Nassau County 2030 Comprehensive Plan
Public Facilities Element

Background Data and Analysis

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Introduction

The purpose of the Public Facilities Element is to identify future demand for necessary public facilities and services and to correlate the adequate delivery of these services with future growth projections. The element also proposes strategies aimed a maintaining or reducing per capita demand and equitable financial measures to assure availability at adopted Levels of Service (LOS).

The element is divided into five (5) sub-elements, incorporating potable water, sanitary sewer, solid waste, stormwater management, and natural groundwater recharge. Each sub-element is constructed as a stand-alone document with its own data and analysis, goals, objectives and policies.

Each sub-element describes the condition, performance and design capacities of existing facilities; existing regulations and programs which govern those facilities; an analysis of future needs, problems and opportunities related to meeting those needs and the impact that those facilities may have upon natural resources within the County and the region. Levels of Service (LOS) are established for each type of public facilities as required by Ch. 163, Florida Statutes, and policies have been adopted to ensure that all future development within the County must be able to meet the adopted LOS for all public facilities.

Recommendations Incorporated from the 2008 EAR & Vision 2032 Final Report

Efficient Development Patterns

- Coordinate with utilities providers to utilize the planned extension of water and wastewater service to delineate urban service boundaries and as an incentive to encourage compact, mixed-use development with those boundaries. *(EAR, Issue 1: Update the future land use plan)*

- Higher density areas should be defined in proximity to existing towns and rural villages, based on the suitability of the land for development and the availability of essential public services and support services. *(EAR, Issue 5: Preserve rural lifestyle choices)*

Water & Wastewater

- Coordinate efforts with communities countywide to establish a strategy for protecting and conserving the water supply and resources for competing uses. *(Vision 2032, QOL Issue 1: Conservation and Preservation of the Natural Environment)*

- Create a public-private partnership to prepare shovel ready industrial and business/office park sites having a minimum of 200 acres, backbone infrastructure including central water, wastewater and stormwater, road and rail transportation, and telecommunications. *(Vision 2032, IGM Issue 3: Economic Development and Tourism)*

- Coordinate with utility providers to explore and establish a plan to extend public sewer lines, where feasible, to control the number of septic tanks sited in environmentally sensitive areas *(EAR, Issue 6: Preserve environmental resources)*

- Investigate alternatives for financing programs to phase out septic tanks and/or package treatment plants in areas of existing urban- or suburban- level development; and provide connections to a regional wastewater system on a voluntary basis. *(EAR, Issue 6: Preserve environmental resources)*

- Coordinate with the SJRWMD and the municipalities to determine the need for alternative water supplies to help meet future demands. Study the feasibility of using various water supply alternatives such as wastewater reuse as potential alternative water source. *(EAR, Issue 6: Preserve environmental resources)*

Aquifer Recharge

- Coordinate with the St. Johns River Water Management District to define the location of significant groundwater recharge areas in the County. These recharge areas will be noted on a map series within the Comprehensive Plan so that requests for rezoning or land use changes in these areas can be evaluated both in terms of need and potential impact to the aquifer. *(EAR, Issue 6: Preserve environmental resources)*

- Coordinate with the St. Johns River Water Management District and the Florida Dept. of Environmental Protection (DEP) to identify all known point and non-point sources of pollution within the County. All permitted discharge sources shall be required to meet state Water Quality Standards, all discharges under state law not requiring a permit will be required to meet all applicable Best Management Practices. *(EAR, Issue 6: Preserve environmental resources)*

- Establish wellhead protection zones, consistent with Chapter 62-521.400, F.A.C., to prevent aquifer contamination within the wellhead cone of influence. Include map of wellhead protection zones in Plan. *(EAR, Issue 6: Preserve environmental resources)*

Stormwater Management

- Maintain a comprehensive Geographic Information System (GIS) - based inventory of all stormwater management facilities in all of the drainage sub-basins under the county's jurisdiction. *(EAR, Issue 6: Preserve environmental resources)*

Potable Water Sub-Element

I. Existing Conditions

Background

The purpose of this sub-element is to ensure that public water supply facilities are available to meet the existing and future needs of Nassau County. The ability of the County, municipalities and other regional utility providers to provide potable water will play an important role in shaping future land use patterns. The availability of water will influence the timing, location, and intensity of development. Planning for the extension of these services should therefore be considered an integral part of the County's Comprehensive Plan.

Regional Systems

Regional potable water facilities are large-scale systems, which generally provide service to relatively densely populated areas. Presently there are four regional water treatment plants (three for JEA and one for Nassau Amelia Utilities) in operation and one planned for construction (by JEA) in the unincorporated area of Nassau County. Existing plants are identified in Table WAT-1.

A potable water supply system consists of a water supply source, a treatment plant, and a distribution and storage network. Either surface water, stored in natural lakes or man made reservoirs, or ground water, or some combination of the two constitute the supply source for a system. In Nassau County, groundwater is the exclusive raw water source. Before being used for public consumption, water must be treated. Treatment removes impurities from the raw water in order to improve its quality for public health, aesthetic reasons, or both. The treatment process adds to the cost of supplying water, but expands the range of raw water sources that can be utilized.

After treatment, the water is supplied to individual users in a community by way of a network of pipes and storage reservoirs. Large transmission lines, called distribution mains, carry water to major demand areas and interconnect with a network of smaller lines, which supply individual establishments. Both the distribution mains and distribution network should be connected to form flow loops to allow water to circulate from various portions of the system to areas of highest momentary demand.

Water is delivered under pressure within the distribution system in order to ensure adequate flow to meet demands. Demand fluctuates during each day, usually exhibiting peaks during the morning and evening, corresponding to periods of highest residential use. In addition to supplying water for residential commercial industrial and institutional uses, regional systems must also be capable of supplying an adequate and dependable flow for firefighting.

Small Treatment Systems

Small treatment systems, or "package" plants are generally privately owned and operated used to serve isolated development and are usually partially or completely pre-assembled by the manufacturer prior to shipment to the site of use. Package plants are available in a range of capacities and may serve residents living within subdivisions, unincorporated communities, condominiums, mobile home parks, RV parks and also serve non-residential users including schools, resorts, businesses, industry, and public facilities.

Private Wells

Many private residences are served by private wells. These wells are constructed to SJRWMD standards. Potable water quality monitoring and maintenance are the owners' responsibility;

however, the Nassau County Public Health Unit will investigate wells located near known pollution sources or on a compliant basis.

Existing Regulatory Framework

Federal

The federal government has established quality standards for the protection of water for public use, including operating standards and quality controls for public water systems. These regulations are provided in the Safe Drinking Water Act, which was updated in 1996. This law directed the EPA to establish minimum drinking water standards. The 1996 amendment included new prevention approaches and revisions to the regulatory program.

State and Regional

In accordance with federal requirements, the Florida Legislature has adopted the Florida Safe Drinking Water Act (Sec. 403.850 - 403.864, F.S.). The Florida Department of Environmental Protection (DEP) is the state agency responsible for implementing this Act. DEP has promulgated rules classifying and regulating public water systems under Chapter 62-550, 555, and 560 F.A.C.

Smaller systems and private wells are regulated by the Department of Health's local public health units. These systems are subject to the rule in Chapter 64E-6, F.A.C.

The St. Johns River Water Management District (SJRWMD) is responsible for managing water supplies to meet existing and future demands. Regulation of consumptive use is achieved through a permitting system, through which water resources are allocated among the permitted consumers. The SJRWMD also oversees the permitting and construction of both public and private wells 4 inches or greater in diameter.

Local

Nassau County has adopted design standards and review procedures to ensure that all connections to the water system are comparable with the system design and in accordance with current acceptable design standards.

Water Supply

Traditional water supply sources in some areas of Florida are not sufficient to meet the future needs of the state's growing population and the needs of the environment, agriculture, industry and mining. The State's five Water Management Districts have identified areas where existing and planned water supply sources will not be able to meet all future needs without resulting in unacceptable impacts to water resources and related natural systems.

Since 1998, the St. Johns River Water Management District has performed district-wide water supply assessments every five years for the purpose of identifying future water supply needs and identifying areas where projected uses cannot be sustained by proposed water sources without unacceptable impacts to water resources and related natural systems. These areas are called Priority Water Resource Caution Areas, or PWRCAs. Nassau County has not been previously classified as a PWRCA.

The first District Water Supply Plan was approved in 2000 and was updated in 2005. The upcoming 2010 District Water Supply Plan will focus on identifying strategies to assure that adequate and sustainable water supply is available to meet projected future water needs through 2030 without causing unacceptable impacts.

Draft Water Supply Assessment (WSA) 2008

The current draft 2008 Water Supply Assessment (WSA) is based on a planning period that extends through 2030. These assessments have traditionally been the foundation on which the District's water supply plans are built. The District has projected water use needs to the 2030 planning horizon based on population projections provided by the Bureau of Economic and Business Research (BEBR) at the University of Florida, which have been reviewed and generally agreed to by public water supply utilities throughout the District. Groundwater flow models are used to predict the changes in Floridan aquifer system water levels from 1995 to 2030 as the result of the projected changes in water withdrawals.

In the draft 2008 WSA, the northeast Florida area is identified as a potential PWRCA, which means the area may not be able to meet all future water demands without unacceptable impacts to water resources and related natural systems. However, the 2008 WSA will remain in draft form until the completion of the water supply planning process, which will allow an opportunity for additional evaluations and local input. Final determination of PRWCAs will not occur until December 2010. Nassau County is participating in the public input process leading to adoption of the WSA.

Regional Systems in the Unincorporated Area

Table WAT-1 lists the regional water treatment plants (WTP) which serve the unincorporated areas on Amelia Island and in the eastern part of Nassau County.

Table WAT-1 Regional Water Treatment Facilities in Unincorporated Nassau County

Facility	Provider	Location	capacity MGD
Yulee Regional WTP	JEA	96362 Piedmont Dr, Yulee	4.80
Otter Run WTP	JEA	Otter Run Dr., Yulee	.40
Lofton Oaks WTP	JEA	St. Paul Blvd. N., Yulee	.14
Nassau Amelia WTP	Nassau Amelia Utilities	5390 First Coast Highway, Amelia Island	4.06

Sources: JEA, Nassau Amelia Utilities, Florida Dept. of Environmental Protection

Nassau Amelia Utilities

In 2003, the County purchased the former Florida Water Services (FWS) franchise and formed Nassau Amelia Utilities. It is the only water and wastewater utility owned and operated by the County. Its service area includes the unincorporated areas on the southern part of Amelia Island, as shown on Map WAT-1. Nassau Amelia Utilities owns and operates a WTP that was expanded in 2009 from a capacity of 3.074 MGD to 4.06 MGD, and currently serves a population of approximately 8,700 persons within its service area.

The current Consumptive Use Permit (CUP) for Nassau Amelia Utilities issued by SJRWMD authorizes the use of 983.675 million gallons per year (MGY) (2.695 MGD) of groundwater from the upper Floridan aquifer for household, commercial/industrial, water utility and unaccounted for water use and 3.636 MGD (maximum) of groundwater from the upper Floridan aquifer for essential use (fire protection) in 2021. The average daily flow (ADF) for this system in 2009 was 1.91 MGD.

JEA

Based in Jacksonville, JEA is one of the largest public utilities in the county. It provides services in Duval, Nassau and St. Johns Counties. In 2001, JEA purchased the former United Water franchise and its service area in eastern Nassau County. The service area is shown on Map WAT-1. JEA now operates three WTPs that serve unincorporated areas in the eastern part of the county. The Yulee Regional WTP has a rated capacity of 4.8 MGD. The Lofton Oaks WTP has a rated capacity of .14 MGD and the Otter Run WTP a capacity of .4 MGD. According to JEA, these three WTPs currently serve a population of approximately 15,000 persons in unincorporated areas in the eastern part of the County. A fourth water treatment facility, the West Nassau WTP, is planned to be constructed in the vicinity of the County Courthouse complex off William Burgess Road in the south-central area of the County (see Map WAT-1). Originally proposed as a 3.5 MGD facility, this project has been scaled back in its initial phase to 1 MGD. This first phase is scheduled for construction in 2010, finishing in early 2011.

In September 2007 JEA submitted a modification to incorporate all of its wellfields into one CUP to allow the withdrawal of 187 MGD (average annual) for its entire system for public supply type use by 2030. This application, which is referred to as the Total Consolidation, is still pending. In the interim, while the application is under review, JEA has been issued a Temporary Consumptive Use Permit (TCUP), whose allocation should accurately reflect the actual water use demands until the Total Consolidation CUP is issued. This permit will be renewed monthly until the final permit is issued. The average daily flow (ADF) for this system in 2009 was 2.29 MGD.

Municipal Systems

Table WAT-2 lists the municipally-owned and operated water treatment plants (WTP) which serve the incorporated areas (and in some cases unincorporated areas) in Nassau County. Service areas for each municipality are shown on Map WAT-1.

Table WAT-2 Municipal Water Treatment Facilities ,Nassau County

Facility	Provider	Location	capacity MGD
WTP No. 1	City of Fernandina Beach	20 N. 11th Street, Fernandina Beach	5.6
WTP No. 2	City of Fernandina Beach	2203 Ryan Rd, Fernandina Beach	8.0
WTP No. 3	City of Fernandina Beach	3425 Citation Ct, Fernandina Beach	4.6
Town of Callahan WTP	Town of Callahan	542300 U.S. Hwy. 1 , Callahan	1.43
Town of Hilliard WTP	Town of Hilliard	37203 Pecan St., Hilliard	1.00

Sources: City of Fernandina Beach, Town of Callahan, Town of Hilliard, Florida Dept. of Environmental Protection

City of Fernandina Beach

As the largest municipality in Nassau County, the City of Fernandina Beach owns and operates three WTPs rated at a combined capacity of 18.2 MGD. The No. 1 WTP has a capacity of 5.6 MGD and has a 500,000 gallon elevated storage tank and a 680,000 gallon ground storage tank. The No. 2 WTP has a capacity of 8.0 MGD and a 620,000 gallon ground storage tank. The No. 3 WTP has a capacity of 4.6 MGD and a 500,000 gallon ground storage tank. According to the City of Fernandina Beach, these plants currently serve a population of approximately 11,900 persons.

The current CUP for the City of Fernandina Beach issued by SJRWMD authorizes the use of 2,400.45 MGY (6.575 MGD) of groundwater from the Floridan aquifer for household, commercial/industrial, water utility, essential uses (fire protection)and unaccounted for water losses in 2020. The average daily flow (ADF) for this system in 2009 was 1.81 MGD.

Town of Callahan

The Town of Callahan owns and operates a 1.43 MGD WTP, with a 250,000 gallon elevated storage tank. According to DEP, this system currently serves a population of approximately 1,480 persons. The Town plans an expansion of its WTP to 2.8 MGD to be completed in 2012.

The current CUP for the Town of Callahan issued by SJRWMD authorizes the use of 123.37 million gallons per year (MGY) of groundwater from the Floridan aquifer for household and light commercial/industrial use, 29.93 MGY of groundwater from the Floridan aquifer for water utility use and unaccounted for water use and 1.872 MGD maximum for essential use (fire protection) in 2026. The average daily flow (ADF) for this system in 2009 was .176 MGD.

Town of Hilliard

The Town of Hilliard owns and operates a 1 MGD WTP, with a 160,000 gallon elevated storage tank. According to DEP, this system currently serves a population of approximately 2,920 persons.

The current CUP for the Town of Hilliard issued by SJRWMD authorizes the use of 206.59 MGY (0.566 MGD) of groundwater from the Floridan aquifer for household and light commercial/industrial use, 16.79 MGY (0.046 MGD) of groundwater from the Floridan aquifer for water utility use and unaccounted for water use and 2.02 MGD maximum for essential use (fire protection) in 2026. The average daily flow (ADF) for this system in 2009 was .26 MGD.

Small Community Systems

In addition to municipal systems and county owned systems, there are seven small community water systems licensed by DEP in Nassau County (See Table WAT-3). Small public supply utility systems are classified by SJRWMD as those typically having an average daily flow (ADF) under 0.1 MGD.

Other non-community, or “package”- type systems are often used for commercial, industrial or institutional uses and are classified under that category by SJRWMD. DEP monitors small package water treatment systems to ensure that they have adequate capacity to serve their intended uses and is responsible for advising the County of any major problems.

Table WAT-3 Licensed Small Public Water Systems, Nassau County

Lic. #	Name	Location	Class	Capacity (MGD)
2454138	Dayspring Village	Hilliard	Community	0.072
2450431	Goodbread Mobile Home Park	Yulee	Community	0.028
2454300	Green Acres Of Yulee	Yulee	Community	0.014
2451322	Marsh Cove Apartments	Fernandina Beach	Community	0.130
2451323	Nassau Acres Mobile Home Park	Yulee	Community	0.016
2451147	Teakwood Mobile Home Park	Yulee	Community	0.021
2454282	Yulee Villas Apartments	Yulee	Community	0.036

Source: Florida Dept. of Environmental Protection

Commercial/Industrial/Institutional Self-Supply

This category includes all permitted commercial/industrial/institutional self-suppliers listed in the SJRWMD Consumptive Use Permit (CUP) database as having an average daily use of at least 0.10 MGD. Nassau County has and is projected to have a relatively high rate of use (36-38 MGD) in the next 20 years according to the 2008 WSA. This is mainly due the water use of the two large pulp mills located in Fernandina Beach. Each mill is presently permitted to withdraw over 24 MGD according to their approved CUPs.

