

WATER RESOURCES ELEMENT

FREDERICK COUNTY, MARYLAND



A Functional Element of the
2010 County Comprehensive Plan
Adopted September 23, 2010



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AMENDMENT STATUS

Goals, Policies, Action Items

09/23/2010

Maps and Graphics

09/23/2010

Background Information

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INTRODUCTION

The purpose of the County's Water Resources Element is to coordinate growth management and water resources planning efforts in Frederick County. This plan element provides the detailed analysis, which is summarized in the Assessing our Water Resources chapter of the County Comprehensive Plan, which was adopted on April 8, 2010. The Water Resources Element primarily addresses the County owned and operated water and wastewater systems, although data is included for municipal systems and municipal growth areas. The Water Resources Element is divided into three components:

- Drinking Water Assessment
- Wastewater Assessment
- Managing Stormwater and Non-point Source Pollution

Included within these components are discussions of the watershed resources of the County; the quality and quantity of drinking water supplies with respect to planned growth; the treatment capacity of wastewater treatment facilities and disposal of treated effluent; and a review of the County's storm water management and non-point source pollution programs. Recommendations for sound land and water resource management practices that contribute towards the health and sustainability of our major watershed systems and human communities are included in the form of goals, policies, and action items. General Water Resources Goals and Policies are provided below while specific Actions for each component are included in the respective Implementation section.

GOALS

- WR-G-01 Maintain a safe and adequate drinking water supply to accommodate the needs of the current population as well as future generations.
- WR-G-02 Protect and enhance the quality of Frederick County's surface waters, ground water resources, and wetlands.
- WR-G-03 Invest in water and sewer infrastructure that will provide adequate treatment capacity and reduce pollutant loading in rivers and streams.
- WR-G-04 Promote coordinated planning between jurisdictions and agencies responsible for drinking water, wastewater, and storm water management.
- WR-G-05 Engage the public in watershed conservation and promote a stewardship ethic.

GENERAL WATER RESOURCE POLICIES

- WR -P-01 Provide community water/sewer service only within Community Growth Areas.
- WR -P-02 Stage development within Community Growth Areas according to the adequacy of drinking water and wastewater treatment capacities.
- WR -P-03 Consider including developed properties on well and septic within adjacent Community Growth Areas to facilitate connections to community water/sewer service.
- WR -P-04 Minimize new development utilizing individual well and septic systems to protect the quality and quantity of ground water resources.

STATE VISION AND PLANS

This serves as the County's Water Resources Element (WRE) mandated through House Bill 1141 by the Maryland State Legislature in 2006. It provides a more detailed presentation of the County's water resources limitations and challenges, than is summarized in the County Comprehensive Plan adopted in April 2010. The WRE will be updated concurrently with subsequent updates of the County Comprehensive Plan to reflect current demographic, economic, and development conditions.

The WRE addresses the following State Visions:

- Quality of Life
- Infrastructure
- Environmental Protection
- Resource Conservation
- Stewardship

RELATED COUNTY PLANS

2004 Lake Linganore Source Water Protection Plan

This plan addresses water quality and quantity issues of Lake Linganore and Linganore Creek, which are used as a drinking water source by the City of Frederick and the County. The plan looks at the portion of the Linganore Creek watershed that drains into Lake Linganore and addresses issues related to agriculture, land development, infrastructure and maintenance, homeowner impacts, and education/outreach. In 2006, an Action Plan for the Linganore Source Water Protection Plan was prepared that identifies specific action items to address the issues noted above.

2008 Frederick County Water and Sewerage Plan

The purpose of the Water and Sewerage Plan is to provide an overview of the goals, policies, and procedures for implementing water and sewerage plans. The Plan includes descriptions of both County and municipal water and sewerage systems including assessments of current demand/use and available capacities. The mapping component includes the various water/sewerage plan classifications, which identifies existing service areas and planned service areas. This Plan is required by the State and is updated every three (3) years.

The Water and Sewerage Plan and its rules, procedures, and classification mapping is the official document guiding water and sewer planning in Frederick County. The Water and Sewerage Plan takes precedence over the information contained within this Water Resources Element.

COORDINATION WITH MUNICIPALITIES

Twelve municipalities lie within the borders of Frederick County and nine provide community water and sewer service to the households and businesses within their municipal boundaries. Each is required to identify its own water resources vulnerabilities, limitations, and opportunities and include a water resources element in their respective comprehensive plans.

This WRE will meet the requirement for the Town of Burkittsville and the Village of Rosemont.

To the extent possible, this plan includes qualitative and quantitative data from the municipalities on their drinking water, wastewater and storm water systems. A municipal survey and water resource data templates were distributed in an attempt to gather information from the municipalities. Policy statements and implementation strategies specific to the municipality will be independent of the County's Water Resources Plan and will be addressed within the respective municipal water resources and comprehensive plans.

PLANNING FRAMEWORK

The County's Comprehensive Plan designates twenty-two Community Growth Areas (CGAs) where residential, commercial, and employment uses will be concentrated. Ten of the CGAs are Municipal Growth Areas (MGA), which include the existing municipal area and their future annexation areas; the remaining twelve are Unincorporated Growth Areas (UGA), where the planning and zoning is under the County's jurisdiction. The intent of the Plan is to direct development to the designated CGAs while protecting the county's green infrastructure and agricultural/rural resources. CGAs will be targeted for public facility and infrastructure financing and improvements. A higher level of available community services is to be expected within a CGA. Community water and sewer service is either provided or planned for all CGAs whereas areas beyond the CGA will only be served by individual well and septic systems. The only exception to this policy, referenced in the County Water and Sewerage Plan, is to address a public health emergency, where community water or sewerage service could be extended to areas outside of a community growth area.

The County Comprehensive Plan illustrates three general plan components as a way to provide a general version of the traditional land use plan map. This map clearly defines the Community Growth Areas and in particular differentiates the municipal growth areas from the unincorporated growth areas controlled by the County. Also illustrated is the relationship between Community Growth Areas, Priority Preservation Areas and the Green Infrastructure.

A summary of the three General Plan Components is provided below and illustrated in the map on page 5.

AGRICULTURAL AND RURAL COMMUNITIES PLAN

This component seeks to emphasize the importance of agriculture and the general rural character of the County that is not necessarily in agricultural use. Too often comprehensive plans identify agricultural areas as whatever is left over after the growth areas have been designated. The features of this component include:

- **Agricultural/Rural Area** – This encompasses a broad area of the County including active agricultural uses, fallow lands, and scattered residences that have been developed from larger farm parcels.
- **Priority Preservation Area** – There are five (5) areas delineated in the County. The focus of these areas is to create larger contiguous areas of preservation easements that also protect the significant prime agricultural soils.
- **Rural Communities** – These are cross road communities located throughout the Agricultural/Rural area and have historically supported the surrounding agricultural

community. Where appropriate some of these communities may experience limited growth in the context of supporting the local agricultural community.

GREEN INFRASTRUCTURE PLAN

This component focuses on the County's network of natural resources and protected lands. It focuses on both natural resource protection including the identification of hubs, corridors and gaps in the Green Infrastructure network and as a way to identify linkages within and connecting the community growth areas. These linkages may accommodate opportunities for recreational use including pathways.

- Natural Resource Areas – Delineates the primary environmental features including the mountain areas (encompasses forestland and steep slopes) and major stream corridors.
- Parks and Protected Lands – Highlights the state and federal parks and the County's regional parks. Other protected lands include municipal watershed properties and Sugarloaf Mountain, which is privately owned.

COMMUNITY PLAN

This component continues to implement the basic structure of the County's Community Concept first described in the County's 1972 Comprehensive Plan. The Community Concept described a hierarchy of communities, regional, district, and rural that was defined by a number of parameters including population, residential density, intensity of commercial and employment uses, and level of community facilities. The Community Concept also supports the following:

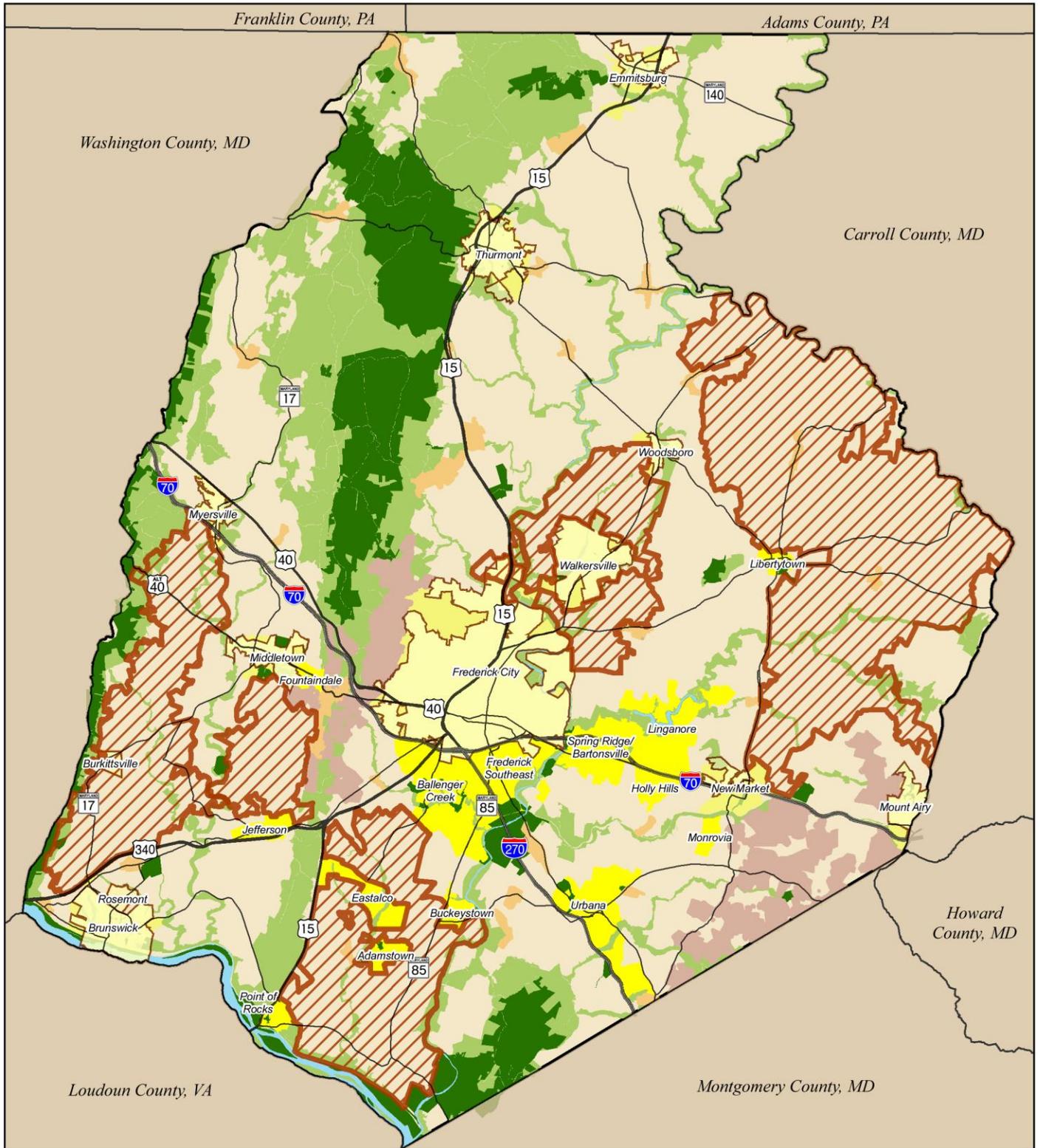
- Encourages compact growth areas to preserve agricultural lands and allow for more efficient provision of community facilities.
- Support the ability to maintain distinct and identifiable communities.

