

# COMMUNITY FACILITIES ELEMENT

## Analysis

This element describes the existing condition of sanitary sewer, solid waste, drainage, and potable water services and facilities and aquifer recharge protection within the City of Keystone Heights. Further, it addresses ways to provide for future demands for these services and facilities to meet future growth as well as addressing existing problems.

Three main sections follow: The first section describes existing and future conditions. The second is the inventory and analysis. The third section is the projection of need based on the future land use plan. The fourth section contains the goals, objectives and policies to guide future actions.

## Existing Conditions

### Background

In order to formulate future plans for sanitary sewer, solid waste, drainage, potable water and natural groundwater aquifer recharge, it is essential to understand the geography of the area in which the City is located.

Keystone Heights is located on Trail Ridge, an old remnant shoreline formation. Natural elevations in the area range from over 175 feet to less than 100 feet mean sea level (MSL). The most prominent scarp or remnant dune ridge lies north of the City.

The basin is characteristically karst terrain which evolved through the dissolution of the underlying limestone and dolomite resulting in numerous swamps, lakes, and shallow sinkholes. Surface drainage is poorly developed with subterranean drainage to lakes or creeks, fifty of which flow into the lakes in Keystone Heights City limits. The lakes located in the City (Keystone, Geneva and Brooklyn) are several of the more prominent lakes in the area.

The geology, topography and drainage in the basin are all interdependent with percolation and erosion shaping the limestone chemically and mechanically. The karst nature of the limestone results in solution features redirecting runoff underground. The sand and soft limestone supporting the flat to hilly topography was first shaped by beach erosion terracing the sand and stone. Afterwards, weak limestone caverns collapsed and surface erosion reshaped the highland sands.

Nutrients and fresh water entering the lakes support the vegetation which in turn supports the lakes and animal life.

Some rainfall normally occurs during each month. The rainy season extends from June through September and a low rainfall period extends from October through May. The average

annual rainfall in the basin is fifty inches per year. Over sixty percent of the annual rainfall occurs during the rainy season and is derived principally from convectional thunderstorm activity.

The Floridan Aquifer is the principal source of potable water for Keystone Heights and most of Northeast Florida. Recharge to the upper layers of the Floridan Aquifer is direct from the groundwater. Direct discharge from the Floridan Aquifer occurs via solution features and other direct hydraulic connections such as rivers, streams and swamps.

Water quality in the Upper Floridan Aquifer is affected by the chemical nature of precipitation that infiltrates the land surface, the composition of the material coming in contact with the water and the certain properties and characteristics that the earth imparts to the surface water.

### Sanitary Sewer

In 1991, there was no central wastewater treatment within the City limits. The City and the Clay County Utility Authority secured a grant to construct a wastewater treatment plant within the City to serve the businesses in 2003. The grant funds were supplemented by the CCUA and the plant became operational in 2005. Central service has been extended to the non-residential development within the City and there is adequate capacity to extend service to residential properties upon request. In 2007, the average flow in the Keystone Heights Wastewater treatment plant was 0.030 MGD; the plant capacity is 0.074. Currently the plant serves 635 ERUs, the majority of which are non-residential connections. In May 2009, the CCUA was permitted to expand the Keystone Heights WWTP to a design capacity of 0.30 MGD, with permitted capacity limited to 0.099 MGD AADF while flows are low (at the request of the CCUA). The CCUA plans to commence construction of the expanded facilities in December 2010 with completion in December 2012.

The expansion is included in the Five Year Capital Budget of the CCUA.

Because the residential properties in the City are each served by on-site septic systems, wholesale extension of central wastewater service to any significant percentage of the existing development in the City is unlikely. Continued use of on-site systems is anticipated for the majority of the residential properties in the City unless there are financial incentives made available to residents to connect to central services.

The majority of the soils within the City are suitable for septic tank drain fields. Only Mandarin fine sand is rated severe for septic tanks due to the high water table. Mandarin fine sand occupies the slopes immediately adjacent to Lakes Keystone and Geneva and a portion of Lake Brooklyn.