Agricultural Self-Supply

SJRWMD has reported that between 1995 and 2005 irrigated agricultural acreage in its jurisdictional area declined by 13%; this trend is expected to continue in the future. Nassau County has very modest needs for irrigated agricultural lands (forestry is the dominant agricultural activity). The 2008 WSA projects a demand of .02 MGD with no increase by 2030.

Domestic Self-Supply

Domestic self-supply water use refers to water use by individuals not served by a public supply water utility (i.e., a residence with a private well).

According to the Nassau County Health Department, approximately 51% of the population in Nassau County are connected to a regional water system and 49% of the population use either a small public system or private water wells (see Table WAT-4). Initial projections included in the SJRWMD draft 2008 Water Supply Assessment indicate that private wells or small public systems may continue to be a principal means of potable water supply in Nassau County during the planning period 2010-2030 (see Table WAT-5).

Table WAT-4 Estimated Population by Water Supply Method, 2009

	Total Pop.	Regional System	%	Small sys. or Well	%
Callahan	1,480	1,080	73%	400	27%
Fernandina Beach	12,055	11,900	99%	150	1%
Hilliard	2,949	2,000	68%	949	32%
Unincorporated	56,400	20,490	36%	35,198	62%
Nassau County (Total)	**72,567**	**35,870**	**49%**	**36,697**	**51%**

Sources: University of Florida, Bureau of Business and Economic Research (BEBR), SJRWMD 2008 Water Supply Assessment

II. Analysis of Need

Level of Service

Table WAT-5 summarizes the presently adopted levels of service (LOS) for all regional potable water systems in Nassau County.

Table WAT-5 LOS for Regional Potable Water Systems, Nassau County

Provider	LOS gpd per capita	Peak factor
JEA	**100.0**	**2.0**
Nassau Amelia Utilities	**81.0**	**1.5**
City of Fernandina Beach	**170.9**	**1.6**
Town of Callahan	**125.0**	**n/a**
Town of Hilliard	**115.0**	**n/a**

Source: Nassau County 2010 Comprehensive Plan

Projected Demand

The draft 2008 WSA indicates that approximately 51 percent of total county residents will be connected to a regional water system in 2010. Projecting forward, the WSA actually forecasts a *decline* in the percentage of residents using central systems, dropping to just over 48 percent by 2030.

Table WAT-6 2008 WSA Projected Population by Water Supply Method 2010-2030

	2010	%	2015	%	2020	%	2025	%	2030	%
Total Population	73,100		80,000		88,200		96,100		104,000	
Regional System	37,062	50.7%	41,200	51.5%	45,423	51.5%	48,338	50.3%	50,128	48.2%
Small System / Self-Supply	36,038	49.3%	38,800	48.5%	42,777	48.5%	47,762	49.7%	53,872	51.8%

Sources: University of Florida, Bureau of Business and Economic Research (BEBR), SJRWMD 2008 Water Supply Assessment

While the 2008 WSA provides a generally reliable and accepted methodology for these projections, the WSA is primarily interested in groundwater withdrawal in the aggregate. The County, on the other hand, is interested in creating and maintaining a sustainable system of supplying the potable water needs for current and future residents in a coordinated system from withdrawal to delivery at the tap. It is in the best interest of the County, both financially and environmentally, to encourage efficient development patterns that maximize the use of regional water systems.

Tables WAT-7-9 on the following pages projects the population that will use a public (i.e. regional) water supply over the planning timeframe and assesses the ability of existing and planned

facilities in the unincorporated areas to meet the adopted LOS, expressed in average gallons per capita per day (gpcd) . The projections for population using public water supply in Table WAT-7 are based on those found in the 2008 WSA. Table WAT-8 analyzes needs based on a moderate target of 65 percent of the total population using regional water systems by 2030. Table WAT-9 analyzes need based on a more aggressive target of 80 percent of the total population using regional water systems.

Because Nassau Amelia Utilities has a geographically limited service area on Amelia Island that is projected by NAU to build out by 2015, theses analyses only take into account the projected amount NAU would need to serve its service area at build out (appx. 2.49 MGD). It is assumed that the remaining need would be caused by development off Amelia Island and most likely located in areas served by JEA or potentially served by JEA in the future. Each analysis also assumes that the entire projected population in incorporated areas will be using municipal central water systems.

In all three analyses, it is clear that sufficient capacity would be available from existing a planned water treatment facilities to serve a much larger percentage of the County's future population than the 2008 WSA projects. However, this capacity does not of itself guarantee a larger percentage of users for regional systems. In order for potable water systems to expand, it must be cost-effective for both providers and developers to build the necessary infrastructure (water lines, pump stations, etc.) and an adequate water supply from the Floridan aquifer or alternative sources must be readily available. These issues are discussed in detail below.

Table WAT- 7 Potable Water Needs Analysis, Target: 2008 WSA Projections

	2010	2015	2020	2025	2030
Target % Total Population using regional systems	**50%**	**51%**	**51%**	**50%**	**48%**
Total Population	73,100	80,000	88,200	96,100	104,000
Unincorporated Population	56,738	62,946	70,274	77,314	84,273
Population using Municipal Systems	16,362	17,054	17,926	18,786	19,727
Target Uninc. Population using regional systems	20,188	23,746	27,056	29,264	30,193
Target %Uninc Pop. using regional systems	36%	38%	39%	38%	36%
Capacity required to meet 100 gpcd LOS (MGD)	2.0	2.4	2.7	2.9	3.0
Capacity-JEA	5.3	6.3	10.3	10.3	10.3
Capacity- Nassau Amelia*	2.01	2.49	2.49	2.49	2.49
Surplus/Deficit	**5.3**	**6.4**	**10.1**	**9.9**	**9.8**

Sources: University of Florida, Bureau of Business and Economic Research (BEBR), JEA , Nassau Amelia Utilities, SJRWMD 2008 Water Supply Assessment

Table WAT- 8 Potable Water Needs Analysis, Target: 65% Total 2030 Population

	2010	2015	2020	2025	2030
Target % Total Population using regional systems	**51%**	**55%**	**60%**	**62%**	**65%**
Total Population	73,100	80,000	88,200	96,100	104,000
Unincorporated Population	56,738	62,946	70,274	77,314	84,273
Population using Municipal Systems	16,362	17,054	17,926	18,786	19,727
Target Uninc. Population using regional systems	20,919	26,946	34,994	40,796	47,873
Target %Uninc Pop. using regional systems	37%	43%	50%	53%	57%
Capacity required to meet 100 gpcd LOS (MGD)	2.1	2.7	3.5	4.1	4.8
Capacity-JEA	5.3	6.3	10.3	10.3	10.3
Capacity- Nassau Amelia*	2.01	2.49	2.49	2.49	2.49
Surplus/Deficit	**5.2**	**6.1**	**9.3**	**8.7**	**8.0**

Sources: University of Florida, Bureau of Business and Economic Research (BEBR), JEA , Nassau Amelia Utilities

Table WAT- 9 Potable Water Needs Analysis, Target: 80% Total 2030 Population

	2010	2015	2020	2025	2030
Target % Total Population using public supply	**52%**	**59%**	**65%**	**73%**	**80%**
Total Population	73,100	80,000	88,200	96,100	104,000
Unincorporated Population	56,738	62,946	70,274	77,314	84,273
Population using Municipal Systems	16,362	17,054	17,926	18,786	19,727
Target Uninc. Population using regional systems	21,650	30,146	39,404	51,367	63,473
Target %Uninc Pop. using regional systems	38%	48%	56%	66%	75%
Capacity required to meet 100 gpcd LOS (MGD)	2.2	3.0	3.9	5.1	6.3
Capacity-JEA	5.3	6.3	10.3	10.3	10.3
Capacity- Nassau Amelia*	2.01	2.49	2.49	2.49	2.49
Surplus/Deficit	**5.2**	**5.8**	**8.8**	**7.7**	**6.4**

Sources: University of Florida, Bureau of Business and Economic Research (BEBR), JEA , Nassau Amelia Utilities

Impact of Amendments to the 2030 Future Land Use Map

As part of the County's 2010 EAR-based amendments (Series 10-2ER), the proposed 2030 Future Land Use Map (FLUM) contains four (4) amendments to the 2010 FLUM. These are shown graphically in Map FL-7 and described in detail in the background data and analysis of the Future Land Use Element. Their maximum development potentials are described in detail in Table WAT-10 below:

Table WAT-10 Development Potential of Proposed Amendments (Series 10-2ER)

Amendment	Acres		Existing Development Potential	Proposed Development Potential	Net Increase or (Decrease)
1. ENCPA	22,675 ac	Residential	6,949 DU	24,000 DU	17,051 DU
		Non-Residential	0 sq. ft.	11,000,000 sq. ft.	11,000,000 sq. ft.
2. Longleaf Mitigation Bank	3,029 ac	Residential	504 DU	0 DU	(504) DU
		Non-Residential	0 sq. ft.	0 sq. ft.	0 sq. ft.
3. Martins Island	110 ac	Residential	110 DU	0 DU	(110) DU
		Non-Residential	0 sq. ft.	0 sq. ft.	0 sq. ft.
4. Liberty Development	10 ac	Residential	100 DU	20 DU	(80) DU
		Non-Residential	0 sq. ft.	0 sq. ft.	0 sq. ft.
Total	**25,824 ac**	**Residential**	**7,663 DU**	**24,020 DU**	**16,357 DU**
		Non-Residential	**0 sq. ft.**	**11,000,000 sq. ft.**	**11,000,000 sq. ft.**

Source: Nassau County Growth Management Dept.

Impact Analysis Methodology

The purpose of this analysis is to evaluate the impacts of each of the 2030 FLUM amendments on facilities and services. The purpose of this analysis is not to conduct a concurrency review, per se. Rather, it provides the County with an analysis of how the adopted level of service standards would be affected by the proposed amendments for planning purposes. Facility needs are dealt with more completely during the site plan review process that incorporates a concurrency review of each of the cited public facilities.

For the purpose of evaluating comprehensive plan amendments development is presumed to have the maximum impact. "Maximum impact assumed" is a convention used by reviewing agencies to quantify impact associated with categories of land use. For residential FLUM designations, the property acreage is multiplied by the maximum permitted density. For non-residential designations the size of the property in acres is multiplied by 43,560 with that product in turn multiplied by the maximum floor area ratio. For all designations, if a property owner voluntarily commits to a proposed number of dwelling units and/or a floor area ratio through a policy adopted in the comprehensive plan ordinance, then the proposed number of dwelling units or floor area ratio may be used in place of the maximums.

Three of the four the amendments listed in Table WAT-10 above result in density reductions that will result in relatively minor impact reduction. As a result, this impact analysis will focus on the first amendment, the proposed Multi-Use designation known as the East Nassau Community Planning Area (ENCPA).

The ENCPA maximum development program established in Future Land Use Element Policy FL.13.10 will form the basis of the analysis – 24,000 dwelling units and 11,000,000 square feet of

non-residential. A five-year and long term planning horizon will be examined following the development schedule shown in Table WAT-11 below:. The first increment of development runs through 2015 with build out assumed by the long term planning horizon ending 2030.

*Table WAT-11 ENCPA Phased Development Program**

Phase 1 (Current-2015) Dev. Program by LU	Land Use Type						
	Dwelling Units		Square Feet				Rooms
	SF	MF	Shopping Ctr.	Gen. Office	Office Park	Gen Light Ind.	Resort Hotel
Regional Center				40,000			
Regional Center-TOD							
Employment Center					225,000	525,000	
Village Center							
Village Center-TOD							
Resort Development							400
Neighborhood Center			20,000				
Res. Neighborhood	1,200						
TOTALS	***1,200***	***0***	***20,000***	***40,000***	***225,000***	***525,000***	***400***

Phase 2-Buildout (2016-2030) Dev. Program by LU	Land Use Type						
	Dwelling Units		Square Feet				Rooms
	SF	MF	Shopping Ctr.	Gen. Office	Office Park	Gen Light Ind.	Resort Hotel
Regional Center		5,696	1,200,000	180,000	225,000	200,000	
Regional Center-TOD		1,460		80,000	75,000		
Employment Center		1,077			2,352,000	4,788,000	
Village Center	438	1,753	650,000				
Village Center-TOD			150,000				
Resort Development	1,513	1,512	50,000				
Neighborhood Center			140,000				
Res. Neighborhood	8,868						
TOTALS	***10,819***	***11,981***	***2,190,000***	***260,000***	***2,352,000***	***4,988,000***	***0***

Overall ENCPA (at Buildout) Dev. Program by LU	Land Use Type						
	Dwelling Units		Square Feet				Rooms
	SF	MF	Shopping Ctr.	Gen. Office	Office Park	Gen Light Ind.	Resort Hotel
Regional Center		5,696	1,200,000	220,000	225,000	200,000	
Regional Center-TOD		1,460		80,000	75,000		
Employment Center		1,077			2,277,000	5,313,000	
Village Center	438	1,753	650,000				
Village Center-TOD			150,000				
Resort Development	1,513	1,512	50,000				400
Neighborhood Center			160,000				
Res. Neighborhood	10,058						
TOTALS	***12,019***	***11,981***	***2,210,000***	***300,000***	***2,577,000***	***5,513,000***	***400***

**The quantities indicated by land use category in this table are estimates for the purpose of quantifying public facility elements. Final units and square footage shall be subject to the DRI requirement for the ENCPA and shall not exceed 24,000 residential units and 11,000,000 square feet of nonresidential. It has been assumed that the Resort Hotel will consist of 400,000 sq. ft. Source: VHB MillerSellen*

ENCPA lies within the JEA service area. The adopted residential levels of service for the JEA service area is 100 gallons per capita per day for potable water. The projected household size is 2.32 PPH (see Tables FL-2 and FL-3, Future Land Use Element). The number of dwelling units included in the five-year and 2030 planning horizons are multiplied by 2.32 PPH to determine the population to be served. This population projection is, in turn, multiplied by the appropriate level of service standard. For non-residential development standard generation factors will be employed absent specific information on end users. The maximum development measured in square feet is multiplied by 0.1 gallon per square foot per day for water consumption The net increase or decrease is a measure of the 2010 FLUM compared to the [proposed] 2030 FLUM classification.

Analysis of Impact on Demand

Table WAT-12 ENCPA Potable Water Demand, 2015

Land use	Units	PPH	Demand Factor	Daily Demand
Residential	1,200 du	2.32	100 GPCD	278,400
Non-Residential	810,000 sf	n/a	.1 GPSFD	81,000
Hotel	400 rm	n/a	150 GPRD	60,000
Sub-Total				419,400
Existing Demand	6,949 du	2.32	100 GPCD	(1,612,168)
Net Decrease in Demand				(1,192,768)

Source: Nassau County Growth Management Dept.

du = dwelling units *sf = square feet*
rm = rooms (units) *GPCD = gallons per capita per day*
GPSFD = gallons per sq. ft. per day *GRPD = gallons per room per day*

Phase 1 of the ENCPA development program represents a net decrease in potable water demand when compared to the existing FLUM designations. Nevertheless, because the ENCPA requires connection to central potable water (see Future Land Use Policy FL.13.16) a 2015 potable water analysis will be performed. ENCPA is located within JEA's Nassau (Lofton Oaks) service area. JEA operates 3 water treatment plants to serve Nassau (Lofton Oaks) having a combined capacity of 5.33 MGD (see Table WAT-1). The JEA 2009 Annual Water Resource Master Plan indicates an Average Daily Flow within the Nassau (Lofton Oaks) system of 2.29 MGD. The Nassau grid well fields have a permitted capacity of 8.72 MGD. The inclusion of an additional 0.4194 MGD from ENCPA can be accommodated together with any growth in background demand.

Table WAT-13 ENCPA Cumulative Potable Water Demand, 2030

Land use	Units	PPH	Demand Factor	Daily Demand
Residential	24,000 du	2.32	100 GPCD	5,568,000
Non-Residential	10,600,000 sf	n/a	.1 GPSFD	1,060,000
Hotel	400 rm	n/a	150 GPRD	60,000
Cumulative Build-Out Demand				6,688,000
Existing Demand	6,949 du	2.32	100 GPCD	(1,612,168)
Net Cumulative Increase				5,075,832

Source: Nassau County Growth Management Dept.

In March 2010 JEA began construction of the new West Nassau water treatment plant located east of I-95 and south of S.R. 200 near William Burgess Blvd. (JEA Project DE137-03).

