Ordinance No. 24-10 ORDINANCE: To adopt the Water Resources Element Plan as an amendment to the adopted Master Plan for Rockville

WHEREAS, pursuant to Section 3.08 of Article 66B of the Annotated Code of Maryland, the Mayor and Council of Rockville did, by Ordinance No. 24-02, adopt the Comprehensive Master Plan (the "Master Plan") for the City of Rockville (the "City"), and

WHEREAS, the City of Rockville Planning Commission (hereinafter referred to as the "Commission") under the provisions of Section 3.07 of Article 66B or the Annotated Code of Maryland may recommend adoption of any amendment or extension of or addition to the Master Plan; and

WHEREAS, Section 3.05 (a)(4)(vi) of Article 66B of the Annotated Code of Maryland sets forth that the General Plan must have a Water Resources Element; and

WHEREAS, the Mayor and Council requested the Commission to make, approve and recommend to the Mayor and Council a Water Resources Element; and

WHEREAS, in connection with the preparation of the Water Resources Element, the City staff did carefully and comprehensively review and study the existing conditions and identify existing receiving waters and wastewater treatment areas and also identify drinking water resources to meet the needs that arise from projected growth; and also addresses water resource protection, ground water resources, water quality standards and Total Maximum Daily Loads (TMDLs) – the maximum amount of pollutant a body of water can receive; and

WHEREAS, the Water Resources Element has been prepared for the purpose of providing a clear vision and guide for the future of the City and to provide a framework for the City to meet the water and wastewater needs for future generations; and

WHEREAS, the said Water Resources Element was the subject of a Planning Commission presentation on May 12, 2010 and Planning Commission Public Hearing on June 9, 2010, as required by law, and work sessions on June 23, July 14, and July 28, 2010 held in the Council Chamber at City Hall, 111 Maryland Avenue, Rockville, Maryland; and

WHEREAS, on July 28, 2010, the Planning Commission adopted a resolution approving the Water Resources Element as Resolution No. 2-10; and

WHEREAS, under the provisions of Section 3.08 of Article 66B of the Annotated Code of Maryland, the Mayor and Council is required to adopt amendments to the Master Plan for the City of Rockville; and

WHERAS, the General Plan and amendments made from time to time provide a general framework for assisting the Mayor and City Council and City Planning Commission in making land use policy and facilities decisions; and

WHEREAS, the said Water Resources Element was the subject of Mayor and Council presentation on August 2, 2010, a public hearing on September 13, 2010, to receive further comments on the Commission's recommendation to the Mayor and Council, and a work session on October 11, 2010.

NOW, THEREFORE, BE IT ORDAINED BY THE MAYOR AND COUNCIL OF ROCKVILLE, MARYLAND, that the Water Resources Element, amendment to the General Plan, thoroughly reviewed by the legislative body is hereby adopted as an amendment to the Master Plan for the City of Rockville, consisting of the publication entitled "Water Resources Element" dated December 13, 2010.

****

I hereby certify that the foregoing is a true and correct copy of a copy of an ordinance adopted by the Mayor and Council at its meeting on December 13, 2010.

Glenda P. Evans, City Clerk

ROCKVILLE WATER RESOURCES ELEMENT

OF THE

COMPREHENSIVE MASTER PLAN

Final Report Approved by the Mayor and Council
December 13, 2010

Rockville, Maryland

Water Resources Element of the Comprehensive Master Plan

Mayor and Council of Rockville

Phyllis Marcuccio, Mayor
John Britton
Piotr Gajewski
Bridget Donnell Newton
Mark Pierzchala

City of Rockville Planning Commission

David Hill, Chair
Jerry Callistein
Sarah Medearis
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Dion Trahan
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Rockville Water Resources Element of the Comprehensive Master Plan

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Safeguarding Rockville's Water Resources

Executive Summary

Introduction

Rockville is proud of its history of exceptional planning and implementation to ensure the delivery of high quality customer services, such as the delivery of drinking water and the disposal of wastewater. These principles and proactive approaches have carried over to the City's stewardship of its land and water resources.

The City has prepared this water resources plan to accomplish the following key objectives:

- Ensure that existing drinking water and wastewater infrastructure capacity is adequate to accommodate projected growth through 2040
- Identify infrastructure concerns, including diminished capacity due to aging, that may restrict predicted population and economic growth
- Protect Rockville's three sub-watersheds and the larger water bodies these sub-watersheds flow into from stormwater impacts

This plan supplements the water resource provisions currently set out in the City's existing Comprehensive Master Plan.

The City currently occupies 13.54 square miles (8,667 acres). While some additional annexation is possible, it is unlikely that these additions will add significant amounts of acreage over the next 20-30 years. Rockville was founded in the 1750s and has been an incorporated City since 1860. The City's current 2010 population is 62,476. This population is anticipated to grow to 77,644 (an additional 15,168) by 2030, and 83,929 (a cumulative addition of 21,453) by 2040. These numbers will be updated over time as this planning document is revisited (no less than every 6 years) and based on future census population numbers.

Over 20% of Rockville's current housing has been constructed since 2000. The total number of 2010 households is 24,327 and that number is expected to grow to 31,509 households by 2030 and 34,509 by 2040. This represents a projected increase of approximately 7,182 (30%) and 10,182 (42%) over the number of current households.

There are few *greenfields* remaining within the City limits. Since Rockville is almost entirely built out, future growth will focus on infill and redevelopment of the City's existing footprint. Land use patterns in the City are predominantly residential and commercial with different neighborhoods offering differing housing styles and densities, including several mixed use, and smart growth centers. Additional population growth is expected to spur greater residential densities and be clustered around Metro subway stations, Rockville Pike (State Route 355), and the City Center.

Drinking Water Capacity

Rockville has a very reliable source of drinking water, and is part of a regional partnership that ensures adequate wastewater capacity. The City is moving forward to expand the capacity and efficiency of its water treatment plant as well as address concerns with aging in both the water distribution system and the wastewater collection system.

Since 1958, Rockville has obtained 100% of its drinking water directly from Potomac River withdrawals. Groundwater is not used to supplement the City's water supply. Virtually all Rockville residences and businesses are either on the City water system or the system owned and operated by the Washington Suburban Sanitary Commission (WSSC). There are a few individual parcels within the City limits that are *islands* still under the Montgomery County jurisdiction that may have an active well. However, these property owners are not subject to the Rockville City Code and have not been required to connect to a City water line or sewer.

The City owns and operates its own water treatment plant and supplies approximately **18,114** residential households (74 percent of the City's total residences) with drinking water. Similarly, Rockville provides water to **784** nonresidential customers. There is no irrigated agriculture or water-intensive manufacturing in the City. The City has an appropriation permit issued by the Maryland Department of the Environment to withdraw an average of 7.1 million gallons of Potomac River water per day and a daily maximum *not-to-exceed* amount of 12.1 million gallons. The actual daily average withdrawal for 2009 was 4.91 million gallons. The approximate summertime maximum withdrawal is currently 8 million gallons per day.

The remaining **26%** of Rockville households and businesses are served by the Washington Suburban Sanitary Commission (WSSC), which owns and maintains the water lines serving these customers. WSSC does not anticipate any concerns with continuing to service its Rockville customers for the next 20-30 years. The reason for the dual service approach derives from periodic annexations of land that have historically been in the WSSC service district and remain therein after annexation. In the future, should Rockville annex additional land into the City, those properties will continue to be served by WSSC. In the event that a parcel is currently on a well (there are only a handful known at this time), the property would be required to connect to the City water and sewer lines as a condition for coming into the City. Rockville does not anticipate any concerns with providing service to these few residents.

The projected drinking water needs of the resident and nonresident populations in 2030 will require an additional **0.82 million** gallons per day. By 2040 this amount will grow to **1.37 million** over current withdrawals for a total need of **6.55 million** gallons per day. This modest additional need can be satisfied from the City's existing Potomac River allocation.

Wastewater Capacity

There are virtually no domestic septic tanks treating sewage within the City limits. Rather all sewage, which is collected in 148 miles of City-owned and maintained sewers, is transported out of the community to interceptor sewers owned and maintained by WSSC. The City provides wastewater service for approximately **18,114** residential households (74 percent of the City's total residences). Similarly, Rockville provides wastewater service to **784** nonresidential customers. The remaining **26%** of Rockville households and businesses are served by the Washington Suburban Sanitary Commission (WSSC), which owns and maintains the wastewater lines serving these customers. WSSC does not anticipate any concerns with continuing to service its Rockville customers for the next 20-30 years.

In turn, WSSC conveys the Rockville sewage, along with the sewage WSSC itself collects from other jurisdictions, to the Blue Plains regional wastewater treatment plant owned and operated by the District of Columbia Water and Sewer Authority (DC WASA). There the sewage receives primary, secondary and tertiary treatment, including denitrification before being discharged into the Potomac River. The current sewage demand for residential and nonresidential customers is 3.93 million gallons per day (approximately 80% of the drinking water demand). In addition, the City's sewer system is

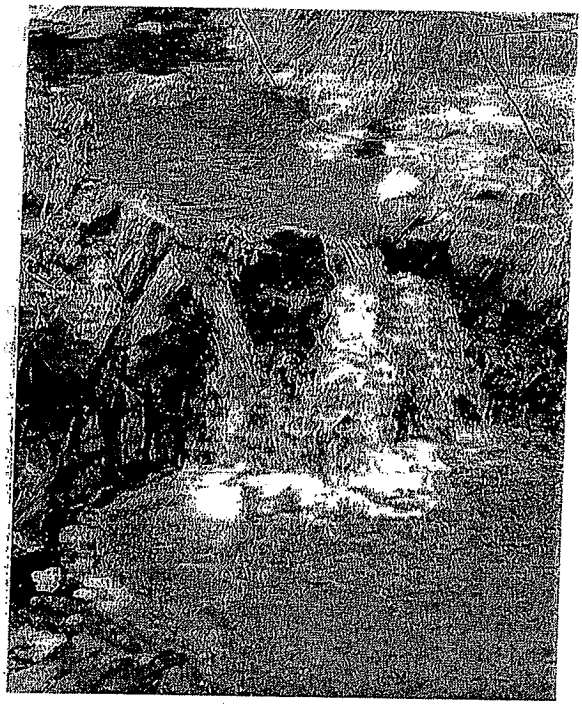
experiencing approximately 2.18 million gallons per day of groundwater infiltration and inflow (I&I) due to breaks and cracks in the system. While the City is taking steps to reduce this amount of I&I, we must still account for it in calculations of Rockville's sewer (and ultimately treatment) capacity at Blue Plains.

The projected wastewater needs of the resident and nonresident populations, including I&I in 2030 will require an additional **0.78 million** gallons per day (**12%**) above current demand. By 2040 this amount will grow another 0.31 million gallons **(17%)** over current demand, for a total demand of **7.42 million** gallons per day. This volume of wastewater is well within the City's existing allotment of Blue Plains regional treatment capacity. Similarly, WSSC is expected to be able to accommodate the portion of the City's sewage that flows into its collection system. Consequently, there are no anticipated wastewater capacity issues for either the City or WSSC beyond the continued maintenance of the collection systems.

Stormwater Controls

Rockville has 32.2 miles of surface streams within 13.54 square miles. These streams flow through three sub-watersheds. The three are Rock Creek, Cabin John Creek and Watts Branch. All of Rockville's waterways flow into the Potomac River and ultimately the Chesapeake Bay.

Rockville has adopted its own stringent regulatory controls to prevent water quality degradation in its three sub-watersheds. For example, the City has the most extensive stream buffers in the State of Maryland. Over the last few years, Rockville has restored several miles of critical stream channel and stream-side habitat in the Rock Creek and Watts Branch watersheds. The City undertakes a comprehensive watershed study of its three watersheds every 10 years. In 2008 the City adopted the first-of-its-kind-in Maryland stormwater utility fee that allows the City to invest in 20 full time equivalent employees (FTE) to address various aspects of stormwater management as well as pay for storm drain and treatment facility capital improvements. In 2010, the City undated its stormwater management ordinance to incorporate environmental site design controls into its stormwater management program.



Stormwater is removed from streets and properties through a combination of public and private stormwater inlets, drainage systems, treatment facilities and outfalls discharging to one of the three sub-watersheds. The City itself currently owns and maintains 2,050 inlets, over 162 miles of storm drains and 106 treatment facilities. In some of the City's older locations, stormwater is conveyed directly to a stream without any treatment. In recent years, the City has begun to supplement these structural approaches with efforts to establish low impact development and environmental site design practices that use or store stormwater runoff on-site rather than transporting the water to a neighborhood treatment structure or stream. This in turn will reduce the quantity and velocity of runoff exiting the City's storm drains, reduce sediment and erosion in City streams and extend the useful life of the existing storm drain system. These practices show particular promise as a way of addressing stormwater in the older neighborhoods lacking treatment.