There is one sewage package treatment plant and one evaporator system in the City. The package plant is at the Keystone Heights High School and also serves the elementary school. The plant capacity is 40,000 gallons per day and it discharges into 4 drainfields located onsite.

The School District and CCUA are working to connect the two schools within the City to the CCUA wastewater treatment facility; the connection to CCUA facilities is anticipated to occur in 2012/13. Clay Electric has a 100 gallon per day evaporator for oil and grease. The hydrocarbon residues are disposed of through a DEP Certified disposal organization. Both systems are currently operating under permits by the Department of Environmental Regulation. The two facilities are currently operating below the level of service standards with no impact on the surrounding area or aquifer.

Septic tanks are used by residents to serve residential units. No immediate plans exist for the city to serve existing residential development with central sewer. However there is a growing concern relative to the potential for pollution of the area lakes from a number of sources including the proliferation of septic tanks within the City as well as in the unincorporated areas surrounding the City. This concern is heightened by the fact that the City lies within the recharge area for the Floridan Aquifer. The City has partnered with the Clay County Utility Authority to apply for a grant under the Small Community Wastewater Facility Grant program administered by the Department of Environmental Protection in order to provide central service to existing residential units in the City. The schedule in the grant application identifies completion of construction if the grant is awarded to occur in mid-2013.

### **Future Demand**

Existing residential units are anticipated to remain on individual on-site wastewater treatment systems. New residential development that occurs on individual vacant lots that are scattered throughout the existing homes in the City (74 lots) are able to apply for on-site systems despite the lot size because all were created prior to 1974; wastewater treatment to these individual lots will continue to be from on-site facilities unless they are located immediately adjacent to existing wastewater gravity line because the cost to extend for a single lot is prohibitive.

New residential development within two planned subdivisions must be served by central wastewater treatment facilities. All new non-residential development must be served by central wastewater. Within the City limits there are 7.95 acres of vacant land in the Commercial Land Use category and 76.20 acres of vacant land in the Residential Land Use category. Of the vacant residential lands, 52.25 acres lie within parcels greater than 1 acre in area; 23.95 acres are contained within 55 vacant scattered lots throughout the City. The scattered lots are not anticipated to be served by central wastewater during the planning period because extension of lines to serve these isolated lots is not financially feasible. At a maximum development potential of 6 units per acre, the vacant residential land associated with parcels greater than 1 acre in area has a maximum development potential of 313 residential units. The vacant commercial lands are located outside the City Core and are subject to a maximum FAR of 0.4. The vacant acres could be developed at a maximum of 138,521 square feet of non-residential use.

Table 1 identifies the future demand for wastewater treatment through 2015, based on the assumption that 50 percent of the vacant land will be developed in the next five years (by type).

Table 1  
2015 Wastewater Generation

	Residential Units	WW Generation	Total Residential Demand	Non-Residential Development	WW Generation	Total Non-Residential Generation
City of Keystone Heights	156	250 gpd/ unit	0.039	69,260 SF	100 gpd/ 1,000 SF	0.007 mgd
	<b>TOTAL</b>		<b>0.039 mgd</b>			<b>0.007 mgd</b>

The average daily treatment volume for the Keystone Heights WWTP in 2009 was 0.074 mgd. The potential increase in demand of 0.046 mgd in 2015 represents a total demand in 2015 of 0.12 mgd, less than the permitted capacity of 0.30 mgd permitted under the 2009 permit, but greater than the self imposed limit of 0.099 mgd placed on the 2009 permit at the request of the CCUA. The CCUA has funded the improvements to 0.099 mgd in its CIP and will fund and initiate construction as demand for treatment increases, up to the permitted treatment volume of 0.30 mgd.

Table 2 identifies the future demand for wastewater treatment through 2025, assuming buildout of all the vacant land in the City during the planning period.

Table 2  
2025 Wastewater Generation

	Residential Units	WW Generation	Total Res Demand	Non-Residential Development	WW Generation	Total Non-Residential Generation
City of Keystone Heights	313	250 gpd/ unit	0.078 mgd	138,521 SF	100 gpd/ 1,000 SF	0.014 mgd
	<b>TOTAL</b>		<b>0.078 mgd</b>			<b>0.014 mgd</b>

Demand for wastewater treatment is projected to be 0.092 mgd through the 2025 planning horizon. The projected total demand is 0.166 MGD, less than the expansion to 0.30 mgd permitted in May 2009 by the DEP.

