Capacity Range
Wellfield 1 (Hidden Lake)	8	6	325 – 700 GPM
Wellfield 2 (Golf Course)	7	6	700 GPM
Wellfield 3 (Oregon Avenue)	5	5	1,000 – 1,500 GPM
Wellfield 4 (Twin Lake)	4	2	1,500 – 2,000 GPM

Source: City of Sanford Water Facilities Work Plan Data and Analysis
GPM = Gallons per Minute

The wellfields are protected from the potential impacts of development in several ways. The development review process incorporates performance standards for conserving open space, prohibiting specific uses within recharge areas, preserving predevelopment soil types, grade elevations, drainage rates, and water levels, and minimizing reduction of recharge to the surficial aquifer. In addition, the City does not allow new development within a 200 foot radius of any existing or proposed wellhead. **[9J-5.011(e)]**

Water Treatment Plants

The City owns and operates two water treatment plants (WTP). The Main WTP and the Auxiliary WPT both provide treatment to the raw water drawn from the Floridan Aquifer through the City's wellfields. The raw water from wellfield 1 is sent to the Auxiliary WTP and the raw water from wellfields 2, 3, and 4 is sent to the Main WTP. Combined, both of these WPTs provide 20.74 MGD to the City's service area. **[9J-5.011(e)]**

- *Main WTP* has two ground storage tanks that provide a combined 1.5 million gallons of ground storage of treated water. The well capacity is 16.13 MGD with a high service pumping capacity of 15.12 MGD.

- *Auxiliary WTP* provides an additional 1.5 million gallons of ground storage for treated water. The well capacity is 4.61 MGD with a high service pumping capacity of 5.76 MGD.

Water Storage Facilities

The current ground storage capacity for the City's potable water system is 4.0 MG, with an additional 0.5 MG of elevated storage. The two elevated storage tanks are located on Mellonville Avenue and on East Lake Mary Boulevard. These storage tanks provide an additional 0.25 MG each of extra storage capacity. However, the City's primary source for potable water storage is the two WTPs. The Main WTP has 1.5 MG of ground storage, the Auxiliary WPT provides 1.5 MG of ground storage, and the City operates another 1.0 MG of ground storage located at French Avenue and 13th street. **[9J-5.011(e)]**

Distribution

The existing water distribution system has been designed and sized for domestic water consumption. The distribution system primarily follows a grid pattern along City roadways and serves all land uses within the City. The system consists of approximately 300 miles or 1.6 million linear feet of distribution pipes, two elevated storage tanks, and ground storage tanks at each of the WTPs.

The Sanford Department of Water and Sewer Utilities has the responsibility for the operation and maintenance of the system. The Department is continually monitoring and upgrading the system when needed to supply increasingly greater quantities of water to customers in the City's water service area. According to the City's Water Supply Plan, approximately 51,470 linear feet of water mains were constructed ranging in size from 12-inches to 24-inches during 2000 through 2005 and an estimated 48,900 linear feet more of water mains ranging in size from 8-inches to 18-inches will be constructed from 2005 to 2010, according to the Department of Water and Sewer Utilities.

In general, the system is in good operating condition. With normal maintenance, the system should last well beyond the planning period. The system is not known to have any adverse impacts on adjacent natural resources and with the increased use of reuse/reclaimed water the City is minimizing the use of potable water for irrigation purposes. Through the reuse/reclaimed water system for irrigation, landscaping requirements that preserve native and drought resistant vegetation, and the encouraging the installation of water saving plumbing fixtures the City is conserving greater amounts of potable water. In addition, the City continues to implement a leak detection program that is designed to curtail the wasteful loss of potable water from the distribution system. **[9J-5.011(e)]**

Existing Water Demands and Level-of-Service

According to data from the Department of Water and Sewer Utilities, as of May 2008, the trailing 12 month average water usage for the City's water service area was 7.52 MGD. The 2007 population for the City, according the adopted Water Supply Plan is 52,618. This equates to an existing potable water LOS of 138.57 gallons per capita per day. This is below the City's adopted Level of Service (LOS) standard of 144 gallons per capita per day and the total demand is well under the system capacity. **[9J-5.011(e)]**