Construction includes a 1.4 MGD well field, 1 MGD water treatment plant, and a .5 MGD finished water storage tank. Completion of the West Nassau WTP in 2011 will increase well field capacity to 10.12 MGD and treatment plant capacity to 6.33 MGD. The 2009 Annual Water Resource Master Plan indicates a projected demand of 3.95 MGD within the Nassau Grid (see Appendix K). With the addition of the cumulative increase from the ENCPA, the 2030 supply and demand is as follows:

Table WAT-14 2030 Demand Analysis With ENCPA, JEA Nassau Grid

JEA 2030 Demand Projection	3.95 MGD
ENCPA Incremental Increase	5.08 MGD
Total Nassau Grid Demand	9.03 MGD
Existing Wellfield Capacity	10.12 MGD
Surplus / (Deficit)	1.09 MGD
Existing WTP Capacity	6.33 MGD
Surplus / (Deficit)	(2.7 MGD)

Source: Nassau County Growth Management Dept.

The West Nassau WTP is designed for an eventual expansion to a 3.6 MGD well field and 3.5 MGD treatment plant. The planned West Nassau WTP plant increase of 2.5 MGD will have to be expanded to 2.7 MGD to accommodate ENCPA and background growth.

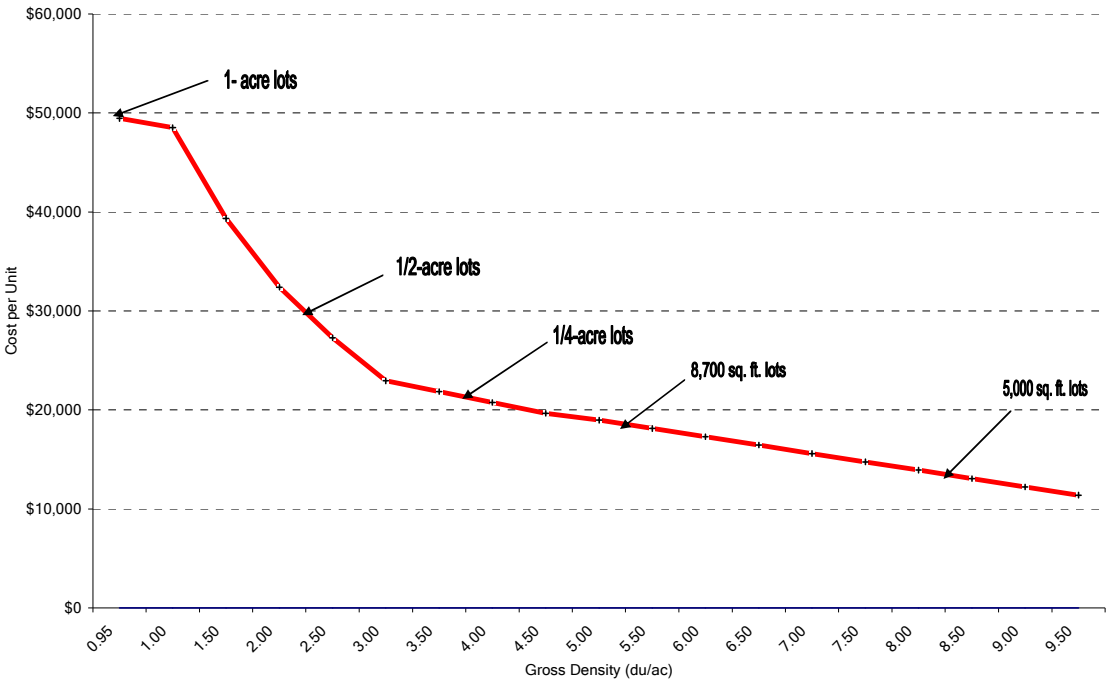
Encouraging Efficient Development Patterns

In 2007, the Florida- based consulting firm WilsonMiller prepared a study of the relationship of land use density to the costs of providing central water and wastewater systems (see Appendix E). Using assumptions and cost estimates prepared by engineers based on several actual Florida communities, the study determined an average cost for water and wastewater infrastructure for single and multi-family residential communities (including associated non-residential uses) in a range of densities from .95 to 9.5 dwelling units per gross acre.

As shown in Figure WAT-1 below, the study determined that there is a substantial savings in the cost of infrastructure as density increased. There is an especially steep decline in costs per unit between one and three units per gross acre, dropping from over $49,000 per unit to less than $23,000. This represents a savings of over 53 percent on the cost of water and wastewater infrastructure. Figure WAT-1 includes notations to demonstrate where certain types of residential development typically fall along the cost curve.

In order to promote more efficient development patterns, The County should adopt strategies that encourage compact, higher density and/or intensity development in areas that are either currently served by central water and/or sewer systems or are planned to be served in the short term (i.e. 3-5 years). Strategies the County should consider include the establishment of minimum densities that make connection to central water supplies economically feasible; policies requiring connection at density thresholds; and establishment of a minimum lot area for the use of private wells.

Figure WAT-1 Residential Density v. Cost for Central Water & Wastewater (2007 dollars)



Source: WilsonMiller, 2007

The County should also consider policies to provide incentives to the private sector to construct treatment and distribution facilities. Such incentives may include contributions in aid to construction, community development districts, municipal services benefit districts and impact fee credits.

The Urban Development Area (UDA), as defined in the Future Land Use Element, is that portion of Nassau County which is located within the existing JEA water and sewer service area, Because of the current and future availability of urban services, including regional potable water supply systems, the UDA is the area that should experience the greatest amount of population growth and urban-level development in the unincorporated area through the 2010-2030 planning period. As a result, this is where higher densities, mixed use development and employment centers should be encouraged.

In order to promote more efficient development patterns, all urban-level development within the UDA should be served by central water and wastewater service in order to discourage urban sprawl; maximize existing and planned infrastructure; preserve environmental resources; and create a greater diversity of housing types and prices.

Due to the relatively high densities permitted by the FLUM in rural areas outside any established service area for central water and sewer, the common planning strategy of prohibiting the extension of water lines beyond established service boundaries to prevent urban sprawl will not be effective in Nassau County. This strategy will simply encourage and expand the extent of unplanned, low density residential development served by private wells which can not be cost-effectively retrofitted for central water service.

Conservation of Water Resources

In order to ensure a healthy economy and quality of life for its residents the County needs to protect and conserve its water resources in order to meet the future needs of the County's population and the needs of the environment, agriculture, and industry.

The County should coordinate with the SJRWMD to adopt policies that will promote public education about water conservation; promote the reuse of treated effluent for irrigation purposes; promote the use of native and drought tolerant landscape materials, promote the use of low-impact development techniques; and provide more specific well head protection standards.

It should be noted that objectives and policies in this Sub-element related to water resource conservation will, in some cases, overlap those of the Natural Groundwater Recharge Sub-element, the Conservation Element and the Future Land Use Element that seek to protect surface waters, wetlands and groundwater sources.

Water Supply Planning

The St. Johns River Water Management District (SJRWMD) approved its updated District Water Supply Plan on Feb. 7, 2006. The updated SJRWMD 2005 District Water Supply Plan (DWSP) addresses current and future water demands and traditional and alternative water sources and water conservation required to meet 2025 water supply needs. According to the 2005 DWSP, no Priority Water Resource Caution Areas are identified in Nassau County. The availability of the required water quantity from the surficial and Floridan aquifers substantially exceeds current and projected use within most areas of the County. No water supply development projects listed in the 2005 plan are located in Nassau County.

The current draft 2008 Water Supply Assessment (WSA) is based on a planning period that extends through 2030. In the draft 2008 WSA, the northeast Florida area is identified as a potential PWRCA, which means the area may not be able to meet all future water demands without unacceptable impacts to water resources and related natural systems. However, the 2008 WSA will remain in draft form until the completion of the water supply planning process, which will allow an opportunity for additional evaluations and local input. Final determination of PWRCAs will not occur until December 2010 or later.

Legislative changes to growth management laws were made in 2002, 2004 and 2005 to more effectively address the state's water supply situation by improving the link between local governments' land use plans and water management districts' regional water supply plans. Local governments must address the enhanced water supply planning requirements by demonstrating that future land use map amendments are based upon the availability of water supplies and water supply facilities and by completing updates to their comprehensive plans and adopting related amendments.
The Department of Community Affairs requires that counties not lying within the Priority Water Resource Caution Area address the following items as part of the EAR-based amendments to their comprehensive plans. They will be addressed in this plan as follows:

1. *Update the Public Facilities, Conservation, and Future Land Use Elements to reflect the Water Management District's District Water Supply Plan.*

   This will be accomplished through the inclusion of updated information from the 2005 DWSP in data and analysis, where appropriate, and in policies specifically addressing the need to reflect the DWSP in the elements listed.

2. *Update the Public Facilities Element to address water needs and sources, water supply development, conservation, reuse, and cooperative planning efforts related to development of multi-jurisdictional water supply facilities, including the development of alternative water sources to supplement traditional sources of groundwater and surface water supplies.*

   In addition to new information on water supply being included in the data and analysis for this sub-element, policies will be included in this element to address water supply and development, including, where required, the development of alternative water resources.

3. *Update the Conservation Element to include an assessment of current and projected water needs and sources for at least a 10-year period. This assessment should consider the St. Johns River Water Management District Water Management Plan.*

   This assessment will be based upon the data and analysis found in the 2008 WSA and will be submitted with the EAR-based amendments as Appendix F.

4. *Update the Regional (Intergovernmental) Coordination Element to address cooperative efforts with other local governments, public and private utilities, regional water supply authorities, special districts, and water management districts with regard to potable and reuse water service delivery.*

   The Regional Coordination Element will include policies requiring cooperation between municipalities, adjacent jurisdictions, public and private utilities, the SJRWMD and other regional water supply authorities to address potable water supply and service delivery issues.

Sanitary Sewer Sub-Element

I. Existing Conditions

Background

The purpose of this sub-element is to ensure that public facilities are available to meet the existing and future needs of Nassau County. As with potable water, the ability of the County and other providers to provide wastewater treatment will play an important role in shaping future land use patterns, influencing the timing, location, and intensity of development.

Regional Facilities

Regional sanitary sewer facilities are large-scale systems, which generally provide service to densely populated areas. There are two regional sewage treatment plants currently serving the unincorporated areas of Nassau County. One plant is operated by Nassau Amelia Utilities (NAU) and serves the southern unincorporated area of Amelia Island. The other is operated by JEA and serves unincorporated areas in the eastern part of the County. These facilities are comprised of three components, which perform the basic functions of collection, treatment, and disposal of sewage.

The collection system is composed of a network of sewer pipes, which collect sewage (also called wastewater) from individual establishments and convey it to a central location for treatment. The collection network is generally laid out in a pattern roughly analogous to the branching pattern of a tree.

A regional treatment plant serves a fairly large geographic area and treats the sewage to remove solid and organic materials. The treatment plant is the component of the regional sanitary sewer facility, which functions to remove solid and organic materials from the sewage. There are a large number of processes, which can accomplish this, but they should generally be grouped into one of three categories depending on the proportion of materials removed. The three levels of treatment are Primary, Secondary, and Tertiary Treatment:

Primary Treatment- This refers to the removal of between 30 to 35 percent of the organic materials and up to 50 percent of the solids from the sewage. This is also referred to as physical treatment because screens and settling tanks are the most common methods used to remove the solids.

Secondary Treatment- Following primary treatment, additional steps are taken so that between 80 and 90 percent of organic materials and solids are removed. This level of treatment usually requires multiple steps involving one biological process and one or more processes for removal of suspended solids.

Tertiary Treatment- Sewage may also contain quantities of synthetic organic compounds or inorganic chemicals, which may create pollution problems, if not removed. Tertiary (or advanced) treatment adds steps to primary and secondary processes to remove these pollutants. The most common tertiary processes remove compounds of phosphorus and nitrogen. The effluent of advanced treatment processes often approaches potable water purity and may be suitable for landscape irrigation or other non-potable uses.

Small Treatment Systems

Small treatment systems, or “package” plants are generally privately owned and operated used to serve isolated development and are usually partially or completely pre-assembled by the manufacturer prior to shipment to the site of use. Package plants are available in a range of capacities up to one million gallons per day, and may be designed to provide any level of treatment, but plants providing secondary treatment are most commonly used.

Septic Systems

Septic systems are usually used to serve single housing units, although relatively large-scale systems have proven successful. The system consists of two components, the septic tank and the drain field. The tank receives wastewater from the home and provides a period of settling, during which time a significant portion of the suspended solids settle out. The settled solids are gradually decomposed by anaerobic bacteria in the tank. The remaining liquids are discharged by displacement through underground drainage pipes into the drainfield and percolate into the soil where microorganisms and filtration processes purify the liquids. A modified onsite sewage disposal system improves on the septic tank design by providing aeration and promoting more efficient treatment. These systems, called aerobic treatment systems, are capable of 95 percent or higher treatment and are utilized in coastal zones or larger commercial facilities.

Septic tanks generally require cleaning every three to five years to remove accumulated solids. These solids, called septage, are generally transported to approved land spreading sites or regional sanitary sewer facilities for treatment.

Effluent Disposal Methods

Effluent and sludge are the waste products of the treatment process. Effluent is the treated wastewater, which flows out of the treatment plant. Effluent disposal options include discharge to a water body, storage within percolation ponds for evaporation and percolation, irrigation reuse or injection into deep aquifers. Sludge refers to the accumulated solid residues of the treatment process. Prior to final disposal, sludge is usually subjected to an additional biological treatment process to remove pathogens and physical dewatering processes to facilitate transportation and disposal. Common disposal methods include burial in solid waste landfills and land application as a soil conditioner for ornamental or similar agricultural purposes. In addition, the placement of septage on permitted land spreading sites is a permitted activity by the Dept. of Health (DOH).

Reclaimed Water and Reuse

Reclaimed water is treated wastewater that has received at least secondary treatment and basic disinfection and is reused after flowing out of a domestic wastewater treatment facility.

Reuse is the deliberate application of reclaimed water, in compliance with Florida Department of Environmental Protection (DEP) and water management district rules, for a beneficial purpose. Reclaimed water can be used for a wide range of beneficial purposes, including the following:

- Landscape irrigation (irrigation of golf courses, parks, highway medians, playgrounds, residential properties, etc.
- Agricultural irrigation (including irrigation of nurseries/ornamentals and edible crops)
- Aesthetic uses (decorative ponds, pools, and fountains)
- Ground water recharge
- Industrial uses (for cooling, process, or wash waters)
- Wetlands creation, restoration, or enhancement
- Toilet flushing
- Fire protection (use in hydrants or sprinklers)
- Other use purposes

The encouragement and promotion of water conservation and reuse of reclaimed water, as defined by the Florida Department of Environmental Protection (DEP), are state objectives and are considered to be in the public interest. In response to this objective, the DEP, the water management districts, and the Public Service Commission (PSC) have implemented a comprehensive reuse program designed to encourage and promote reuse of reclaimed water.

Existing Regulatory Framework

Federal

The Federal Water Pollution Control Act (FWPCA) is the controlling national legislation relating to the provision of sanitary sewer service. The goal of this Act is the restoration and/or maintenance of the chemical, physical, and biological integrity of the nation's waters. The Act established the national policy of implementing area wide waste treatment and management programs to ensure adequate control of sources of pollutants. Under Section 201 of the FWPCA, grants were made available to local governments to construct facilities to treat "point sources" of pollution, which include effluent from sewage treatment processes. The U.S. Environmental Protection Agency is responsible for implementing the Act.

State

The Department of Environmental Protection (DEP) is responsible for ensuring that the state carries out responsibilities assigned to it under the FWPCA. DEP has adopted rules for the regulation of wastewater facilities in Chapter 62-600, Florida Administrative Code (F.A.C.). These rules apply to facilities, which treat flows exceeding 10,000 gallons per day for domestic establishments, 3,000 gallons per day for food service establishments, where the sewage contains industrial or toxic or hazardous chemical wastes. Additional state regulatory authority may be found in Chapters 373 and 403, Florida Statutes, as well as DEP rules Chapter 62-4, 62-302, 62-610 which address reuse water conservation, and water quality.

The Department of Health regulates septic tank and drain field installation within the state. These requirements have been adopted by rule in Chapter 64E-6 F.A.C.

Local

To ensure economic efficiency in the operation of the regional sanitary sewer facilities which it provides, Nassau County has adopted design standards and review procedures to ensure that all connections to the system are compatible with the system design.

The Nassau County Public Health Unit, Environmental Health Section, oversees permitting, set-up, and operation of individual septic systems in accordance with County and state rules and regulations.

Regional Systems in the Unincorporated Area

Table SEW-1 lists the regional wastewater treatment facilities which serve the unincorporated areas on Amelia Island and in the eastern part of Nassau County.