#### Solid Waste Disposal

The City contracts with a private hauler to collect solid waste, yard trash and recyclables from the residents and businesses within the City. The City anticipates continuing with a private hauler contract arrangement for the collection of these wastes throughout the planning period.

The solid waste facilities that handle the disposal of solid waste generated within the City is managed by Clay County. In 1993 the County converted from a fee based system of financing solid waste facilities to a system based on a solid waste assessment for all residents of the unincorporated county; the City assesses its residents the same fee, collects the funds and makes payment to the County directly. The City collects a solid waste disposal fee from the businesses in the City and pays the applicable tipping fees to the County.

The disposal fees paid to Clay County for the disposal of solid waste collected within the City includes funding of the following:

- transfer station /disposal operations and facilities to manage the disposal of Class I, construction debris, yard trash and tires;
- recovered materials processing and sale of materials in support of the curbside collection, public buildings recycling and drop- off center operations (recycling);
- post closure monitoring and maintenance of the ten closed landfills within Clay County;
- operation of drop-off centers for collection of household hazardous waste and special waste, including three outreach collection days annually; and,
- the operation of five Environmental Convenience Centers.

The solid waste generated in the City is transported to the Rosemary Hill Transfer station. The County contracts with a private operator to manage its Class I waste and transfer it to an out-of-County facility. In 2009, waste collected in Clay County was transferred to the Chesser Island Road Landfill Area. As of November 2008, there was 3,369,940 cubic yards of available airspace at the Chesser Island Road facility with an additional 6,480,130 cubic yards of future airspace available. The total available airspace is 9.8 million cubic yards, representing 7.88 million tons of available capacity. Based on the tonnage accepted monthly from all sources, there was 8.75 years of life available at the Chesser Island Road facility. Expansion plans are underway to permit an additional 150 acres of horizontal area, adding 40 years to the site life.

The City generates an average of 3.99 lbs per capita per day of Class I waste. Population increases in the planning period indicate only a small increase in solid waste generated by the residents and businesses of the City through 2025:

TABLE 3  
CLASS I SOLID WASTE GENERATION PROJECTIONS

	<b>Population</b>	<b>Solid Waste Generation (annual)</b>
2005 Population	1,386	1,009 tons
2010 Projection	1,413	1,029 tons
2020 Projection	1,450	1,056 tons
2025 Projection	1,462	1,064 tons

Clay County includes the population of the municipalities when projecting the solid waste generated annually. Throughout the planning period, the City represents less than one percent of the total Class I waste stream projected for Clay County and its municipalities, falling to just over one half of one percent of the total waste stream in 2025.

#### Future Disposal Needs

The City is obligated to secure adequate capacity to meet the projected need for solid waste disposal facilities for its population through the planning period. The City will continue to rely on a third party to manage and operate the disposal facilities necessary to meet its projected need. The analysis performed by Clay County identifies that the County will begin a study in 2009 to review its current contracts and approach of shipping solid waste out of the County for disposal. The City will coordinate with the County to ensure that the City's solid waste demand is recognized in any study undertaken by the County related to solid waste disposal options.

Clay County has undertaken the request for proposal process for a waste hauler/ provider in late 2010. The selected provider may partner with the County to provide landfill capacity within Clay County or at a location outside the County. The City plans to continue to contract with the County's waste disposal provider.

#### Drainage

Keystone Heights is located along a series of ridges that stretch North and South through the North Central area of Florida. Drainage is poorly defined. Rainfall averages 50 inches per year. Eventually the water moves downward through the soil to the zone of saturation referred to as the groundwater table. Groundwater continues to move laterally within the limestone recharge area to areas of lower elevation. Some is discharged by evapotranspiration, seepage, springs or wells. Groundwater in Keystone Heights occurs in the water table aquifer and in the Floridan Aquifer which is directly connected to the water table.