Recommendations

Rockville is well positioned to protect its precious water resources and provide adequate service to its population now and well into the future. In order to expand or accelerate these actions, the City will require assistance from the federal government or the State of Maryland. The following steps will ensure that the City's program remains on track in the future:

Drinking Water Actions

1. Complete the investigation of the condition of the City's 24-inch transmission line from the water plant to the distribution system, including the valves on that line, and follow up with repairs and replacement as needed. Incorporate periodic inspections, repairs and right-of-way easement maintenance activities into the existing water main rehabilitation CIP project.

2. Continue replacing 34 miles of the most vulnerable 182 total system miles of water lines over the next 20 years. Thereafter, replace additional water lines as may be warranted given their condition.

3. Resolve concerns with the water age (i.e., stale water with potentially low chlorine levels) and storage capacity of the City's three existing storage tanks.

4. Bring the Glen Mill Pump Station on line.

5. Upgrade and expand the water plant with energy efficient components and solids handling that will allow it to produce up to a maximum of 14 million gallons per day, and pursue commensurate increases in the City's Potomac River allocation as needed.

6. Provide customers with consumption data and water conservation techniques and other meaningful public education activities.

Wastewater System Actions

1. Complete mapping and metering the entire system, including privately-owned sewers and the WSSC interconnections.

2. Continue to support the annual camera inspections of the sewer system.

3. Determine a more accurate estimate of the amount of I&I in Rockville's sewer system by comparing the metered flow data to the water meter consumption data, and follow up on the results of the television inspections and the Rock Creek and Watts Branch Infiltration and Inflow (I&I) studies and undertake priority sewers rehabilitation and replacement.

4. Continue to implement commercial and residential fats, oils and grease management program to prevent grease buildups and sewer blockages from occurring.

5. Maintain easement access to all portions of the wastewater infrastructure.

6. Develop a City-wide hydraulic model of the collection system.

Stormwater Management Actions

1. Develop and implement regulatory amendments to the City Code.

2. Improve the City's stormwater enforcement program.

3. Identify potential stormwater facility retrofits that will be responsive to U.S. EPA and State Chesapeake Bay restoration requirements to reduce the amount of untreated or partially treated runoff in the City.

4. Implement an effective preventative maintenance program.

5. Repair watershed damage through the stormwater capital improvement project (CIP) budget.

6. Identify and implement effective data management approaches to inform decision-making.

7. Perform continuous program assessment and planning updates.

8. Actively participate in regional stormwater improvement efforts targeted to the Potomac River and Chesapeake Bay.

Chapter One: Goals, Organization and Comprehensive Planning Consistency

Water is the life's blood of any community. A safe and adequate drinking water supply is critical to the sustainability of existing communities and the viability of planned future growth. Population increases, climate change and pollutant contamination all present potential challenges to maintaining this assured supply. Limited supplies can slow or stop planned development thereby preventing communities from achieving the vision set out in Comprehensive Land Use Plans and pursuing smart growth policies to manage growth.

Population and economic growth must align with water quantity and quality. A balance must be struck to avoid over development that in turn leads to water shortages and non-potable water sources. Careful water-resources planning will protect public health, safety and welfare; and support smart-growth land use choices in the future.

Water Resources Planning Requirements

On May 2, 2006, House Bill 1141, the Government Planning Act was signed into law. The legislative purpose of this Act is to ensure that comprehensive land use plans and future growth considerations reflect both the opportunities and limitations presented by a community's water resources. Water resources include drinking water sources and service, wastewater service, and the community's efforts to protect surface and groundwater resources through a stormwater management program and activities. The 2006 law requires all local jurisdictions in Maryland to incorporate into their comprehensive master plans a *water resources planning element* by October 1, 2009. The Maryland Department of the Environment and the Maryland Department of Planning can extend this deadline to October 1, 2010 and have done so for Rockville.

Water Resources Plan Goals

The water resources plan presents both challenges and solutions for Rockville's community water resources. The City's goals for this plan can be summarized as follows:

- Ensure that existing drinking water and wastewater infrastructure capacity is adequate to accommodate projected growth through 2040
- Identify infrastructure concerns, including diminished capacity due to aging, that may restrict predicted population and economic growth
- Protect Rockville's three sub-watersheds and the larger water bodies these sub-watersheds flow into from stormwater impacts
- Promote the reduction of impervious surfaces in the community during redevelopment activities
- Preserve existing open spaces and expand them as opportunities present themselves
- Encourage future population expansion to concentrate in areas designated as mixed use or *smart growth* neighborhoods.

The document outlines how water supplies, wastewater and stormwater will be managed to support planned growth. Since Rockville has very limited undeveloped land or *greenfields,* this plan describes the City's approach to growing population densities rather than changing land uses. The plan is realistic and sustainable over time.

The water resources plan functions as an early warning system that alerts City decision-makers when predicted growth and densities could outpace supply and infrastructure capacities. Therefore, the plan is intended to trigger work on laws, policies and actions needed to ensure future water and wastewater needs are met while protecting local and regional watersheds and related habitat.

Plan Organization

The remainder of this plan is organized into **five** Chapters.

Chapter Two presents an overview of the general physical and planning circumstances surrounding Rockville and provides the context for this document. For more detailed information, see *The Municipal Growth Element* (of the Comprehensive Land Use Master Plan)(August 2010), a companion document to this one.

Chapter Three describes Rockville's drinking water program, including current and projected water demand, the City's available water supplies, the Rockville water treatment plant, the water distribution system, known concerns about long-term capacity regarding all of these facilities, and the City's current plans to address those concerns.

Chapter Four addresses Rockville's current and projected domestic sewage collection and treatment needs, the capacity of existing city sewers to carry these loads, and the wastewater treatment provided by the Washington Suburban Sanitary Commission and the District of Columbia Water and Sewer Authority. The Chapter also identifies concerns about the long-term capacity of these facilities and our current plans to address those concerns.

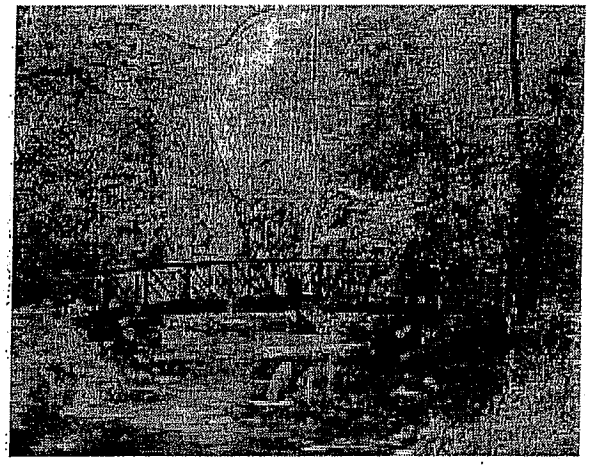
Chapter Five addresses the many aspects of stormwater management and the wide variety of actions Rockville is currently pursuing to address potential pollutant loads to the City's three sub-watersheds (Rock Creek, Cabin John Creek and Watts Branch) that flow to the Potomac River and then into the Chesapeake Bay, as well as groundwater underlying the City's footprint. The Chapter includes steps the City anticipates taking to further enhance the effectiveness and efficiency of the stormwater program.

Each of the last three Chapters includes information on funding needed improvements and any data gaps that need to be addressed in the coming years.

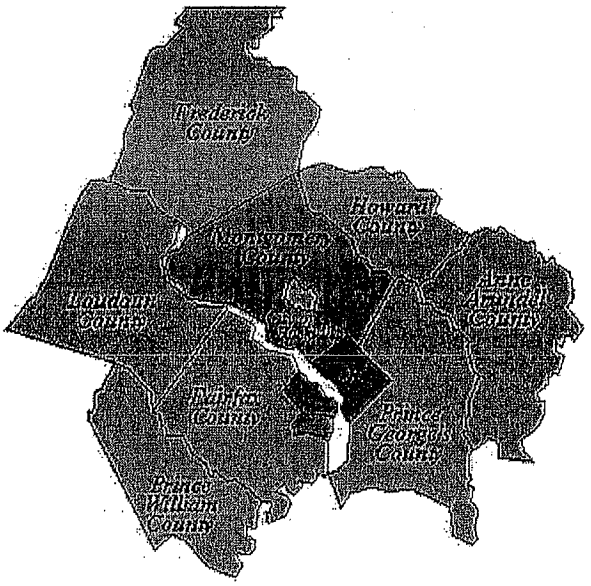
Consistency with the Comprehensive Plan and Inter-Jurisdictional Coordination

This plan supplements the water resource provisions currently set out in the City's existing Comprehensive Master Plan. In the event of any conflict between the provisions of the Comprehensive Master Plan and the statements and conclusions contained in this plan, the statements and conclusions of this plan will govern.

Rockville recently enacted comprehensive changes to our existing zoning code, including the City's zoning map. This land use pattern is not expected to change existing actual uses (other than the expectation that key population centers will grow increasingly dense over time). It should also be noted



that since the City of Rockville is located entirely within Montgomery County, the two jurisdictions have coordinated their plans. In fact, the Rockville information on existing land use, projected land use changes, and nonpoint source pollutant analyses have been included in the maps and supporting documentation contained in the County's own water resources plan.



Finally, Rockville acknowledges that the City needs to coordinate with the Maryland State Highway Authority (SHA) when utility or facility upgrades and expansions relative to the Rockville storm drain system, the sanitary sewer system, and water distribution lines may impact State highways or rights-of-way; or impact SHA's ability to implement roadway improvements, acquire additional right-of-way, or otherwise act to maintain a safe and efficient multi-modal transportation system.

Chapter Two: General Physical and Planning Background

Originally called Hungerford's Tavern, the community of Rockville was founded in the 1750s and has been an incorporated City since 1860. The City is currently celebrating 150 years of home rule in 2010. Rockville has been the county seat for Montgomery County government since 1776.

Population Growth

When first incorporated in the mid nineteenth century, Rockville boasted a population of 365. Population growth was modest until World War II, after which the City experienced sharp population increases in every decade after the 1950s. For example, between 1950 and 1960, the population rose by 276 percent. In 2010, the population is approximately 62,500 (24,300 households) and is projected to rise to 84,000 (34,500 households) by 2040. This increase is broken down into 5-year increments in the table below. These projections equate to a 34% increase in population and a 42% increase in the number of Rockville households.

Table 2.1 Rockville Population Growth Projections (2010 - 2040)*

Year	Population	Percent Change	Number of Households	Percent Change
2010 - Current	**62,476**		**24,327**	
Five Year Change	4,865	7.8%	2,317	9.5%
2015	67,341		26,644	
Five Year Change	4,506	6.7%	2,140	8.0%
2020	71,847		28,784	
Five Year Change	2,656	3.7%	1,250	4.3%
2025	74,503		30,034	
Five Year Change	3,141	4.2%	1,475	4.9%
2030	77,644		31,509	
Five Year Change	3,142	4.0%	1,500	4.8%
2035	80,786		33,009	
Five Year Change	3,143	3.9%	1,500	4.5%
2040	83,929		34,509	
30 Year Change	**21,453**	**34.3%**	**10,182**	**41.9%**

*/ Projection numbers provided by the Metropolitan Washington Council of Governments.

In 2000, Rockville's population density was 3,524.1 persons per square mile.

Employment

Due largely to its proximity to Washington D.C., and the wide variety of transportation modes available in the immediate vicinity, Rockville has and is expected to remain a net job importer. That is, the City will continue to enjoy job expansion in numbers that exceed its present and future population projections. The table below indicates the number of projected jobs in 5-year increments through 2040.

Table 2.2 Rockville Employment Projections (2010 – 2040)*

Year	Number of Jobs	Percent Increase
2010 – Current	74,549	-
5 Year Change	9,047	12.1%
2015	83,596	
5 Year Change	8,004	9.6%
2020	91,600	
5 Year Change	5,183	5.7%
2025	96,783	
5 Year Change	2,620	2.7%
2030	99,403	
5 Year Change	3,000	3.0%
2035	102,403	
5 Year Change	3,000	2.9%
2040	105,403	
30 Year Change	30,854	41.4%

*/ Projection numbers provided by the Metropolitan Washington Council of Governments.