Table SEW-1 Regional Wastewater Treatment Facilities in Unincorporated Nassau County

Facility	Provider	Location	capacity MGD
Nassau Regional WRF	JEA	96237 Amelia Concourse, Yulee	2.0
Nassau Amelia WWTP	Nassau Amelia Utilities	5390 First Coast Highway, Amelia Island	0.95

Sources: JEA, Nassau Amelia Utilities, Florida Dept. of Environmental Protection

Nassau-Amelia Utilities

In 2003, the County purchased the former Florida Water Services (FWS) franchise and formed Nassau Amelia Utilities (NAU). It is the only water and wastewater utility owned and operated by the County. Its service area includes the unincorporated areas on the southern part of Amelia Island, as shown on Map SEW- 1. NAU operates a .95 MGD wastewater treatment plant that serves a population of approximately 8,700 persons within its service area. The average daily flow (ADF) for this system in 2009 was .897 MGD.

NAU's 2006 Water & Sewer Master Plan projects a 2015 demand of 1.19 MGD annual average daily flow (AADF). The wastewater treat facility will need to be improved and expanded to meet future demands. NAU and the County need to update the schedule of capital improvements as necessary in order to ensure that future demands can be met.

JEA

Based in Jacksonville, JEA is one of the largest public utilities in the county. It provides services in Duval, Nassau and St. Johns Counties. In 2001, JEA purchased the former United Water franchise and its service area in eastern Nassau County. The service area is shown on Map SEW-1. JEA operates the Nassau Regional WRF, a 2.0 MGD wastewater treatment plant that serves a population of approximately 15,000 persons within its service area. The average daily flow (ADF) for this system in 2009 was .80 MGD.

Construction of a new 24-inch force main and outfall is planned for 2010-2011. The outfall will increase the discharge capacity by an initial 0.5 MGD with the potential to convey an ultimate 2.7 MGD (estimated receiving wetland capacity). The outfall will serve a dual purpose; convey reclaimed water to customers in addition to conveying unused reclaimed water to the receiving wetland. The Nassau WRF site has been sized to ultimately treat 4.0 MGD, but, according to JEA's 2009 Water Resource Master Plan, the expansion of this facility has not been funded in the next ten years.

Municipal Systems

Table SEW-2 lists the municipally-owned and operated wastewater treatment facilities which serve the incorporated areas (and in some cases unincorporated areas) in Nassau County. Service areas for each municipality are shown on Map SEW-1.

Table SEW-2 Municipal Wastewater Treatment Facilities, Nassau County

Facility	Provider	Location	capacity MGD
City of Fernandina Beach WWTP	City of Fernandina Beach	1007 S. 5th Street, Fernandina Beach	3.5
Town of Callahan WWTP	Town of Callahan	618628 Dr. Martin Luther King Jr Ave, Callahan	0.30
Town of Hilliard WWTP	Town of Hilliard	5th Street & Ruby Drive, Hilliard	0.32

Sources: City of Fernandina Beach, Town of Callahan, Town of Hilliard, Florida Dept. of Environmental Protection

City of Fernandina Beach

The City of Fernandina Beach operates a 3.5 MGD (million gallons per day) wastewater treatment plant that discharges effluent to the Amelia River. According to the City of Fernandina Beach, this plant currently serves a population of approximately 11,900 persons. The average daily flow (ADF) for this system in 2009 was 1.53 MGD.

Town of Callahan

The Town of Callahan operates a .30 MGD (million gallons per day) wastewater treatment plant. According to DEP this system currently serves a population of approximately 1,480 persons. The average daily flow (ADF) for this system in 2009 was .15 MGD.

Town of Hilliard

The Town of Hilliard operates a .32 MGD (million gallons per day) wastewater treatment plant. According to DEP, this system currently serves a population of approximately 2,920 persons. The average daily flow (ADF) for this system in 2009 was .30 MGD. The Town is planning an expansion of its wastewater treatment plant to .48 MGD by 2011.

Small Treatment Systems

According to DEP, 21 small (or "package") wastewater plants exist in the County. These facilities are listed in Table SEW-3 below. Most of treatment plants are operating at designed capacity and generally are performing satisfactorily. While inspection of these facilities by the DEP Northeast District in Jacksonville has noted performance violations at various times, these violations usually are related to maintenance procedures and can be controlled through improved management of the facility.

Table SEW-3 Licensed Small Wastewater Treatment Systems, Nassau County

Lic. #	Name	Location	Class	Capacity (MGD)
FLA011689	Amerada Hess Corp	Fernandina Beach	Industrial Wastewater	0.024
FLA011675	Amoco Service Station WWTF	Yulee	Domestic WWTP	0.0034
FLA011666	Callahan Intermediate School WWTF	Callahan	Domestic WWTP	0.0099
FLG110257	East Coast Concrete - Callahan	Callahan	Concrete Batch GP	n/a
FLG110345	Fernandina Beach Ready Mix Plant	Fernandina Beach	Concrete Batch GP	n/a
FLG912665	First Coast Energy #3046	Yulee	Petroleum Cleanup GP	n/a
FLG110163	Florida Rock - Yulee	Yulee	Concrete Batch GP	n/a
FL0032662	Goodbread Mobile Home Park WWTF	Yulee	Domestic WWTP	0.005
FLA011683	Green Acres of Yulee WWTF	Yulee	Domestic WWTP	0.012
FLA011684	Hance's First In Florida RV Park WWTF	Yulee	Domestic WWTP	0.0143
FL0116921	J.A.V.A. LLC	Yulee	Domestic WWTP	0.023
FL0001104	Jefferson Smurfit Corp-Fernandina Beach Mill	Fernandina Beach	Industrial Wastewater	37.5
FL0032654	Marsh Cove WWTF	Fernandina Beach	Domestic WWTP	0.099
FLA116807	Nassau Acres Mobile Home Park WWTF	Yulee	Domestic WWTP	0.004
FL0000701	Rayonier, Inc	Fernandina Beach	Industrial Wastewater	26.31
FLA011676	Sunshine Truck Plaza WWTF	Yulee	Domestic WWTP	0.02
FLA011690	Teakwood Mobile Home Park WWTF	Yulee	Domestic WWTP	0.0078
FLA011695	The Oasis at Amelia WWTF	Yulee	Domestic WWTP	0.006
FLA301647	White Oak Plantation - 100% Recycle	Yulee	Industrial Wastewater	n/a
FLA011678	Yulee Villas Apartments WWTF	Yulee	Domestic WWTP	0.015
FL0167258	Yulee WWTF	Yulee	Domestic WWTP	0.5

Source: Florida Dept. of Environmental Protection

Septic Tanks

Septic tanks are used throughout the County and in all municipalities, although central sewer systems exist in Callahan, Fernandina Beach, and Hilliard. The Nassau County Health Department regulates the installation of septic tanks and drainfields according to rules adopted in Chapter 64E-6 F.A.C. According to the Nassau County Health Department, approximately 51% of the population uses private septic tanks. The County's Land Development Code follows the state-mandated minimum net lot area of one-half acre for the use of private well and septic systems. The County has adopted a minimum 100-foot setback for septic tanks from the St. Mary's River.

Septic tanks may cause problems in certain areas where water tables are high due to either proximity to surface water bodies or where located in low areas or a combination of both. This results in the drainfield being located too close to the water table and a lack of adequate depth of unsaturated soil to treat the effluent. Chapter 64E-6.006 (2) F.A.C. requires that the water table elevation at the wettest season of the year is at least 24 inches below the bottom surface of the drainfield. This requirement has resulted in the mounding of many newer drainfields in order to meet the minimum separation of drainfield and high water tables. Problems occur more where septic tanks are old and drainfields have not been mounded pursuant to more recent State requirements. Areas that experience flooding are also likely to have problems with septic tanks.

II. Analysis of Need

Level of Service

Table SEW-4 summarizes the presently adopted levels of service (LOS) for all regional wastewater treatment systems in Nassau County.

Table SEW-4 LOS for Regional Wastewater Treatment Systems, Nassau County

Provider	LOS gpd per capita	pk
JEA	**85**	**1.2**
Nassau Amelia Utilities	**76.8**	**1.2**
City of Fernandina Beach	**172**	**1.2**
Town of Callahan	**122**	**2.0**
Town of Hilliard	**60**	**1.2**

Source: Nassau County 2010 Comprehensive Plan

Projected Demand

The draft 2008 WSA indicates that approximately 51 percent of total county residents will be connected to a regional water system in 2010. Projecting forward, the WSA actually forecasts a *decline* in the percentage of residents using central systems, dropping to just over 48 percent by 2030. The WSA does not predict connections to central wastewater service. However, although it is possible that a certain amount of future residents may be served by a regional water system but may continue to rely on an on-site wastewater treatment system, for planning purposes it is reasonable to assume that the majority of residents using a regional water system will also use a regional wastewater treatment system.

The projection of continued use of septic systems by half or more of the County residents through the end of the planning period should be a priority. It is in the best interest of the County, both financially and environmentally, to encourage efficient development patterns that maximize the use of regional sewer systems.

Tables SEW-5-7 on the following pages projects the population that will use a public (i.e. regional) water supply over the planning timeframe and assesses the ability of existing and planned facilities in the unincorporated areas to meet the adopted LOS, expressed in average gallons per capita per day (gpcd) . The projections for population using public water supply in Table WAT-5 are based on those found in the 2008 WSA. Table WAT-6 analyzes needs based on a moderate target of 65 percent of the total population using regional wastewater treatment systems by 2030. Table WAT-7 analyzes need based on a more aggressive target of 80 percent of the total population using regional wastewater treatment systems.

Because Nassau Amelia Utilities has a geographically limited service area on Amelia Island that is projected by NAU to build out by 2015, theses analyses only take into account the projected amount NAU would need to serve its service area at build out (appx. 1.19 MGD). It is assumed that the remaining need would be caused by development off Amelia Island and most likely located in areas served by JEA or potentially served by JEA in the future. Each analysis also

assumes that the entire projected population in incorporated areas will be using municipal wastewater treatment systems.

According to Table SEW-5, the ability of existing regional wastewater treatment systems to meet the 2008 WSA's projected demand of residents using a central wastewater treatment system in the unincorporated areas of Nassau County (including both JEA and NAU service areas) appears to be sufficient through 2030.

As mentioned previously, Nassau Amelia Utilities (NAU) projects a 2015 build-out demand of 1.19 MGD annual average daily flow (AADF), resulting in a shortfall in capacity of .24 MGD by that date. The County should update the schedule of capital improvements as needed in order to improve and expand the NAU wastewater treatment facility as necessary to meet future demands.

Unlike the analyses for potable water supply, the analyses of sanitary sewer capacity indicate that additional capacity beyond that which would be available from existing or planned regional wastewater treatment facilities to serve a percentage of the County's future population equal to or greater than the 2008 WSA projects. As with regional water systems, however, available capacity is not of itself a guarantee of a larger percentage of users for regional systems. In order for regional wastewater treatment systems to expand, it must be cost-effective for both providers and developers to build the necessary infrastructure (sewer lines, pump stations, etc.) and an adequate and environmentally sound methods of effluent disposal or reuse of wastewater must be readily available. These issues are discussed in detail below.

For the target projection of 65 percent of residents using a regional wastewater treatment system, shown in Table SEW-6, the analysis predicts a shortfall in capacity of .9 MGD. Assuming that the required improvements to NAU's facilities mentioned above are made, it is reasonable to assume that the remainder of the projected shortfall at this target level will be located in JEA's service area. This shortfall could be eliminated by the expansion of JEA's Nassau WRF from 2.0 to 4.0 MGD in the latter part of the planning period between 2020 and 2030. The Nassau WRF will have a permitted capacity of 1.865 MGD by the end of 2011 (the actual treatment capacity is 2.0 MGD).

For the target projection of 80 percent of residents using a regional wastewater treatment system, the analysis predicts a shortfall in capacity of 2.3 MGD. This may require additional capacity beyond that potentially available from JEA's Nassau WRF and would require the construction and operation of additional facilities between 2020 and 2030.

Table SEW-5 Sanitary Sewer Needs Analysis, Target: 2008 WSA Projections

	2010	2015	2020	2025	2030
Target % Total Population using regional systems	**50%**	**51%**	**51%**	**50%**	**48%**
Total Population	73,100	80,000	88,200	96,100	104,000
Unincorporated Population	56,738	62,946	70,274	77,314	84,273
Population using Municipal Systems	16,362	17,054	17,926	18,786	19,727
Target Uninc. Population using regional systems	20,188	23,746	27,056	29,264	30,193
Target %Uninc Pop. using regional systems	36%	38%	39%	38%	36%
Capacity required to meet 85 gpcd LOS (MGD)	1.7	2.0	2.3	2.5	2.6
Capacity-JEA	2.0	2.0	2.0	2.0	2.0
Capacity- Nassau Amelia*	0.95	1.19	1.19	1.19	1.19
Surplus/Deficit	**1.2**	**1.2**	**0.9**	**0.7**	**0.6**

Sources: University of Florida, Bureau of Business and Economic Research (BEBR), JEA , Nassau Amelia Utilities, SJRWMD 2008 Water Supply Assessment

Table SEW-6 Sanitary Sewer Needs Analysis, Target: 65% Total 2030 Population

	2010	2015	2020	2025	2030
Target % Total Population using regional systems	**51%**	**55%**	**60%**	**62%**	**65%**
Total Population	73,100	80,000	88,200	96,100	104,000
Unincorporated Population	56,738	62,946	70,274	77,314	84,273
Population using Municipal Systems	16,362	17,054	17,926	18,786	19,727
Target Uninc. Population using regional systems	20,919	26,946	34,994	40,796	47,873
Target %Uninc Pop. using regional systems	37%	43%	50%	53%	57%
Capacity required to meet 85 gpcd LOS (MGD)	1.8	2.3	3.0	3.5	4.1
Capacity-JEA	2.0	2.0	2.0	2.0	2.0
Capacity- Nassau Amelia*	0.95	1.19	1.19	1.19	1.19
Surplus/Deficit	**1.2**	**0.9**	**0.2**	**0.3**	**0.9**

Sources: University of Florida, Bureau of Business and Economic Research (BEBR), JEA , Nassau Amelia Utilities

Table SEW-7 Sanitary Sewer Needs Analysis, Target: 80% Total 2030 Population

	2010	2015	2020	2025	2030
Target % Total Population using regional systems	**52%**	**59%**	**65%**	**73%**	**80%**
Total Population	73,100	80,000	88,200	96,100	104,000
Unincorporated Population	56,738	62,946	70,274	77,314	84,273
Population using Municipal Systems	16,362	17,054	17,926	18,786	19,727
Target Uninc. Population using regional systems	21,650	30,146	39,404	51,367	63,473
Target %Uninc Pop. using regional systems	38%	48%	56%	66%	75%
Capacity required to meet 85 gpcd LOS (MGD)	1.8	2.6	3.3	4.4	5.4
Capacity-JEA	2.0	2.0	2.0	2.0	2.0
Capacity- Nassau Amelia*	0.95	1.19	1.19	1.19	1.19
Surplus/Deficit	**1.1**	**0.6**	**0.2**	**1.2**	**2.2**

Sources: University of Florida, Bureau of Business and Economic Research (BEBR), JEA , Nassau Amelia Utilities

Impact of Amendments to the 2030 Future Land Use Map

As part of the County's 2010 EAR-based amendments (Series 10-2ER), the proposed 2030 Future Land Use Map (FLUM) contains four (4) amendments to the 2010 FLUM. These are shown graphically in Map FL-7 and described in detail in the background data and analysis of the Future Land Use Element. Their maximum development potentials are described in detail in Table SEW-8 below:

Table SEW-8 Development Potential of Proposed Amendments (Series 10-2ER)

Amendment	Acres		Existing Development Potential	Proposed Development Potential	Net Increase or (Decrease)
1. ENCPA	22,675 ac	Residential	6,949 DU	24,000 DU	17,051 DU
		Non-Residential	0 sq. ft.	11,000,000 sq. ft.	11,000,000 sq. ft.
2. Longleaf Mitigation Bank	3,029 ac	Residential	504 DU	0 DU	(504) DU
		Non-Residential	0 sq. ft.	0 sq. ft.	0 sq. ft.
3. Martins Island	110 ac	Residential	110 DU	0 DU	(110) DU
		Non-Residential	0 sq. ft.	0 sq. ft.	0 sq. ft.
4. Liberty Development	10 ac	Residential	100 DU	20 DU	(80) DU
		Non-Residential	0 sq. ft.	0 sq. ft.	0 sq. ft.
Total	**25,824 ac**	**Residential**	**7,663 DU**	**24,020 DU**	**16,357 DU**
		Non-Residential	**0 sq. ft.**	**11,000,000 sq. ft.**	**11,000,000 sq. ft.**

Source: Nassau County Growth Management Dept.

Impact Analysis Methodology

The purpose of this analysis is to evaluate the impacts of each of the 2030 FLUM amendments on facilities and services. The purpose of this analysis is not to conduct a concurrency review, per se. Rather, it provides the County with an analysis of how the adopted level of service standards would be affected by the proposed amendments for planning purposes. Facility needs are dealt with more completely during the site plan review process that incorporates a concurrency review of each of the cited public facilities.