The new Community Concept that supports a framework for this Plan will continue to carry on the strategies of encouraging compact growth areas and supporting identifiable communities. The primary change from the original Community Concept is the focus on a broader definition of Community Growth Areas (CGA's) rather than a strict hierarchical structure.

Municipal Growth Areas – Most of the County's municipalities continue to provide a logical location for managed growth both within their existing municipal borders and in surrounding lands for future annexation. The General Plan highlights the existing municipal boundary and the future growth area that would be controlled by the municipality through the annexation process. The limits of a Municipal Growth Area (MGA) on the County Plan may be different from a growth area identified on a respective municipal plan. The MGA's in the County Plan represent those areas the County has recognized as appropriate for future growth given the limitations and constraints on County public facilities and services during the timeframe of the comprehensive plan.

Unincorporated Growth Area – There are several existing communities under the County's jurisdiction that have served as a foundation for growth. These communities have a historic "downtown" core, schools, and water/sewer infrastructure to support additional growth. Several of the unincorporated growth areas delineate newer communities, which are focused on an older historic core.

Map 1: General Plan



General Plan

Community Plan

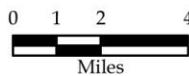
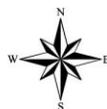
-  Municipalities
-  Municipal Growth Areas
-  Unincorporated Growth Areas

Green Infrastructure Plan

-  Parks & Protected Lands
-  Natural Resource Areas

Agriculture & Rural Community Plan

-  Agricultural/Rural
-  Priority Preservation Areas
-  Rural Community
-  Rural Residential



Division of Planning
GIS & Data Services Section

April 8, 2010

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PROJECTED POPULATION AND DEVELOPMENT

As a basis for the planning of future community water and sewerage service this section describes the projected population for the County and summarizes the development capacity of the County Comprehensive Plan. The Maryland Department of Planning projects a total population of 331,700 in 2030, which is an increase of approximately 96,300 people from the County's 2010 population of 235,400. This population increase would result in a need for an estimated 36,300 new dwelling units based on a projected household size of 2.65 persons/household.

As of December 2009 there were approximately 17,550 dwellings with some degree of development approvals (i.e. the pipeline). This pipeline number includes developments in the County (approximately 10,000 dwellings) and the municipalities (approximately 7,550 dwellings). The City of Frederick alone has a pipeline of approximately 5,300 dwellings.

Projected 2030 Population	331,700	Projected Additional Population 2010-2030	96,300
Current 2010 Population	235,400	Projected 2030 Household Size	2.65
Current Household Size	2.72	Gross Dwellings Needed	36,300

IMPORTANCE OF WATER RESOURCES PLANNING

With an additional 1.1 million people expected to reside in the State of Maryland over the next 25 years, population growth and its associated water resources challenges are anticipated in Frederick County. In addition to addressing the competing needs of residential, agricultural, and commercial/industrial development, local governments will need to review their land use plans to ensure delivery of adequate water and sewer service to a larger customer base. Alternative supplies and additional storage may be needed to augment smaller community systems and wastewater treatment facilities may require upgrades to reduce the concentration of pollutants in their discharge. There will be additional well and septic development on rural lands, which will affect groundwater levels and transport additional nutrients to local streams. The conversion of forests and agricultural land for development will impact watershed health and new rooftops, roads, and driveways will increase our total impervious surface area, inhibiting natural recharge of water.

In addition to the challenge of providing adequate drinking water and wastewater services to a growing population is the environmental impact of development on the water quality of our streams and rivers. This impact extends to the larger Chesapeake Bay watershed, which includes the County's two major tributaries, the Monocacy River and Catoctin Creek. The County's streams and rivers are impacted by both non-point runoff sources from farm fields, parking lots, and residential lawns and from point sources such as wastewater treatment plants. Non-point runoff contributes sediment and topsoil, fertilizers and pesticides, oil, and pet waste to the storm water discharges. An emerging contaminant, not easily addressed in current wastewater treatment technology, include pharmaceuticals and endocrine disruptors, though nitrogen and phosphorus continue to be the primary concern to the health of the Bay.

The challenges associated with growth are not new or unique to Frederick County; in fact, communities across the country and region are dealing with many of them and have found solutions. The County’s Water Resources Element takes into account the diversity of water resources issues, limitations and vulnerabilities that Frederick County and its twelve municipalities are facing and offers recommendations for potential solutions. As this is the first attempt to develop a comprehensive water resources element, it should be recognized that subsequent updates to this element will likely have new sources of data and technical reports that will expand upon this initial effort.

FREDERICK COUNTY WATERSHEDS

Water in Frederick County flows across two major watersheds: the Catoctin Creek watershed to the west of the Catoctin Mountains and the Monocacy River watershed to the east. Both watersheds lie within the larger Potomac River Basin, which drains to the Chesapeake Bay.

The headwaters of the ***Monocacy River*** are in the Gettysburg, PA vicinity; the free flowing river then meanders 58 miles south to its confluence with the Potomac near the Montgomery County line. Approximately 75% of Frederick County’s land area drains to the Monocacy River. There are seven municipalities within the watershed including Emmitsburg, Frederick, Mount Airy, New Market, Thurmont, Walkersville and Woodsboro. In addition, ten unincorporated growth areas are located in the watershed, including: Adamstown, Ballenger Creek, Buckeystown, Holly Hills, Libertytown, Linganore, Monrovia, Point of Rocks, Spring Ridge/Bartonsville, and Urbana.

Table 2: Frederick County Watersheds, Potomac River Basin

Monocacy River	
Ballenger Creek	Israel Creek
Bennett Creek	Linganore Creek
Bush Creek	Little Pipe Creek
Carroll Creek	Owens Creek
Fishing Creek	Toms Creek
Glade Creek	Tuscarora Creek
Hunting Creek	
Catoctin Creek	
Little Catoctin Creek	Middle Creek

The Monocacy River is an impaired stream and Total Maximum Daily Loads (TMDLs) have been issued by the Maryland Department of the Environment (MDE) for fecal coliform bacteria and sediment in both the upper and lower reaches of its watershed. Other Draft TMDLs are under development for biological impairment (fish and stream insects) and nutrients. Two sub-watersheds, Linganore Creek and Double Pipe Creek, have been issued TMDLs for sediment and phosphorus as well as sediment and fecal coliform bacteria, respectively.

Catoctin Creek flows through the Middletown Valley, an intermountain area characterized by heavily rolling land and narrow streams. The valley is surrounded on three sides by the Catoctin and South Mountain ridgelines. These mountain ranges form the boundary of the Catoctin Creek watershed, which accounts for approximately 25% of the county's total land area. The creek's confluence with the Potomac River is located just east of Brunswick. There are five municipalities in its watershed: Brunswick, Burkittsville, Middletown, Myersville, and Rosemont and one unincorporated growth area: Jefferson.

MDE has listed streams in the Catoctin Creek watershed as impaired for sediments, nutrients, bacteria, and impacts to biological communities. A TMDL for sediment was approved by the Environmental Protection Agency (EPA) in July 2009. TMDLs for the other impairments are expected in the future.

Watershed Management Issues

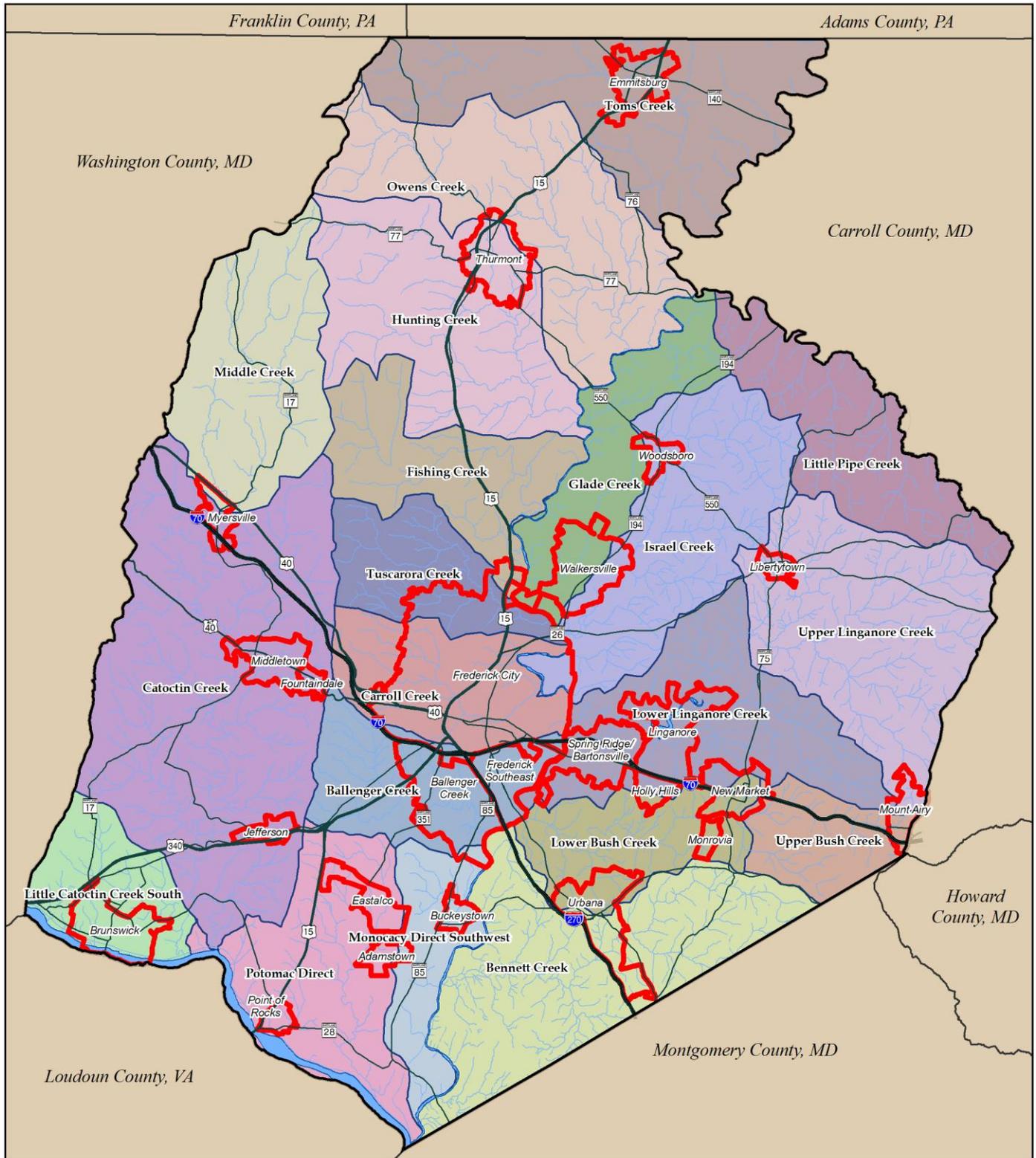
The stream corridors that comprise the county's watersheds serve several functions including:

- Recreation
- Ecological habitat for plants and animals
- Flood control
- Drinking water source
- Accommodate wastewater treatment effluent

Improvements to the health of the Monocacy River and Catoctin Creek watersheds are needed to allow the county's streams to adequately address the variety of functions listed above. The ability to meet the regulatory requirements established by the TMDL's and support the diverse functions of our streams are impacted by the following:

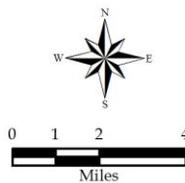
- Nonpoint source runoff from agricultural activities
- Restoration of the stream riparian buffers
- Sediment and erosion control during land development
- Impervious surface runoff from existing and new developments
- Improving wastewater treatment technology
- Drinking water conservation measures

Map 2: Subwatersheds & Community Growth Areas



Subwatersheds & Community Growth Areas

-  Rivers, Lakes, and Streams
-  Community Growth Boundaries



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GIS & Data Services Section
April 8, 2010

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DRINKING WATER ASSESSMENT

Healthy watersheds provide a safe and sustainable drinking water supply. With more than 1,400 miles of rivers and streams in Frederick County, water appears abundant. The perception of abundance highlights the importance of water resources planning. The water supplies, whether it be groundwater or surface water, can vary significantly from season to season and can also be affected over a period of years with prolonged drought conditions.

The drinking water assessment investigates drinking water supply; drinking water demand; major issues related to drinking water; and drinking water policies and projects. The current drinking water supplies for the County and municipal water systems are compared with the projected build out of the respective community growth areas based on the County Comprehensive Plan.

DRINKING WATER SUPPLY AND AVAILABILITY

In Frederick County, drinking water is obtained from surface water and ground water sources. The two supplies are intimately related; ground water is stored in aquifers and crevices beneath the ground that are recharged by precipitation. In an unconfined aquifer, the most common in Frederick County, ground water moves horizontally before it is discharged into a stream or other surface water body, such as a seep, spring, or wetland. Stream flow directly correlates with the rise and fall of the water table; both are impacted by climatic and drought conditions.

Disruptions to the natural hydrologic cycle by land use affects availability of both supplies. The steady increase in the County's population that is expected over the next twenty years poses limitations to the resource. Increased development reduces water recharge areas and has the potential for introducing new pollutants and contaminants to watersheds.

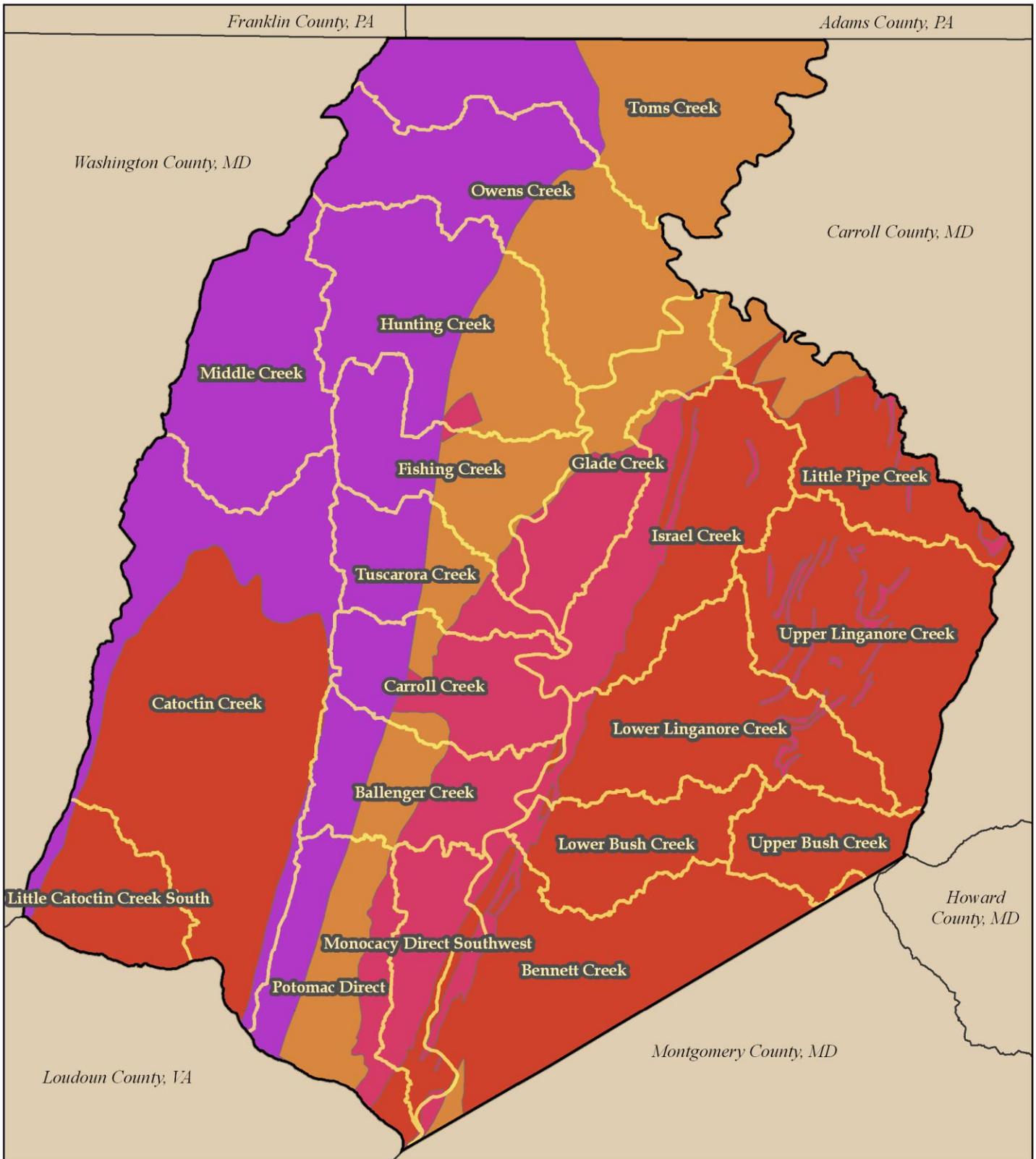
Ground Water

The available supply of ground water in Frederick County is dependent upon the underlying geologic conditions. In most areas, the water bearing characteristics of the geology offer low storage capacity and low transmissibility. An extensive stream network and the nature of fine particle soils contribute to these characteristics. The United States Geologic Survey (USGS) and Maryland Geological Survey have generalized the water yielding character of the County's aquifers and organized them by hydrogeomorphic region. The four regions located in Frederick County are Blue Ridge, Piedmont Crystalline, Piedmont Carbonate, and Mesozoic Lowlands.

Each region is further defined by its Hydrologic Unit, which is numbered I – III. The most productive aquifers, Hydrologic Unit I, include the karst aquifers of the Frederick and Glade Valley (Piedmont Carbonate). The poorest aquifers, in terms of yield and capacity, include fractured rock aquifers in the Mount Airy, Ijamsville, and Jefferson areas (Piedmont Crystalline). Table 3 presents the estimated yield and availability by acreage for the four regions during both average and dry years.

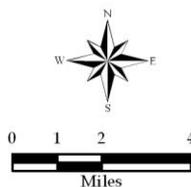
While karst aquifers provide the highest storage and capacity, they are more vulnerable to surface water contamination than most other aquifers. As a result, ground water in these areas can be contaminated with pathogenic organisms from septic systems and animal waste. Public water systems served by these relatively unprotected ground water sources are required to meet certain treatment requirements; however private wells serving homes and small businesses are less able to meet the complex treatment requirements.

Map 3: Hydrogeomorphic Regions



Hydrogeomorphic Regions

- Blue Ridge
- Mesozoic Lowland
- Piedmont Carbonate
- Piedmont Crystalline
- Subwatersheds



Division of Planning
GIS & Data Services Section

August 18, 2010

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In addition to geology, climatic conditions impact the county's supply of ground water. With water table conditions being most prevalent, seasonal variation in groundwater is a limitation to its use as a reliable supply. In a recent evaluation of the Catoctin Creek watershed, the State of Maryland concluded that groundwater may be an adequate source during average precipitation years, but under drought conditions, groundwater supplies are not adequate to meet existing demand and support the biological and natural resources of the watershed¹. Ground water limitations are accentuated during the summer months. Mid-June through mid-September is the driest time of the year therefore, ground water supply declines significantly during this time.

Table 3: Annual Water Budget Predictions of Annual Recharge by Hydrogeomorphic Region

		Piedmont Crystalline (PCR)	Mesozoic Lowland (ML)	Blue Ridge (BR)	Piedmont Carbonate (PCA)
Average Year	Yield (gpd/acre)	630	390	910	1,000
	Total Acres	179,514	81,284	111,747	54,851
	Total Availability (gpd)	113,093,801	31,700,861	101,690,198	54,850,650
Dry Year 20 Yr Drought	Yield (gpd/acre)	390	180	510	1,000
	Total Acres	179,514	81,284	111,747	54,851
	Total Availability (gpd)	70,010,448	14,631,167	56,991,210	54,850,650

Water Balance Methodology

Ground water availability is difficult to predict; aquifers are not confined to topographic, political or watershed boundaries. Availability is based on the amount of recharge (in the form of precipitation and septic system discharge) to the aquifer minus the amount of water required to provide base flow to streams. This method provides an estimate, usually on a watershed scale, and is not used to guarantee availability at a particular well.

The water balance method has been utilized in the Catoctin Creek and Monocacy River watersheds. Korsak and Smith (2006) investigated ground water availability in the Catoctin Creek watershed and revealed the potential for major variations in ground water availability under summertime and drought conditions. Under combined summertime and 20-year drought conditions ground water supplies would be over-allocated in 50% of the sub-watersheds of Catoctin Creek by 2030.

In a Monocacy River watershed pilot study (2004), ground water was projected to be available in 2030 in all sub-watersheds after demand and reserve flow was accounted for; however, summer conditions were not incorporated into the findings. The sub-watershed with the lowest expected availability, 2.71 million gallons per day (mgd) in 2030, was the Israel Creek watershed that serves the Woodsboro and Walkersville areas. The Linganore Creek sub-watershed was estimated to have the highest ground water availability at 13.38 mgd.