The historical ~~one existing~~ drainage problem in the City was ~~is~~ surface drainage on many of the aggregate streets. Prior to 1991, there were six miles of unpaved streets; since 1991, the City completed a paving program using CDBG funds. All streets within the City with the exception of a portion of Forest Street and Fox Run are now paved. The remaining drainage issue in the City is runoff from the impervious parking area serving Keystone Beach, a public recreation facility. Steps are underway to improve drainage.

### Water Quality

The discharge of untreated stormwater is reasonably expected to be a source of pollution of the lakes within the City (as waters of the state). As such the quality of water discharged from stormwater management facilities is regulated, with standards established in Chapter 62-25 of the Florida Administrative Code. The City shall review development and redevelopment plans that include new stormwater discharge facilities for compliance with the Florida Administrative Code standards and will require all stormwater management facilities to be permitted by the St Johns River Water Management District unless otherwise exempt.

### Potable Water

The City has been served by central water since before adoption of the original comprehensive plan in 1991. All development within the City must connect to central water service. Southern States Utilities owned and operated the system prior to its acquisition by the Clay County Utility Authority in 2005.

### *Water Supply*

The CCUA system serving the City and surrounding unincorporated Clay and Bradford counties serves primarily residential customers; in 2008, only 27 percent of the customer base of 1585 active ERCs represented non-residential connections. The residential customers are almost exclusively single family homes; the non-residential customers are primarily small service businesses. Except for the Clay Electric Cooperative's offices within the service area, the non-residential customers are service and retail establishments that serve the needs of the community.

One way the SJRWMD manages water supply is through its Consumptive Use Permitting (CUP) process. For the City, the Clay County Utility Authority holds the CUP for the public water supply. In recent CUP permitting efforts, the CCUA evaluated the water supply in its service area, including the Keystone Heights area. The results of that analysis and projected demand for water are presented below.

The Florida Aquifer is recognized as one of the most productive aquifers in the world. It has been estimated that, under the region, the Floridan Aquifer stores far more fresh water than is stored in all of the Great Lakes combined. However, there are restraints on the amount of fresh water that may be withdrawn from this aquifer.

The St Johns River Water Management District has identified Priority Water Use Caution Areas in which potential water shortages, considerable reductions in water levels, saltwater intrusion or other water degradations to the water supply may occur in the next 20 years. The City does not fall within a designated Priority Water Use Caution Area. The SJRWMD has indicated that it will initiate a regional study in mid- 2009 with the Suwannee Water Management District to review the status of the area with regard to designation as a Priority Water Use Caution Area.

*Potable Water Treatment*

In 2005 the CCUA took over operation of the two water treatment plants that serve the City. The CCUA serves the City from two wells within the City limits. The WTP that serves the City (Keystone Heights) is looped with the Keystone Heights Club WTP, creating a combined service area that extends beyond the City limits. While the combined capacity for these two plants is 1.376 mgd, the Consumptive Use Permit (CUP) for this system authorizes withdrawals of 0.6499 mgd (236.747 MGY):

Household Use	0.0385 mgd
Commercial	0.1721 mgd
Irrigation Use	0.0019 mgd
Utility and Unaccounted	0.0828 mgd
Essential Use (fire)	0.0081 mgd
 Total	 0.6499 mgd

The average daily flow in the Keystone Grid in 2008 was 0.5284 mgd. The CCUA applied for a modification of its CUP in December 2006; the modification will consolidate the permits for the Keystone Grid, Postmasters Village (located in unincorporated Clay County) and Geneva Lakes Estates (located in unincorporated Bradford County) and increase the permitted withdrawals to 2.00 mgd.

Two new production wells were constructed in 2010 at the Postmasters’ Villages site and extensive aquifer performance testing submitted to the SJRWMD on these new wells. Because the SJRWMD is updating its regional groundwater model it has requested the CCUA wait until it is available to utilize for the final permitting of the consolidation of the CCUA wells that serve the City. The CCUA is currently operating under the previous permits. The SJRWMD has agreed to issue Temporary CUPs until the modeling can be completed and final review of the CUP application occur.