For the purpose of evaluating comprehensive plan amendments development is presumed to have the maximum impact. "Maximum impact assumed" is a convention used by reviewing agencies to quantify impact associated with categories of land use. For residential FLUM designations, the property acreage is multiplied by the maximum permitted density. For non-residential designations the size of the property in acres is multiplied by 43,560 with that product in turn multiplied by the maximum floor area ratio. For all designations, if a property owner voluntarily commits to a proposed number of dwelling units and/or a floor area ratio through a policy adopted in the comprehensive plan ordinance, then the proposed number of dwelling units or floor area ratio may be used in place of the maximums.

Three of the four the amendments listed in Table SEW-8 above result in density reductions that will result in relatively minor impact reduction. As a result, this impact analysis will focus on the first amendment, the proposed Multi-Use designation known as the East Nassau Community Planning Area (ENCPA).

The ENCPA maximum development program established in Future Land Use Element Policy FL.13.10 will form the basis of the analysis – 24,000 dwelling units and 11,000,000 square feet of non-residential. A five-year and long term planning horizon will be examined following the

development schedule shown in Table SEW-9 below. The first increment of development runs through 2015 with build out assumed by the long term planning horizon ending 2030.

*Table SEW-9 ENCPA Phased Development Program**

Phase 1 (Current-2015) Dev. Program by LU	Land Use Type						
	Dwelling Units		Square Feet				Rooms
	SF	MF	Shopping Ctr.	Gen. Office	Office Park	Gen Light Ind.	Resort Hotel
Regional Center				40,000			
Regional Center-TOD							
Employment Center					225,000	525,000	
Village Center							
Village Center-TOD							
Resort Development							400
Neighborhood Center			20,000				
Res. Neighborhood	1,200						
TOTALS	***1,200***	***0***	***20,000***	***40,000***	***225,000***	***525,000***	***400***

Phase 2-Buildout (2016-2030) Dev. Program by LU	Land Use Type						
	Dwelling Units		Square Feet				Rooms
	SF	MF	Shopping Ctr.	Gen. Office	Office Park	Gen Light Ind.	Resort Hotel
Regional Center		5,696	1,200,000	180,000	225,000	200,000	
Regional Center-TOD		1,460		80,000	75,000		
Employment Center		1,077			2,352,000	4,788,000	
Village Center	438	1,753	650,000				
Village Center-TOD			150,000				
Resort Development	1,513	1,512	50,000				
Neighborhood Center			140,000				
Res. Neighborhood	8,868						
TOTALS	***10,819***	***11,981***	***2,190,000***	***260,000***	***2,352,000***	***4,988,000***	***0***

Overall ENCPA (at Buildout) Dev. Program by LU	Land Use Type						
	Dwelling Units		Square Feet				Rooms
	SF	MF	Shopping Ctr.	Gen. Office	Office Park	Gen Light Ind.	Resort Hotel
Regional Center		5,696	1,200,000	220,000	225,000	200,000	
Regional Center-TOD		1,460		80,000	75,000		
Employment Center		1,077			2,277,000	5,313,000	
Village Center	438	1,753	650,000				
Village Center-TOD			150,000				
Resort Development	1,513	1,512	50,000				400
Neighborhood Center			160,000				
Res. Neighborhood	10,058						
TOTALS	***12,019***	***11,981***	***2,210,000***	***300,000***	***2,577,000***	***5,513,000***	***400***

**The quantities indicated by land use category in this table are estimates for the purpose of quantifying public facility elements. Final units and square footage shall be subject to the DRI requirement for the ENCPA and shall not exceed 24,000 residential units and 11,000,000 square feet of nonresidential. It has been assumed that the Resort Hotel will consist of 400,000 sq. ft. Source: VHB MillerSellen*

ENCPA lies within the JEA service area. The adopted residential levels of service for the JEA service area is 85 gallons per capita per day for sanitary sewer. The projected household size is 2.32 PPH (Tables FL-2 and FL-3, 2030 Comprehensive Plan). The number of dwelling units included in the five-year and 2030 planning horizons are multiplied by 2.32 PPH to determine the population to be served. This population projection is, in turn, multiplied by the appropriate level of service standard. For non-residential development standard generation factors will be employed absent specific information on end users. The maximum development measured in square feet is multiplied by 0.08 gallon per square foot per day for wastewater generation. The net increase or decrease is a measure of the 2010 FLUM compared to the [proposed] 2030 FLUM classification.

Analysis of Impact on Demand

Table SEW-10 ENCPA Sanitary Sewer Demand, 2015

Land use	Units	PPH	Demand Factor	Daily Demand
Residential	1,200 du	2.32	85 GPCD	236,640
Non-Residential	810,000 sf	n/a	.08 GPSFD	64,800
Hotel	400 rm	n/a	150 GPRD	60,000
Sub-Total				361,440
Existing Demand	6,949 du	2.32	85 GPCD	(1,370,343)
Net Decrease in Demand				(1,008,903)

Source: Nassau County Growth Management Dept.

du = dwelling units *sf = square feet*
rm = rooms (units) *GPCD = gallons per capita per day*
GPSFD = gallons per sq. ft. per day *GRPD = gallons per room per day*

Phase 1 of the ENCPA development program represents a net decrease of slightly more than 1MGD in sanitary sewer demand when compared to the existing FLUM designations. Because the East Nassau Community Planning District requires connection to the JEA central sanitary sewer collection and treatment system (Policy FL.13.16) a 2015 sanitary sewer analysis will be performed. ENCPA is located within JEA's Nassau Lofton Oaks service area. JEA's Yulee Water Reclamation Facility (WRF) capacity of 2.0 MGD (see Table SEW-1). The 2009 Average Daily Flow within the JEA Nassau system is .897 MGD. The 2009 Annual Water Resource Master Plan published by JEA projected a background flow of 1.454 MGD in 2015 (Table 3, page 244). The existing 2.0 MGD capacity can handle the projected background flow plus the Phase 1 ENCP (1.454 + .361 = 1.815 MGD).

Table SEW-11 ENCPA Cumulative Sanitary Sewer Demand, 2030

Land use	Units	PPH	Demand Factor	Daily Demand
Residential	24,000 du	2.32	85 GPCD	4,732,800
Non-Residential	10,600,000 sf	n/a	.08 GPSFD	848,000
Hotel	400 rm	n/a	150 GPRD	60,000
Cumulative Build-Out Demand				5,640,800
Existing Demand	6,949 du	2.32	85 GPCD	(1,370,343)
Net Cumulative Increase				4,270,457

Source: Nassau County Growth Management Dept.

The 2009 Annual Water Resource Master Plan projects a 2018 Nassau WRF flow of 1.6 MGD. Extrapolating this straight line growth of .05 MGD to 2030 yields a background flow of 2.2 MGD. The projected background flow plus ENCPA at build out will generate 6.47 MGD.

Table SEW-12 2030 Demand Analysis with ENCPA, JEA Yulee WRF

JEA 2018 Flow Projection	1.60 MGD
2030 Extrapolated Flow Projection	2.20 MGD
ENCPA Incremental Increase	4.27 MGD
Total Nassau Service Area Demand	6.47 MGD
Existing Yulee WRF capacity	2.00 MGD
Planned Yulee WRF expansion	2.00 MGD
Surplus / (Deficit)	(2.47) MGD

Source: Nassau County Growth Management Dept.

The existing 2.0 MGD Yulee WRF is sized to accommodate a 2.0 MGD expansion. A further 2.47 MGD expansion will be necessary to accommodate ENCPA.

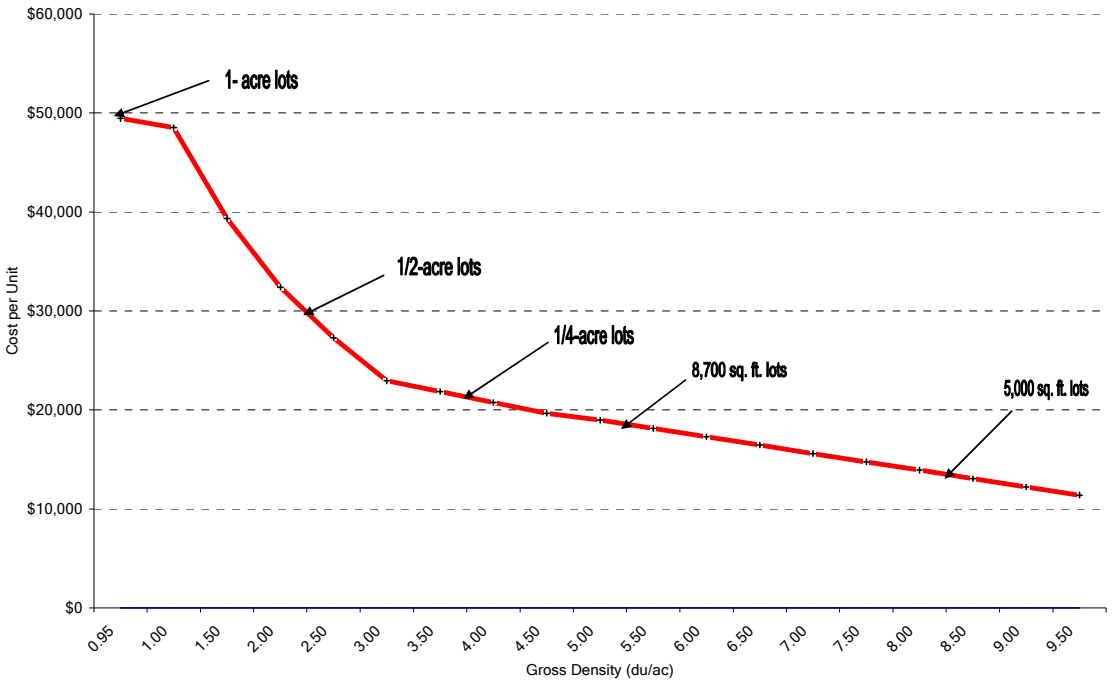
Encouraging Efficient Development Patterns

In 2007, the Florida- based consulting firm WilsonMiller prepared a study of the relationship of land use density to the costs of providing central water and wastewater systems (see Appendix E). Using assumptions and cost estimates prepared by engineers based on several actual Florida communities, the study determined an average cost for water and wastewater infrastructure for single and multi-family residential communities (including associated non-residential uses) in a range of densities from .95 to 9.5 dwelling units per gross acre.

As shown in Figure SEW-1 below, the study determined that there is a substantial savings in the cost of infrastructure as density increased. There is an especially steep decline in costs per unit between one and three units per gross acre, dropping from over $49,000 per unit to less than $23,000. This represents a savings of over 53 percent on the cost of water and wastewater infrastructure. Figure SEW-1 includes notations to demonstrate where certain types of residential development typically fall along the cost curve.

In order to promote more efficient development patterns, The County should adopt strategies that encourage compact, higher density and/or intensity development in areas that are either currently served by central water and/or sewer systems or are planned to be served in the short term (i.e. 3-5 years). Strategies the County should consider include the establishment of minimum densities that make connection to central water supplies economically feasible; policies requiring connection at density thresholds; and establishment of a minimum lot area for the use of private wells.

Figure WAT-1 Residential Density v. Cost for Central Water & Wastewater (2007 dollars)



Source: WilsonMiller, 2007

The County should consider incentives to provide for the expansion of centralized services to areas of urban or suburban level densities, where it may alleviate existing or potential problems caused by malfunctioning septic systems, including areas where there is the potential for health problems from contaminated private wells.

The County should also consider policies to provide incentives to the private sector to construct treatment and distribution facilities. Such incentives may include contributions in aid to construction, community development districts, municipal services benefit districts and impact fee credits.

The Urban Development Area (UDA), as defined in the Future Land Use Element, is that portion of Nassau County which is located within the existing JEA water and sewer service area, Because of the current and future availability of urban services, including regional sanitary sewer systems, the UDA is the area that should experience the greatest amount of population growth and urban-level development in the unincorporated area through the 2010-2030 planning period. As a result, this is where higher densities, mixed use development and employment centers should be encouraged.

In order to promote more efficient development patterns, all urban-level development within the UDA should be served by central water and wastewater service in order to discourage urban sprawl; maximize existing and planned infrastructure; preserve environmental resources; and create a greater diversity of housing types and prices.

Due to the relatively high densities permitted by the FLUM in rural areas outside any established service area for central water and sewer, the common planning strategy of prohibiting the

extension of water lines beyond established service boundaries to prevent urban sprawl will not be effective in Nassau County. This strategy will simply encourage and expand the extent of unplanned, low density residential development served by septic systems which can not be cost-effectively retrofitted for central sewer service.

Conservation of Water Resources

In order to ensure a healthy economy and quality of life for its residents the County needs to treat its wastewater in methods that will protect and conserve its water resources in order to meet the future needs of the County's population and the needs of the environment, agriculture, and industry.

The County should coordinate with the SJRWMD to adopt policies that will promote public education about water conservation; promote the reuse of treated effluent for irrigation purposes; promote the use of low-impact development techniques; and provide more specific well head protection standards.

It should be noted that objectives and policies in this Sub-element related to water resource conservation will, in some cases, overlap those of the Potable Water and Natural Groundwater Recharge Sub-elements, the Conservation Element and the Future Land Use Element that seek to protect surface waters, wetlands and groundwater sources.

Solid Waste Disposal Sub-Element

I. Existing Conditions

Background

Waste collection is a very important aspect of Nassau County's service to its citizens. Proper and timely collection and disposal of waste assures protection of the general public's health, safety, and welfare.

In order to provide suitable service, the County utilizes intergovernmental and public-private partnerships. The County depends upon private companies to collect and transport waste products throughout the county for disposal. In September 2009, the County closed its only Class I landfill (the West Nassau Landfill, located north of the Town of Callahan) and signed an interlocal agreement with Camden County, Georgia to transport Nassau County's solid waste to Camden County's landfill for disposal. An agreement was also signed with Waste Management, Inc., to allow the county to dispose of its waste at its Chesser Island Road facility in Charlton County, Georgia.

Existing Regulatory Framework

Federal

The *Resource Conservation and Recovery Act* (RCRA) was adopted by Congress in 1976 and serves as the Federal legislation which regulates the disposal of municipal solid waste by setting minimum standards for waste disposal facilities. It also established resource recovery as a national priority and mandated that efforts to better utilize and manage the recycling of wastes were needed.

State

Chapter 403, Part IV, Florida Statutes, known as the 1988 Solid Waste Management Act, greatly altered the management of solid waste for local governments within the state. The act required local governments to start recycling programs in order to reduce the amount of waste being deposited into landfills by thirty percent (30%). The act also addresses the disposal of various other wastes such as lead-acid batteries, used oil, and tires. House Bill [HB] 851 passed by the 2002 Florida Legislature and signed by the Governor on May 30, 2002 modifies the solid waste management goals found in Section 403.706, Florida Statutes. Recycling programs shall be designed to recover a significant portion of at least four of the following materials from the waste stream prior to final disposal; newspaper, aluminum cans, steel cans, glass, plastic bottles, cardboard, office paper, and yard trash.

Chapter 62-701, Florida Administrative Code, outlines specific state requirements regarding the operation and closure of landfills, solid waste permits, and the handling of special wastes. This rule also regulates the disposal and classification of waste, and prohibits the disposal of yard wastes in landfills with liners.

The Florida Department of Environmental Protection (DEP), Division of Waste Management works to implement state and federal laws to protect the environment from the improper handling and disposal of solid and hazardous wastes. This includes regulatory programs for waste facilities and pollutant storage systems, and non-regulatory activities such as financial and technical assistance for recycling and waste reduction. The Division also oversees and contracts for the cleanup of sites contaminated with petroleum products, dry-cleaning solvents, or other hazardous wastes. There are three bureaus within the Division of Waste Management – the Bureau of Petroleum Storage Systems, the Bureau of Solid and Hazardous Waste and the Bureau of Waste Cleanup.

Local

Nassau County has adopted local regulations which govern solid waste in order to be consistent with these state, federal, and regional guidelines. Chapter 30 ½ of the County's Code of Ordinances regulates the operation of the landfill and service collectors within the county, implementing the programs required by the Federal and State governments, as well as the comprehensive plan.

Municipal Solid Waste (MSW) Disposal

Municipal solid waste (MSW) collection in Nassau County is franchised out to several different providers. Refuse collection is also franchised out in the municipalities. The majority of the MSW generated in Nassau was previously disposed of in the County's West Nassau Class I Landfill, located north of Callahan. However, as of September 30, 2009, Nassau County ceased to accept waste at the West Nassau Class I Landfill.

An interlocal agreement was signed with Camden County, Georgia on September 15, 2009 to transport Class I non-hazardous waste to the Camden County Landfill Solid Waste Disposal Facility in amounts up to 450 tons per day. Although Nassau County will use Camden County's facility as its primary disposal method for solid waste, the County also signed an agreement with Waste Management, Inc. on October 14, 2009, to allow the County to dispose of its solid waste at its Chesser Island Road landfill, located in Charlton County, Georgia. Each agreement is effective for ten (10) years, with the ability to renew each for another five years.