The current CUP with the SJRWMD allows withdrawal of up to 9.58 MGD of raw water from the Floridan Aquifer starting in year 2010 and lasting through 2026. The current permitted amount of withdrawal for 2008 and 2009 is 9.02 and 9.30 MGD. Based on the

City's trailing 12 month average of 7.52 MGD, there is a 1.50 MGD surplus in remaining permitted withdrawal. With the combined capacity of the water treatment plants being 20.74 MGD, the City has adequate total capacity to meet the potential increase in potable water demand that may be generated from growth in the City. To facilitate increased conservation and demand, the City is and continues to actively increase the use of reclaimed water for irrigation purposes and is participating in the planning and coordination of surface water treatment facilities with the SJRWMD, Seminole County and other utilities. In addition, the previously mentioned conservation measures (leak detection program, landscaping with native and drought resistant vegetation, and water saving plumbing fixtures) further support the City's ability to meet water demands without dramatically increasing raw water withdrawal.

The general performance of the existing water system has been sufficient to supply the demands of the service area. The existing water system provides 20.74 MGD with all the wells in the service area and 4 MG of ground storage along with 0.5 MG of elevated storage. As the population increases, improvements will be necessary to meet future demands. **[9J-5.011(f)]**

Projected Water Demand

In 2007, the City adopted a Water Facilities Work Plan. The plan analyzed the existing capabilities of the system, compared these capabilities to the current and future needs, and created a 20-year program for the City's water system.

According to the Water Supply Plan, the projected water demand is anticipated to increase from its current projected demand of 7.783 MGD in 2008 to 9.49 MGD in 2017; table 4.2 illustrates the projected and permitted amounts of water. Based on the projected growth the City may exceed the amount permitted for withdrawal from the Floridan Aquifer sometime after 2017. The projected demand is within the design capacity of the system. Therefore, the City is actively trying to conserve potable water through its reclaimed water system and the water conservation measures mentioned throughout.

Table 4-2
Projected and Permitted Water

Year	Projected Water Demand Outside City Limits	Projected Water Demand Inside City Limits	Total Projected Water Demand (MGD)	CUP Permitted Withdrawal Amount (MGD)	Difference
2008	0.60	7.18	7.78	9.02	1.24
2009	0.62	7.37	7.99	9.30	1.31
2010	0.64	7.57	8.21	9.58	1.37
2011	0.65	7.76	8.41	9.58	1.17
2012	0.67	7.95	8.62	9.58	0.96
2013	0.68	8.15	8.83	9.58	0.74
2014	0.70	8.35	9.05	9.58	0.53
2015	0.72	8.55	9.27	9.58	0.30
2016	0.73	8.65	9.38	9.58	0.20
2017	0.74	8.75	9.49	9.58	0.09

Source: City of Sanford 2007 Water Supply Plan

The table above illustrates the projected water demand, for areas within the City's jurisdictional boundary and areas of unincorporated Seminole County within the City's water service area, in MGD along with the permitted CUP withdrawal. The projected water demand does not increase above the permitted withdrawal amount until sometime after the year 2017. The demand for water service outside of the City's jurisdictional boundary was estimated using the straight line method. In 2008, the City had approximately 16,072 total water service connections. Among these connections, 1,245 or 7.75 percent were outside of the City's jurisdictional boundary. It was assumed that the demand for water service outside the City's jurisdictional boundary would increase proportionately with the increase in demand for water service within the City's jurisdictional boundary.

The City, with its service area partners, Seminole County, Lake Mary, Volusia County and other utilities aims to offset demand through the continued optimization, extension, and use of reclaimed water. The increased use of reclaimed water is beginning to have a positive impact on potable water demand. As stated before, the trailing 12-month water usage average for the City was 7.52 MGD, as obtained from the City's Department of Water and Sewer Utilities. This 12 month average is 0.263 MGD less than the projected water demand of 7.783 MGD. **[9J-5.011(f)]**

As part of the City's Water Facilities Work Plan, alternative water supply projects were identified to aid the City in meeting the projected water demand.

Reclaimed Water

The City has and continues to actively support, both financially and with regulatory policies, the use of reclaimed water for irrigation purposes. The establishment of this large-scale reclaimed water system took place in 1990. Since then, the City has consistently funded its implementation and expansion. According to the Department of Water and Sewer Utilities, in 2008 the City had approximately 2,620 reclaimed water customers.