Based on average demand per equivalent residential unit of 294 gallons per day, the City’s daily consumption of potable water in 2008 is approximately 0.1402 mgd. In 2009, Clay County adopted a Centralized Water and Sewer Service Area Map that does not include any unincorporated lands adjacent to the City as lying within a service area; therefore no potable water demand associated with vacant land within unincorporated Clay County is included in calculations of future demand associated with the CCUA system that serves the City. The

CCUA does serve the Keystone Club Estates area which is located within the urban service area for Bradford County. In Bradford County, vacant land is in the Residential Low density (< 2 units per acre) Land Use Category, but the land within the service area is platted. Vacant Land within the CCUA service area and not within the City is available for development as follows:

Residential Low Density (Bradford) 52 vacant platted lots                      52 DU

The maximum development potential associated with these non-City vacant lands is shown in Table 4.

Within the City limits, there are 55 vacant residential, platted single family lots, 7.95 acres of vacant land in the Commercial Land Use category and 52.25 acres of vacant land in the Residential Land Use category associated with non-platted lots. At a maximum development potential of 6 units per acre, the vacant residential non-platted land has a maximum development potential of 313 residential units for the 55 vacant lots and 313 potential units within the non-platted residential vacant lands. The vacant commercial lands are located outside the City Core and are subject to an maximum FAR of 0.4. The vacant acres could be developed at a maximum of 138,521 square feet of non-residential use.

Table 4  
2015 Potable Water Demand  
CCUA Keystone Grid

	Residential Units	Potable Water Demand	Total Residential Demand	Non-Residential Development	Potable Water Demand	Total Non-Residential Demand
City of Keystone Heights	184	294 gpd/unit	0.054 mgd	69,260 SF	100 gpd/1,000 SF	0.007 mgd
Bradford County	26	300 gpd/unit	0.008 mgd	0 SF	100 gpd/1,000 SF	0
	<b>TOTAL</b>		<b>0.062 mgd</b>			<b>0.007 mgd</b>

The peak daily flow in the Keystone Grid in 2009 was 0.5284 mgd. Then potential increase in demand of 0.069 in 2015 represents a total demand in 2015 of 0.597 mgd, less than the available capacity of 0.6499 permitted under the current CUP.

Table 5  
2025 Potable Water Demand  
CCUA Keystone Grid

	Residential Units	Potable Water Demand	Total Residential Demand	Non-Residential Development	Potable Water Demand	Total Non-Residential Demand
City of Keystone Heights	368	294 gpd/unit	0.108 mgd	138,521 SF	100 gpd/ 1,000 SF	0.014 mgd
Bradford County	52	300 gpd/unit	0.016 mgd	0 SF	100 gpd/1,000 SF	0
	<b>TOTAL</b>		<b>0.124 mgd</b>			<b>0.014 mgd</b>

The projected demand for 2025, representing an additional demand of 0.069 over the 2015 projected demand will increase the demand for potable water to 0.666 mgd, which just exceeds the 0.6499 mgd permitted withdrawals in the current CUP. The consolidated CUP under review by the SJRWMD, increasing the permitted withdrawals to 2.0 mgd, includes in the service area portions of Clay County that are not within its Centralized Service Areas and as such, the requested withdrawal amounts are in excess of the projected demand associated with vacant land that can be served with central water.

While the City has designated a Community Redevelopment Area that addresses blight in the City, redevelopment of properties within the CRA boundary is not anticipated to be of a higher intensity than the existing use. New development within the City is subject to the land development regulations applicable at the time of development /redevelopment and the standards for parking, stormwater management and landscaping are higher than the standards under which existing development in the City was constructed. While modifications to existing structures occur in the City, there has not been wholesale redevelopment of properties or areas so it is anticipated that the CRA will increase the economic vitality of the City overall and the properties within the CRA, but will not increase the demand for potable water. Redevelopment within the City must meet concurrency management requirements which provide the review for adequate capacity prior to issuance of a final development order.

The average water demand rates within the City are low in comparison to demand rates in unincorporated Clay County. The total demand on the water supply by City residents and businesses is a very small percentage of the overall demand in the County. These attributes of the CCUA system within the City are projected to continue. The City will focus on efforts to educate its residents and businesses on water conservation opportunities and to work with the CCUA to implement any initiatives it undertakes.