The water balance method is used by MDE for distribution of ground water appropriation permits for community water systems. To apply for a permit, a community must own or

¹ 2006. MDE. An Evaluation of Water Resources in the Catoctin Creek Watershed, Frederick County, Maryland.

otherwise control (such as easements) sufficient undeveloped land resources to allow for recharge of the aquifer they intend to withdrawal from. This policy primarily affects municipalities who are constrained by a municipal boundary with respect to where their wells are located. These communities must develop under state Smart Growth policy, which prescribes higher densities for growth areas, while also identifying land resources to keep in permanent open space for their groundwater appropriations.

In sum, ground water supplies in Frederick County have diverse limitations affecting a broad range of users. The most limiting factor in the near future will be the difficulty in locating sufficiently high yielding well sites necessary for public water supplies. The County has already moved towards providing community drinking water from more reliable surface water supplies and many well sites are currently off-line and only used as a back-up supply. As population increases in communities relying on groundwater like Middletown, Thurmont, Walkersville and Woodsboro, they will need to identify alternatives that will serve to diversify their current supply.

Surface Water

The most abundant surface water supply available to Frederick County is the Potomac River. The river drains a watershed of 14,679 square miles encompassing parts of West Virginia, Virginia, Maryland, Pennsylvania, and the District of Columbia. The river originates at Fairfax Stone, WV and runs 383 miles to its confluence with the Chesapeake Bay at Point Lookout, MD. It is estimated that the Frederick County land area contributes 419 billion gallons of water per year via runoff to the Potomac River or 1.15 billion gallons per day (Frederick County Water and Sewerage Plan 2008). Frederick County's use of the Potomac River is considered 'non-consumptive', since the return flow discharges from the County's WWTPs are typically at or near the County's withdrawal rates from the Potomac River.

According to the Interstate Commission on the Potomac River Basin (ICPRB), the Potomac's highest recorded flow was 275 billion gallons per day (March 1936) and its lowest recorded flow at the same Washington, DC location was 388 million gallons per day (September 1966) ([ICPRB Facts & Figures](#)). Before water supply withdrawals, the Potomac's average flow is approximately 7 billion gallons per day.

The Potomac River supply is augmented by two reservoirs: Jennings Randolph located on the North Branch of the Potomac in Garrett County, MD and Little Seneca Lake located on Little Seneca Creek near Boyds in Montgomery County, MD. Releases are made from the reservoirs when low flow conditions of 600-700 mgd are present. Low flow conditions result from low summer rainfall, low groundwater levels, and low precipitation levels over the previous 12 months ([ICPRB Water Supply Outlook, October 2008](#)). The Potomac River has a minimum flow-by requirement of 100 mgd (the minimum flow needed to maintain suitable conditions for fish and aquatic communities); summertime demand ranges between 400 and 700 mgd.

The volume and consistency of the Potomac River's flow has leveraged it to become the County's principal source of community drinking water. Other sources of surface water used for drinking water (Monocacy River, Catoctin Creek, Linganore Creek, Turkey Creek, and Fishing Creek) have availability limitations that restrict their use as a primary source. Those limitations include seasonal variability of stream flow, inability to meet flow-by requirements, and lack of adequate storage capacity. Linganore Creek, Turkey Creek and Fishing Creek are augmented by reservoir storage; however, the relatively small sized reservoirs provide limited safe yields.

Like ground water levels, surface water flows vary seasonally. These seasonal variations in flow can be exacerbated by short term seasonal droughts typical during the summer and long term

droughts that may extend over a year or more. For example, a USGS stream gage on Catoctin Creek measured zero (0) for 17 consecutive days during the 1966 drought of record and visual observations during the 2002 drought confirmed dry conditions on tributaries of Catoctin Creek. The County's smaller streams and even the Monocacy River are more sensitive to seasonal variability in flow. The lack of reservoirs within the Catoctin Creek watershed would not allow Catoctin Creek to be used for a continuous, reliable surface water supply.

An additional limitation to developing a community drinking water source using surface water is meeting the flow-by requirements mandated by the State of Maryland. This requirement, which protects the biological integrity of the stream, is based on the 7 day, 10-year low flow (7Q10). Without a reservoir or adequate storage, streams cannot meet the minimum required flow all of the time². Through a consent order, the City of Frederick and the Maryland Department of the Environment set a flow-by requirement of 50 cubic feet per second (cfs) for the Monocacy River at the Jug Bridge stream gage for the City's upstream intake. During the 2002 drought, when levels dropped to 20 cfs, there was not adequate flow in the river to meet the flow-by; therefore, use by the City was restricted.

Surface Water Appropriations

Surface water is appropriated by the Maryland Department of the Environment for 12-year periods. The County holds a Water Appropriation and Use Permit (WAUP) for the Potomac River and Linganore Creek. The combined permitted withdrawals total 17.2 mgd (daily average) and 28 mgd (maximum daily). A portion of this appropriation is used by the City of Frederick. The following Frederick County jurisdictions hold individual WAUP's for surface water withdrawals: City of Frederick (Monocacy River, Fishing Creek, Tuscarora Creek, and Linganore Creek), City of Brunswick (Potomac River), Town of Emmitsburg (Turkey Creek), and the Town of Myersville (Little Catoctin Creek). Fort Detrick in the City of Frederick also maintains its own water system and has a withdrawal permit from the Monocacy River.

SOURCE WATER PROTECTION

The quality of drinking water varies by source. Different issues exist for ground and surface water sources. With the exception of ground water in karst aquifers, which is under the influence of surface water, surface water is vulnerable to contamination from nonpoint sources such as runoff from parking lots, roads, and from agricultural lands. Therefore, water quality concerns like sedimentation, potential spills, and fecal contamination are more prevalent. Ground water quality can be negatively impacted by naturally occurring radon or iron, but can also be contaminated by fecal coliform, particularly from septic systems. Groundwater may also be impacted by active quarry operations that exist in the County. The State has delineated zones of dewatering influence (see map 4) where quarry operations may impact wells of individual residences or for community water systems.

Water quality standards are in place for community systems using ground and surface water. Regular testing of drinking water is a requirement. The federal Safe Drinking Water Act amendments of 1996 required public systems to conduct a Source Water Assessment to better understand the vulnerabilities of their source. The State of Maryland has prepared Source Water Assessments for all community water systems in the County. These plans list in detail the vulnerabilities of the supply and offer recommendations for continued protection.

² 2004. Advisory Committee on the Management and Protection of the State's Water Resources. *Appendix D - Monocacy River Watershed - Pilot Study*.

Sedimentation	Nitrates
Human pathogens	Natural organic matter
Fecal contamination (<i>Cryptosporidium</i> and <i>Giardia</i>)	Algae
Potential spills	Taste and odor compounds
Fecal coliforms	Gasoline-related compounds

A Source Water Protection Plan was prepared in 2004 for the Linganore Creek/Lake Linganore drinking water source in response to issuance of TMDLs for sediment and phosphorus. This plan presents the water body’s vulnerabilities in detail and proposes a set of recommendations for agriculture, development, infrastructure and maintenance, homeowners, and outreach. These recommendations, once implemented, will serve to improve the water quality and quantity issues at the Lake. With TMDLs pending at the federal level for most streams in Frederick County, it is likely that additional in-depth watershed management plans will be conducted to protect the diverse sources of drinking water in the future.

When surveyed, several municipalities in the County reported an interest in increased source water protection through wellhead, springhead or headwater protection ordinances. With ground water wells, springs, and streams often located outside of municipal boundaries, County regulations and ordinances are needed for adequate source water protection of municipal water systems.

Wellhead Protection

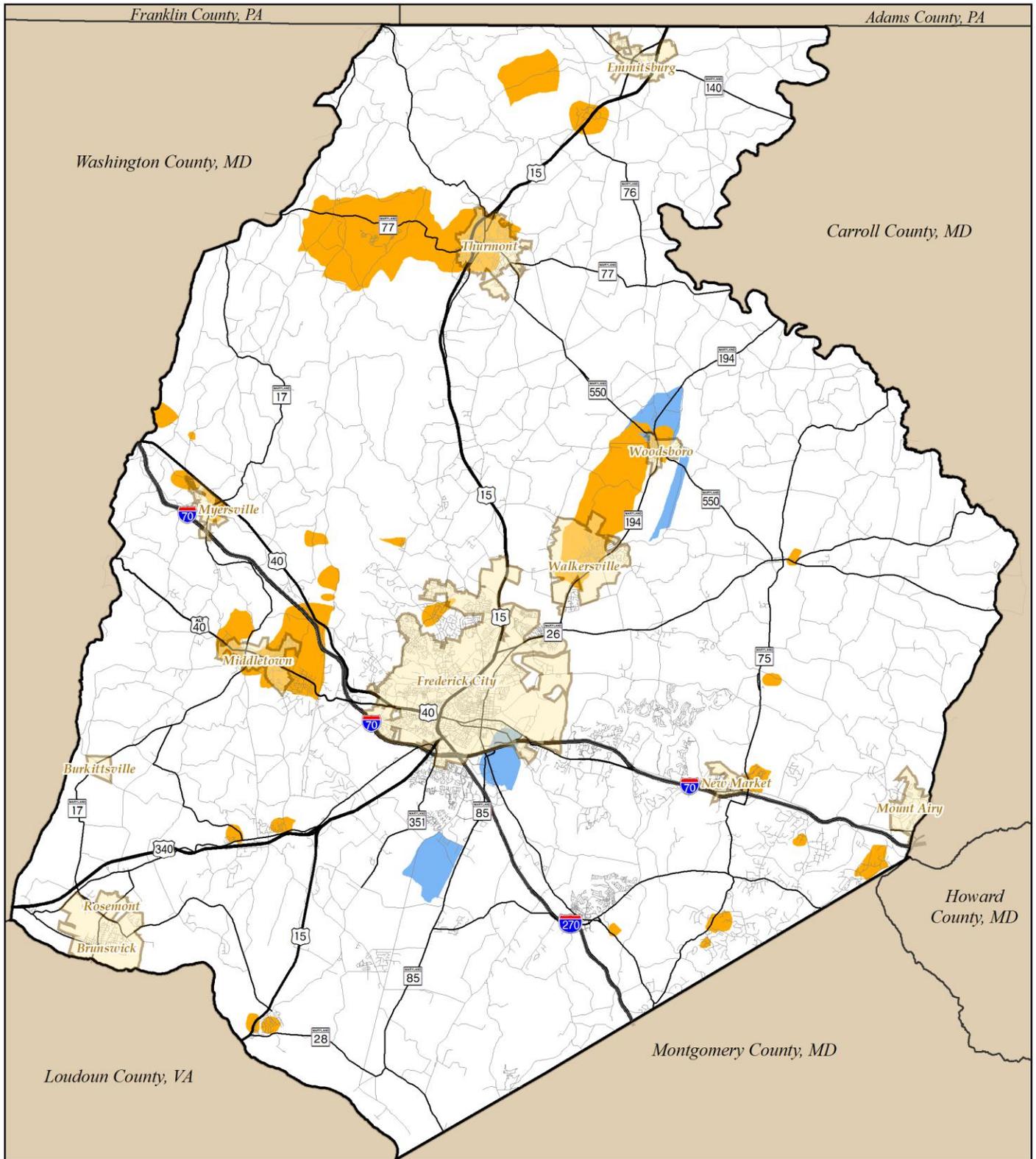
The purpose of wellhead protection is to protect groundwater resources of community public water supplies to reduce the potential for ground and surface water contamination. Between 2000 and 2005 the Maryland Department of the Environment (MDE) published a series of assessments for each of the County’s community water systems that rely on groundwater. Components of MDE’s water supply assessment include:

- Delineation of an area that contributes water to the source
- Identification of potential sources of contamination, and
- Determination of the susceptibility of the water supply to contamination.