Currently, the City owns, operates, and maintains the Sanford North Water Reclamation Facility (SNWRF) which has a capacity of 7.3 MGD and in 2002 the Surface Water Augmentation System, with a capacity of 7.3 MGD, was completed and placed into service at the SNWRF. The Surface Water Augmentation System draws water from Lake Monroe. The surface water is filtered and blended with reclaimed water that is produced at the SNWRF. In 2007, the City added an additional 2.0 MGD of capacity to the reclaimed water system with the completion of the Sanford South Water Resource Center (SSWRC). There is approximately 407,000 linear feet of reuse water pipes throughout the City's service area. The City continues to monitor and evaluate the reclaimed water system to ensure that improvements keep pace with demand and any needed improvements become programmed in five-year Capital Improvements Plan. Sanford is the sole operator of these two facilities along with the reclaimed water distribution system.

In 2007, the Timacuan Golf Course reclaimed water storage pond was completed. Additional improvements for the 2005 – 2010 planning period include: Greenwood Lakes reclaimed water tanks, distribution system improvements, and the implementation of an augmentation facility management system at the SNWRF.

Tri-Party Agreement

While the City owns and operates significant reclaimed water facilities, the reclaimed water system needs to be taken in context of the entire Tri-Party Reclaimed Water Service Area. In 2001, the City entered into a Tri-Party Agreement with the City of Lake Mary and Seminole County related to the use of reclaimed/reuse water and surface water augmentation from the St. Johns River to help reduce groundwater withdrawal from the Floridan Aquifer. This agreement establishes coordination mechanisms for the expansion of these facilities. The amended agreement increased the maximum flow of reclaimed/reuse water to Seminole County. The flow increased from 0.75 MGD to 2.75 MGD to Seminole County and 0.15 MGD to 1.2 MGD for the City of Lake Mary. This additional capacity was made available through the Surface Water Augmentation System Upgrade at the SNWRF mentioned above. Reclaimed/reuse water is mostly used for irrigation purposes and can have a significant effect on the amount of raw water drawn from the Aquifer. The Tri-Party Reclaimed Water Service Area includes the City of Sanford, the City of Lake Mary, Seminole County's Northwest Service Area and several areas of unincorporated portions of Seminole County. This service area is served by over 75-miles of distribution piping.

The City is becoming a regional supplier of reclaimed water and has a forward vision for expansion on a regional level. According to the adopted 2007 Water Facilities Work Plan (WFWP), there is capacity to further expand the system to supply Winter Springs, Altamonte Springs, Oviedo, and Volusia County. The North Seminole Regional Reclaimed Water and Surface Optimization System Expansion and Optimization Project proposed an alternative water system supply project using water drawn directly from the St. Johns River to be used in the reclaimed water system. This could add an additional 7.3 MGD to the system. The expansion and facility improvements to the reclaimed water system are closely coordinated with the SJRWMD. The 2007 WFWP also concluded that the increased usage of reclaimed water for irrigation should have a limited impact on groundwater quality. **[9J-5.011(f)]**

SANITARY SEWER SUB-ELEMENT

A functional aspect of protecting an area's water resources is the treatment and reuse or disposal of wastewater. Sanford continues to take an innovative and aggressive approach to collecting and treating wastewater. The wastewater generated within the City continues to be collected by City owned and operated wastewater treatment plants and collection facilities. As discussed in the Potable Water Sub-Element, the City has and is continuing to serve the entire service area with an integrated system which does not distinguish individual wastewater service districts that provide service outside the City's jurisdictional boundary. A description of the City's wastewater system is below. **[9J-5.011(a)]**

Wastewater Treatment Facilities

To serve the customers within the City's service area, the City owns, operates, and maintains wastewater treatment plants and collection facilities. This responsibility has been delegated to the City's Department of Water and Sewer Utilities. The wastewater system is designed to serve all of the City's land uses including residential, commercial, light industrial and agricultural uses. The wastewater generated by the above uses is collected by a system that consists of lift stations, force mains, and gravity sewers which

transmits the wastewater to the City's water treatment plants. According to the Department of Water and Sewer Utilities, there are currently 13,677 sewer connections (2008).