The CCUA adopted tiered rates for potable water in 2010; the rate structure increases quickly when consumption exceeds the average established for an equivalent residential unit. The application of tiered rates has been shown to be effective in maintaining or reducing potable water demand when implemented in other communities in Florida.

### Aquifer Recharge

The projected growth of the City's population will not substantially affect water resources. With less than 87 acres of vacant land within the City, development in the City in the future will not be a significant factor in the quantity of water retained in the Floridan Aquifer, however all development represents a threat because of the increased runoff from impervious area which reduces the amount of water percolation into the aquifer. The introduction of pollutants to the water supply, some of which may be hazardous wastes, is also a concern.

The Floridan Aquifer is the deep freshwater aquifer that supplies much of Northeast Florida with its potable water supply. In this area, rainwater percolates directly into the limestone formation that is the aquifer. Reduction in the amount of percolation would have a direct effect on the aquifer's potential to supply future growth in Keystone Heights as well as all the counties in Northeast Florida. Urban ground coverage (buildings, parking lots, etc.) should be minimized so that this natural percolation continues in order to safeguard the common source of potable water.

The City implemented land development regulations in 1992 consistent with its adopted goals, objectives and policies that address protection of the prime and high recharge areas of the Floridan Aquifer that are located within the City limits. Because the City is essentially built-out, there is little opportunity for new development that would impact the Floridan Aquifer from a water quality or recharge perspective. Redevelopment activities and the intensification of uses on existing properties within the City do however represent a threat to the Floridan aquifer if not properly regulated.

Policies adopted in 2010 establish setbacks for septic tanks and drain fields for waterfront lots, limit the maximum impervious surfaces to 20 percent of the total lot area, limit the storage or use of hazardous materials, and prohibit certain uses. Redevelopment within the high recharge area must meet the adopted standards at the time of redevelopment.

### **Future Needs**

## Sanitary Sewer

Because existing residential development is not anticipated to connect to central wastewater services unless a significant financial incentive is provided to offset the cost to the individual, the greatest future issue related to sanitary sewer in the City is to monitor the maintenance of existing septic tanks that serve residential lots. The City has partnered with the Clay County Utility Authority to apply for a grant under the Small Community Wastewater Facility Grant program administered by the Department of Environmental Protection in order to provide central service to existing residential units in the City. The schedule in the grant application identifies completion of construction if the grant is awarded to occur in mid-2013.

## Solid Waste

Clay County is presently planning to expand its solid waste facility capacity. The City will continue to insure that the demand represented by its citizens and businesses is represented accurately in the calculation of future capacity needs for the County and the municipalities it serves.

## Drainage

The City has completed a road paving program which addresses the major source of runoff and pollutants to surface water bodies within the City. Future efforts consist of the enforcement of stormwater management standards and level of service for new development and redevelopment within the City.

The discharge of untreated stormwater is reasonably expected to be a source of pollution of the lakes within the City (as waters of the state). As such the quality of water discharged from stormwater management facilities is regulated, with standards established in Chapter 62-25 of the Florida Administrative Code. The City shall review development and redevelopment plans that include new stormwater discharge facilities for compliance with the Florida Administrative Code standards and will require all stormwater management facilities to be permitted by the St Johns River Water Management District unless otherwise exempt.

## Potable Water

The Clay County Utility Authority manages and operates the potable water supply facilities that serve the City. The CCUA continues to operate its facilities in a manner consistent with its permits and to expand the system to meet projected need within the City and areas outside the City but within the CCUA service area. There are no future needs of the City that are not anticipated by the CCUA; continued communication of annexation plans or efforts between the City and the CCUA is the most effective means for meeting the future needs related to potable water.

## Aquifer Recharge

Implementation and enforcement of policies adopted in 2010 that establish setbacks for septic tanks and drain fields for waterfront lots, limit the maximum impervious surfaces to 20 percent of the total lot area, limit the storage or use of hazardous materials, and prohibit certain uses within the high aquifer recharge areas within the City represent the future actions to be undertaken by the City to protect the water quality and quantity of the recharge area of the Floridan Aquifer.