Potential sources of contaminants include agricultural activities, gas stations, and industrial uses that store and use various liquids such as gasoline, diesel fuel, and kerosene. The improper use, storage, disposal, or release of these or other substances from agricultural, industrial, or residential activities can harm groundwater quality. The contaminants may include volatile organic compounds, radionuclides, synthetic organic compounds, microbial contaminants, and nitrates.

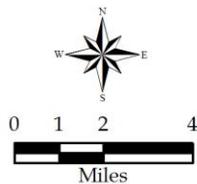
In 2007 the County adopted a Wellhead Protection Ordinance, which only applies to the County’s jurisdiction. The ordinance established wellhead protection areas for all community groundwater supply systems; included new regulations for hazardous substance storage tanks; and prohibited certain land uses and activities within designated wellhead protection areas. Several municipalities have adopted their own wellhead protection ordinances including Middletown, Mt. Airy, Walkersville, Myersville, and Frederick.

Map 4: Wellhead Protection & Zones of Dewatering Influence



Wellhead Protection & Zones of Dewatering Influence

- Wellhead Protection Areas
- Zones of Dewatering Influence



Division of Planning
GIS & Data Services Section
April 8, 2010

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DRINKING WATER CAPACITY AND DEMAND

In Frederick County, community drinking water is either currently provided or planned for land within the municipal and unincorporated community growth areas. The designated community water service areas generally mirror the particular community growth boundaries. As of 2010 nearly 60% of the County's residents obtained their drinking water from community water systems with the remaining 40% of the population relying on individual wells.

The Planned Service area depicted on Map 5 reflects properties with water classifications of "1" (existing service) to PS (Planned Service). The Planned Service Area would generally be expected to have water service within a 20-year time frame. However, areas within a Community Growth Area may also have a No Planned Service (NPS) water category, indicating a longer-term time frame for public water service than the PS category, consistent with growth policies in the County Comprehensive Plan and the Water and Sewerage Plan.

Table 5 references the current, approximate capacities of the individual county and municipal water systems. Not all County owned water systems are included in this document, only those in a community growth area. In particular the County's New Design System serves several of the County's unincorporated growth areas in addition to the City of Frederick and the Town of New Market.

It is important to note that the capacities referenced in Table 5 are based on existing treatment facilities and water sources and do not include additional water supplies in the planning or development stages. Table 6 indicates the projected residential development potential in the Community Growth Areas based on the 2010 County Comprehensive Plan with their particular water system. Water supply and/or treatment systems may need to be upgraded to serve the figures shown in Table 6.

It should also be noted that current demand is based only on current residential development and does not include potential demand from commercial, office, and industrial development. Due to the dynamic nature of withdrawal, treatment, storage, and transmission of water resources for public use, figures in Table 5 do not constitute a complete evaluation of actual capacity and demand for use in allocating water capacity for specific properties.

Table 5: Current Drinking Water Capacity and Demand

Water Systems (community growth area only (a))	Design (Max Day) Treatment Capacity gpd	Average Permitted Capacity gpd	Current Demand gpd(1)	Current County Demand gpd(2)
County Systems				
Cambridge Farms (Jefferson)	100,000 (b)	62,000		79,660
Copperfield (Jefferson)	47,300 (b)	28,300		44,520
Fountaindale/Braddock	360,000 (b)	280,000		292,040
Libertytown Apts. (Libertytown)	7,500 (b)	5,000		5,180
Liberty East (Libertytown)	23,600 (b)	15,700		10,640
<u>New Design System</u> (Adamstown, Ballenger Creek, Buckeystown, Eastalco, portions of Frederick City (4), Frederick Southeast, Holly Hills, Linganore, Monrovia, New Market, Point of Rocks, Spring Ridge/Bartonsville, Urbana)	<u>2009</u> 8.8 MGD <u>2010</u> 25 MGD <u>Ultimate</u> 45 MGD	16,000,000		5,460,000
Municipal Systems				
Brunswick	1,500,000	1,350,000	500,000	
Emmitsburg	463,000	463,000	315,000	
Frederick (4)	10,700,000	11,200,000	6,300,000	
Middletown	1,782,000	402,400	370,000	
Myersville	412,000	269,000	128,800	
Mount Airy		855,000	766,000	
Thurmont	1,200,000	1,020,000	454,000	
Walkersville	1,400,000	1,000,000	600,000	
Woodsboro		120,000	70,000	

Notes:

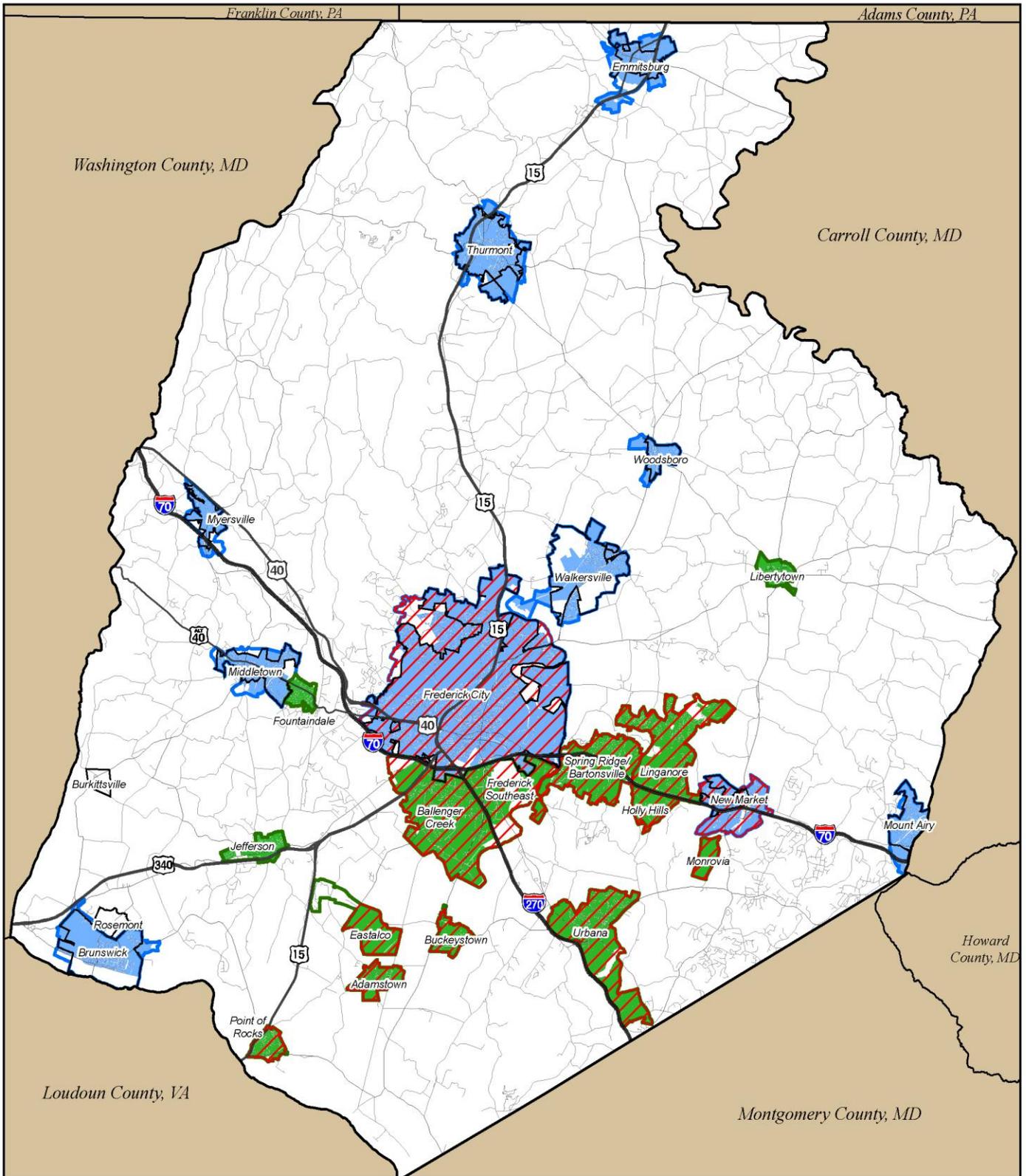
- (1) The demand associated with the total annual water production for the data shown may vary from system to system and is not intended to be relied upon for precise capacity allocation or calculation purposes. Annual water production is divided by 365 days to indicate gallons/day (gpd).
- (2) Current County Demand—derived from current demand multiplied by a best well out factor of 1.4 as required by County Design Manual for groundwater “well” systems.
- (3) Demand figures do not account for public use/health emergency reservation or taps allocated in multi-year tap agreements (MYTA).
- (4) New Design WTP current capacity is 8.8 MGD (max day) of which 1.5 MGD is allocated to the City of Frederick per the Potomac River Water Supply Agreement (PRWSA). Ongoing improvements (scheduled for completion in Fall 2010) will result in capacity of 25 mgd Max Day (16 mgd Avg Day) of which the City is allocated 8.0 MGD Max Day (5.0 MGD Avg Day). Net Capacity is shared between Frederick City and County service areas in accordance with the PRWSA.
 - a) Does not include all of the county’s water systems or service areas. This table only includes those systems in the Community Growth Areas as shown in the Comprehensive Plan.
 - b) May be greater than actual well yield of groundwater systems

Table 6: Residential Development Potential

Water Systems (community growth areas)	Pipeline Dwellings	Undeveloped Potential Dwelling Units	Total Potential Dwelling Units
County Systems			
Cambridge Farms (Jefferson)	199	28	227
Copperfield (Jefferson)			
Fountaindale/Braddock	0	20	20
Libertytown Apts. & Libertytown East	10	489	499
<u>New Design System</u> (Adamstown, Ballenger Creek, Buckeystown, Eastalco, Frederick Southeast, Holly Hills, Linganore, Monrovia, New Market, Point of Rocks, Spring Ridge/Bartonsville, Urbana)	8,454	4,256	12,710
Municipal Systems			
Brunswick	1,505	1,234	2,739
Emmitsburg	52	670	722
Frederick	5,296	4,109	9,405
Middletown	166	28	194
Myersville	159	14	173
Mount Airy	0	135	135
Thurmont	34	2,335	2,369
Walkersville	65	513	578
Woodsboro	7	363	370

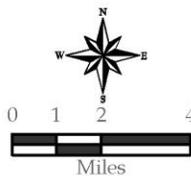
Source: 2010 County Comprehensive Plan

Map 5: Current/Planned Water Service Areas



Current/Planned Water Service Areas

- Municipalities
- New Design Water Service Areas
- Municipal Growth Areas
- Municipal Water Service Areas (W1 - PS Classifications)
- Unincorporated Growth Areas
- Unincorporated Water Service Areas (W1 - PS Classifications)



Division of Planning
GIS & Data Services Section
September 3, 2010

This map is intended for Planning Purposes only. Refer to the Master Water and Sewerage Plan for specific service classifications. While efforts have been made to ensure the accuracy of this map, Frederick County accepts no liability or responsibility for errors, omissions, or positional inaccuracies in the content of this map. Reliance on this map is at the risk of the user. This map is for illustration purposes only and should not be used for surveying, engineering, or site-specific analysis.