There are two wastewater treatment plants that serve the City's service area, the Sanford North Water Reclamation Facility (SNWRF) and the Sanford South Water Resource Center (SSWRC). The SNWRF has a permitted and designed capacity of 7.3 MGD and the SSWRC has a capacity of 2.0 MGD, however, the total design capacity is 6.0 MGD. The capability exists for an additional 4.0 MGD of capacity at the SSWRC. The City's Department of Water and Sewer Utilities is monitoring growth and demand and will increase the capacity at the SSWRC as necessary to adequately meet any increase in for wastewater service.

Treatment plants are the components of wastewater systems that remove solid and organic material from the effluent. There is a variety of processes that can accomplish this procedure. Depending on the proportion of the material that is removed, these processes are typically grouped into one of the following categories. Primary treatment can remove the majority of solids from the effluent and secondary treatment removes almost all of the organic material and suspended solids. The treated effluent is then disposed of via spray irrigation within the North Seminole Regional Reclaimed Water Service Area.

The SSWRC treatment process, according the Florida Department of Environmental Protection (FDEP), uses effluent screening, grit removal, and advanced secondary treatment by way of Kruger Triple Ditch Process. This method achieves the removal of nitrogen without using internal recycle streams or external clarifiers and is very cost effective. **[9J-5.011(d)(e)]**

Current Facilities Demand and Level-of-Service

There are approximately 96 lift stations within the City's service area. The City operates and maintains 63 of these lift stations while the other 36 are privately owned. In addition to the lift stations, the system consists of force mains ranging in size from 2-inch to 20-inch and gravity sewer lines that range in size from 4-inch to 36-inch. As with the design of the potable water system, the wastewater collection system is designed in a grid pattern along City roadways. This facilitates service for residential customers which comprise the majority of the customers. The effluent collected by these lift stations flows to one of the City's two water treatment plants.

The 12 month trailing average of wastewater collected within the entire service area, according to the Department of Water and Sewer Utilities as of May 2008 was 7.1 MGD. The system is currently operating at an LOS of 131.6 gallons per capita daily (GPCD) which is within the adopted LOS standard of 132 GPCD. The current operating LOS is fairly close to the adopted LOS standard of 132 GPCD. The City has the ability to increase the wastewater treatment plant capacity by an additional 4.0 MGD. The Department of Water and Sewer Utilities is monitoring wastewater demand and will schedule capacity increases as necessary to meet any increases in demand. Table 4.3 illustrates the projected wastewater demand through year 2017 and Table 4.4 illustrates the projected operating LOS for each equivalent year.

Table 4-3
Projected Wastewater Demand

Year	Population[1]	WW Projected Demand within City Limits	WW Projected Demand Outside Limits[3]	Total WW Demand[2]	WW Capacity*	Remaining Capacity
2008	54,047	6.55	0.55	7.10	9.3	2.20
2009	55,515	6.70	0.56	7.26	9.3	2.04
2010	57,022	6.82	0.57	7.39	9.3	1.91
2011	58,431	6.98	0.59	7.57	13.3	5.73
2012	59,874	7.16	0.60	7.76	13.3	5.54
2013	61,354	7.33	0.62	7.95	13.3	5.35
2014	62,870	7.51	0.63	8.15	13.3	5.16
2015	64,423	7.70	0.65	8.34	13.3	4.96
2016	65,157	7.79	0.65	8.44	13.3	4.86
2017	65,900	7.88	0.66	8.54	13.3	4.76

[1] Population estimates derived from 2007 adopted Water Supply Plan.

[2] Wastewater for 2008 was based on usage information from the Department of Water and Sewer Utilities. The wastewater projection for the year 2009 was based on the current operating LOS of year 2008 (130.8 MGD) multiplied by the 2009 population estimate since wastewater demand will most likely be very similar. Projections for years 2010 – 2017 were computed by taking 90% of potable water demand projections because wastewater generation is historically 90% of potable water demand.

[3] The same percentage for potable water used outside the City limits was used to project wastewater demand in areas that are outside the City limits but within the Service Area. This percentage was used on the basis that those customers who received potable water service are highly likely to receive wastewater service as well.

*The City has programmed an additional 4.0 MGD of wastewater capacity to be available by the year 2011.

