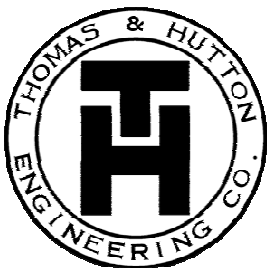


**PRELIMINARY WATER, SEWER AND  
TRANSPORTATION DESIGN  
CONSIDERATIONS**

**PREPARED FOR :  
CITY OF WOODBINE**

**J - 17969  
JUNE 26, 2007**



**THOMAS & HUTTON ENGINEERING CO.**

SAVANNAH, GEORGIA ♦ BRUNSWICK, GEORGIA  
CHARLESTON, SOUTH CAROLINA ♦ MYRTLE BEACH, SOUTH CAROLINA

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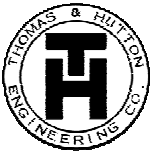
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**EXHIBITS** [Click on the title to view the exhibit.](#)

- A Proposed Water System Improvements
- B Proposed Wastewater System Improvements
- C Proposed Transportation Improvements



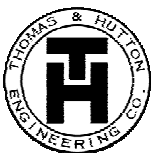
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## SECTION I. INTRODUCTION

Located just 45 miles north of Jacksonville, Florida, with easy access to the primary east coast north south route, I-95, the City of Woodbine is beginning to experience a period of rapid growth. Between 1990 and 2000, Woodbine's population increased by 0.3%. Between 2000 and 2005 the City of Woodbine population increased by 11.1%. In the future, the population is expected to increase at an even more accelerated rate. Existing projects such as the Satilla River Landing Subdivision, Satilla River Bluffs and Cabin Bluff are indicative of the accelerated rate of growth that the City of Woodbine and adjacent areas are set to experience.

The purpose of this report is to provide the City of Woodbine with a preliminary report of water, sewer and road infrastructure upgrades that will be needed to meet future additional water demand requirements, future additional wastewater treatment capacity requirements and meet the increased traffic that will accompany Woodbine's growth.



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**SECTION II.**  
**WATER DISTRIBUTION SYSTEM ANALYSIS**

**WATER DEMANDS**

Water demand requirements for the Satilla River Landing Subdivision, Satilla River Bluffs, approximately 735 undeveloped acres within the city limits of Woodbine and approximately 3,800 acres of land outside the city limits but immediately adjacent to Woodbine have been estimated. Water demands for residential developments are based on established demand rates. The demand loading rate is presented in Table 1.

**TABLE 1. WATER LOADING RATES**

Development	Unit Loading
Residential	400 gpd/unit

It should be noted that the unit loading rates presented in Table 1 are utilized to determine average daily demands. Peaking factors (Table 2) are used in conjunction with average day demands to determine “Peak Day” and “Peak Hour” water demands.

**Table 2. Demand Peaking Factors**

Demand	Peaking Factor
Average Day	1.0
Peak Day	1.8
Peak Hour	2.7



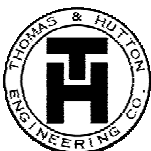
The projected average daily flow, peak daily flow and peak hourly water demands for 2008, 2009, 2010, 2015, 2020 and 2025 are provided in Table 3.

**Table 3. Projected Additional Water Demand Rates**

<b>Year</b>	<b>Total Estimated Additional Residential Units</b>	<b>Average Daily Water Demand (GPD)</b>	<b>Peak Daily Water Demand (GPM)</b>	<b>Peak Hourly Water Demand (GPM)</b>
2008	529	211,600	265	397
2009	1,028	411,200	514	771
2010	1,527	610,800	764	1,145
2015	2,026	810,400	1,013	1,520
2020	2,525	1,010,000	1,263	1,894
2025	3,024	1,209,600	1,512	2,268

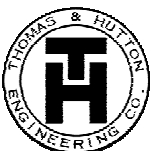
**SUMMARY**

The Satilla River Landing Subdivision and the Satilla River Bluffs development are projected to develop annually at 10% of total build-out projections. For example the Satilla River Landing Subdivision is projected to have 144 units at build-out therefore the estimated number of units constructed each year is estimated to be 15. The other areas both within the city limits and outside the city limits but adjacent to Woodbine’s city limits are projected to develop at an annual rate of 2% or 3% depending whether the area is projected to be high density (3 residential units/acre) or low density (2 residential units/acre) development. Undeveloped areas within the city limits and immediately adjacent to the city limits are high density areas and are projected to develop at an annual rate of 3%. Other nearby areas to the southeast and southwest are projected as low



density areas and as such would develop at an annual rate of approximately 2% per year. Since the annual rate of development between 2000 and 2005 is 2.2%, these projection rate seem reasonable. As previously stated, a higher development rate is planned for the Satilla River Landing Subdivision and for Satilla River Bluffs. Other developments such as Cabin Bluff will have an impact on Woodbine's growth as supporting business such as hardware stores, restaurants, new retail stores, etc are opened. These new businesses will make additional demands on Woodbine's water supply infrastructure.