The County also monitors and maintains two previously closed landfills at Lofton Creek and Bryceville.

During the 12 month period ending in May 2008 the County reported 53,397 tons had been disposed of in the West Nassau Class I Landfill (Note: this amount includes waste from the municipalities). This amount is equivalent to approximately 146 tons per day, or 4.11 pounds per capita per day, based on the estimated 2008 population of 71,256 persons.

Recycling

Thanks to public awareness and participation in a variety of areas, the amount of solid waste generated in Nassau County going into landfills is constantly being reduced.

The County currently maintains eight (8) recycling collection sites throughout the County. Each site has two closed top recycle bins. The bins are divided into five (5) compartments for clear, brown and green glass, newspaper, and aluminum.

Although the West Nassau Landfill will cease accepting Class I solid waste after September 30, 2009, a new Convenience Recycling Center will be located at the entrance of the landfill. This center will be in operation on October 1, 2009. The Center will accept residential waste generated by Nassau County residents only. The Convenience Center will accept: glass, office paper, newspapers, batteries, scrap metals, and aluminum cans for recycling.

Yard waste can be recycled at the privately-operated Sandhill Recycle Center located on C R 108 in the Yulee Area.

According to information from DEP's Division of Waste Management, 14 percent of the total solid waste collected in Nassau County was recycled during the 12 month period ending December 2007. A breakdown of recycled materials in the County for this time period is shown in Table SOL-1.

Table SOL- 1 Recycled Materials, Nassau County, 2007

Material	tons collected	tons recycled	% recycled
Newspaper	1677	1040	62%
Glass	2171	65	3%
Aluminum Cans	395	47	12%
Plastic Bottles	1184	0	0%
Steel Cans	691	0	0%
Cardboard	5624	1462	26%
Office Paper	1085	119	11%
Yard Trash	5920	1243	21%
Const./Demo. Debris	57259	5726	10%
White Goods	1767	0	0%
Tires	0	0	0%
Process Fuel	0	0	0%
Other Wastes	36904	6643	18%

Source: DEP, Div. of Waste Management

State-wide, Florida generates more than 32 million tons of municipal solid waste annually, almost two tons per resident per year. Although the Solid Waste Management Act passed a 30percent recycling goal more than two decades ago, Florida collectively recycles only 28 percent of its solid waste.

The Energy, Climate Change and Economic Security Act of 2008 established an aggressive recycling goal of 75 percent, the highest of any state. The Act directed DEP to submit a comprehensive program to achieve it. DEP released its report to the Florida Legislature in January, 2010.

The report is based on broad research and contributions of more than 500 stakeholders who participated in four public workshops and ideas were submitted through E-mails and DEP's Web forum. It explores ways to increase the percent of material recycled in an economically responsible way through heightened public awareness, state leadership, development and expansion of recycling markets as well as increased investments throughout the local government and commercial sectors.

The report outlines initial steps low in financial impact but high in recycling value in order to make the report practical in today's economic climate. Some of the key recommendations in the report include:

- Require state agencies to meet the 75% goal.
- Require commercial recycling in large counties and cities to include multi-family residential units such as apartments and condominiums, as well as institutional facilities such as schools and hospitals.

- Direct school districts to implement recycling programs.
- Create a Recycling Grants or Revolving Loan program to help local governments reach a 75% recycling goal in their jurisdictions.
- Require construction and demolition debris (C&D) disposal facilities to be modified to incorporate a Materials Recovery Facility (MRF), a specialized plant that receives, separates and prepares recyclable materials for marketing to end-user manufacturers.
- Create a recycling business assistance center to promote markets for the entire spectrum of recyclable municipal solid waste materials, organic and inorganic.

The Legislature will consider these recommendations during the 2010 legislative session. The County should consider adoption of some of these recommended strategies to boost the amount of recycled waste within the County and should support the creation of state funding program to help local governments reach higher recycling goal in their jurisdictions.

Hazardous Waste

Hazardous waste (HW) is solid waste, or a combination of solid wastes, which, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or may pose a substantial present or potential hazard to human health or the environment when improperly transported, disposed of, stored, treated or otherwise managed.

HW exhibits one or more characteristics of ignitability, corrosivity, reactivity or toxicity which make it dangerous. Paint products, pool chemicals, household cleaners and pesticides are typical examples. HW cannot be disposed on or in the ground, or in local landfills, septic tanks, or injection wells. When disposed of in the municipal solid waste stream or otherwise improperly managed, these materials have the potential of contaminating the groundwater – and the County's potable water supply.

A hazardous waste determination must be made of any waste material generated. If the material is hazardous, then it must be recycled, treated, stored, or disposed at a treatment, storage and disposal (TSD) facility authorized by DEP, EPA or another state. As of November 2009, there are no TSD facilities identified within Nassau County.

Florida's hazardous waste regulations for transporters and transfer facilities are more stringent than the federal regulations. DEP's Hazardous Waste Regulation Section (HWRS) reviews and issues permits and coordinates compliance monitoring and enforcement activities at hazardous waste generators, transporters and Treatment, Storage and Disposal (TSD) facilities. Large Quantity Generators (LQGs) and Small Quantity Generators (SQGs) are required to obtain an EPA identification number and to label all hazardous waste containers. In addition, the waste must be stored properly onsite and in limited quantities until shipped off site. The shipper must ensure that the materials are shipped properly to the disposal and storage sites. Also, regardless of quantity, the generator of HW is ultimately responsible for the waste from "cradle to grave", and can be held liable for improper management of HW even though it may have been sent to an authorized HW management facility using a licensed transporter authorized by DEP.

Large Quantity Generators (LQGs) generate 1000 kilograms or more of HW per month or 1 kilogram or more of acute HW (such as some pesticides, toxins or arsenic and cyanide compounds) per month. As of November 2009, there are no LQGs identified within Nassau County.

Small Quantity Generators (SQGs) generate 100 - 1000 kilograms of HW per month. As of November 2009, DEP has identified 44 SQGs of hazardous waste. They are listed in Table SOL-2.

The government does not regulate hazardous wastes generated in the home. In Florida, household hazardous waste collection centers have been established in most communities.

The Florida Legislature initiated the Hazardous Waste Collection Center Grant Program to encourage the establishment of a statewide network of local hazardous waste collection centers. These facilities are intended to provide free collections of non-regulated hazardous waste from households and to provide short-term storage of potentially hazardous waste generated by small businesses. Also, the public awareness component of a collection not only helps citizens to better understand and manage their household hazardous waste, but may help them to learn to reduce the volume they generate.

Table SOL-2 Small Quantity Generators (SQGs) of Hazardous Waste, Nassau County 2009

EPA ID	Name	Address
FLD039384698	B & C Tire & Battery Inc	South 8th St Fernandina Beach, FL 32097
FLD984215483	BP Oil Co #24550	200 N Kings Rd US Hwy 1 & Rte. 23 Hilliard, FL 29465
FLR000089193	CSX Transportation Inc	404 Gum St. Fernandina Beach, FL 32034
FL0000871848	Davis Automotive	801 N Kings Rd Callahan, FL 32011
FLD984179333	Flash Foods #101	2809 Atlantic Ave Fernandina Beach, FL 32034
FLD984179911	Flash Foods #104	Int A1A Hwy & Interstate 95 Yulee, FL 31502
FLD984179432	Flash Foods #106	Int US Hwy 17 & A1A Yulee, FL 31502
FLD984179358	Flash Foods #138	925 A S 14th St Fernandina Beach, FL 31502
FLD984179440	Flash Foods #142	US-1 & 2nd Street Hilliard, FL 32046
FLD984179457	Flash Foods #143	2020 Sadler Rd Fernandina Beach, FL 32034
FLD984179861	Flash Foods #97	Hwy A1A W Fernandina Beach, FL 31502
FL0000228882	GMB Productions Inc	Henry Smith Rd & Cr 115 Hilliard, FL 32046
FLD981858046	H & H Tire & Service Center Inc	925 S 8th St Fernandina Beach, FL 32034
FLR000085704	Hess Corporation #09233	185 SR 200 (A1A) Fernandina Beach, FL 32034
FLR000128314	Home Depot #6921	463785 State Rd 200 Yulee, FL 32097
FLD984229161	Home Of Guy S Register	1591 Harts Rd E Yulee, FL 32097
FLD984193623	Huntley Jiffy Food Stores #158	Rt 2 Box 250 J Us A1A Fernandina Beach, FL 32067
FLD984193300	Huntley Jiffy Food Stores #187	Rt 1 Box 107 Fernandina Beach, FL 32067
FLD984193615	Huntley Jiffy Food Stores #262	3331 S Fletcher Ave Fernandina Beach, FL 32034
FLD984193318	Huntley Jiffy Food Stores #284	Rt 1 Box 207 C Nassau Villa Fernandina Beach, FL 32067
FLD984191734	Huntley Jiffy Food Stores #41	US 1 & 5th St S Rt 3 Box 820 Callahan, FL 32067
FLD984191726	Huntley Jiffy Food Stores #56	Lem Turner Rd & Jonas Rd Callahan, FL 32067
FLD984193268	Huntley Jiffy Food Stores #7077	A1A & US 1 Callahan, FL 32011
FLD984193292	Huntley Jiffy Food Stores #88	541549 US Highway 1 Hilliard, FL 32046
FLD984193284	Huntley Jiffy Food Stores #95	1202 S US Highway 17 Yulee, FL 32097
FLD981857980	Hurseys Transmission Service	A1A & US 17 Yulee, FL 32097
FLR000010181	Island Custom Cabinets	2160#C Sadler Rd Fernandina, FL 32034
FLD981931389	Johnny Auto Electric	Rt 4 Box 80b Hwy A1A Fernandina Beach, FL 32034
FLD981932593	Johnsons Auto Electric	Us Hwy 1 South Hilliard, FL 32046
FLR000152025	Kmart #7613	1525 Sadler Rd Fernandina Beach, FL 32034
FLD984199323	Lil Champ #1262	2504 N Kings Road Hilliard, FL 32046
FLD984199307	Lil Champ Food Stores Inc	US-17, 2 miles South of Yulee Yulee, FL 32097
FLD984257808	Nassau County Landfill	US Hwy 1 N Callahan, FL 32011
FLD984249920	OB Cannon & Son Inc	N 8th St (B) Fernandina Beach, FL 32034
FLD982116279	Paul Lewis Tire Co	317 South Kings Callahan, FL 32011
FLD981860190	Quality Auto Service	PO Box 806 Yulee, FL 32041
FLD004056255	Rayonier Performance Fibers LLC	10 Gum St Fernandina Beach, FL 32034
FLR000151019	Ron Anderson Chevrolet Pontiac Buick GMC	464054 State Road 200 Yulee, FL 32097
FLD984234831	Southeast Express Inc	Sr A1A & Waas Rd Fernandina Beach, FL 32034
FLR000107185	Stevenson Collision Center Inc	85049 Commercial Park Dr Yulee, FL 32097
FLD982174245	Stone Container Corp	Highway 17 Yulee, FL 32097
FLD982173155	Thrift Automotive	Route 4 Box 85a Fernandina Beach, FL 32034
FLR000074336	Wal-Mart #977	1385 Amelia Plaza Fernandina Beach, FL 32034
FLR000129122	Wal-Mart Supercenter #5037	464016 St Rd 200 Yulee, FL 32097

Source: DEP, Hazardous Waste Regulation Section

II. Analysis of Need

Level of Service

Table SOL-3 summarizes the presently adopted levels of service (LOS) for per capita solid waste landfill disposal in unincorporated Nassau County, expressed in pounds per day, tons per year, and the estimated fill rate in cubic yards per year. For calculating the fill rate, a ton of solid waste (2,000 lbs.) is estimated to have a volume of approximately 1.55 cubic yards.

Table SOL- 3 LOS for Solid Waste Landfill Disposal, Nassau County

Measure	LOS
Lbs. per capita/day	**4.91 lbs.**
Tons per capita/year	**.90 ton**
Fill Rate per capita/year (cubic yards)	**1.4 cy**

Projected Demand

Table SOL- 4 projects the landfill need to serve the population of the unincorporated area over the planning timeframe.

Nassau County shall, in accordance with an interlocal agreement was signed with Camden County, Georgia on September 15, 2009, transport its Class I non-hazardous waste to the Camden County Landfill Solid Waste Disposal Facility in amounts up to 450 tons per day. This agreement is effective for ten (10) years, with the ability to renew each for another five years. It is projected that the county will produce between 137 and 169 tons per day of solid waste requiring landfilling in the next 10 years, leaving a significant surplus of capacity according to the agreement with Camden County. The County also signed an agreement with Waste Management, Inc., to allow the County to dispose of solid waste at its Chesser Island Road landfill, located in Charlton County, Georgia. This agreement is also effective for 10 years, with the ability to renew for another five years.

Based on this analysis, the County will be able to meet the expected demand for solid waste landfill disposal for the population in the unincorporated areas until September, 2019. If the agreements with Camden County and/or Waste Management, Inc. are renewed for a combined capacity of at least 207 tons per day, the County should be able to meet its needs through 2024.

It is essential that this analysis and the policies contained in this sub-element be reviewed on a regular basis, especially when these interlocal agreements are renewed, amended or terminated, in order to ensure that the County can properly address the need for solid waste disposal in the unincorporated areas throughout the planning period.

Table SOL-4 Solid Waste Landfill Disposal Need, Nassau County 2010-2030

year	pop est.	lbs/day	tons/day	tons/year	cubic yd/yr
2010	56,738	278,584	139	50,842	78,804
2011	58,258	286,047	143	52,204	80,915
2012	59,778	293,510	147	53,566	83,027
2013	61,298	300,973	150	54,928	85,138
2014	62,818	308,436	154	56,290	87,249
2015	62,946	309,065	155	56,404	87,427
2016	64,366	316,037	158	57,677	89,399
2017	65,786	323,009	162	58,949	91,371
2018	67,206	329,981	165	60,222	93,344
2019	68,626	336,954	168	61,494	95,316
2020	70,274	345,045	173	62,971	97,605
2021	71,634	351,723	176	64,189	99,494
2022	72,994	358,401	179	65,408	101,383
2023	74,354	365,078	183	66,627	103,271
2024	75,714	371,756	186	67,845	105,160
2025	77,314	379,612	190	69,279	107,383
2026	78,614	385,995	193	70,444	109,188
2027	79,914	392,378	196	71,609	110,994
2028	81,214	398,761	199	72,774	112,799
2029	82,514	405,144	203	73,939	114,605
2030	84,273	413,780	207	75,515	117,048

Sources: Nassau County Growth Management Dept.; Nassau County Solid Waste Dept.

Impact of Amendments to the 2030 Future Land Use Map

As part of the County's 2010 EAR-based amendments (Series 10-2ER), the proposed 2030 Future Land Use Map (FLUM) contains four (4) amendments to the 2010 FLUM. These are shown graphically in Map FL-7 and described in detail in the background data and analysis of the Future Land Use Element. Their maximum development potentials are described in detail in Table SOL-5 below:

Table SOL-5 Development Potential of Proposed Amendments (Series 10-2ER)

Amendment	Acres		Existing Development Potential	Proposed Development Potential	Net Increase or (Decrease)
1. ENCPA	22,675 ac	Residential	6,949 DU	24,000 DU	17,051 DU
		Non-Residential	0 sq. ft.	11,000,000 sq. ft.	11,000,000 sq. ft.
2. Longleaf Mitigation Bank	3,029 ac	Residential	504 DU	0 DU	(504) DU
		Non-Residential	0 sq. ft.	0 sq. ft.	0 sq. ft.
3. Martins Island	110 ac	Residential	110 DU	0 DU	(110) DU
		Non-Residential	0 sq. ft.	0 sq. ft.	0 sq. ft.
4. Liberty Development	10 ac	Residential	100 DU	20 DU	(80) DU
		Non-Residential	0 sq. ft.	0 sq. ft.	0 sq. ft.
Total	**25,824 ac**	**Residential**	**7,663 DU**	**24,020 DU**	**16,357 DU**
		Non-Residential	**0 sq. ft.**	**11,000,000 sq. ft.**	**11,000,000 sq. ft.**

Source: Nassau County Growth Management Dept.

Impact Analysis Methodology

The purpose of this analysis is to evaluate the impacts of each of the 2030 FLUM amendments on facilities and services. The purpose of this analysis is not to conduct a concurrency review, per se. Rather, it provides the County with an analysis of how the adopted level of service standards would be affected by the proposed amendments for planning purposes. Facility needs are dealt with more completely during the site plan review process that incorporates a concurrency review of each of the cited public facilities.

For the purpose of evaluating comprehensive plan amendments development is presumed to have the maximum impact. "Maximum impact assumed" is a convention used by reviewing agencies to quantify impact associated with categories of land use. For residential FLUM designations, the property acreage is multiplied by the maximum permitted density. For non-residential designations the size of the property in acres is multiplied by 43,560 with that product in turn multiplied by the maximum floor area ratio. For all designations, if a property owner voluntarily commits to a proposed number of dwelling units and/or a floor area ratio through a policy adopted in the comprehensive plan ordinance, then the proposed number of dwelling units or floor area ratio may be used in place of the maximums.