PROFILES OF COMMUNITY WATER SYSTEMS

This section includes brief profiles of the County water service area/systems as well as service area/systems for the individual municipalities.

Fountaindale/Braddock Heights Service Area

The County Comprehensive Plan designates Fountaindale as an Unincorporated Growth Area apart from the adjoining Middletown Municipal Growth Area. Braddock Heights is now designated a Rural Community; the 1997 Middletown Region Plan showed a larger Braddock Heights area, which was designated as a growth area. The new Rural Community plan designation is consistent with the current water service area boundary.

The Fountaindale/Braddock Heights system utilizes ground water from five (5) wells and springs in the Catocin Metabasalt aquifer. While Braddock Heights is planned for only limited infill development, demand has already reached the system's capacity.

Jefferson Service Area

Jefferson currently has 765 dwelling units and a population of approximately 2,065 people. The residential lot yield in the community is 227 potential dwelling units, consisting of 199 units in the development pipeline and 28 units in undeveloped land potential.

The Jefferson CGA is currently served by two community water systems for the Copperfield and Cambridge Farms subdivisions. These are ground water based systems in the Catocin Metabasalt, Granodiorite, and Biotite/Granite/Gneiss aquifers, which are not suited for consistent community supplies. The remaining portions of the community are served by individual wells, including Valley Elementary School.

The County's long-term plans are to combine the ground water systems in Jefferson into a single community water system. Furthermore, additional wells and storage would be needed.

Libertytown Service Area

The 2008 population for the Libertytown Growth Area is 1,141. The majority of residents are served by individual wells; however, Liberty East, Liberty Village, Libertytown Apartments, and Liberty Elementary School maintain individual community water systems. Residents of Libertytown receive drinking water from ground water sources in the Wakefield Marble, Ijamsville Formation, and Metarhyolite aquifers. Generally, the underlying aquifers are low yielding, with the exception of the Wakefield Marble, which has the potential for a high production well that could benefit the entire community. Additional development in Libertytown is limited until a long-term plan to develop a single community water system can be implemented.

The primary vulnerability to drinking water in Libertytown is the low yield of its underlying aquifers. With the majority of the community on individual wells, future growth of the area is limited until alternative drinking water sources are identified. Additionally, with limited infrastructure in place extensive capital expenditures will be required to develop a single community system.

New Design Service Area

The New Design Water Treatment Plant (WTP) is the County's largest system and has a Potomac River allocation of 16 mgd (daily average) and 26 mgd (month of maximum use). This system provides water to the City of Frederick as defined in the Potomac River Water Supply Agreement. Described below are the individual communities served by the New Design System. The service area provides existing or planned service to the following community growth areas:

- Adamstown/Eastalco
- Ballenger Creek
- Buckeystown
- Frederick Southeast
- City of Frederick
- Holly Hills
- Urbana
- Monrovia
- New Market
- Linganore
- Spring Ridge/Bartonsville
- Point of Rocks

Adamstown - Eastalco

The Adamstown community, population 1,980, was connected to a community water system due to local groundwater contamination. The community includes the village of Adamstown and the newer developments of Adamstown Commons and Greenhill Manor. At present, there are 644 existing dwellings in the Adamstown CGA and there is the potential for an additional 119 dwelling units (87 units in development pipeline and 32 units from undeveloped land potential).

Only a portion of the Eastalco Employment Area is planned for community water. This area encompasses the Eastalco owned lands, which includes the aluminum plant, which is currently closed, and significant undeveloped land for limited and general industrial uses.

Ballenger Creek

The Ballenger Creek community includes significant areas of residential development including Wellington Trace, and Robin Meadows, as well as office/industrial developments along the MD 85 corridor. In 2008, there are 6,298 existing dwelling units and 16,840 people residing in the Ballenger Creek CGA. The total development potential in this community is 3,630 dwelling units, comprised of 3,110 units in the development pipeline and 520 from undeveloped land potential.

Buckeystown

Currently, Buckeystown relies on individual wells for its residences and businesses with the exception of the Buckingham's Choice nursing home/retirement development. The long-term plan is to have the entire community connected to the New Design system.

Linganore-Holly Hills- Spring Ridge/Bartonsville

All three of these community growth areas are currently served by the New Design system. This area previously received drinking water from Lake Linganore, however, in April 2007, these areas were connected to the New Design WTP. The Lake Linganore WTP is available as a secondary, back-up source. Major developments within these growth areas include the Linganore Planned Unit Development (PUD), Spring Ridge PUD, and Greenview PUD. In 2008, there are 16,340 people residing in the Linganore community alone.

The Linganore CGA has the greatest residential development potential; there are 3,569 total potential dwelling units, consisting of 2,596 already in the development pipeline with 973 units from undeveloped land potential.

The Holly Hills CGA has 375 existing dwellings and only one parcel available for future residential development. Finally, the Spring Ridge-Bartonsville CGA has the potential for an additional 1,294 dwelling units (192 in pipeline development and 1,102 from undeveloped land within the CGA).

Monrovia

The Monrovia CGA encompasses the Landsdale Planned Unit Development (PUD). This PUD has approval for 1,100 dwellings as an active adult community with an age restriction.

New Market

The Town of New Market, population 609, currently relies on individual wells for most of the older part of town, though water lines have been recently constructed to connect the Main Street properties with the County's New Design System. The Town's newer developments are served with public water. Existing developments, outside of the Town but within the growth area have had separate water systems but have now been tied into the New Design System.

Point of Rocks

The community of Point of Rocks is situated along the Potomac River and currently has 470 existing dwelling units and 1,395 people. The Canal Run PUD is the largest development in the community and is still building out.

Urbana

The Urbana service area spans developments such as Villages of Urbana and Urbana Highlands PUD's. In 2008, there are 2,312 existing dwelling units and 6,221 people residing in the Urbana CGA. There is an additional 1,015 dwelling units in the development pipeline for this growth area. This growth area also includes the I-270 Employment Corridor that includes approximately 1,300 acres designated for Limited Industrial and Office/Research uses.

City of Brunswick Service Area

The City of Brunswick obtains its drinking water supply from the Potomac River and Yourtee Springs in Washington County, MD. Water service is also provided to several areas outside of the City including portions of Knoxville, New Addition, Washington County (Brownsville area) and the Village of Rosemont. The drinking water supply system serves a population of approximately 5,600 people with a current demand of 0.5 mgd.

The City has a Potomac River permit for a daily average withdrawal of 1.0 mgd with a maximum daily withdrawal of 1.5 mgd. Yourtee Springs is permitted for 0.35 mgd (daily average) and 0.5 mgd (max day demand). The ultimate design capacity of their water treatment plant is 1.5 mgd.

The development of Brunswick Crossing, which will add 1,505 residential dwelling units as well as commercial and office uses to the community, will increase the drinking water demand by 0.45 mgd for a total average daily demand of 0.99 mgd and 1.62 mgd maximum daily demand, according to the County's Water and Sewer Plan (2008). To handle the additional demands of Brunswick Crossing, a 1 million gallon water tank has been built and plans for expansion to the water treatment plant have been approved. The City estimates that drinking water demand will reach 2.04 mgd by 2030. To accommodate the projected population, additional appropriations will be required as well as expansions to the water treatment facility.

The primary vulnerability of Brunswick's drinking water supply is surface water quality. The city is interested in springhead protection policies to protect their source at Yourtee Springs. A Source Water Assessment was performed by MDE for their Potomac River treatment plant and recommendations for protection are included.

Village of Rosemont

Rosemont has a population of 313 and 79 households receive drinking water service from the City of Brunswick's system. The remaining 39 homes utilize individual wells. Rosemont is not considered a growth area though it does have some residential potential for approximately 95 dwellings on two undeveloped parcels. While these undeveloped parcels are within a planned water service area there have not been any discussions about the ability of the Brunswick system to serve the remaining areas in Rosemont. Rosemont experiences and reports low pressure and low chlorine levels from their connection with Brunswick. Additionally, the need for replacement of the water lines serving Rosemont that were installed in 1940 was reported as a vulnerability of the system.

Town of Emmitsburg Service Area

The Town, population 2,852, has two surface water sources, Rainbow Lake, a 33-million gallon reservoir located on Turkey Creek, and a 3-million gallon reservoir that is currently not in use. There are six ground water wells (#1-6) with allocations in the Catoctin Metabasalt aquifer. Well 7 and Well "J" are located in the Gettysburg Shale aquifer and are not currently in use. Well 7 has an MDE permit, however, Well "J" has not yet received an allocation from MDE that is acceptable to the town. The current capacity of their water treatment facility is 0.463 mgd. With an existing demand of only 0.315 mgd, there is additional capacity for new service connections. The town projects that the demand in 2010 will be 0.321 mgd.

Drinking water service is provided to residents outside of Town along Mt. View Road, Waynesboro Road, and Old Gettysburg Road. In addition to residential users, the system serves two major institutional uses: the St. Catherine's nursing care facility and the National Emergency Training Center.

The Town believes that their greatest drinking water concerns are protecting sources and providing reliable quantities of water to support demand. Currently, the Town owns more than 1,000 acres in the Turkey Run watershed for source water/watershed protection.

The current water treatment plant was brought online in January 2003. A second water treatment plant and a water storage tank, both located within the town boundary, are currently in the preliminary planning phase. These facilities would allow the town to process water from Well 7 and Well J, and to maximize performance of the town's water system.

Mount Saint Mary's University operates a private water system, which is interconnected with the Town's system for emergency purposes. The Town has a contract extending until 2040 with the Mount to purchase 0.1 mgd of drinking water on demand. The Mount's system uses three wells, the Roddy Quarry, and Grotto Spring. The ground water sources are permitted for 0.365 mgd (average daily demand) and 0.548 mgd (maximum daily demand) and are located in the Grove, Harper's and Frederick Limestone.