By 2020 the additional water demand is projected to be over one million gallons per day. To meet the additional water demand requirements, additional water sources and water storage to supplement the two existing wells and two existing elevated water storage tanks will be needed. See Exhibit A. Pipe sizes and well and tank locations are preliminary and will be need to be reevaluated as Woodbine growth rate and direction are clearer. Woodbine's population growth rate is a dynamic process and close monitoring of the rate of development will be required to insure that upgrades (wells, storage tanks, new water mains, etc.) to the infrastructure are made in a timely manner so as to not inhibit growth.



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**SECTION III.**  
**WASTEWATER COLLECTION & TREATMENT**

**WASTEWATER GENERATION**

In a manner similar to that used to determine water demands, wastewater generation rates based on established wastewater generation rates was used to determine the total wastewater generation. Table 4 presents the typical wastewater generation rates.

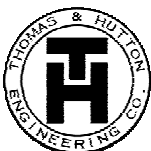
**Table 4. Wastewater Generation Rates**

Development	Unit Loading
Residential	350 gpd/unit

Based on build-out conditions, the total projected average daily flow and peak flow (2.5 times average daily flow) are presented in Table 5.

**Table 5. Additional Average Daily and Peak Hourly Flow Rates**

Year	Total Estimated Additional Residential Units	Average Daily Wastewater Generation (GPD)	Peak Hourly Wastewater Generation (GPM)
2008	529	185,150	321
2009	1,028	359,800	625
2010	1,527	534,450	928
2015	2,027	709,450	1,232
2020	2,525	883,750	1,534
2025	3,024	1,058,400	1,838



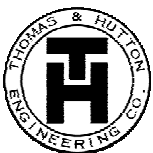
## SUMMARY

As previously stated, the Satilla River Landing Subdivision and the Satilla River Bluffs development are projected to develop annually at 10% of total build-out projections. Other areas adjacent to Woodbine are projected to develop at a slower rate, either 2% or 3%.

Wastewater generated in the new areas will have to be collected and transported to the wastewater treatment plant. Typically, the wastewater will be collected and transported to regional pump stations by gravity sewers systems within each development. Satilla River Landing Subdivision already has such a system. Based on preliminary engineering, approximately additional 14 regional pump stations may be required to meet wastewater pumping requirements. See Exhibit B. Existing pump stations may also have to be upgraded.

Woodbine's actual growth rate for the next 3-5 years may be controlled by the available wastewater treatment capacity. Assuming an available treatment capacity of 150,000 gallons per day, approximately 500 additional homes can be treated by the existing wastewater treatment plant. In low density developments, use of septic may be an option to facilitate growth but most recently the EPD has been reluctant to permit septic tanks.

Additional wastewater treatment capacity will be required to meet Woodbine's projected population growth. Over one million gallons of additional wastewater treatment capacity will be needed by 2025. The additional capacity may be provided in stages. The new wastewater treatment plant will most likely have to meet urban reuse standards – a higher standard than the existing wastewater treatment plant. Additionally, the EPD may require water reuse distribution systems as well.



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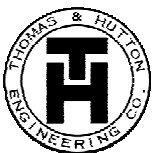
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## SECTION IV. TRANSPORTATION

All of Camden County is in a state of rapid growth. Woodbine's population is increasing as are St. Mary's, and Kingsland's. Each will grow in its own way but the one common problem that each will share is how to compensate for all the additional traffic being imposed on streets designed for the small, quiet neighborhood environment that presently exists. A comprehensive road upgrade program will be required to meet future traffic requirements. Early planning and timely upgrade of existing roads and construction of new roads will minimize road congestion in the future.

Because the Satilla River borders Woodbine to the north, the population growth is projected to be to the east, southeast and southwest initially. To provide access to the new residential areas and to existing residential areas new roads will need to be constructed and existing roads will need to be upgraded. Several new roads projected to serve areas of future development are presented in Exhibit C. Road improvements include a new interchange at I-95 and Billyville Road and extending Billyville Cutoff to GA 110. This will provide a much needed east-west corridor. This east-west corridor would become part of a perimeter route that would provide improve access to downtown from outlying areas. The perimeter route would be made up of several existing roads including Spur 25, 10<sup>th</sup> Street, Godley Avenue, GA 110, Billyville Cutoff, Billyville Road and I-95.

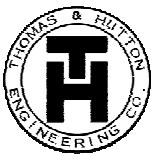
The road upgrades proposed herein to the existing road system are preliminary and as such should be considered with population growth information as well as industrial growth for Woodbine. Many of the proposed upgrades may be made in phases – thus controlling the cost impact on Woodbine.



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**EXHIBIT A.**  
**PROPOSED WATER SYSTEM IMPROVEMENTS**

[Click anywhere to view the exhibit.](#)

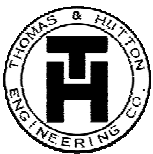


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**EXHIBIT B.**  
**PROPOSED WASTEWATER SYSTEM IMPROVEMENTS**

[Click anywhere to view the exhibit.](#)

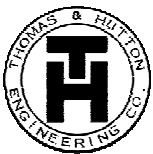


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**EXHIBIT C.**  
**PROPOSED TRANSPORTATION IMPROVEMENTS**

[Click anywhere to view the exhibit.](#)

**APPENDIX**



*Preliminary Water, Sewer & Transportation Design Considerations*  
CITY OF WOODBINE  
CAMDEN COUNTY, GEORGIA

J-17969