**All wastewater value in MGD.

Table 4-4
Level-of-Service

Year	Population[1]	Total WW Demand[2]	Level-of-Service
2008	54,047	7.10	131.37
2009	55,515	7.26	130.80
2010	57,022	7.39	129.58
2011	58,431	7.57	129.54
2012	59,874	7.76	129.57
2013	61,354	7.95	129.53
2014	62,870	8.15	129.55
2015	64,423	8.34	129.50
2016	65,157	8.44	129.56
2017	65,900	8.54	129.61

[1] Population estimates derived from 2007 adopted Water Supply Plan.

The operational performance of the wastewater system has been adequate and is projected to be adequate and functioning within the adopted LOS standard of 132 GPCD. With normal maintenance and operation the City's wastewater system should perform and operate well into the next planning period. The City has an additional 4.0 MGD of wastewater capacity and will schedule capacity increases according to demand. The City will have adequate operating capacity to meet the projected increase in demand. The City has established a reclaimed/reuse water system and continues to expand both capacity and service. More information can be found in the Potable Water Sub-Element and in the City's adopted 2007 Water Facilities Work Plan. **[9J-5.011(f)]**

Septic Tanks

In addition to wastewater system, private septic tank systems are used within the City limits. The Florida Department of Health (FLDOH) is the agency responsible for permitting the use of onsite sewage treatment and disposal systems (OSTDS) along with licensing septic tank contractors and the mediation of OSTDS complaints. Septic tanks typically only serve individual sites, and within the City of Sanford the use of septic tanks is very limited due to the City's extensive wastewater system collection system.

The residential septic tanks in the City range in capacity from 500 to 1,000 gallons. Commercial septic tanks are typically larger. The effluent collected in septic tanks discharges into a drain field where it then will percolate into the soil. The City continues to facilitate the transition to public potable water and wastewater by requiring connection to these services when they are placed within 75 feet of a subject property that uses a septic tank. Geographic Information Systems (GIS) information obtained from the FLDOH contains OSTDSs that are inspected by the FLDOH; the data was last updated in June 2008. According to the data, the City has approximately 218 septic tanks within the jurisdictional boundary and this includes Kaywood subdivision in West Sanford. Furthermore, within the City's water service area there are approximately 695 septic tanks. The data does not delineate between which septic tanks are for commercial verses residential use.

There are a variety of soil types around the land area that serves septic tank. Table 4.5 describes the soil type and it suitability for septic tanks.

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Table 4-5
Soil Suitability

Soil Type	Description	Drainage and Permeability	Suitability for Septic Tanks
Astatula - Apopka	Consists of very deep, well drained, and moderately permeable soils	Well drained with rapid and moderate permeability	Fair
Tavares - Millhopper	Consists of very deep, moderately well drained, rapid to moderately permeable soils	Moderately well drained, rapid to slow permeability	Fair
Myakka & Eaugallie	Consists of very deep, poorly to very poorly drained soils	Poorly drained, rapid to slow permeability	Fair
Brighton - Samsula	Consists of very deep, very poorly drained, moderately to rapidly permeable soils	Very poorly drained	Fair
Basinger & Delray	Consists of very deep, poorly drained and very poorly drained soils	Poorly and very poorly drained, rapid permeability	Fair
St. Johns	Consists of very deep, very poorly or poorly drained, moderately permeable soils	Poorly or very poorly drained, moderate permeability	Good
Eaugallie & Immokalee	Consists of deep and very deep, poorly drained and very poorly drained soils	Poorly and very poorly drained, very rapid to moderate and slow permeability	Good

Sources: United States Department of Agriculture
Natural Resources Conservation Service Soil Surveys
St. Johns River Water Management District

An analysis of soil surveys for areas served by septic tanks within the City's jurisdictional boundary was performed in the above table. The ranges of soil suitability are from fair to good. In order for a particular soil type or a combination of soil types to be suitable for septic tank use, the soil should have a moderate to slow permeability. The permeability of a soil affects the rate of velocity that the effluent moves through the soil and ultimately to the water table. Slow travel will provide the opportunity for good absorption of effluent components to soil particles and allow and widen the opportunity for bacteria and viruses to die off, along with the biodegradation of degradable materials. **[9J-5.011(f)(4)]**

STORMWATER MANAGEMENT SUB-ELEMENT

The geographic location of the City places it in one of the largest drainage basins within the St. Johns River Water Management District. This provides the City with unique opportunities and challenges for stormwater management. Stormwater drainage within the City is performed by a combination of man-made structures designed to collect, convey, hold, divert, or discharge stormwater. In addition to man-made structures, there are a significant amount of natural drainage features that facilitate stormwater drainage.