City of Frederick Service Area

The City of Frederick, population 61,960, has historically relied on surface water sources all located in the Monocacy River watershed; including the Monocacy River, Linganore Creek, and the Fishing Creek reservoir. After the 2002 drought, the City determined that alternatives were needed to accommodate projected demand. The City drilled three (3) wells and reached an agreement with the County to purchase a share of the County's Potomac River appropriation.

The Potomac River Water Supply Agreement (PRWSA) between the City and County allows Frederick City to purchase 8 mgd of water immediately and ultimately 12 mgd, which is provided

through the New Design system. The City agreed to contribute to the construction costs of the County's New Design WTP upgrade and associated transmission lines

Presently, the City manages three permanent water treatment plants: the Monocacy WTP, Linganore Creek WTP, and Lester Dingle WTP. The Monocacy WTP has a design capacity of 3 mgd and is located on the Monocacy River south of MD 26. The Linganore Creek WTP has a design capacity of 6 mgd and is located downstream of Lake Linganore, on Linganore Creek. A 50 million gallon reservoir located on Fishing Creek supplies the Lester Dingle WTP, which has a design capacity of 1.7 mgd.

The City's three (3) ground water wells are located in the Frederick Limestone aquifer; the total appropriation is for 565,000 gpd (average daily demand) and 680,000 gpd (month of maximum use). A portable filtration WTP treats its groundwater sources. The City also has a ground water source for the golf course; the well is permitted for 10,000 gpd (average daily demand) and 40,000 gpd (month of maximum use). Drinking water consumption averaged 6.3 mgd in 2004.

The City's greatest drinking water concerns are lack of available supply; providing reliable quantities of water to support future growth; and expansion of public water supply services. Other concerns include contamination of groundwater from spills or pollutant releases; declining stream flows; and protection of water sources for public water supplies.

Within this decade, the City faced serious limitations to its drinking water service when the Monocacy River dropped below its flow by requirement. The seasonal variation in flow on the Monocacy River has limited its use, particularly in the summer. Lake Linganore, which is situated upstream of the Linganore WTP, is filling with sediment, which may reduce its capacity and therefore, limits its use as a drinking water supply. Studies are underway by the United States Geological Survey (USGS) to determine the nature and extent of the problem.

Fort Detrick

The Fort Detrick military installation, located within the City of Frederick, maintains its own system serving approximately 278 housing units, 152 barrack units, and 7,107 employees. Fort Detrick has an appropriation from the Monocacy River and has a water treatment plant (WTP) immediately downstream from the City's WTP. The Monocacy is their sole source of drinking water; the Fort is permitted to withdraw 2.0 mgd (average daily demand) and 2.5 mgd during the month of maximum use.

The Fort is connected to the City of Frederick's system and an agreement is in place to exchange water through the City's system in an emergency or drought situation. The Fort's WTP has a maximum processing capacity of 4.25 mgd. In addition to their surface water supply, the Fort has a ground water appropriation from the Harpers Formation aquifer. The permit allows for a daily average of 9,000 gpd and a maximum withdraw of 9,500 gpd.

Town of Middletown Service Area

The Town's system is comprised of 15 wells in the Catoctin Metabasalt Formation and four springs. The Town recently initiated discussions with the County about linking the Town's system with the adjoining Fountaindale/Braddock system, for emergency use only.

The Town's system relies on fifteen (15) ground water wells and four (4) springs; they are permitted to withdrawal 0.4024 mgd (average daily demand) and 0.4888 mgd (maximum day demand). Middletown's system serves a population of approximately 4,150 people with a current demand of about 0.37 mgd (maximum use of 0.5 mgd). The Town estimates a 2030

population of 5,667 and an associated drinking water demand of 0.742 mgd. To accommodate this projected population, the town will need to identify additional water sources.

Middletown has been under consent order by the MDE due to its limited water supply. A building moratorium was put in place in 2004 that halted building permits and subdivision plats until the town could identify capacity to meet the demand of additional water service connections. The Town is vulnerable due to their dependence on groundwater as a sole source of drinking water and has concerns related to depletion of ground water levels due to the number and capacity of wells and the need for protection of ground water supplies. Other vulnerabilities include the seasonal variation of groundwater and impact of drought; overuse of water resources during summer months; and maximum daily demand exceeding maximum permit allocations.

Middletown, in particular, is affected by conflicting state policies regarding smart growth and ground water allocation. The water balance methodology, which is used to determine the limits of groundwater withdrawals, requires sufficient open, undeveloped land within a water service area to allow for recharge of the aquifer. This policy encourages a lower density condition for service areas utilizing ground water. In contrast, state Smart Growth policy encourages higher densities in designated growth areas, requiring an average density of 3.5 dwelling units per acre to maintain Priority Funding Area status.

There are at least three alternatives that Middletown may consider to address their drinking water limitations. The first is the water recharge easement, where properties would sell water rights to the municipality. Properties in land preservation programs are also being considered for the purchase of water recharge easements. . A program has begun in Carroll County where the County purchases water rights from landowners adjacent to growth areas then sells them back to the municipality. This enables a growth area to maintain its PFA status while also having sufficient land protected for recharge. This alternative addresses the conflicting state policies noted above and is currently under review for properties under agricultural preservation easements by the Maryland Agricultural and Land Preservation Foundation (MALPF) for implementation statewide.

The second alternative resulted from the Maryland Department of Environment's evaluation of Catoctin Creek, which advised that Middletown consider a surface water impoundment to diversify their supply or interconnection to another more reliable system. A final alternative is to review the long-term development potential of the town and consider whether growth needs to be redirected elsewhere.

Town of Mount Airy Service Area

The Town of Mount Airy, located in both Frederick and Carroll counties, provides drinking water to town residents from ten wells located in three separate watersheds. The current Town population, for the Frederick County portion, is estimated to be 3,845. The major aquifers are the Ijamsville Formation and Marburg Schist.

According to the Town, the capacity of their drinking water supply is 0.895 mgd (yearly average) and 1.219 mgd (month of maximum use). The existing demand on the supply is 0.766 mgd (yearly average) and 0.842 mgd (yearly average, drought conditions). During the month of maximum use, demand rises to 0.83 mgd and 0.913 mgd (drought conditions).

The Town projects that total anticipated use of water for existing, pipeline, potential, and infill projects will be 1.105 mgd (yearly average) and 1.237 mgd (month of maximum use). When

development of the growth area is incorporated, the projection increases to 1.656 mgd (yearly average) and 1.898 mgd (month of maximum use).

To meet short-term demand, the town is moving forward on additional well field development. A proposed reservoir at Gillis Falls is located approximately 1-1/2 miles northeast beyond the town limits in Carroll County. The Gillis Falls reservoir would have a maximum safe yield of 3.8 mgd. Carroll County government has acquired 95% of the land necessary for this reservoir, but progress has been delayed by environmental issues.

The primary vulnerability of Mt. Airy's drinking water supply is the reliance on ground water sources. The town is limited by the lack of reliable surface water sources in the vicinity and the limited amount of open space in their growth area to account for ground water recharge. Low yielding aquifers and the expense of a reservoir to meet ultimate demand for drinking water are other limitations. Mount Airy has had a wellhead protection ordinance in effect since 1997.

Town of Myersville Service Area

The Town has a ground water supply system consisting of 11 wells and one spring in the Catoclin Metabasalt Formation and a surface water intake on Little Catoclin Creek. In total, the groundwater supply is permitted for 0.2297 mgd (average daily) and 0.3297 mgd (maximum daily). The Little Catoclin Creek allocation is for .04 mgd (average daily) and .15 mgd (maximum daily). The total water supply is permitted for 0.269 mgd (average daily) and 0.4797 mgd (maximum daily). The water treatment plant's design capacity is 0.288 mgd and current water demand in Town is 0.115 mgd. As of 2008, there were approximately 1,530 residents in Town.

The Town's primary concerns are declining stream flows, protection of their drinking water sources, and provision of reliable quantities of water to support future growth. Also of interest is the feasibility of surface water impoundments in appropriate areas for water storage.

Town of Thurmont Service Area

The Town of Thurmont provides drinking water service to 6,200 people or 2,100 households (2007). The source of drinking water are six wells in the Frederick Limestone and Gettysburg Shale aquifers, which can produce an average of 1.02 mgd. Service in Thurmont is primarily for residential use (75%) while commercial use accounts for 21% and industrial, 4%. The existing demand for water service is 0.342 mgd residential, 0.095 mgd commercial and 0.017 mgd industrial. The total public water service demand in 2007 was 0.454 mgd.

The projected 2030 population of 7,700 people or 2,600 households will demand 0.392 mgd residential (72%), 0.115 mgd commercial (21%), and 0.037 (7%) industrial for a total estimated 2030 demand of 0.544 mgd. According to the town, the existing treatment capacity of their plant is 1.2 mgd and the ultimate demand on the system will be 1.3 mgd at build-out of their land use plan.

Thurmont has experienced groundwater contamination of Well 5 (not in service) and in Wells 7 and 8 from underground gasoline storage tanks. Wells 7 and 8 use air strippers to purify water to meet drinking water standards.

The Town's primary drinking water limitation is providing supply to meet demand. Additionally, the Town is impacted by elevation differences between their well sites and storage tanks; five of the Town's wells are located in an area without adequate storage.

Town of Walkersville Service Area

The Walkersville Service Area provides 2,784 drinking water connections to a diverse mix of residential, commercial, and institutional users. The service area includes the Town of Walkersville and three County subdivisions adjacent to the Town (Glade Manor I, Discovery PUD, and Spring Garden Estates). The Town's 2008 population is 5,868.

The Town treats water from five (5) wells located in the Grove Limestone Formation; together the wells are permitted for 1 mgd (yearly average) and 1.5 mgd (month of maximum use). Average water use in the service area is 0.6 mgd; current demand does not exceed 0.8 mgd. The Town owns a reservoir on Grape Creek, located approximately 2½ miles east of Town, as a secondary, emergency source. The daily average withdrawal is permitted at 0.083 mgd with a maximum daily withdrawal of 1.0 mgd.

The Town's water supply is particularly vulnerable to contamination due to the limestone formation and the resulting karst geology where surface contaminants can enter the groundwater very quickly. There have been two incidents that have required the construction of a temporary, emergency connection to the County's distribution line. One incident was due to the damage of a sewer line within the Town and the second was due to a manure spill at a farm outside of the Town limits. The emergency connection was removed when the contamination passed out of the supply aquifer.

Fountain Rock Spring, a perennial spring located in the County's Fountain Rock Park, is another potential future water supply for the Town. The spring has a reported yield of between 1.5 and 3.0 mgd. An analysis of water from the spring indicated that it is likely from the same limestone formation as the Town's wells.