Land Area and Use

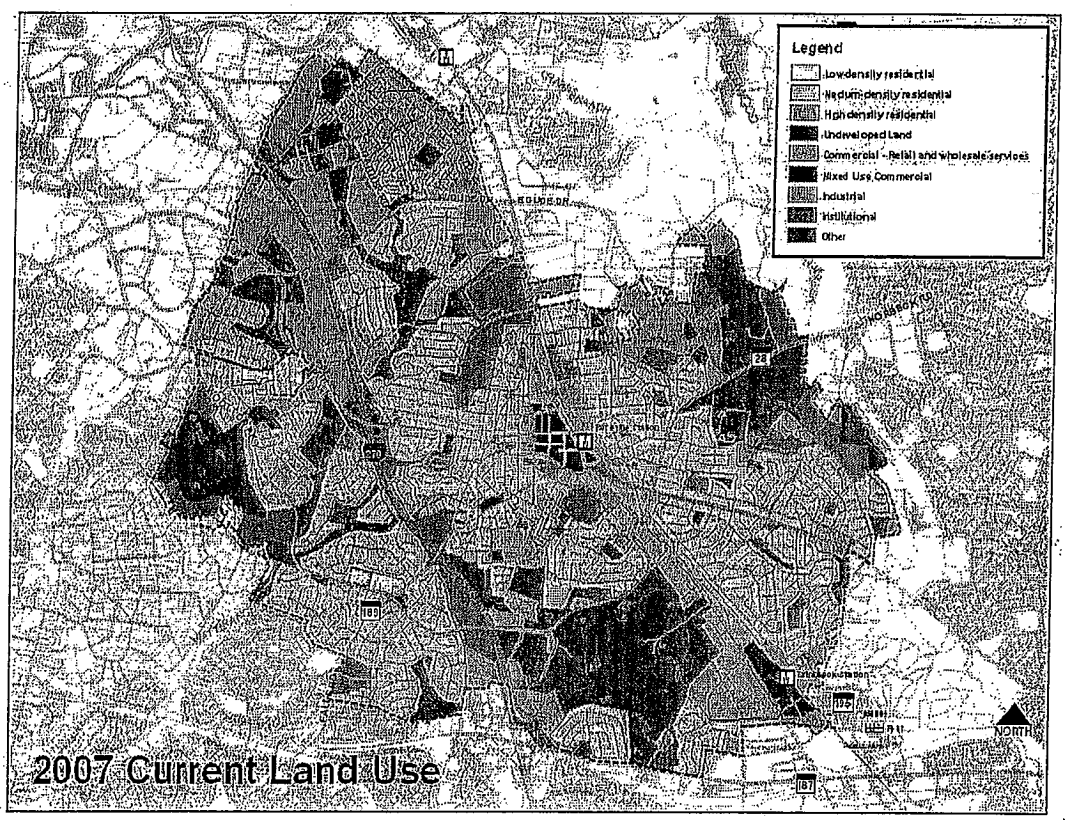
Rockville currently occupies 13.54 square miles (8,667 acres). When the City was incorporated, it was 73 acres. Rockville is located approximately 12 miles from the District of Columbia. Our proximity to the nation's capital and the federal agencies, and government consultants and contractors also makes the City an attractive place for employees and businesses to locate. Moreover, it is only an hour's drive to the State capitol in Annapolis and the City of Baltimore.

Except for green areas specifically reserved by the master plan and City zoning code, there are few *developable greenfields* remaining in the City limits. That is, Rockville is almost entirely built out. Consequently, **future growth will principally consist of redevelopment projects within the City's existing footprint**. Land use patterns in the City are predominantly residential and commercial with different neighborhoods offering differing housing styles and densities, including several mixed use, smart growth centers. Additional population growth is expected to spur greater residential densities and be clustered around proximity to metro subway stations and the City Center. This continues a trend underway since 1970 when multi-family dwellings began to make significant inroads in Rockville housing. By 2000, multi-family dwellings comprised 25% of residential dwellings in the City. That trend is expected to intensify as the City moves to more mixed-use, higher-density, smart-growth redevelopment in the future.

There are no agricultural land uses remaining in the City. The City zoning code was comprehensively rewritten in 2009, along with the zoning maps. The new code emphasizes smart growth objectives and predicts mixed-use, higher-density redevelopment in several neighborhoods, including the Rockville Pike/State Route 355 corridor. Land use flexibility was codified in specific areas while doing away with optional and overlay zoning categories. The Code was also *greened* up and contributes to water resources stewardship through such provisions as an expressed preference for parking structures over larger surface lots, the use of water conservation measures, installation of on-site stormwater controls

(including pervious pavements), cross linkage to the City's water quality protection and tree protection ordinances, and the use of green or vegetated roofs.

Map 2.1 Rockville Land Use Patterns



Rockville's Zoning Code has never allowed the presence of junk yards or other establishments that might contaminate stormwater runoff.

Rockville's Land use patterns may be described as follows:

- 15% of the City's land is in mixed use.
- 6% is the Town Center city core area.
- 15% is office buildings and grounds.
- 13% of the City is designated as 61 parks totaling 1,050 acres.

Rockville's tree canopy is 44%, including over 25,000 street trees and 12 forest preserves.

Table 2.3 Percent of Rockville Land Uses

LAND USE	ACRES	% OF TOTAL
RESIDENTIAL (ALL TYPES)	4,275	49.3%
RESERVED PARKS, FORESTS & WETLAND AREAS	1,913	22.1%
INSTITUTIONAL	811	9.4%
INDUSTRIAL	694	8.0%
COMMERCIAL (RETAIL/WHOLESALE)	628	7.2%
TRANSPORTATION	232	2.7%
COMMERCIAL MIXED-USE	114	1.3%
TOTAL	**8,667**	**100.0%**

Transportation Options

Rockville enjoys access to three major regional airports [Baltimore-Washington International (aka Thurgood Marshall), Reagan National, and Dulles International]; interstate highways [Routes 270, 495, 95, 29, 70 and Maryland 200]; and local mass transit options [the Washington Metro subway system, Amtrak and MARC trains, and Ride-On buses] make the community attractive to residents and businesses alike.

The City maintains all roadways that are not maintained by the State, Montgomery County or private parties. The City does not operate local bus service in the community but has installed over 70 bus shelters to encourage residents to use this system. Finally, the City adopted and completed a Bicycle Master Plan in 1998, including construction of a large network of bike commuter trails around the City.

For more detailed information on population projections, land use, maximum expansion limits, and projected growth impacts beyond water resources, see *The Municipal Growth Element* (of the Comprehensive Land Use Master Plan)(August 2010), a companion document to this one.

Rockville Water Resources

Rockville has 32.2 miles of surface streams within its 13.5 square miles. These streams flow through three sub-watersheds. The three are Rock Creek, Cabin John Creek and Watts Branch. All of Rockville's waterways flow into the Potomac River and ultimately the Chesapeake Bay.

Table 2.4 Rockville Surface Stream Miles

Area (in square miles)	Cabin John Creek	Rock Creek	Watts Branch
Within Rockville	3.6	2.9	6.5
Within Montgomery County (est.)	21.4	48.1	15.5
Within D.C. (est.)	0	17	0
Total Watershed Area	25	68	22
Percentage of Watershed within Rockville	14.4%	4.3%	29.5%
Percentage of Rockville's land area within Watershed	28%	22%	50%

Historically, Rockville relied on groundwater to meet its drinking water needs. However, since 1958, Rockville has obtained 100% of its drinking water directly from Potomac River withdrawals (see Drinking Water Chapter). There are no active wells within the City and Rockville does not currently withdraw any groundwater resources to meet its needs.

Water Supply Capacity

The City owns and operates its own water treatment plant and supplies approximately 46,300 people living in 18,114 households (74 percent of the City's residential population; 72 percent of the City's residential households) with drinking water. The City has an approved 2002 Maryland Department of the Environment allocation to withdraw an average of 7.1 million gallons per day and a daily maximum not-to-exceed amount of 12.1 million gallons of Potomac River water. The actual daily average is currently just below 5 million gallons per day and the summertime maximum withdrawals currently total approximately 8 million gallons per day (for more details on this consumption, see discussion in Chapter 3). The allocation is subject to renewal in 2014.

The City water treatment plant is located in Potomac, Maryland on the bank of the Potomac River. Water is withdrawn and treated by settling and filtering out solids and the addition of chemicals and disinfectants to eliminate and prevent the occurrence of bacteria, pathogens, and viruses. The water is then pumped to the City and distributed through 182 miles of water lines. The City also maintains three storage tanks with a combined 12 million gallons of storage capacity. There are a number of security protocols used to safeguard the plant from outsiders; and tours must be arranged with the City in advance.

The Washington Suburban Sanitary Commission (WSSC) services the remaining 26 percent of the City's population. WSSC owns and maintains the water and wastewater lines serving these customers. This dual approach derives from periodic City annexations of land that have historically been and remain in the WSSC service district.

In the event of a planned or emergency outage of the City's system, Rockville can obtain sufficient water from WSSC via nine intersystem connections tying the two systems together. For more on the City's Drinking Water system, see Chapter Three.

Future annexation will not result in significant new demands placed on Rockville's water and sewer systems. First, the areas identified in the existing and proposed maximum expansion limit (MEL) are already nearly fully developed. Second, those areas that are already serviced by the Washington Suburban Sanitary Commission will remain WSSC customers following annexation. Third, the few properties that still have individual wells or septic systems will be required to connect to Rockville's water and sewer systems as a condition of annexation.

Threats to Rockville's Water Supply

As noted above, Rockville draws its drinking water from the Potomac River above Little Falls Dam. Although there are several medium size urban areas in its drainage, much of the Middle and Upper Potomac River flows through land that is primarily forested or engaged in agriculture. Threats to the Potomac River include:

- Urban area stormwater
- Agricultural runoff
- Municipal treatment plants
- Transportation (road surface) runoff
- Septic tanks discharges
- Wildlife generated bacteria
- Legacy (historic) pollutants in sediments
- Drought-caused low-flow conditions

- Terrorist threats and vandalism

The entire Maryland shore of the Potomac is contained within the boundaries of the Chesapeake and Ohio National Historical Park. The park buffers pollutants from entering the River and in general, the Potomac River runs clear and has a low turbidity. However, Maryland and Virginia tributaries still carry sediments and runoff to the Potomac mainstem.

Tributary erosion, channel widening, and down-cutting of these tributary stream banks deliver substantial sediments to the Potomac. However, since the Rockville water treatment plant is capable of removing these sediments, they do not render the River unusable. Similarly, disinfection addresses bacteria in the river system. Other pollutants (e.g., metals, pesticides, oil and grease, fertilizers and organic materials) could require additional treatment at the water plant but have not been observed at levels high enough to warrant this action. Therefore, the leading threat to the continued use of the Potomac River as Rockville's water supply is the remote possibility that climate change could lead to a temporary low-flow based disruption in service. There is little scientific evidence that this threat is likely during the 2010 to 2040 time horizon. Only one of Rockville's three sub-watersheds (Watts Branch) flows to the Potomac upstream from the City's intake location. A second (Cabin John Creek) reaches the Potomac above the Washington D.C. intake. The third (Rock Creek) waterway discharges into the Potomac in the vicinity of Georgetown just above the National Mall where the River is tidally influenced. Rockville has taken steps to ensure that none of these waters is contaminated by local discharges or pollution-causing activities.

Existing Water Resource Protection Laws

The Potomac River is an interstate water of the United States protected by the federal Clean Water Act [33 U.S.C. 1251 et seq.]. The water quality programs established by the Clean Water Act are implemented by the Maryland Department of the Environment, the Virginia Department of Conservation and Recreation, and the West Virginia Department of Environmental Protection. These States develop water quality standards to protect the River's designated uses including use as a drinking water supply. The States then issue point-source regulatory permits for all process and stormwater discharges into the river and administer nonpoint source pollution programs addressing other dischargers. In the event that designated uses are impaired, the States undertake total maximum daily load (TMDLs) analyses to identify and correct the situation and ensure the continued designated uses for the River.

Due to the size and scope of the watershed, there is little Rockville can do to influence upstream conditions in the Potomac River basin. However, Rockville, has adopted several local ordinances that serve as a model to other communities further up the drainage.

Rockville's Water Quality Protection Ordinance (City Code Chapter 23.5) was adopted in 2007 and prohibits any pollutants from being discharged, dumped or even placed in proximity to a waterway or a storm drain inlet such that the pollutant can be reasonably expected to reach the waterway or storm drain. The ordinance prohibits phosphates of any kind from being discharged. It establishes stream buffers of 125 to 175 feet on either side of a Rockville stream and requires adjacent landowners to allow stream banks to develop natural vegetation.

Rockville's Stormwater Management Ordinance (City Code Chapter 19) is one of the oldest in the State. First adopted in 1978, the ordinance as amended establishes mandatory stormwater management

practices, soil and erosion controls, a development review process, and a stormwater utility fee system based on the amount of impervious surface on each parcel in the City.

The City Building Codes and Property Maintenance Codes (City Code Chapter 5) ensure that development pursues low flow water fixtures and considers stormwater implications when designing new building projects. The Codes also prevents litter and other pollutants from reaching the waterways of the City.

Rockville's Forest and Tree Preservation Ordinance (City Code Chapter 10.5) is one of the most protective in the State and requires that trees be retained on site or replaced in another off site location elsewhere in the City.