Stormwater runoff is one of the primary contributors to surface water pollution. Furthermore, the pollution from stormwater runoff can enter into groundwater recharge

areas where the pollutants can migrate into the Floridan Aquifer and pollute groundwater supplies. With the appropriate use of Comprehensive Plan goals, objectives, and policies, Land Development Regulations, and the proper management of stormwater facilities the negative effects of pollution can be mitigated against and groundwater resources protected.

Natural Drainage Features

Due to the City's geographic location, there are significant natural drainage features that facilitate the collection and discharge of stormwater. The City is located in the Middle St. Johns River Basin. This basin encompasses the watersheds of the St. Johns River, the Wekiva River, and the Econolahatchee River along with Lake Monroe and Lake Jesup. The entire basin is comprised of two sub-basins that typically receive a majority of stormwater flows. The two sub-basins that make up the larger Middle St. Johns River Basin are the Lake Jesup drainage basin and the Lake Monroe drainage basin. Other natural drainage features are: Lake Jennie, Reservoir Lake, Lake Ada, Hidden Lake, Lake Minnie, Silver Lake and Lake Golden. Together all these features comprise the Middle St. Johns River Basin which is greater than 1,200 square miles. A more in depth and technical analysis of the Middle St. Johns River Basin has been completed by the SJRWMD.

The two most recognized water features that are impacted by the City's stormwater system are Lake Monroe and Lake Jesup. Lake Monroe is located along the City's northern border and Lake Jesup is located to the southeast of the City. Lake Monroe is approximately 17 square miles and is part of the larger St. Johns River system. The lake has been identified as a priority water body because of its potential water resources and its impact on the ecology of the surrounding area. As of 2004, the water quality rating for Lake Monroe was fair while the water quality ratings for Lake Jesup were poor.

The SJRWMD completed a Surface Water Improvement and Management Plan for the Basin in 2002. The City has a close working relationship with the District and coordinates stormwater system improvements with the District. This coordination is typically done through the City Manager, the Planning and Development Services Department, or Public Works Department depending on the issue.

Man-Made Drainage Features

The man-made drainage features that the City owns and operates are drainage conveyance mechanisms which include pipes, ponds, culverts, and swales. The City continually monitors development patterns and land use changes to ensure that adequate stormwater drainage exists or will be in place to serve development. The City has created performance standards that impact open space, the minimization in the reduction of recharge areas, and the preservation of original soil types and grading. One of the largest concerns of the City is to reduce residential flooding and a majority of the City's man-made stormwater improvement focuses on this aspect. However, in the process of reducing flooding in residential neighborhoods the City is actively enforcing policy mechanisms that retain stormwater run-off to maximize aquifer recharge. This is done through specific criteria for drainage easements and site preparation. **[9J-5.011(a)]**

Existing Storm Drainage System and Level-of-Service

Both the natural and man-made drainage facilities provide stormwater drainage to the entire City. As mentioned before, due to the location of the City, the stormwater system receives flows from areas located outside the jurisdictional boundaries. The stormwater system has been designed to accommodate a 25 year – 24 hour retention/detention of stormwater.

Soils also play an integral role in stormwater drainage. The ability of different soil types to absorb and retain stormwater will have an impact on the amount of runoff, which will subsequently increase or decrease the demand placed on a stormwater system. For example, a beach quality soil has an excellent absorption rate and very good infiltration, while a clay soil type is almost completely impervious and can accommodate very little storage. The principal and most abundant soil located within the jurisdictional boundary of the City, according to the City's Water Supply Facilities Work Plan, is Urban Land-Astatula Apopka. Small amounts of Nittaw-Felda-Floridana, Brighton-Samsula-Sanibel and Pompano-Nittaw-Basinger are located on the south side of Lake Monroe and the west side of Lake Jesup has the soil type Nittaw-Felda-Floridana. The Urban Land-Astatula Apopka consists of very well drained sandy soils, while the Nittaw-Felda-Floridana, Brighton-Samsula-Sanibel and Pompano-Nittaw-Basinger types consists of poorly drained mineral soils. These poorly drained soils are mostly located on the shores of Lake Monroe and Lake Jesup.