Three of the four the amendments listed in Table SOL-5 above result in density reductions that will result in relatively minor impact reduction. As a result, this impact analysis will focus on the first amendment, the proposed Multi-Use designation known as the East Nassau Community Planning Area (ENCPA).

The ENCPA maximum development program established in Future Land Use Element Policy FL.13.10 will form the basis of the analysis – 24,000 dwelling units and 11,000,000 square feet of

non-residential. A five-year and long term planning horizon will be examined following the development schedule shown in Table SOL-6 below:. The first increment of development runs through 2015 with build out assumed by the long term planning horizon ending 2030.

*Table SOL-6 ENCPA Phased Development Program**

Phase I (Current-2015) Dev. Program by LU	Land Use Type						
	Dwelling Units		Square Feet				Rooms
	SF	MF	Shopping Ctr.	Gen. Office	Office Park	Gen Light Ind.	Resort Hotel
Regional Center				40,000			
Regional Center-TOD							
Employment Center					225,000	525,000	
Village Center							
Village Center-TOD							
Resort Development							400
Neighborhood Center			20,000				
Res. Neighborhood	1,200						
TOTALS	***1,200***	***0***	***20,000***	***40,000***	***225,000***	***525,000***	***400***

Phase 2-Buildout (2016-2030) Dev. Program by LU	Land Use Type						
	Dwelling Units		Square Feet				Rooms
	SF	MF	Shopping Ctr.	Gen. Office	Office Park	Gen Light Ind.	Resort Hotel
Regional Center		5,696	1,200,000	180,000	225,000	200,000	
Regional Center-TOD		1,460		80,000	75,000		
Employment Center		1,077			2,352,000	4,788,000	
Village Center	438	1,753	650,000				
Village Center-TOD			150,000				
Resort Development	1,513	1,512	50,000				
Neighborhood Center			140,000				
Res. Neighborhood	8,868						
TOTALS	***10,819***	***11,981***	***2,190,000***	***260,000***	***2,352,000***	***4,988,000***	***0***

Overall ENCPA (at Buildout) Dev. Program by LU	Land Use Type						
	Dwelling Units		Square Feet				Rooms
	SF	MF	Shopping Ctr.	Gen. Office	Office Park	Gen Light Ind.	Resort Hotel
Regional Center		5,696	1,200,000	220,000	225,000	200,000	
Regional Center-TOD		1,460		80,000	75,000		
Employment Center		1,077			2,277,000	5,313,000	
Village Center	438	1,753	650,000				
Village Center-TOD			150,000				
Resort Development	1,513	1,512	50,000				400
Neighborhood Center			160,000				
Res. Neighborhood	10,058						
TOTALS	***12,019***	***11,981***	***2,210,000***	***300,000***	***2,577,000***	***5,513,000***	***400***

**The quantities indicated by land use category in this table are estimates for the purpose of quantifying public facility elements. Final units and square footage shall be subject to the DRI requirement for the ENCPA and shall not exceed 24,000 residential units and 11,000,000 square feet of nonresidential. It has been assumed that the Resort Hotel will consist of 400,000 sq. ft. Source: VHB MillerSellen*

The adopted LOS standard for solid waste is 4.91 lbs. per capita per day (Policy SOL.01.01, 2030 Comprehensive Plan). The population projection methodology is the same as paragraphs B and C, above. For general planning purposes, the solid waste generation rate for industrial uses is 2 lbs per 100 square feet per day; for office/business park uses 1 lb. per 100 square feet per day; for retail uses 5.5 lbs. per 100 square feet per day; and for lodging 2.5 lbs per unit per day.

Analysis of Impact on Demand

Table SOL-7 ENCPA Solid Waste Generation, 2015

Description	Lbs. per Day	Tons per Year
ENCPA, residential, 1,200 du	5,892	1080.0
ENCPA, office 265,000 sf	2,650	483.6
ENCPA, industrial 525,000 sf	10,500	1,916.0
ENCPA, retail 20,000 sf	1,100	200.8
ENCPA, resort hotel 400 rms	1,000	182.5
ENCPA, Phase I Total	21,142	3,862.9
Existing FLUM, 6,949 du	34,120	6254.1
Reduction in Solid Waste Generation	(12,978)	(2,391.2)

Source: Nassau County Growth Management Dept.

The data set forth in Table FL-32 indicates that there will be a net reduction in solid waste generation for the East Nassau Community Planning Area amendment through 2015. Solid waste will be collected by private haulers and disposed of in the Camden County, Georgia or Chesser Island Landfill pursuant to the existing interlocal agreements discussed in detail in the Solid Waste section of the Public Facilities Element.

Table SOL-8 ENCPA Solid Waste Generation, 2030

Description	Lbs. per Day	Tons per Year
ENCPA, residential, 24,000 du	117,840	21,600
ENCPA, office 2,877,000 sf	28,770	5,251
ENCPA, industrial 5,513,000 sf	110,260	20,122
ENCPA, retail 2,210,000 sf	121,550	22,183
ENCPA, resort hotel 400 rms	1,000	182.5
ENCPA, Total	379,420	69,244
Existing FLUM, 6,949 du	34,120	6254.1
Increase in Solid Waste Generation	345,300	62,990

Source: Nassau County Growth Management Dept.

The Camden County site will accept up to 450 tons per day (164,250 tons per year). Camden alone can accommodate the projected 2030 population and ENCPA. Alternative solid waste disposal capacity is available at the Chesser Island Road Landfill in Charlton County, Georgia. The minimum densities of the ENCPA and mandatory utility connection (and billing) make it well suited for curbside recycling.

Stormwater Management Sub-Element

I. Existing Conditions

Background

Stormwater management is the planned control of surface water runoff resulting from rainfall in order to prevent flooding and pollution. All development creates an impact to overland flow of rain water, and this sub-element provides direction for ensuring that development impacts are mitigated by stormwater management facilities. It establishes policy directions for minimizing the flooding of lands and the degradation of water quality caused by storm events to ensure that the county's potable water is drinkable and that recreational water is suitable for swimming and fishing.

Based on hydrological data from the St. John's River Water Management District (SJRWMD), Nassau County is divided into two major drainage basins, the Nassau River and the St. Marys River, which are each divided into several drainage sub- basins. Each sub-basin represents a geographic area which is developed around a central drainage feature such as a stream or lake (see Map STM-1).

In general, stormwater runoff in Nassau County is rapid. Past studies by the United States Geological Survey (USGS) found that the amount of runoff flowing into the St. Marys and Nassau River basins was often over 50 percent greater than the average for the state as a whole. This high yield of runoff is attributed to the fact that very little of the rain seeps to the Floridan aquifer, and the rain that does not enter the shallow surficial aquifer runs off before much of it has time to evaporate or transpire through vegetation.

The County's drainage system consists of the integration of natural drainage features (creeks, streams, topography) with man-made swales that channel runoff into these natural drainage features to enhance flow and reduce or eliminate flooding. The natural drainage features in Nassau County consist of many short tributaries which flow into the three major streams: the St. Marys River, which drains approximately 48 percent of the County, the Nassau River, which drains approximately 38 percent of the County, and the Intracoastal Waterway(i.e. Amelia River), which drains the remaining 14 percent.

Existing Regulatory Framework

Federal

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP). The NFIP was established by Title XIII of the Housing and Urban Development Act of 1968 to provide previously unavailable flood insurance protection to property owners in flood-prone areas. In return for the federally subsidized insurance, local governments who are members of the program must implement flood plain management measures to protect lives and new construction from flooding. The major strength of the NFIP program is the requirement of participating local governments to adopt floodplain management ordinances. This requirement requires local governments assessing flood hazards in the area and implementing a mediation program. The NFIP offers reasonably priced flood insurance in communities that comply with minimum standards for floodplain management. The NFIP's Community Rating System (CRS) is a voluntary incentive program that recognizes community efforts beyond those minimum standards by offering discounts on flood insurance premiums for the community's property owners. ranging from 5 percent up to 45 percent based on the credits earned through public information and floodplain management activities undertaken by the local government. Nassau County has had an adopted floodplain ordinance since 1984, which was last updated in 2005.

The County will seek to further update its ordinance and take other community actions during the planning period in order to participate in the NFIP Community Rating System.

The U.S. Army Corps of Engineers (USACOE) regulates dredge and fill activities in waters of the United States, including adjacent and isolated wetlands. The primary functions of the USACOE dredge and fill program are to restore and maintain navigability of waterways, and to protect ocean waters from pollutants dumped by vessels. The USACOE also considers impacts to adjacent and isolated wetlands of the nation's waters.

State and Regional

The Florida Department of Transportation (FDOT) maintains the stormwater management systems for state maintained roads. Most of these roads are drained by ditches, but some in urbanized area have stormwater conveyance systems.

The Florida Dept. of Environmental Protection (DEP) regulates dredge and fill activities in the State of Florida in accordance with Chapter 403, F.S., and Chapters 62-312 and 62- 330, F.A.C. DEP is primarily concerned with maintaining and, where appropriate, improving the quality of the waters of the state, as well as protecting and preserving wetlands, including fish and wildlife which use these areas. DEP requires a dredge and fill permit for such activity in all waters of the state except a water body owned by one person that does not discharge onto other property or waters, or those waters within an artificially constructed stormwater system.

The St. Johns River Water Management District (SJRWMD) has been delegated dredge and fill (wetland resource management) permitting for certain projects which require a stormwater permit, pursuant to Chapter 40C-42, F.A.C. This includes projects which may also require an Environmental Resource Permit (ERP) pursuant to Chapter 40C-4, F.A.C.

As mandated by Chapter 373, Florida Statutes, the Water Management Districts are responsible for managing water and related land resources in Florida. The St. Johns River Water Management District (SJRWMD) has jurisdiction over all or part of 18 counties in northeast and east central Florida, including all of Nassau County.

Through research and regulation, the SJRWMD promotes the conservation, development, and proper utilization of surface and groundwater. The SJRWMD require permits for well construction, management and storage of waters, stormwater discharge, consumptive use, works of the District, and wells for artificial recharge. In addition, the District has the authority to declare and implement water shortage warnings, water shortages, and water use restrictions. The SJRWMD also has the authority to acquire land for flood control, water storage, water management, and preservation of wetlands, streams and lakes. In Nassau County the District manages 1,586 acres in southwestern Nassau County as part of the Thomas Creek Conservation Area.

The SJRWMD Environmental Resource Permit (ERP) programs are regulated by Chapter 40C-1, F.A.C. (Procedural Rule), Chapter 40C-4, F.A.C. (Environmental Resource Permits), Chapter 40C-40, F.A.C. (General Surface Water Management Permits), and Chapter 40C-41; F.A.C. (Surface Water Management Basin Criteria).

In addition to the ERP program, the Water Management Districts were authorized in 1986 to regulate stormwater discharge. Chapter 62-25, F.A.C., under DEP jurisdiction Chapter 40C-42, F.A.C. governs this program, which is designed to prevent pollution of the waters of the state by discharges of stormwater. The purpose of this program is to ensure that the designated most beneficial of water, as prescribed by Chapter 62-25, F.A.C., are protected. Both general and

individual stormwater permits are issued, with specific criteria for each. Additional treatment is required for facilities which directly discharge to Class I, Class II or Outstanding Florida Waters.

The difference between the ERP rule and the stormwater rule is basically quantity versus quality. An ERP permit addresses water quality from stormwater runoff but also looks at impacts to wetlands, and requires the peak runoff after development be less than or equal to the peak runoff prior to development. A stormwater permit focuses on water quality impacts from runoff. The thresholds for each of these permits limit the type and size of development projects which the District reviews.

Local

County Ordinance 99-17 (Roadway and Drainage Standards) provides stormwater management standards and practices.

The Nassau County Road and Bridge Department is responsible for maintaining County maintained roads and associated stormwater management facilities such as roadside ditches and swales. The Department also maintains stormwater improvements (drainage ditches, swales, stormwater sewers, and culverts) developed, approved, and accepted by the County.
Nassau County has primary jurisdiction over major outfalls within the following areas:

- Unincorporated areas not included within the limits of Special Drainage Districts per Ch. 298, F.S., State of Florida rights-of-way, private undeveloped land, property owned by the State of Florida or the Nassau County School District.

- Incorporated areas within a County Road right-of-way

- Secondary drainage facilities (minor swales and facilities leading to outfalls) which are maintained by the County and located within dedicated easements or rights-of-way in the unincorporated area.

Areas of Flooding

In Nassau County, very localized flooding can result from strong convective storms, common in spring and summer, and general flooding may result from tropical storms in summer and fall or from strong frontal activity in winter.

Most soils in Nassau County are sandy and have high percolation rates and are classified as well-drained to excessively well-drained. The rain falling in these areas absorbs into the ground rapidly. In the southwestern portion of the County, in the area surrounding the Town of Callahan, the area has a high percentage of gumbo clay soil. This type of soil retards percolation of standing water and is classified as poorly drained to very poorly drained.

The structural alteration of floodplains and wetlands can significantly increase and create drainage problems. Wetlands are extremely valuable for storing floodwaters, augmentation stream flow, filtering nutrients from polluted water and providing fish and wildlife habitat. They should be protected from development that would interfere with seasonal flows and levels for surface watercourses and groundwater.

Surface Water Quality

Nassau County's surface water resources are, generally, in good condition. The enforcement of State, Federal, and local regulations, coupled with the public's generally increased awareness of the need to conserve and protect water resources have combined to protect these waters from the types of point and non-point sources of pollution which have degraded surface waters in other parts of the state. The primary threats to Nassau County's surface waters continue to include non-point source pollution generated by urban and agricultural runoff, leachate from septic tanks and package wastewater treatment plants, and erosion from improper land clearing activities.

Florida's water quality standards, the foundation of the state's program of water quality management, designate the "present and future most beneficial uses" of the waters of the state (Sec. 403.061(10), Florida Statutes). Water quality criteria for surface water and ground water, expressed as numeric or narrative limits for specific parameters, describe the water quality necessary to maintain these uses. Florida's surface water is classified using the following five designated use categories:

- Class I Potable water supplies
- Class II Shellfish propagation or harvesting
- Class III Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife
- Class IV Agricultural water supplies
- Class V Navigation, utility, and industrial use (there are no state waters currently in this class)

The waters in Nassau County are classified by DEP as either Class II or Class III. Class III water quality standards are intended to maintain suitability for sports and recreation, and production of diverse fish and wildlife communities. Management standards for Class II waters are much more restrictive than standards for Class III waters. Class II water standards place more stringent limitations on bacteriological and chemical pollution. Although Class II waters are classified by DEP as suitable for shellfish harvesting, shellfish harvesting has not been allowed in Nassau County because of high levels of fecal coliform found in area waters during the mid 1970s.

The three principal Florida aquifer systems—surficial, intermediate, and Floridan—are all present beneath the entire Nassau-St. Marys Basin. These aquifer systems are defined and separated based primarily on variations in lithostratigraphy. The primary source of potable water in the basin is the Floridan aquifer, which is deep, confined, and under artesian pressure throughout the area. The intermediate system is mainly a confining unit that occurs in the Hawthorn Group, which in this area includes extensive clay layers. The surficial aquifer system is the "water table" aquifer in the basin. It is used as a potable water supply to a limited extent, but the surficial aquifer is significant to this evaluation because it is the ground water source that directly interacts with surface waterbodies, providing base flow to streams, estuaries, and lakes in the basin.

The basin is not known for significant amounts of spring discharge because the limestone formations are so deeply buried by confining sediments. However, seepage from the surficial aquifer may constitute a significant percentage of water to the overall stream flow in the basin. In A 2005 analysis of base flow conducted by the DEP Ground Water Protection Section for a study site on the St. Marys River, the ground water component of flow at U.S. Geological Survey flow measurement stations on the St. Marys River was approximately 50 percent of the total flow. Similar amounts of ground water seepage are expected for other streams in the basin.

II. Analysis of Need

Level of Service

For stormwater management, Level of Service (LOS) should be expressed the terms of the carrying capacity required by various components of the system in order to carry away stormwater at various intensities of rainfall with minimum polluting impact on receiving waters or sites. The standard which is commonly accepted in designing drainage facilities is the design storm event. This standard specifies the intensity (rate of rainfall) and duration of the rainfall event.

Stormwater discharge analysis includes generating pre-development and post-development runoff hydrographs; routing the post-development runoff hydrographs through the stormwater storage system; and, sizing the storage system and discharge control structures to limit post-development discharge rate and/or volume to pre-development or existing conditions for the storm events. Stormwater discharge computations include the storm frequency, storm duration, rainfall amount, rainfall distribution, hydrologic soil conditions, surface storage, changes in land use cover and slope conditions, off-site runoff contributing areas, time of concentration, and any other changes in topographic and hydrologic characteristics.