Stream Restoration and Treatment Facility Retrofits

Rockville has undertaken a number of projects aimed at repairing stream courses damaged by adverse stormwater impacts as well as improving the quality of stormwater itself. Stream Restoration Projects include daylighting and restoring Maryvale Creek, an East Rockville tributary of Rock Creek; restoration of more than a mile and a quarter of the Watts Branch mainstem in the Wootton Mills area; and nearly another mile of Watts Branch in the Woodley Gardens neighborhood.

Rockville recently completed a retrofit in the College Gardens neighborhood. This project involved the installation of a regional stormwater pond facility that treats 79 acres that previously ran directly into Watts Branch without treatment. A similar project was completed in 2008 at Carnation Drive addressing 352 acres of drainage. The next project is scheduled for 2012 in Horizon Hills Park draining 186 acres. For more details on Rockville's stormwater controls, see Chapter Five.

Wastewater Treatment Capacity

There are no domestic septic tanks treating sewage within the City limits. All sewage is collected in 148 miles of City-owned and maintained sewers and transported out of the community. Rockville has not owned or operated a wastewater treatment plant since the 1950s, but rather contracts with WSSC to dispose of our domestic waste. In turn, WSSC conveys the Rockville sewage, along with the sewage WSSC collects from other jurisdictions, to the Blue Plains regional wastewater treatment plant owned and operated by the District of Columbia Water and Sewer Authority (DC WASA). There the sewage receives primary, secondary and tertiary treatment, including denitrification before being discharged into the Potomac River. For more on this system see Chapter Four.

Stormwater Management

Stormwater is removed from streets and properties through a combination of public and private stormwater inlets, drainage systems, treatment facilities and outfalls discharging to one of the three sub-watersheds. The City itself currently owns and maintains 2,050 inlets, over 162 miles of storm drains, and 106 treatment facilities. There are nearly 400 facilities in private hands. In some of the City's older locations, stormwater is conveyed directly to a stream without any treatment and often at erosive velocities.

In recent years, the City has begun to supplement these structural approaches with efforts to establish low impact development and environmental site design practices that use or store stormwater runoff on-site rather than transporting the water to a neighborhood treatment structure or stream. This in turn will reduce the quantity and velocity of runoff exiting the City's storm drains, reduce sediments and erosions entering the City streams and extend the useful life of the existing storm drain system. These practices

show particular promise as a way of addressing stormwater in the older neighborhoods lacking treatment. For more on the City's stormwater program see Chapter Five.

Growth Restrictions and Regulatory Obligations

Rockville growth is restricted by its allocation of Potomac River Water, the capacity of its water treatment plant, the capacity of its water distribution lines, and the capacity of its sewers. In addition, storm drain capacity dictates the amount of impervious surface available before local flooding begins to occur. Finally, the City holds a State Clean Water Act (NPDES) permit that establishes stormwater requirements associated with the City's storm drain system, including the drains and treatment facilities, and a second permit that controls activities that could potentially adversely impact runoff from the City's vehicle maintenance yard and golf course. The stringency of these permits is expected to increase in conjunction with State and Federal efforts to restore the Chesapeake Bay.

Rockville's Pro-Active Approach to Water Resources Management

Rockville's development review process ensures that additional residential and commercial growth does not occur if the water, sewer and stormwater needs of that growth cannot be assured. The process determines whether there is adequate capacity *downstream* of the project (all the way to the City limits) and requires developers to increase that downstream capacity before the project can go forward. In 2009, Rockville adopted comprehensive revisions to the City's zoning code, including provisions that anticipate denser mixed or *smart* growth in the future. Along with the water element component of the Comprehensive Plan, the City enacted comprehensive revisions to the City's building codes that establish a green building program.

Since Rockville's population has already constructed homes, retail and offices on virtually all of the developable land in the City; and since irrigated agriculture has been eliminated and replaced by urban land uses; the City's per capita water demand has actually declined against its historical consumption. With the exception of several golf courses, agricultural scale irrigation and livestock watering have ceased. Similarly, there is no water-intensive industry within Rockville's borders. As the City's population grows denser over the next 30 years, lawn irrigation is expected to decline on a per capita basis as well. The denser portions of the City will continue to require water for drinking, food preparation, wastewater removal, washing dishes and surfaces, vehicle washing, cleaning laundry, gardening, supplying pools and fountains, and other uses associated with an urban lifestyle. However, this volume is not expected to equal historic agricultural consumption until the population experiences considerable growth beyond the projections for the next 30 years.

While the per capita water demand may fall, the City anticipates the absolute need for water may increase. Therefore, Rockville has already begun the planning process to upgrade and expand capacity at its water treatment plant. Further, knowing that our drinking water lines are nearing the end of their useful life, the Rockville Mayor and Council has embarked on a 20-year project to replace the most vulnerable 34 miles of water lines. This effort will minimize water breaks and service interruption as well as increase capacity in those neighborhoods to support fire flow demands and improve the quality of the drinking water in those neighborhoods. Given the useful life of other parts of the distribution system, it is likely that some level of this work will continue beyond the existing 20-year capital campaign.

Our sewer conveyance system is aging as well. A capital project repair and replacement program is underway. The City is also systematically studying the condition of sewers across the City as the first step to ensuring adequate long-term capacity.

Conclusion

Rockville has a very reliable source of drinking water, and is part of a regional partnership that ensures adequate wastewater conveyance and treatment capacity. The City is moving forward to expand the capacity and efficiency of its water treatment plant as well as address concerns with aging in both the water distribution system and the wastewater collection system.

In recent years, Rockville has adopted its own stringent controls to prevent water quality degradation in our three sub-watersheds. The City has the most extensive stream buffers in the State of Maryland. Over the last few years, Rockville has restored several miles of critical stream channel and stream-side habitat in the Rock Creek and Watts Branch watersheds. The City undertakes a comprehensive watershed study of its three watersheds every 10 years. Finally, in 2008 the City adopted the first-of-its-kind-in Maryland stormwater utility fee that allows the City to invest in 20 full time equivalent employees (FTE) to address various aspects of stormwater management as well as pay for storm drain and treatment facility capital improvements.

Chapter Three: Assuring Adequate Drinking Water Supplies

Without adequate drinking water, a community cannot survive or thrive. Water supports population and economic growth and allows a community to flourish. Further, poor local land use decisions can unknowingly jeopardize an existing water supply by leading to its contamination. Therefore, protection of existing water supplies must be considered an overriding factor influencing a community's ultimate sustainability. The Safe Drinking Water Federal and State laws and standards address both microbial and chemical contaminants that threaten the integrity of drinking water quality. Microbial contaminants are considered immediate or acute public health concerns while chemical contaminants pose longer-term or chronic health risks. Safe Drinking Water Regulations are periodically updated with more stringent standards, which necessitate upgrades to Rockville's drinking water treatment and delivery processes.

This plan sets out the vision and path needed to assure that Rockville has an adequate supply of drinking water that meets all applicable health and safety standards. Since Rockville is located in a rapid growth area of Maryland, residents, businesses, developers and environmental professionals are understandably concerned that the City will enjoy an adequate supply of drinking water well into the future. Moreover climate change and recent drought conditions have generated concerns that Central Maryland communities may not always have an adequate supply. However, Rockville has no such concern for the foreseeable future.

Table 3.1 Rockville Demographic Information

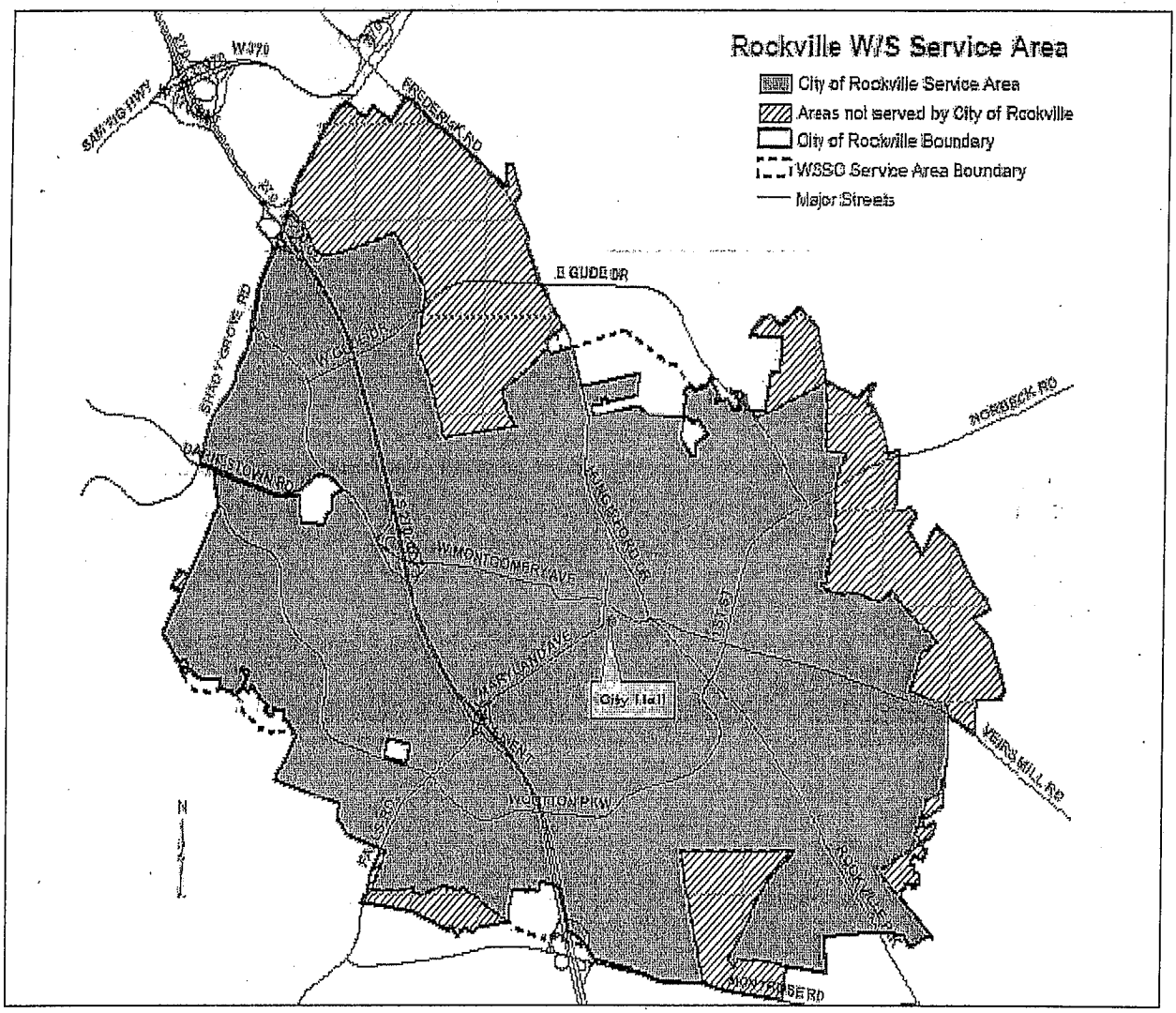
	2010	2030	2040	Change (Percent)
Square miles	13.5	13.5	13.5	-
Total City Population	62,476	77,644	83,929	21,453 (34%)
Total Rockville Households (served by City & WSSC)	24,327	31,509	34,509	10,182 (42%)
City Service Households	18,114	23,460	25,690	7,576 (42 %)
City Nonresident Service Connections	784	824	835	51 (6%)
WSSC Service Households*	6,213	8,049	8,819	2,606 (42 %)

*/ The Washington Suburban Sanitary Commission (WSSC) continues to provide water and sewer service to those households and businesses located within its historic service area that have been annexed into the City.

Since the City of Rockville is completely built out, future growth will be infill and redevelopment. This redevelopment will be concentrated in close proximity to the City's redeveloped Town Center, its three Metro (subway) stations, and redevelopment along the Rockville Pike corridor. With the exception of the area surrounding the Shady Grove Metro Station and part of the areas surrounding the Twinbrook

Metro Station, the City provides drinking water to these areas and will be expected to absorb these new customers.

Map 3.1 The Rockville/WSSC Drinking Water Service Areas



Rockville's Water Supply

As noted above, there is no irrigated agriculture or water intensive industry located in Rockville. Similarly, there are no known public or private drinking wells currently in operation in Rockville. The City holds a May 15, 2002 State Water Appropriation Permit [No. MO1958S001(04) from the Maryland Department of the Environment (MDE) that allows it to withdraw a daily average amount of 7.1 million gallons each day and a not-to-exceed daily maximum of no more than 12.1 million gallons of Potomac River water. At present, Rockville water system is meeting the needs of our customers through daily average withdrawals of 4.91 million gallons a day (69% of the 7.1 million gallon authorized daily average amount), and approximately 8 million gallons per day (during the driest summer months) of the 12.1 million gallon a day peak authorization (66% of the daily peak demand). Both State withdrawal

authorizations still have considerable room for additional withdraws. This seasonal difference is attributed to lawn and garden irrigation and backyard pool maintenance demands. The permit expires in May 2014 and is subject to renewal.