The Public Works Department is responsible for the maintenance and proper function of the stormwater system. The Department is in the process of completing several significant improvements to the system. The Cloud Branch 13th Street Outfall Project is adding additional reservoir capacity through the construction of two large ponds. In addition, the completion of two large box culverts will significantly enhance control and flow throughout the entire system. Also tying into the Cloud Branch 13th Street project is the addition of another drainage line just east of US 17-92 to provide better drainage along that major roadway. Several other recently completed projects have enclosed open drainage ditches along roadways which provide additional safety to motorists and the public. **[9J-5.011(e)(f)]**

For regulations and programs that govern land use and development of natural drainage features and groundwater recharge areas, please see the Natural Groundwater Aquifer Recharge Element. **[9J-5.011(h)]**

SOLID WASTE SUB-ELEMENT

Seminole County is responsible for the storage and disposal of solid waste throughout the County. The County operates and maintains the Osceola Road Landfill (ORL) and the Central Transfer Station (CTS). The City is responsible for the collection and transportation of solid waste generated within its jurisdictional boundaries to one of the County's two solid waste facilities. Typically, the solid waste generated by the City is delivered to the CTS due to its central location within the County's urban area.

Solid Waste Disposal System

Seminole County maintains and operates two solid waste facilities. The ORL is the County's main solid waste facility and is located in the northeastern corner of the

County. This facility provides disposal and recycling services to the entire County. The CTS is located in the center of the County, where it is easily accessible to a majority of the County's urban areas. The CTS is an essential part to the County's waste management system. It provides a central point at which solid waste generated from the municipalities can be deposited before it is transferred to the ORL. According to the Seminole County Evaluation and Appraisal Report (EAR), the ORL and CTS are projected to meet the needs of the County beyond the 2025 planning horizon. This estimate is based on current County regulations, disposal techniques, and operational policies. **[9J-5.011(f)]**

The City is responsible for the collection and delivery of solid waste that is generated within its jurisdictional boundary. The City has contracted this service out to a private waste hauler that collects and distributes the solid waste generated in the City to one of the Counties two solid waste facilities, the CTS or the ORL. The City has contracted the collection and delivery of solid waste with Waste Services, Inc.

The FDEP collects data on solid waste facilities within each county in the State. The latest data numbers for Seminole County are for the year 2006. For the year ending in December 2006, the ORL landfilled 423,553 tons of solid waste. The total amount of solid waste recycled was 150,339 tons. Combining both totals, the County generated 573,892 tons of solid waste. **[9J-5.011(a)(b)(e)]**

Recycling Effort

The City has established a recycling program for residents to participate in. Residents are allowed to place an unlimited amount of accepted recyclable materials out for collection in a 14-gallon recycle bin provided by the City. The following are materials that are accepted for the curbside pickup recycling program: newspapers, magazines, junk mail, mixed office paper, cardboard, plastic bottle #1 - #7, glass bottles and jars of clear, green or brown color, aluminum cans, steel cans, and telephone books. Through this recycling program the City is moving toward achieving compliance with the State's recycling goals. By offering curbside pick-up, the City is making it very easy and accessible for broad participation in the program. **[9J-5.011(f)]**

Solid Waste Level-of-Service

Table 4-6
Solid Waste Level of Service

Year	Population*	Solid Waste Tonnage	LOS
2004	46,491	52,902	6.24
2005	48,801	52,041	5.84
2006	51,227	62,088	6.64
2007	52,618	61,069	6.36

*Population figures obtained from the City of Sanford Adopted Water Supply Plan

[9J-5.011(e)]

Future Projects, Programs, and Policies

The City's solid waste level of service will be maintained through the planning period and be coordinated with the County's LOS standard. Since the solid waste disposal facilities are owned and operated by Seminole County, there are no solid waste facilities or improvements planned by the City for the foreseeable future. **[9J-5.011(f)]**

NATURAL GROUNDWATER AQUIFER RECHARGE SUB-ELEMENT

The purpose of the natural groundwater aquifer recharge sub-element is to identify and analyze natural groundwater recharge areas for the Floridan Aquifer that may be located within the City. Furthermore, existing regulations and programs that govern land use and development around these recharge areas will be identified and assessed for their strengths and weaknesses in maintaining the natural recharge function of the area.