In Nassau County, the allowable stormwater discharge rate and discharge volume from a project is based on the following design and performance criteria, pursuant to Rule 40C-42, F.A.C:

- Projects which discharge or contribute runoff to downstream areas which are not volume sensitive and have adequate capacity to accept and convey stormwater runoff from the project site without increasing flood levels shall limit peak rates of discharge for developed conditions to pre-developed or existing conditions for the 5-year, 10-year, and 25-year design storm event.

- Projects which discharge or contribute runoff to downstream areas which are volume sensitive and/or do not have adequate capacity to accept and convey stormwater runoff from the project site without increasing flood levels shall provide detention of the 25-year discharge volume for developed conditions such that the volume released from the project during the critical time period is no greater than the volume released under pre-developed or existing conditions during the same time period. For the purposes of this requirement the critical time period shall be the storm duration based on the 24-hour duration rainfall event unless a detailed hydrologic study of the contributing watershed demonstrates otherwise.

- All projects shall meet state water quality discharge standards as regulated by the St. Johns River Water Management District pursuant to Rule 40C-4 F.A.C., and must submit of a copy of a valid St. Johns River Water Management District permit as part of the development review process.

These standards do not apply to projects considered exempt pursuant to Rule 40C-42.0225 F.A.C. However, certain design criteria may still be required for exempt projects by the County's Land Development Code. Exempt projects include single family dwelling units and duplexes which are not a part of a larger common plan of development; agricultural and forestry uses; and maintenance work performed on existing stormwater management systems, provided that such maintenance work does not alter the purpose and intent of the system as constructed.

Stormwater Master Plan

Urban development and road construction have modified the natural drainage of Nassau County. As is the case with most counties and municipalities in North Florida, response to rapid growth was often delayed, and structures and roads were located without concern for the impact of this development on comprehensive stormwater management. These communities now are faced with problems of identifying needs and implementing a comprehensive program to correct the stormwater problems caused by past development and set in place a master plan for managing stormwater to accommodate projected growth.

The 2010 Comprehensive Plan stated that there is a need to develop a master stormwater master plan because the drainage system of the County has been developed incrementally without a full understanding of how each increment affected other components of the system. The result has been the breakdown of efficient drainage in some parts of the County.

The 2008 Evaluation and Appraisal Report (EAR) recommends that the County continue to pursue the development of a stormwater master plan. This recommendation is also made in the County's Local Mitigation Strategy. The Goals, Objectives and Policies of the proposed 2030 Comprehensive Plan also recommend that the County develop and implement a county-wide stormwater master plan.

In order to develop a stormwater master plan, a comprehensive Geographic Information System (GIS) inventory that documents the location, capacity and condition of all stormwater facilities within the County must first be conducted. This inventory is then used to evaluate the effectiveness (quantitative and qualitative) of existing stormwater management facilities and to identify existing and potential problems, needs, opportunities and constraints. Once completed, the GIS inventory would provide many benefits, including enhanced stormwater-modeling capabilities and improved storage of maintenance records.

Once the inventory has been developed, the next step involves the development of goals and objectives. The goals and objectives should address both existing needs and long-range prevention-based measures, such as floodplain preservation, zoning regulations, or regional detention facilities. Once goals and objectives have been finalized, actions are prioritized and implemented through the Schedule of Capital Improvements (SCI), the Land Development Code (LDC), and other methods.

Funding New Stormwater Management Facilities

To effectively implement a stormwater management program, the County will need to investigate sources of funding that can be dedicated exclusively to stormwater management. The use of county general revenue for stormwater management practices could be replaced with dedicated funding sources including sources such as bonds, impact fees, or creation of a stormwater utility.

A stormwater utility would assess a user fee based on the stormwater characteristics (i.e. size and amount of impervious surface area) of a particular parcel. Credits can be given for the use of Best Management Practices (BMPs). A stormwater utility would be sufficient to fund minor projects and ongoing maintenance. However, large-scale projects, such as building a regional stormwater facility, would need to be funded by bonds, development impact fees, or grant funds. It. should also be noted that by having an adopted stormwater master plan, the county would be more successful in securing grant funds from state, regional and federal authorities.

Low Impact Development (LID)

Stormwater has been identified as a major source of pollution for all water body types in the United States, and the impacts of stormwater pollution are not static; they usually increase with land development and urbanization. The addition of impervious surfaces, soil compaction, and tree and vegetation removal result in alterations to the movement of water through the environment. As interception, evapotranspiration, and infiltration are reduced and precipitation is converted to overland flow, these modifications affect not only the characteristics of the developed site but also the watershed in which the development is located.

Low Impact Development (LID), as defined by the U.S. Environmental Protection Agency (EPA) is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treat stormwater as a resource rather than a waste product.

There are many practices that have been used to adhere to these principles such as bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. By implementing LID principles and practices, water can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed. Applied on a broad scale, LID can maintain or restore a watershed's hydrologic and ecological functions.
LID can be applied to new development, redevelopment, or as retrofits to existing development. LID has been adapted to a range of land uses from high density ultra-urban settings to low density development.

Traditional approaches to stormwater management typically involve hard infrastructure, such as curbs, gutters, and piping. LID-based designs, in contrast, are designed to use natural drainage features or engineered swales and vegetated contours for runoff conveyance and treatment. In terms of costs, LID techniques can reduce the amount of materials needed for paving roads and driveways and for installing curbs and gutters. Other LID techniques can eliminate or reduce the need for curbs and gutters, thereby reducing infrastructure costs. Also, by infiltrating or evaporating runoff, LID techniques can reduce the size and cost of flood-control structures. Note that in some circumstances LID techniques might result in higher costs because of more expensive plant material, site preparation, soil amendments, underdrains and connections to municipal stormwater systems, as well as increased project management costs. Other considerations include land required to implement a management practice and differences in maintenance requirements. In many cases LID practices can offset the costs associated with regulatory requirements for stormwater control.

In 2007, EPA published the report *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices.* EPA researched and assembled 17 case studies that examine cost savings and additional costs associated with LID designs compared to traditional stormwater management designs. The case studies revealed that LID practices can be both fiscally and environmentally beneficial to communities. Site-specific factors influence project outcomes, but in general, for projects where open space was preserved and cluster development designs were employed, infrastructure costs were lower. In most cases, significant savings were realized due to reduced costs for site grading and preparation, stormwater infrastructure, site paving, and landscaping. Total capital cost savings ranged from 15 to 80 percent when LID methods were used, with a few exceptions in which LID project costs were higher than conventional stormwater management costs.

LID can also provide other benefits including improved aesthetics, expanded recreational opportunities, increased property values due to the desirability of the lots and their proximity to

open space, increased total number of units developed, increased marketing potential, and faster sales.

Natural Groundwater Recharge Areas Sub-Element

I. Existing Conditions

Background

Natural groundwater recharge is the addition of water to the saturated zone and the downward movement of the water into aquifer systems. As defined by Chapter 9J-5.003, F.A.C., natural groundwater aquifer recharge areas are areas that contribute or provide volumes of water which make a contribution to the storage or regional flow of an aquifer. The two functions of natural groundwater recharge that must be protected are the ability of water to percolate downward to the aquifer and the need to protect water quality. The ability of the land surface to absorb water is related to, among other parameters, the amount of permeable surface areas. Covering the surface with streets, parking areas and structures decreases the available permeable surface.

The SJRWMD recently updated GIS data on Recharge to the Floridan Aquifer. As shown on Map RCH-1, the largest area of natural groundwater recharge in Nassau County is in the far western part of the County. Other areas of recharge occur on the northern end of Amelia Island (Fernandina Beach) and the northeast corner of the County mainland. According to information from the SJRWMD, these areas encompass approximately 207,261 acres.

Almost all areas of natural groundwater recharge in Nassau County are considered by the SJRWMD to be low recharge areas (0-4 in/yr). Areas of moderate recharge (4-8 in/yr) are only found on approximately 278 acres in the far northwestern area of the County. Areas of high recharge (greater than 8 in/year) are not found in Nassau County. While the recharge rate per unit area is less in the low recharge areas than other recharge areas, it should be noted that the recharge areas cover significant acreage and contribute a significant volume of the total recharge to the Floridan aquifer.

Existing Regulatory Framework

Federal

The federal government has established quality standards for the protection of water for public use, including operating standards and quality controls for public water systems. These regulations are provided in the Safe Drinking Water Act, which was updated in 1996. This law directed the EPA to establish minimum drinking water standards. The 1996 amendment included new prevention approaches and revisions to the regulatory program.

State and Regional

In the State of Florida, the Department of Health (DOH) and the Department of Environmental Protection (DEP) promulgate regulations that protect aquifer water quality. Chapter 62-528 F.A.C. controls the permitting of underground injection wells. Chapter 62-522 F.A.C. regulates discharges to groundwater and Chapter 62-550 F.A.C. regulates the source and quality of drinking water supplies.

The St. Johns River Water Management District (SJRWMD) is responsible for managing water supplies to meet existing and future demands. Regulation of consumptive use is achieved through a permitting system, through which water resources are allocated among the permitted consumers. The SJRWMD also oversees the permitting and construction of both public and private wells. SJRWMD maintains six groundwater monitoring stations located throughout the County: Ft. Clinch (Fernandina), Yulee Fire Tower (Yulee), Fairgrounds (Callahan), Hilliard Elementary School (Hilliard), St. Marys WMA (Boulogne), and Cary State Forest (Bryceville).

Local

The County has adopted policies in its Comprehensive Plan regarding the protection of recharge areas to the Floridan Aquifer through limits on impervious areas and hazardous materials and through requirements for onsite retention and subsequent recharge of treated stormwater runoff. These policies are intended to be implemented through the adopted Land Development Code (LDC).

Groundwater Resources

Three aquifer systems supply groundwater within the County: the surficial, the intermediate, and the Floridan aquifers. The source of water to all of these aquifers in the district is rainfall occurring within or near the district's boundaries. Some of this rainfall runs off to streams that carry it to the ocean. Some of it is returned to the atmosphere as evaporation from open water surfaces and as transpiration by plants. Some rainfall is stored in lowland areas such as lakes. Only a portion of rainfall moves downward from land surface to recharge the aquifers. The Southeastern Geological Society has defined the hydro-geologic nature of these aquifer systems, which may be briefly characterized as follows:

Surficial Aquifer System - The surficial aquifer system consists primarily of sand, silt, and sandy clay. It extends from land surface downward to the top of the confining unit of the intermediate aquifer system, where present, or to the top of the confining unit of the Floridan aquifer system. The surficial aquifer system contains the water table, which is the top of the saturated zone within the aquifer.

Water quality in the surficial aquifer system is generally good. However, in coastal areas like Amelia Island, this aquifer system is prone to saltwater intrusion.

The surficial aquifer system is sometimes used as a source of water for domestic self-supply, primarily in coastal areas.

Intermediate Aquifer System - The intermediate aquifer system, also known as the intermediate confining unit, lies between the surficial aquifer system and the underlying Floridan aquifer system. This unit consists of fine-grained deposits of sand and clay layered within thin, water-bearing zones of sand, shell, and limestone, and collectively retards the exchange of water between the other aquifer systems.

The intermediate aquifer system is generally not used as a water source in Nassau County but is used for domestic self-supply in other areas of northeast Florida, including Duval and Clay counties.

Floridan Aquifer System - The Floridan aquifer system is one of the world's most productive aquifers. Composed primarily of limestone and dolomite rock, the Floridan aquifer system underlies the entire state, although this it does not contain potable water at all locations. Water in the Floridan aquifer system occurs under confined conditions throughout most of the SJRWMD.

The Floridan aquifer system is divided into sub-regions on the basis of the vertical occurrence of two zones of relatively high permeability. These zones are called the Upper and Lower Floridan aquifers. A less-permeable limestone and dolomitic limestone sequence, referred to as the middle semiconfining unit, generally separates the Upper and Lower Floridan aquifers.

The Upper Floridan aquifer is the primary source of water for public supply water use in Nassau County and for most of the northern and central portions of SJRWMD, where the aquifer contains water that generally meets primary and secondary drinking water standards. Portions of the Lower Floridan aquifer furnish water for public supply in Duval County.

Groundwater Recharge to the Floridan Aquifer

Groundwater recharge to the Floridan aquifer is the addition of water to the Floridan aquifer from the overlying surficial aquifer. Recharge rates to the Floridan aquifer are based on hydraulic pressure differences between the water table of the surficial aquifer and the potentiometric surface of the Floridan aquifer and on the hydrated conductivity of the upper confining unit separating the aquifers.

Recharge to the Floridan aquifer occurs in areas where the elevation of the water table of the surficial aquifer is higher than the elevation of the potentiometric surface of the Floridan aquifer. In these areas, water moves from the surficial aquifer in a downward direction through the upper confining unit to the Floridan aquifer. Recharge also occurs directly from infiltrating rainfall, where the limestone of the Floridan aquifer is at or near land surface. In addition, significant local recharge may occur where sinkholes have breached the upper confining unit.

Discharge from the Floridan aquifer occurs in areas where the elevation of the Floridan aquifer potentiometric surface is higher than the elevation of the water table. In these areas, water moves from the Floridan aquifer in an upward direction through the upper confining unit to the surficial aquifer. Where the elevation of the Floridan aquifer potentiometric surface is higher than land surface, springs and free-flowing artesian wells occur.

Nearly all of the water recharging the Floridan aquifer in the SJRWMD is derived from rainfall in the district. Rainfall percolating downward from land surface to the Floridan aquifer must move through the unsaturated soil zone, the surficial aquifer, and the semi-confining layers to recharge the Floridan aquifer. The amount of water stored in the aquifer systems is determined by a balance between recharge, evapotranspiration, runoff, leakage to or from the adjacent aquifers, natural discharge, and withdrawals from water wells. The movement of water through sink holes or lakes of probable sinkhole origin that breach the semi-confining layer can be a significant conduit for recharge, depending on the degree of hydraulic connection to the Floridan aquifer.

Recharge rates to the Floridan aquifer are based on hydraulic pressure differences between the water table of the surficial aquifer and the potentiometric surface of the Floridan aquifer and on leakance of the upper confining unit separating the aquifers. Recharge areas of the Floridan aquifer in the SJRWMD were mapped using a geographic information system to analyze the geologic and hydrologic factors that affect recharge. Recharge rates were mapped by the at a 4-inch-per-year (in/yr) contour interval.

II. Analysis & Recommendations

The Impact of Development on Natural Groundwater Recharge

Projections of population levels indicate that Nassau County's total population will increase to approximately 105,135 by the year 2030. Consequently, groundwater withdrawal rates for domestic and commercial/industrial/institutional use are expected to increase to meet these growth demands (withdrawal rates for agriculture are not projected to increase). Population growth and land development can significantly impact recharge areas of the Floridan Aquifer. Development increases impervious surfaces which can reduce the amount of available natural groundwater recharge.

Based on the findings of the SJRWMD draft 2008 Water Supply Assessment (WSA), widespread water level declines are projected for northeast Florida as a result of numerous projected increases in groundwater withdrawals in the area. The declines create a cone of depression in the pressure of water, known as potentiometric pressure, in the Floridan aquifer. The draft assessment also finds that surficial aquifer water levels are projected to decline in some areas of northeast Florida in response to withdrawals from the underlying Floridan aquifer.

Protection of Groundwater Resources

State and federal regulations provide minimum protection of groundwater resources. Each local government must plan carefully to ensure that growth does not adversely impact a groundwater quantity or quality.

The County has adopted policies in its Comprehensive Plan regarding the protection of recharge areas to the Floridan Aquifer through limits on impervious areas and hazardous materials and through requirements for onsite retention and subsequent recharge of treated stormwater runoff. These policies are implemented through the adopted Land Development Code (LDC). The County will need to insure that these regulations are being implemented properly and consistently for applicable development orders issued in recharge areas.

In particular, The LDC should set forth regulations to safeguard potable water supplies by regulating the storage, handling, use or protection of hazardous substances around the public potable water supply wells. The area around a well that must be protected in order to prevent potential pollutants from entering the aquifer around the well is called the "Wellfield Protection Zone". There are a number of approaches for defining a wellhead protection area. These range from a simple arbitrary fixed radius to a very sophisticated numerical flow/transport model which is based upon well pumping rate, porosity of the aquifer, slope of the topography and other parameters. DEP defines the wellhead protection zone as a 500 foot radial setback distance around a potable water wellhead. The County's largest regional water provider, JEA, defines a 750 foot setback from its public wells. Given the limited resources, rural character and the relatively simple hydrogeology of Nassau County, the arbitrary fixed radius approach is appropriate for a short term in providing wellfield protection.

Land use planning in Nassau County must consider the trade-off between protecting the groundwater resources of the County versus encouraging growth/development to locate in areas of natural groundwater recharge. The County, in coordination with the Water Management District, should monitor water quantity and quality within the Floridan aquifer and plan to implement conservation measures to conserve and protect the County's water resources.