Table 3.2 Rockville Average Daily Water Production

Year	Production (Million Gallons per Day)
2005	4.70
2006	4.97
2007	5.16
2008	4.87
2009	4.91
Five Year Average	4.92

As noted in the table above, Rockville's water plant produced 4.91 million gallons of water daily in 2009. The five year average from 2005 to 2009 is 4.92 million gallons of water produced daily. The water treatment plans produces 1.79 billion gallons of water annually to serve approximately 46,300 residents living in 18,114 households (72% of our households). The remainder of the City's households is served by WSSC. A 2006 Rockville water consumption study indicates that, on average, City households use 162 gallons per day per household (approximately 65 gallons per person per day). This per capita consumption is expected to fall as a result of a series of conservation practices and incentives the City has put in place. That same study indicates that non-residential connections consume approximately 2,865 gallons of water per day. This level is also expected to decline over the next 20 years.

Threats to the Water Supply

The Potomac River drains 14,670 square miles in Maryland, Virginia, Pennsylvania, West Virginia and the District of Columbia.

A minimum Potomac River flow has been established to protect aquatic life. This *flow-by* requirement is 100 million gallons per day (MGD) at Little Falls Dam, and 300 MGD at Great Falls (both points are downstream of the Rockville intake). It should be noted that the scientific basis for the 100 MGD Little Falls Dam number is currently under review. During low flow periods, additional water can be released from the Jennings Randolph impoundment (13 billion gallons) and Little Seneca Lake (4 billion gallons).

Potential threats to the watershed include:

- Spills from roadways and pipelines
- Upstream point-source discharges
- Upstream agricultural runoff
- Urban stormwater flows
- Drought (low flow) conditions
- Terrorist threats and vandalism

All of these land uses and threats lay beyond the Rockville City limits. However, the federal, state and local governments have regulatory and incentive programs to address each of these concerns. Further, the Chesapeake and Ohio Canal National Historic Park occupies the Maryland shoreline for more than 184 miles above Washington D.C. and acts as a natural stream buffer to filter pollutants.

Since the river is the primary water supply for the metropolitan Washington D.C. region, it is extensively monitored for quality and quantity by water utilities including Rockville and WSSC, the U.S. Geological Survey, the Interstate Commission on the Potomac River Basin, the Metropolitan Washington Council of Governments, and the Army Corps of Engineers. In the event a spill occurs upstream, all potentially affected water utilities are notified. The nature and circumstances of the spill are investigated and the size and shape of the spill plume are transmitted to the water utilities. Recently, these entities have begun monitoring for emerging contaminants that are yet to be regulated by the State and Federal government.

In the event that a spill threatens the Potomac in the vicinity of the City's water supply, Rockville has the ability to immediately close off the intake and allow a spill to pass by, without harming the system. The system will continue to operate and provide approximately six hours of short-term water demands. If the spill will take longer to pass the intake, water will be purchased from the Washington Suburban Sanitary Commission (WSSC) through a series of intersystem connections. Further, for spills that float on the river's surface (e.g., gasoline and oil) the water plant is fully equipped with a series of booms and other devices to prevent the spill material from entering and contaminating the water system.

In the event of a prolonged power outage affecting the intake or the water plant that might otherwise prevent water withdrawals and treatment, Rockville's water plant is equipped with an emergency backup diesel generator that is capable of running the plant.

It is unlikely that even an extreme drought condition will cause a significant adverse effect on Rockville's water source. The likelihood that the Potomac River flow will be insufficient to satisfy the Rockville allocation is extremely small. For example, during the significant low flow periods experienced in the drought summer and fall of 2007 and 2008, river levels never fell below a point more than 2 feet above the top of Rockville's intake pipe. The lowest the river has fallen (in 1966 and 2009) was approximately 600 million cubic feet per second, which is more than adequate to support all existing river allocations (plus an additional 100 million gallons per day increment to support aquatic life).

Rockville City Code provides authority to restrict water use in the event of a prolonged drought [see City Code Chapter 24, Section 24.72(b)], including limiting or curtailing water for lawn and garden irrigation, vehicle washing, street, sidewalk and building washing, fountains, swimming pools, and water cooled air conditioning equipment. Moreover, Rockville participates in a regional partnership that manages several Potomac reservoirs that can be released into the main stem during very low-flow situations.

Anticipated Increased Water Demands

Residential Demand

Rockville currently provides 2.93 million gallons per day for its residential customers. By 2030, the City's residential households are expected to climb from 18,114 in 2010 to 23,460. By 2040 the number of residential households is estimated to reach 25,690. At the same time, the WSSC service area is expected to experience an increase in the number of households as follows: 6,213 in 2010, 8,049 by 2030, and 8,819 by 2040. A separate survey done specifically for Rockville indicates that the average number of Rockville residents per household is approximately 2.5; below both the National and State averages.

3.3 Projected Residential (Household) Growth

	2010	2030	2040	Total Change and Percentage
Rockville Service Area	18,114	23,460	25,690	7,576 (42%)
WSSC Service Area	6,213	8,049	8,819	2,606 (42%)

Translating this growth to water demand involves applying the average water consumed in each household to the expected growth in the number of those households.

2010 Current Demand per Household = 18,114 households x 162 gallons per household or **2.93 million gallons per day**

2030 Projected Demand per Household = 23,460 households x 162 gallons per household or **3.80 million gallons per day**
An increase of 0.87 million gallons per day (30%)

2040 Projected Demand per Household = 25,690 households x 162 gallons per household or **4.16 million gallons per day**
An increase of 0.36 million gallons per day (9%)

The total additional projected demand placed upon the City's water plant is expected to be 1.23million gallons per day. **This brings the total water needed for projected residential service to 4.16 million gallons per day.**

Nonresident (Commercial/Industrial/institutional) Demand
Rockville currently provides 2.25 million gallons per day to its 784 nonresident (commercial/industrial/Institutional) customers. Note that there are no significant irrigated agricultural uses in the City any more. By 2030, the City's nonresident customers are expected to climb from 784 to 824. By 2040 the number of nonresident customers is estimated to reach 835. According to an actual study of water usage in Rockville, the average nonresident consumption rate is 2,865 gallons per day. Assuming this consumption number remains representative in the future, the increased nonresident demand is as follows in the table below:

Table 3.4 Projected Nonresidential Customer Growth

	2010	2030	2040	Total Change and Percentage
Rockville Service Area	784	824	835	51 (6%)

2010 Current Nonresident Demand = 2,865 gallons per day x 784 nonresident connections or **2.25 million gallons per day**

2030 Projected Nonresident Demand = 2,865 gallons per day x 824 nonresident connections or **2.36 million gallons per day**

An increase of 0.11 million gallons per day (5%)

.2040 Projected Nonresident Demand = 2,865 gallons per day x 835 nonresident connections or **2.39 million gallons per day**
An increase of 0.03 million gallons per day (1%)

The total additional projected demand placed upon the City's water plant is expected to be 0.14 million gallons per day. **This brings the total needed for nonresident water service to 2.39 million gallons per day.**

Taken together, the anticipated residential and nonresidential increases are 1.37 million gallons per day (an 26% increase) for a **total projected demand of 6.55 million gallons per day**. This demand is under Rockville's existing Potomac River allocation of 7.1 million gallons per day.
Even if Rockville were to aggressively pursue annexation over the next 20-30 years, pushing the City limits further into Montgomery County will not create additional water demands because all of this land has been developed and these potential customers already receive water and sewer service from WSSC. These properties will continue to receive WSSC service following annexation into the City. There are a very small number of properties inside the Maximum Expansion Limit (see the Rockville Municipal Growth Element for more detail) that are currently on private wells and septic tanks. While these properties will be compelled to connect to City water and sewer (if available) following annexation, they do not represent a significant burden on either the water or wastewater systems. In addition, given water conservation incentives and mandates that the City has and will continue to put in place, the actual water demand may actually be significantly less on a *per capita* and *per job* basis than the calculated projection set out above.

Despite this analysis, should the City require more water than the projected demand, and its current River allocation, it has three potential courses of action:

1) Impose or incentivize even greater water conservation measures for both resident and nonresident customers.

2) Pursue an additional River allocation from the State (MDE).

3) Supplement its water source by purchasing WSSC water and reselling it to the Rockville customers.

All three approaches may form part of the eventual solution.

Drought is not expected to present a major consideration regarding Potomac flows. While climate change may have a significant impact on future summer base flows, this impact is not anticipated to take place within the planning horizons of this document. Further, there are two water reservoirs (Little Seneca – 4 billion gallons, and Jennings Randolph - 13 billion gallons) upstream just off the Potomac River. Water from these reservoirs will be released to supplement the base summer flows as needed to counteract low flow conditions.

However, should reduced flows in the Potomac River become chronically problematic, or temporarily unreliable during exceptional or unprecedented months, Rockville has the authority to impose water restrictions to temporarily limit consumptions. In addition, the Rockville water system abuts the neighboring Washington Suburban Sanitary Commission (WSSC) system. There are 10 intersystem

locations that can be accessed to provide additional water to Rockville customers. At the present time these interconnections are only used when the City system is rendered insufficient or unavailable because of construction or the prolonged loss of power. Currently Rockville has the ability to purchase 8 million gallons per day pursuant to an existing agreement with WSSC. Negotiations for a greater amount could be pursued if necessary in the future.

Rockville's Water Treatment Plant

Rockville was settled in the 18th century and has provided water for its residents for over 150 years. From 1897 to 1958, water was withdrawn from groundwater production wells. These wells are no longer in operation and were abandoned when Rockville opened a water treatment plant adjacent to the Potomac River. The historic pump house structure of the *Rockville Electric Light and Water Works* has served as a community center since 1962.

The City holds a State allocation to withdraw up to 12.1 million gallons of Potomac River water each day. Originally a 4 million gallon per day facility, the water plant was expanded to its current 8 million gallon per day capacity in 1969. In 1995, a solids handling facility was added to the water plant. This new treatment component allowed the termination of the City's historical practice of discharging removed solids back into the River. The plant currently produces an average of 1.79 billion gallons of drinking water each year and satisfies the daily need of 46,300 customers. The average cost of treatment is $1.16 per 1,000 gallons. Currently, Rockville is nearing the completion of the Glen Mill Pump Station that will increase the pumping capacity from 8 million gallons per day to 12 million gallons per day.

Water is withdrawn directly from the Potomac River through an underwater intake structure located on the towpath of the Chesapeake and Ohio Canal National Historical Park. The intake pipe is divided into 2 channels. Each channel has two 36-inch diameter screens (3 feet by 3 feet). The screens can continue to withdraw up to 12 million gallons per day even if River levels drop half way down the screens. During the drought years of 2007 and 2008, the River never fell below a level that was 2 feet above the top of these intake screens.

Floating river debris is prevented from entering or damaging the intake structure by these screens. During times of possible algae blooms, potassium permanganate is added to kill the algae and reduce taste and odor concerns. From the intake structure, water is pumped to the treatment plant approximately one half mile away.

Once at the treatment plant, a chemical flocculent is added to aid in settling solids then the raw water is sent to a clarifier where the settling takes place. The recovered solids are collected and removed to a thickening unit and, following dewatering, ultimately sent off site. The settled water then goes to a series of sand and anthracite coal filters where it is further processed. The highly-filtered water is then disinfected using chlorine gas. Fluoride is added as an enhancement to prevent tooth decay. Finally, sodium hydroxide is added for final pH adjustment. The fully treated water is then pumped via a seven-mile, 24-inch main transmission line to the City's distribution system.

Near-Term Improvements to the Water Plant

In 2008, the City prepared a *Water Treatment Plant Facility Plan* that articulates intended plant upgrades anticipated over the next 5-7 years. Current upgrades address the chemical storage facilities, improving our organic pollutant removal process, upgrading the electrical system, reviewing potential improvements to the disinfection process, and increasing our solids handling capability (disposal of the material removed from the raw water). The total cost of these improvements is estimated to be $14.6 million over 5 years. We are also currently considering operational changes that will make the treatment facility more efficient and effective.

In addition to these upgrades, the electrical components at the raw water intake and water treatment plant are the most inefficient and demanding electrical systems in the City. Rockville has recently

received $1.57 million dollars under the Federal American Recovery and Reinvestment Act (ARRA) of 2009 to convert these systems to more energy efficient ones. Specifically, these economic stimulus funds will be used on the HVAC system, raw water pumps, solids transfer pumps, chemical feed pumps, the solids press, the instrumentation and control panels, and improved lighting throughout the plant.

Water Plant Capacity Expansion

The improvements identified in the 2008 Facility Plan will allow the water plant to increase its production up to 12 million gallons per day. A recently installed emergency generator reduces or eliminates service disruptions due to local power outages. Other improvements will extend capacity, improve energy efficiency and extend the useful life of plant treatment components.