Natural Groundwater Aquifers

There are two aquifer systems within the City, the Floridan Aquifer and the non-artesian surficial aquifer. The Floridan Aquifer is an artesian aquifer that is comprised of limestone and dolomite. An artesian aquifer holds groundwater under natural pressure that is greater than atmospheric pressure, which will allow water to rise naturally in tightly cased wells that run down to the aquifer. As described in the Potable Water Sub-Element, the City's primary source of raw potable water is drawn from this aquifer under the CUP approved by SJRWMD. The City is currently permitted to withdrawal 9.02 MGD in the year 2008 and increasing to 9.58 by the year 2017. The surficial aquifer is composed of sand, shells, and some clay. This aquifer is directly replenished by rainfall and its flow typically follows the topography of the land. In the absence of adequate water quality from the Floridan Aquifer, the surficial aquifer is an important source for individual domestic wells and small-scale irrigation. The surficial aquifer is directly impacted by pollutants that can seep into the aquifer from stormwater runoff. These pollutants can then seep into the Floridan Aquifer, which is the City's primary source for potable water. Therefore, it is of high importance that aquifer recharge areas be protected from improper development. **[9J-5.011(a)]**

Aquifer Recharge Areas

The City is located within the Middle St. Johns River Basin. Detailed information on this river basin is provided within the Stormwater Management Sub-Element. The SJRWMD has provided general inventory report of the groundwater resources that are present in the Middle St. Johns River Basin in the form of a technical report titled *Middle St. Johns Ground Water Basin Resource Availability Inventory*. In addition, the SJRWMD provides geographic information systems (GIS) data for aquifer recharge areas. This GIS data was used to provide a general description of where the most significant recharge areas area present within the City.

According to the Seminole County EAR, the most beneficial recharge areas are located in the southwest part of the County and include the Interstate 4 corridor, and the Geneva area. The Interstate-4 corridor runs along the western jurisdictional boundary of Sanford for approximately 1.5 miles and the aquifer recharge areas range between 0 to 4-inches

per year and 8 to 12-inches per year. The central portion of the City contains recharge areas that range from 0 to 4, 4 to 8, and 8 to 12-inches per year. Southern portions of the City contain recharge areas that range from 0 to 8 inches per year and the western area has recharge areas ranging from 0 to 20 inches per year. The majority of the northern portion of the City's jurisdictional boundary has been determined to be a discharge area.

Typically, aquifer recharge is done through the use of ponds that store stormwater. These ponds can be man-made or naturally occurring. In addition, reclaimed water may be used to facilitate aquifer recharge. The two primary factors that impact ponds ability for recharge are soil conditions and water table. The soil conditions impact the peculation of water into the water table and water table depth impacts how far the water must travel.

Protection Mechanisms for Recharge Areas

The City has four wellfields that are used to withdraw raw potable water from the Floridan Aquifer. These wellfields are described in the Potable Water Sub-Element. The City understands the importance of protecting these wellfields and all of designated high aquifer recharge areas from development pressures and pollution. Therefore, the City has been proactive and aggressive in establishing Land Development Regulations and Comprehensive Plan policies to provide protection to these assets.

As part of the Future Land Use Map series (Water Resources Map I-1), the City has mapped their wellfields and recharge areas and provides them protection from development under the Resource Protection future land use designation. This allows for adjacent land uses to be properly planned and managed in regards to protecting and buffering these sensitive areas. To further protect these areas, the City has established open space requirements for new and redevelopment projects, and allows the SJRWMD to review and comment on development proposals and their potential impact on groundwater recharge.

The City also engages in protection through conservation efforts. The City's Water Supply Facilities Work Plan identified and analyzed projects and measure designed to reduce the consumption of aquifer resources for non-potable uses, most notably irrigation. This has led the City to become one of the most abundant suppliers of reclaimed water. The City's reclaimed efforts and system is described in the Potable Water Sub-Element. To enhance the recharge effect, the City continues to manage the stormwater system and its facilities to maximize aquifer recharge zones. **[9J-5.011(h)]**

Refer to Major Natural Drainage Features and natural groundwater recharge maps.
[9J-5.011(g)]