Limitations or restrictions on water plant production are the State allocation of 7.1 million gallon average daily withdrawal limit, the 12.1 million gallon maximum daily withdrawal limit, the size of the City's intake pipe, and the capacity of pumps, clarifiers and filters. *As noted above, Rockville does not anticipate needing an increase in the Potomac River allocation it holds between now and 2030.* However, as Rockville improves its water plant and infrastructure to handle up to 14 million gallons per day, petitioning the State to increase the allocation from 12.1 million gallons per day to perhaps 14 or 15 million gallons may be desirable.

In the event Rockville exhausts its river allocation and cannot obtain an increase from the State, the City is in position to seek additional or supplemental water elsewhere. First, 26% of Rockville residents already receive their water and sewer service from the Washington Suburban Sanitary Commission (WSSC). The WSSC presence creates an opportunity for the City to negotiate with WSSC to use one or more of the nine locations where the WSSC distribution system and the Rockville distribution system come together to routinely purchase additional water. Currently, these interconnects are used to satisfy emergency or short-term needs. For example, during a planned plant shutdown (e.g., for upgrades or repairs) or in an emergency situation (e.g., prolonged power outage, a pressure drop caused by a major water line break, or other water supply shortage), Rockville, by agreement with WSSC can open these interconnections and purchase 8 million gallons of water per day to meet its needs. In 2008, Rockville purchased over 1.551 million gallons (about 0.1% of its total need) from WSSC.

In the future, should the production of additional drinking water be unavailable or no longer cost effective, Rockville could decide to supplement the volume of water the City produces by purchasing enough water to meet the additional demands projected for future growth. Similarly, Rockville could decide to obtain 100% of our water from WSSC and either abandon the water plant or maintain it as an emergency back-up facility. Yet another alternative would be to supplement the surface water withdraws with ground water.

In addition to WSSC, Rockville has entered into two mutual aid agreements with other Washington area jurisdictions. These agreements facilitate assistance from other communities that could take the form of labor, equipment and expertise needed in the event of a natural or man-made disaster, including disruption to Rockville's water treatment plant and the distribution system.

Rockville's Distribution System

As noted above, 4-8 million gallons of fully treated drinking water per day are pumped the seven miles from the water treatment plant in Potomac, Maryland to Rockville's distribution system. The City's water distribution system has expanded to keep pace with the City's footprint. The City owned and maintained system is now 182 miles. These lines vary from 4 to 24 inches in diameter. Once the Glen Mill Pump Station becomes operational, in 2011, Rockville will be able to pump up to an additional 4 million gallons per day (12 MGD total) to its distribution system.

The City has 3 storage tanks with a total storage capacity of 12 million gallons.

Table 3.5 Rockville Drinking Water Storage Tanks

Tank Name	Capacity
Huntington Hills	8 million gallons
Carr Avenue	3 million gallons
Talbott Street	1 million gallons

However, because these tanks were all constructed at grade (rather than elevated), the City is unable to use 100% of the stored water without losing some head pressure in the system. Rockville has already undertaken a study to determine tank upgrades that will improve the access and water age (quality) of water stored in these tanks.

Limitations of the Water Distribution System

The flow carried through the water distribution system is the primary limiting factor that may restrict the projected growth expected by the City by 2030. Pump capability, water line capacity, storage and aging infrastructure are all elements that influence the overall flow capacity and the ability of Rockville to serve its customers.

Much of the distribution system is now reaching the end of its useful life. Approximately 115 miles (64%) of water lines were constructed before 1970. These older parts of the system were constructed with unlined iron pipe and spiral-welded steel pipe. The newer sections are constructed of the more durable cement-lined, ductile iron and typically have a useful life of 100 years or more. The age and materials used in the older sections of the system present several concerns for the City.

First, after 40-60 years, the age and materials used in these older water lines are making the pipes brittle and subject to breaks and leaks. Second, sections of the system are becoming turberculated and no longer carry the volume of water they once did. Turberculation occurs when water chemically reacts with the deteriorating iron in the pipe. The result is growth inside the pipe that reduces the interior diameter and therefore, reduces the amount of water that can pass through the pipe. Tuberculation also causes rust and can reduce the chlorine residual available to address bacteria. Similarly, the fire hydrants located along these water lines may also be adversely affected by having reduced flow.

The City is aware that over 33 miles (19%) of the system is becoming brittle and tuberculated. In 2007, Rockville's system experienced a record 70 line breaks. Similarly, 51 of the City's 1,369 (<4%) fire hydrants have less than optimal fire suppression flow.

Table 3.6 Distribution System Line Breaks (2006-2010)

FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
30	70	41	64	40

Finally, some isolated low spots, dead ends and low flow areas are experiencing either a low chlorine level or the creation of disinfection byproducts. In the future, both ends of these dead-end pipes will be connected to eliminate the dead end. In other cases, the pipe may be retrofitted with pressure reducing valves to ensure improved water circulation.

Distribution System Improvements

Rockville is taking proactive steps to address these distribution system concerns. In 2008, the City adopted a *Water Distribution Master Plan.* The plan prioritizes the replacement of water lines, house connections, fire hydrants,,and valves across the City. The City has identified 33.8 miles of the worst sections of lines and has begun to repair or replace these lines. From 2008 through 2028, Rockville anticipates replacing an average of 1.7 miles each year over 20 years at a cost of $76 million. $4.4 million was spent in fiscal year 2010 alone. As pipes are replaced, some smaller lines will be enlarged to provide additional flow capacity, and dead-end lines will be connected to other adjacent lines. All new pipes will be cement-lined, ductile iron pipes with an exterior polyethylene wrap that is expected to have a 100-year useful life. Similarly, hydrants along these lines will also be replaced and will be tested and painted consistent with the National Fire Protection Associations guidelines (i.e., a yellow barrel with different color nozzles reflecting the flow condition of the hydrant).

In July 2010, Rockville experienced two back-to-back water breaks in the 24-inch transmission line. An investigation was conducted of the 24-inch prestressed concrete cylinder pipe (PCCP) using a robot equipped with electromagnetic capability and specialized leak detection equipment. The inspection and repairs caused the line and water treatment plant to remain out of service for almost three months. Several access ports were installed in the line to facilitate installation of the inspection equipment and a few sections of pipe were replaced as a result of the inspection. While detailed results were not yet available at the time of this writing, the City expects to incorporate any additional short-term (2-3 years) repairs and pipe/valve replacement needed to maintain the useful life of the transmission line into the existing Water Transmission Main Rehabilitation CIP Project. In addition, the City intends to periodically re-inspect the line. A plan for replacement of the line will be developed when inspections begin to reveal that the line is nearing the end of its useful life. Replacement of the line will be a large fiscal and planning undertaking due to the cost, construction time and need to keep the City supplied with water while the pipe replacement effort is on-going.

The incorporation of the inspection and repairs to the 24-inch transmission main will affect the priorities established in the original 2008 Plan. The likely result is to extend the 20-year program by a year or two.

In addition to replacing the water lines, Rockville is expanding its existing System Control and Data Acquisition (SCADA) electronic communication system. The system generates and analyzes data from sensors at the water plant, pump station, storage tanks and distribution system. The SCADA system also allows the entire system to be managed remotely from the water plant control room. The upgrade, including installing additional sensors in the distribution system, expanding the optic fiber available at the various drinking water facilities and upgrading the programmable logic controllers at the water plant, will cost $600,000 and will increase the scope and efficiency of the system.

In 2010, the City installed new air release valves in the 24-inch main, and hydraulic surge suppression tanks at the water plant. A second surge tank is planned for the Glen Mill Pump Station. This will mitigate hydraulic surges in the system and help protect the transmission line.

In addition to these repairs, the City conducted a water-loss audit of the distribution system in 2007. The net lost/unmeasured water was 73.01 million gallons. This equates to *3.9%* of the total water produced. Much of these losses were attributed to line breaks rather than leakage. The Maryland Department of Environment (MDE) guidelines indicate that well-operated systems should not lose more than 10% of their total water.

The City plans to evaluate its water tanks in the summer of 2011 and determine whether additional CIP work may be needed to modify or replace one or more of them due to water quality issues. Regardless, the City will replace all tanks with elevated storage tanks when the current ground-level tanks reach the end of their useful lives, if not sooner.

Water Conservation Measures

Although Rockville does not have a long-term concern with its water supply, the City has nevertheless pursued a number of measures intended to decrease the water demand of the City's consumers. These measures include providing better consumption data for customers, using incentive-based pricing, requiring low-flow plumbing fixtures, and implementing source water protection actions.

Low Flow Fixtures

Rockville is currently developing comprehensive green building standards and complementary stormwater controls for new and renovated residential and commercial development that will require water conservation features in all buildings and structures in the City. For example, the new building code requires the installation of toilets that use no more than 1.2 gallons per flush. The stormwater requirements emphasize the use of rainwater for irrigation and other non-potable purposes. The City expects to have both of these ordinances in place and effective by May 2010.

Incentive Pricing

Rockville charges its customers for the water they use. The average water bill is $30.98 per quarter. The water fee is expected to rise to $71.28 (22% annual increase) through 2013 and level off thereafter. This revenue is deposited into an enterprise fund used to expand and maintain the system, pay debt service incurred for water capital projects, and pay operating costs including chemicals, electricity and personnel.

To encourage water conservation, Rockville has adopted a three tier pricing approach that charges higher rates at the higher volume tier. The current and projected water fees are shown on the table below.

Table 3.7 Projected Rockville Water Rates (per 1,000 gallons)

Volume	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
0-12,000 gal.	$2.78	$3.48	$4.33	$4.38	$4.43	$4.48
12,001 up to 24,000 gal.	$4.00	$5.01	$6.23	$6.30	$6.37	$6.44
> 24,000 gal	$4.30	$5.37	$6.69	$6.76	$6.84	$6.91
% Increase	-	25%	24.5%	1.15%	1.10 %	1.10%

These tiered rates encourage customers to reduce the amount of water they are using, particularly for nonessential purposes. The planned rate increases set out in Table 3.6 are intended to pay for upgrades and improvements to the water plant and the distribution system over the next six (6) years. In addition to the tiered rate structure, Rockville imposes a *Ready-to-Serve* charge for water meters that ranges from $2.19 to $262.80 per month. However, this charge (vis-à-vis the water rates above) is a flat fee and does not vary with actual usage. Consequently, commercial customers often reconsider using a smaller diameter line when constructing or renovating a building, thereby decreasing their potential demand on the system.

Water Meters

Rockville has recently completed a program to replace *all* 12,660 of our residential and commercial water service meters, including installing meters in city-owned facilities and other previously unmetered buildings. The new meters are *Sensus* and have remote radio-read capability. They will more accurately and efficiently collect water consumption data that can be provided to customers to help them understand their water use and show decreases in their bill due to office and household conservation practices (see also Consumer Education below)

Consumer Education

Rockville wants to put its water consumers in a position to make informed water-use choices and change poor water-use habits. Although difficult to quantify, these savings play an important role in the demand-side management of the water system. There are several components to the City of Rockville's information and education program.

An Informative Water Bill: Customers must first be aware of their own water usage and costs, before they can begin to consider investing in methods designed to reduce their water usage and therefore their costs. Rockville's water bill contains information on the amount of water used in the current usage period, and for comparison, the last usage period, last year's usage period and the same usage period from two years ago.

Newsletters and Television: Rockville currently uses a multi-media approach to informing consumers about water conservation. Conservation tips are put in *Rockville Reports*, the City's monthly newsletter sent to all residences and available to all businesses; tips are aired on *The Rockville Channel*, the City's cable TV station; the City has an educational pamphlet on water conservation that is handed out at community events or by request.

Website: The City's website provides a more detailed description of the charges appearing on the water bill, the full rate schedule, and contact information for additional questions or water emergencies (water line breakage, drinking water quality issue, etc.). There are also descriptions of conservation practices and actions our residents can take to reduce the volume of water they

use. Since the City relies on these other methods, we have stopped the practice of including conservation tips in water bill inserts.

Regional Initiatives: Rockville is an active partner in the *Wise Use* water program coordinated by the Metropolitan Council of Governments and the Interstate Commission on the Potomac River Basin. The partnership has agreed in advance to regional voluntary and mandatory water conservation measures in the event the river flow drops beyond certain points. The program also has a centralized, public education campaign that alerts residents of the applicable water restrictions.

Funding the Drinking Water Program

Rockville will continue to rely on water fees from commercial and residential customers to pay for infrastructure, operation, electricity, chemicals and personnel needed to improve and provide water to our customers. These funds are deposited in an enterprise fund that can only be used for these drinking water purposes. The City has a AAA bond rating and capital projects are often bonded through municipal bond sales. In turn, the bonds are paid off over time using the fee revenue. The City supplements these revenues with grants and below-market-interest loans for such projects when available. Rockville collects a Capital Contribution Charge from developers, based on meter size, for new development or expanded development to buy into the existing water system. We also continue to rely on developers to absorb the immediate costs of serving or increasing service to their proposed re-developments.

Washington Suburban Sanitary Commission Service in Rockville

The Washington Suburban Sanitary Commission (WSSC) serves 1.8 million residents in Montgomery and Prince George's Counties, including some Rockville households. In fact, 6,213 Rockville households obtain drinking water from WSSC rather than the City. The number of Rockville households in WSSC's service area is anticipated to grow to 8,046 by 2030 and 8,819 by 2040 (an increase of 2,606 households or 42%).

WSSC also relies on supplies from the Potomac and the Patuxent Rivers. Rockville customers are supplied by a Potomac withdrawal near the confluence with Watts Branch. The exact intake is directly downstream from the point where Muddy Branch and Great Seneca Creeks enter the Potomac. WSSC treats Potomac River Water at the Potomac Water Filtration Plant permitted to withdraw 300 MGD and has a current production capacity of 285 MGD, although typical daily production is 109.3 MGD. Peak flow is 161.7 MGD.

WSSC has determined that its supply, treatment facilities and distribution system have adequate capacity to accommodate the projected population growth in their entire service district, including its Rockville customers.

According to WSSC's 30 year Infrastructure Plan, aging and deteriorating water mains and valves present a serious challenge to the integrity of the water distribution system. By 2025, it is estimated that approximately 50% of the entire distribution system will reach or exceed its useful life. There are over 2,000 miles of cast iron pipe in the system and over 85% of this pipe will exceed its useful life by 2025. WSSC is working with County officials to develop an infrastructure investment plan that will provide a roadmap to refurbish and replace this infrastructure over time.

WSSC has a variety of programs to promote water conservation and reduce the water demand of households and jobs in its service area. These actions include the adoption of stringent plumbing codes requiring low water fixtures, and a water rate structure that encourages conservation and community education and outreach activities. These programs are particularly important during the summer and early fall months when the River experiences lower flow conditions. In the event WSSC is unable to serve the Rockville households in its service district, the City's water plant may, on a temporary basis, be capable of meeting emergency demands for these residents.

Recommended Rockville Actions

Rockville's water supply is adequate to satisfy the demand of projected population growth over the next 20 years. The City also has additional alternative sources that will meet further long-term demands. These sources are limited by the size and condition of the City's infrastructure. Rockville is taking pro-active steps to ensure that the infrastructure also keeps pace with demand. The City is also aggressively moving to reduce per-capita demand through mandatory and voluntary water conservation practices and incentives. These measures enjoy adequate funding under the City's water service enterprise fee program.

Rockville has already accomplished much of what it needs to do to position the City to address its future needs. Nevertheless, the City will continue to look for innovative and creative methods to improve the effectiveness and efficiency of its drinking water system. To complete these tasks, the City must follow through on its plans to:

1. Complete the investigation of the condition of the City's 24-inch transmission line from the water plant to the distribution system, including the valves on that line, and follow up with repairs and replacement as needed. Incorporate periodic inspections, repairs and right-of-way easement maintenance activities into the existing water main rehabilitation CIP project.

2. Continue replacing 34 miles of the most vulnerable 182 total system miles of water lines over the next 20 years. Thereafter, replace additional water lines as may be warranted given their condition.

3. Resolve concerns with the water age (i.e., stale water with potentially low levels of chlorine) and storage capacity of the City's three existing storage tanks.

4. Bring the Glen Mill Pump Station on line. Upgrade and expand the water plant with energy efficient components and solids handling that will allow it to produce up to 14 million gallons per day and pursue a commensurate increase in the daily average and daily maximum Potomac River allocations as needed.

5. Provide customers with consumption data, water conservation techniques and other meaningful public education activities to encourage per capita reductions in water use.

Chapter Four: Assuring Adequate Wastewater Disposal

As with drinking water, communities must provide adequate wastewater disposal for the domestic sewage they generate. Left untreated, sewage carries bacteria, viruses and diseases that can harm public health and contaminate downstream drinking water supplies. Similarly, many communities allow commercial and light industrial facilities to discharge their process wastewater into the community's sewers. These discharges may contain toxic pollutants such as solvents and metals. They may also contain blocking or viscous substances that can obstruct a sewer and lead the contents of the sewer to spill out onto the land surface or community street exposing residents to public health concerns. In some cases, a sewage spill from the collection system can also reach and contaminate nearby waterways.

In the same manner that drinking water supplies are potentially jeopardized, poor local land use decisions can result in a domestic sewage overload beyond the capacity of the community's sewers, pump stations or treatment plant to handle. This plan sets out the vision and path needed to assure that Rockville will continue to enjoy adequate facilities for wastewater disposal far into the future. As can be gleaned from the description below, Rockville has already put plans in motion to ensure this future capacity.

4.1 Rockville Demographic Information

	2010	2030	2040	Change (Percent)
Square miles	13.5	13.5	13.5	-
Total City Population	62,476	77,644	83,929	21,453 (34%)
Total Rockville Households	24,327	31,509	34,509	10,182 (42%)
City Service Households	18,114	23,460	25,690	7,576 (42 %)
City Nonresident Service Connections	784	824	835	51 (6%)
WSSC Service Households*	6,216	8,049	8,819	2,606 (42%)

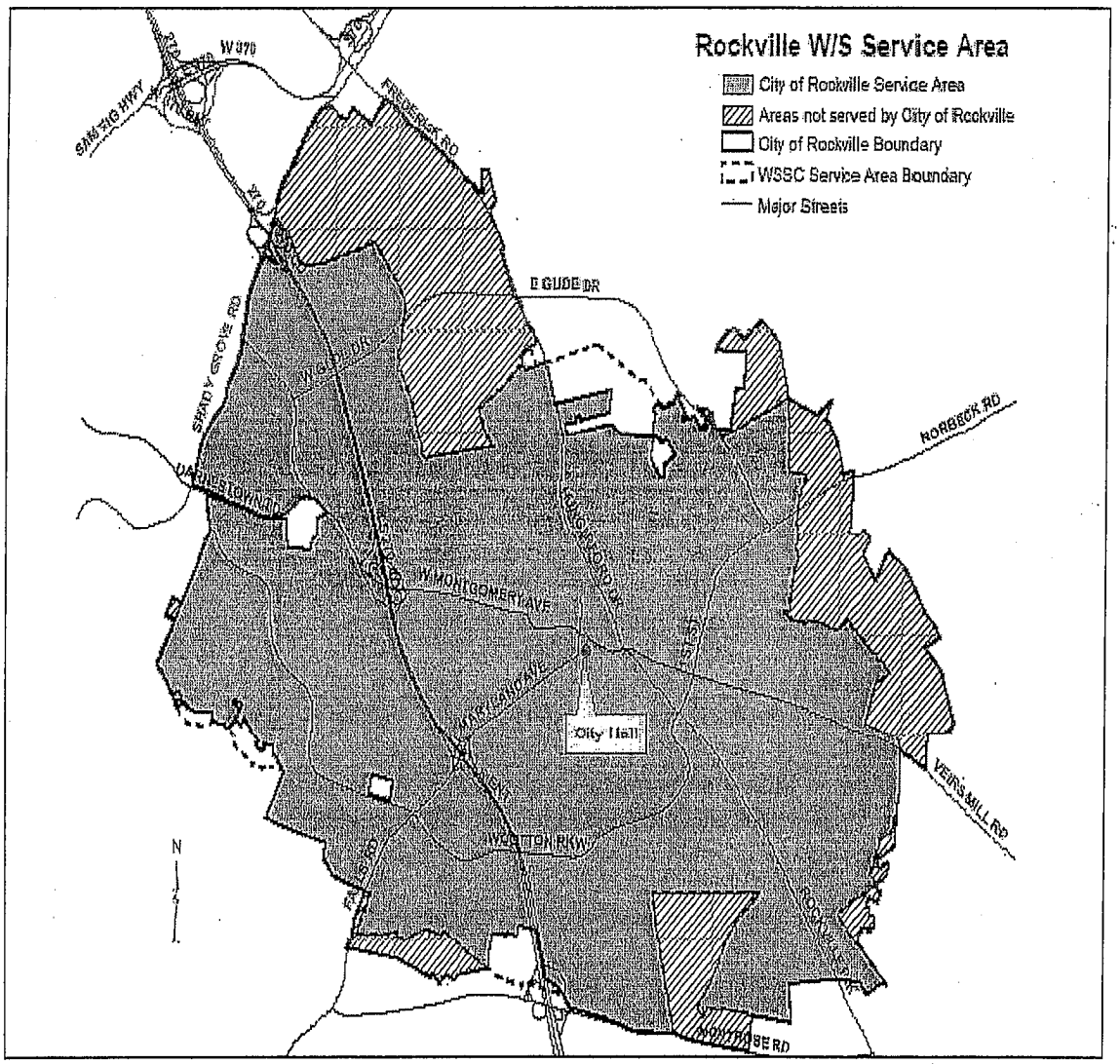
*/ The Washington Suburban Sanitary Commission (WSSC) continues to provide sewer service to those households and businesses located within its historic service area that have been annexed into the City.

Since the City of Rockville is completely built out, future growth (both residential and nonresidential) will consist of infill and redevelopment. This redevelopment will be concentrated in close proximity to the City's redeveloped Town Center, its three Metro (subway) stations, and redevelopment along the Rockville Pike corridor. With the exception to the Shady Grove Metro station and part of the Twinbrook Metro station areas (served by WSSC), the City provides wastewater service to these growth areas and will be expected to absorb these new customers.

Rockville's Wastewater Needs

Throughout most of the City's history, wastewater treatment and disposal occurred within the City limits. During the winter of 1913-14, Rockville experienced a severe typhoid epidemic that made national news. The cause was eventually traced to a typhoid-carrying guest of a resident whose privy contaminated the City wells located only 400 feet away. By 1916, Rockville had a state of the art sewer and treatment system that all residents were required to connect to. The typhoid event also directly led to the creation of the Washington Suburban Sanitation Commission (WSSC) to service Montgomery and Prince George's Counties. However, in the 1950s, pursuant to an order issued by the Maryland Department of Health, Rockville's wastewater treatment facilities were closed and the City has conveyed its sewage to the Washington Suburban Sanitary Commission ever since. Although the City is no longer responsible for direct treatment and disposal of its sewage, Rockville continues to own and maintain much of the sewage collection system in the City.

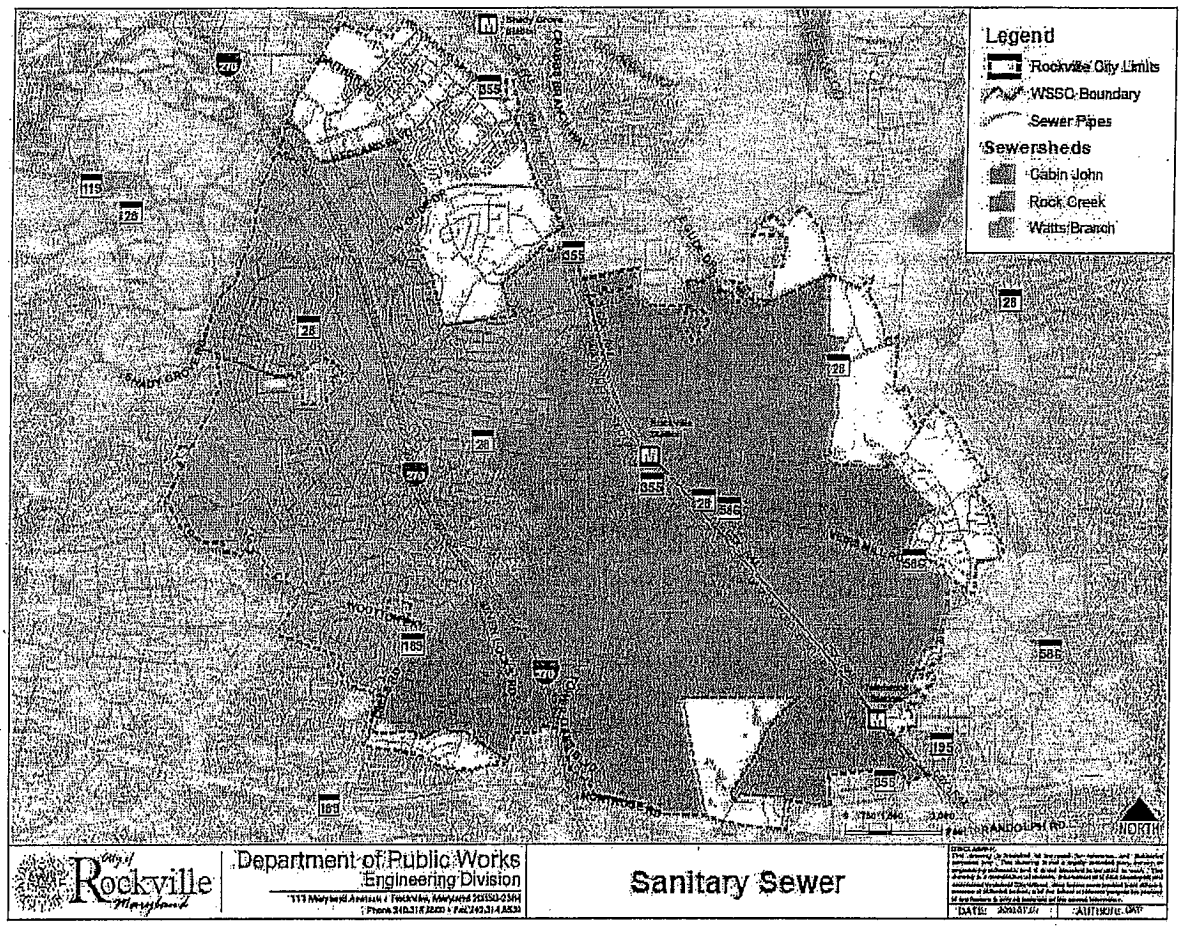
Map 4.1 The Rockville/WSSC Wastewater Service Areas



As with drinking water, Rockville's own sewage system serves approximately 74% of the community, including 784 nonresidential customers. In 2009, the City's resident and nonresident populations generated 6.38 million gallons of sewage each day. The remaining 26% of the City is served directly by sewers owned and maintained by the Washington Suburban Sanitary Commission (WSSC). The WSSC wastewater service area is identical to the drinking water service area described in Chapter Three.

Pursuant to an agreement negotiated in the 1970s, the City conveys all of it collected sewage to sewers owned by WSSC. However, the agreement restricts Rockville's contribution to 9.31 million gallons each day. The City has never used its full treatment allotment and does not expect to do so even after the projected population growth anticipated by 2040.

Map 4.2 Rockville Sewersheds



At the present time, Rockville is only using less than 69 percent of its allotted Blue Plains capacity via WSSC. Over 31 percent (2.92 million gallons per day) of the City's capacity remains available to support future growth.

Table 4.2 Rockville Average Daily Wastewater Flows

Year	Flow (Million Gallons per Day)
2005	6.16
2006	6.23
2007	5.97
2008	6.07
2009	6.38
Five Year Average	6.12

Anticipated Residential Wastewater Demand

Rockville currently collects sewage from 18,114 residential customers. By 2030, theses connections are expected to climb to 23,460, and 25,690 by 2040. Similarly, the WSSC service area is expected to experience an increase in the number of households as follows: 6,213 in 2010, 8,049 by 2030, and 8,819 by 2040. A separate survey done specifically for Rockville indicates that the average number of Rockville residents per household is approximately 2.5; below both the National and State averages.

Table 4.3 Projected Residential (Household) Customer Growth

	2010	2030	2040	Total Change and Percentage
Rockville Service Area	18,114	23,460	25,690	10,182 (42%)
WSSC Service Area	6,213	8,049	8,819	2,606 (42%)

Rockville assumes its residents and nonresident customers follow the national trend and typically discharge 80% of the water they consume back to the City in the form of sewage and greywater. While the recent trend toward bottled water may complicate a precise calculation, it is unlikely that the introduction of bottled water will present a significant variance from projections based on City drinking water consumption data. Therefore, a reliable wastewater need calculation can be derived by taking 80% of the estimated drinking water demands of the City's customers and adding flow for I&I based on an overall meter wastewater flow and drinking water withdrawn from the Potomac River.

Residential Wastewater Demand

2010 Current Wastewater Demand = 18,114 households x 162 gallons per day – 20% or
2.35 million gallons per day

2030 Projected Wastewater Demand = 23,460 households x 162 gallons per day – 20% or
3.04 million gallons per day
An increase of 0.69 million gallons per day (29%)

2040 Projected Wastewater Demand = 25,690 households x 162 gallons per day – 20% or
3.33 million gallons per day
An increase of 0.29million gallons per day (9%)

Therefore, the total projected increase in residential wastewater demand is 0.98 million gallons per day (a 42% increase).

Nonresident (Commercial/Industrial/Institutional) Demand
Rockville currently collects sewage from its 784 nonresident (commercial/industrial/Institutional) customers. Note that there are no significant irrigated agricultural uses in the City any more. By 2030, the City's nonresident customers are expected to climb from 784 to 824. By 2040 the number of nonresident customers is estimated to reach 835.

Table 4.4 Projected Nonresident Customer Growth

	2010	2030	2040	Total Change and Percentage
Rockville Service Area	784	824	835	51 (6%)

According to an actual study of water usage in Rockville, the average nonresident water consumption rate is 2,865 gallons per day. Assuming this consumption number remains representative in the future, the increased nonresident wastewater demand can also be estimated using 80% of the water totals as follows:

2010 Current Wastewater Demand = 2,865 gallons per day x 784nonresident connections – 20% or
1.80 million gallons per day

2030 Projected Wastewater Demand = 2,865 gallons per day x 824nonresident connections – 20% or
1.89 million gallons per day
An increase of 0.09 million gallons per day (5%)

2040 Projected Nonresident Demand = 2,865 gallons per day x 835nonresident connections - 20% or
1.91 million gallons per day
An increase of 0.02 gallons per day (<2%)

Therefore, the total projected increase in nonresidential wastewater demand is 0.11 million gallons per day (a 6% increase over current levels).

Inflow and Infiltration (I&I)

I&I is a factor of pipe age and is not influenced by population growth. The current amount of I&I can be determined by finding the difference between the metered wastewater flow leaving Rockville and the amount of wastewater entering Rockville's sewer system (80% of the drinking water drawn from the Potomac River).

2010 I&I Demand =
6.12 million gallons per day [from Table 4.2] – (80% of 4.92 million gallons per day [from Table 3.2]) =
2.18 million gallons per day

2010 Residential Wastewater Demand = 2.35 million gallons per day
2010 Nonresident Wastewater Demand =1.80 million gallons per day
I&I Demand =2.18 million gallons per day
2010 Total Wastewater Demand = 6.33million gallons per day

2030 Residential Wastewater Demand = 3.04 million gallons per day
2030 Nonresident Wastewater Demand =1.89 million gallons per day
I&I Demand =2.18 million gallons per day
2030 Total Wastewater Demand = 7.11 million gallons per day

2040 Residential Wastewater Demand = 3.33 million gallons per day
2040 Nonresident Wastewater Demand =1.91 million gallons per day
I&I Demand =2.18 million gallons per day
2040 Total Wastewater Demand = 7.42 million gallons per day

Taken all together, the projected increase in total wastewater demands is 1.09 million gallons per day (17%). **The total projected wastewater demand from all sources is 7.42 million gallons per day.** This demand is well under Rockville's existing treatment allotment at the Blue Plains regional treatment facility. In addition, given water conservation incentives and mandates that the City has and will continue to put in place, the actual wastewater demand may actually be significantly less on a *per capita* and *per job* basis than the calculated projection set out above. For example, Rockville recently adopted a green building code (City Code Chapter 5) that requires the use of low-flow toilets (1.2 gallons per flush) and faucets in all new and renovated buildings. Additionally, Rockville is pursuing a capital improvement program to rehabilitate or replace older sewer mains that are more prone to leaking, which will reduce I&I over time.

Moreover, in the event that Rockville were to aggressively pursue annexation over the next 20-30 years, it would not create significant additional demands for wastewater treatment because the properties identified on the City's *Maximum Expansion Limit* map (see the companion *Municipal Growth Element* for more details on the MEL) have already been developed and are either 1) on private wells and septic systems or 2) already receiving water and sewer service from WSSC.

Those properties receiving WSSC service will continue to receive these services even after annexation. The City has identified a small number of residential properties 10 or fewer on private wells and septic tanks. While these properties will be compelled to connect to City water and sewer systems (if available) as a condition of annexation, they do not represent a significant increase or burden on the system beyond the increases calculated for growth inside the current City limits.

Therefore, the only wastewater-based restrictions on short-term population growth will derive from any limitations in Rockville's collection (sewer) system.

Rockville's Collection System

There are no public or private septic tanks in Rockville. Similarly, there are no public or private wastewater treatment plants located in the City. However, the City owns and maintains 149.44 miles of sanitary sewers. The diameter of these pipes ranges from 6 inches to 27 inches. WSSC maintains 32.56 miles of sewers. Another 18 miles of private sewers connected to the City's collection system at various locations.

Most of the sewage in the system is moved by gravity (that is it is not pumped uphill). However, there are two locations that require pumping. The City has two pump stations, one on South Horners Lane (0.5 million gallons a day) in East Rockville, and another in the Fallsgrove neighborhood (1.1 million gallons per day).

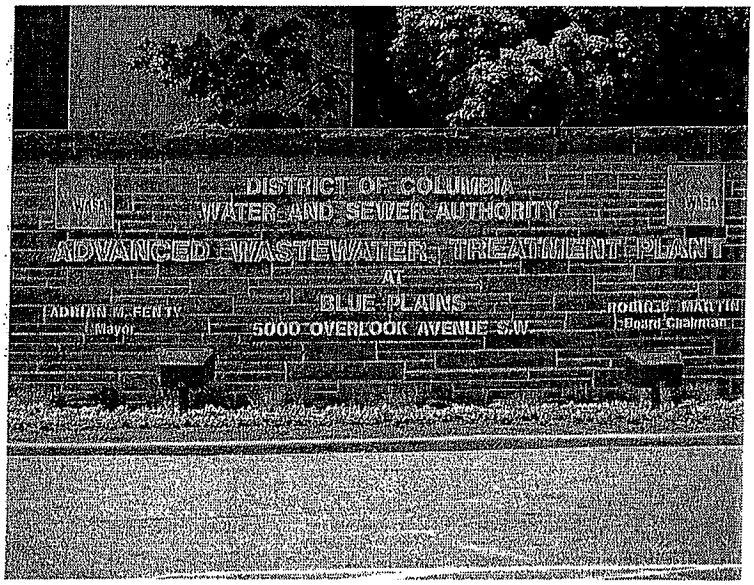
Table 4.5 Rockville's Collection System Elements

System Components	Number of Components
Publicly-Owned Sewers	149.44 miles
Privately-Owned Sewers	18 miles
Total Sewers in City	160 miles
Pump Stations	2

There are 10 interconnections where the City's collection system meets the WSSC collection system and wastewater is conveyed to WSSC. WSSC in turn conveys its sewage, including the Rockville portion, to a 370 million gallon per day wastewater plant owned and operated by the District of Columbia Water and Sewer Authority (D.C. WASA). The regional wastewater treatment plant is known as the Blue Plains facility. WSSC's total contribution is limited to 169.9 million gallons per day pursuant to the regional agreement. Blue Plains treats another 200 million gallons of sewage generated in Washington D.C. as well as several Northern Virginia suburbs.

In addition to traditional primary and secondary treatment operations, the Blue Plains facility denitrifies and filters the wastewater and is the largest wastewater treatment plant in the world to do so. It discharges fully treated water to the Potomac River at a location just south of the confluence of the Potomac and Anacostia Rivers.

The Blue Plains facility holds a Clean Water Act, NPDES discharge permit issued by the Federal U.S. EPA. This permit establishes stringent requirements on nitrogen, phosphorus and bacteria. However, the advanced tertiary treatment provided by the plant is expected to satisfy these requirements. Therefore, Rockville's projected population growth is not expected to be restricted by State and Federal regulatory obligations.



Collection System Concerns

The design capacity of the collection system is not considered an issue in Rockville. Rockville developers proposing new growth in the City are required to pay for infrastructure improvements and upgrades necessary to support the proposed development. Since Rockville is virtually built out, all new growth is expected to take the form of infill and redevelopment projects. Developers will continue to remain financially responsible for upgrades to increase or extend wastewater service to their properties in the future. This obligation continues as far downstream in the sewer system as may be necessary to assure capacity. All of these upgrades are at the developer's expense and are overseen by City personnel.

There are five primary concerns with the Rockville collection system:

- Ensuring system data is easily accessible
- Rehabilitating and replacing aging or damaged sewers
- Preventing precipitation and groundwater from entering the system
- Preventing blockages into and spills out of the system
- Eliminating discharges of incompatible wastes

None of these concerns are expected to limit or restrict the population growth anticipated by 2040.

Resolving Information and Data Gaps

Rockville has electronically mapped all of its collection system, but the City is still in the process of mapping the privately-owned sewer segments that connect to it. City engineers, emergency response, field maintenance crews, and environmental compliance officers have access to this GIS information.

Most of the interconnections between the City collection system and the WSSC collection system are metered and provide accurate data on peak and diurnal flows. However, flows traveling through the four interconnects in the Rock Creek portion of the City (i.e., the *sewershed*) are estimated rather than metered with precision. Rockville is working with WSSC to install meters in these locations.