The town has three primary concerns related to their drinking water supply: contamination of groundwater from spills or releases of pollutants, declining stream flows, and protection of sources for future supply. Vulnerabilities to their supply include the prevalence of karst aquifers and large farms within their wellhead protection area. The Town has adopted a wellhead protection ordinance.

Town of Woodsboro Service Area

The Town of Woodsboro provides water to 235 customers including nine (9) residential properties outside of the Town boundary on MD 550 and Gravel Hill Road. Most customers are residential households; an elementary school and various commercial establishments are included in the service area. The Town's industrial park located on the east side of MD 194 has one commercial business using a well not connected to the Town's system. The Town's system includes five (5) active wells in the Grove Limestone Formation and one inactive well in the Frederick Limestone Formation. The Town's average water consumption is 70,000 gpd. They are permitted to withdrawal 120,000 gpd (average daily) and 178,200 gpd maximum daily for the month of maximum use.

The Town's water supply originates from limestone aquifers and are susceptible to surface water infiltration. Several sources of potential contamination exist in town, which could affect the wells. Wellhead protection areas were delineated by the state in 1997. Another vulnerability to drinking water in Woodsboro is the impact from nearby quarries. The Maryland Department of the Environment (MDE) has established a zone of dewatering influence around the Barrick and LeGore quarries north of Town. Any measurable impact to groundwater wells or households in place before the delineation would be subject to compensation by the quarry owners.

Woodsboro has significant limitations to its drinking water supply. At present, there are less than 10 water service connections available. The town is working with MDE to determine the feasibility of reclaiming drinking water from an inactive quarry. The town also experiences water loss via leaks.

SMALL COMMUNITY WATER SYSTEMS

There are a number of small community systems, some owned and maintained by the County and others that are privately owned/maintained. All of these are located outside of community growth areas and are ground water based systems. Six private community water systems exist in the County outside of growth areas. These systems serve mobile home parks and small residential developments like apartment complexes that are legacy issues and not representative of new development.

INDIVIDUAL WELL USE

Outside of the community growth areas and the small community systems residents and businesses rely on individual wells in a variety of water-bearing formations. There have been 34,565 well permits issued in Frederick County since July 1945 and it is estimated that there are 36,000 private wells in the County serving approximately 40% of the County's population. Properties that utilize wells are estimated to return 80% of the water back to the aquifer through associated septic systems, allowing for natural recharge of the aquifer.

Town of Burkittsville

The Town of Burkittsville, located on the west side of the County, is the only municipality solely served by individual wells for all of its residents. There are 66 existing wells serving the 204 residents of Burkittsville. Burkittsville is not considered a growth area and has virtually no residential development potential as most of the undeveloped land within the Town are part of larger farms under agricultural preservation easements. The Town is located within the Hydrologic Unit III, which is characterized by average to below average ground water capacity. Specifically Burkittsville is within the Piedmont Crystalline hydrogeomorphic region, which has average year yields of 630 gallons/day/acre and drought year yields of 390 gallons/day/acre. In addition to ground water quantity issues there have also been reports of well contamination, likely from failing septic systems, in the eastern portion of the Town.

Village of Rosemont

The Village of Rosemont, located adjacent to Brunswick has 39 households on private wells; the remaining 79 households are currently served by public water via the City of Brunswick's system. At this time there are no plans to connect the remaining residences, currently using wells, to Brunswick's water system.

Commercial/Employment and Agricultural Demand

Commercial/employment and agricultural water use can be tracked by ground and surface water permit data from the State of Maryland. This method does not take into account businesses or operations that are supplied drinking water from community or public water systems. The largest permit holders (in no particular order) are: quarries; aquaculture/goldfish farm facilities; nurseries/farms/orchards; golf courses; and low intensity commercial/industrial developments.

The County also has numerous institutional uses including churches and private schools in the Agricultural areas, which rely on groundwater based systems.

Lilypons Water Gardens, a water garden nursery in the Adamstown area, has the largest water appropriation. They are permitted to withdrawal 12 mgd (max 90 mgd) of surface water from Bennett Creek. Quarries are one of the largest commercial consumers of water in the County; the Lehigh Cement Company holds two combined dewatering permits for 7.2 mgd, followed by Redland/Genstar's Frederick quarry appropriation of 4 mgd.

Irrigation is used for golf courses, greenhouse/plant nursery operations, and for agricultural/crops, although most agricultural operations rely on natural rainwater. An estimate of total water use in the Catoclin Creek watershed showed that agricultural operations implementing irrigation accounted for about 11% of total water use. In contrast, livestock operations were shown to use less than 1% of total water use in the watershed.

WATER CONSERVATION

While water consumption by individual households in Frederick County is below the national average, opportunities exist for further reductions in daily water use. Households, businesses, and institutions can reduce consumption by installing water efficient landscaping, rain barrels, low flow bathroom fixtures, gray water systems, and retrofits to older homes. Widespread education and outreach efforts on the benefits of water conservation are proven to reduce water use in a community.

Conservation is especially important during the summer months when demand is high and supplies are low. Peak season water demand management is in place in many local jurisdictions. Middletown, for example, has implemented the use of tiered billing where rates increase with consumption, lawn watering restrictions, and water conservation public alert systems for use during drought. Other communities have investigated or implemented leak detection programs and public education and outreach efforts like handing out free dye tablets to detect leaky toilets, low flow shower heads, toilet dams, and faucet aerators.

Water conservation measures lower consumer rates and utility bills while placing less pressure on precious resources. Communities realize major benefits from conservation measures when its citizens participate. Rather than seeking additional sources of water, conservation provides an alternate source of drinking water supply to the community.

IMPLEMENTATION OF DRINKING WATER ASSESSMENT

To achieve water resources goals related to the drinking water assessment, the following policies and action items have been identified. Completion of the action items and adherence to the policies will be monitored by the County through review and update of the Water Resources Element, and the County's Comprehensive Plan.

DRINKING WATER POLICIES

- WR-P-05 Diversify sources of public drinking water and explore alternatives in order to meet future demand.
- WR -P-06 Employ demand management strategies and conservation measures to maximize use of existing water resources.
- WR -P-07 Protect community groundwater-based systems and individual wells in karst (limestone) areas.
- WR-P-08 Support compatible land uses within designated wellhead protection areas.
- WR-P-09 Consider reductions in the size of community growth areas based on the adequacy of drinking water supplies.

DRINKING WATER ACTION ITEMS

- DW-A-01 Explore the application of water recharge easements as a complement to existing agricultural and land preservation easement programs.
- DW-A-02 Explore the use of impoundments to supplement other drinking water sources.
- DW-A-03 Coordinate with Frederick, Middletown and Walkersville regarding the feasibility of interconnections with the County distribution system for emergency or general situations.
- DW-A-04 Implement the Linganore Source Water Action Plan and consider countywide source water protection efforts.
- DW-A-05 Identify funding for the dredging of Lake Linganore to increase the volume of the lake and available water supply.
- DW-A-06 Develop a water conservation education program for residents and businesses of Frederick County.
- DW-A-07 Develop a water-resources-based GIS database for staff to review in regard to development plans and proposals.
- DW-A-08 Implement and if necessary revise the County's Wellhead Protection Ordinance to identify appropriate protection measures for municipal water system wellheads, springheads, and headwater areas that lie outside of their boundaries.
- DW-A-09 Explore options such as providing public water and limiting permitted land uses in karst areas.
- DW-A-10 Conduct an assessment of the availability and reliability of groundwater resources in the County.
- DW-A-11 Coordinate the development of GIS mapping and drinking water data with the municipalities.
- DW-A-12 Identify means to keep pharmaceuticals and endocrine disruptors out of the County's waste stream and wastewater treatment systems.

WASTEWATER ASSESSMENT

Community wastewater systems will continue to experience pressure from population and employment growth in Frederick County. Also at issue is the continuing use of individual septic systems and how to address those that are failing. The larger issue is how the County can balance the ability to provide wastewater treatment capacity based on current and future limitations of pollutant loading that can be discharged into the County's streams and rivers.

This section of the WRE addresses issues related to wastewater treatment capacity and the discharge of treated effluent. It presents the quality of treated effluent and its impact to water resources; the regulatory framework related to water quality; current and projected demand on community wastewater systems; and the impact of individual septic systems. The section concludes with a list of major issues and potential solutions related to wastewater treatment and disposal as well as recommendations for future policy direction.

QUALITY OF EFFLUENT/IMPACT TO WATER RESOURCES

Wastewater treatment plants (WWTPs) treat raw wastewater to meet effluent requirements established by the Maryland Department of the Environment (MDE). WWTPs are considered point sources since they discharge the effluent directly into streams at single point. MDE issues a National Pollution Discharge Elimination System (NPDES) permit for each WWTP, which specifies the allowable ranges for chemical, physical and biological parameters of the effluent. Permits are issued on a five-year planning horizon and set discharge limits for WWTPs.

The contribution of nutrients (nitrogen and phosphorus) from WWTPs is a major water quality problem facing Frederick County streams and impacts the larger Chesapeake Bay watershed.

Frederick County WWTPs discharge to main stem sections of the Monocacy River, Catoctin Creek and the Potomac River as well as their tributaries. The type of treatment required at each WWTP is determined by the ability of the receiving stream to assimilate effluent discharge and the overall impacts to the watershed. The County's major streams have limited ability to assimilate pollution due to low flow, seasonal variation in flow, and slow moving stream conditions.

Catoctin Creek has reached its maximum capacity of permitted pollutant loads from the existing WWTPs. Expansion of the existing WWTPs serving Middletown, Myersville, Fountaindale and Jefferson would require a corresponding reduction in nutrient effluent concentration.

The ***Monocacy River*** is close to reaching its nutrient load limitations. Upgrades to existing plants and diversion of flow from sub-regional plants to the Ballenger/McKinney WWTP where major Biological Nutrient Removal (BNR)/Enhanced Nutrient Removal (ENR) facilities are in progress to reduce overall nutrient loading. Smaller plants are also going offline as flow is diverted into the regional WWTPs, reducing pollution in smaller tributary streams. Emmitsburg, Fort Detrick, Frederick, Thurmont, Woodsboro, and Frederick County (Ballenger Creek/McKinney, Crestview, Mill Bottom, Monrovia, New Market, Pleasant Branch, and White Rock) operate treatment facilities that discharge either directly to the Monocacy River or its tributaries.

To take advantage of the higher degree of treatment at the Ballenger/McKinney WWTP the County has been closing smaller, sub-regional plants and diverting the flows to the

Ballenger/McKinney plant. In addition to the Libertytown WWTP, which has just recently been closed and diverted to Ballenger/McKinney, four other plants at Monrovia, New Market, the County Landfill, and an Urbana High School plant are expected to be closed and their flows diverted.

As with drinking water supply, the *Potomac River* has emerged as the panacea for meeting future wastewater disposal needs in Frederick County. Two wastewater treatment plants currently discharge directly into the Potomac River (Brunswick and Point of Rocks) and both the Monocacy River and Catoctin Creek flow directly to the Potomac. The City of Frederick and Frederick County may utilize an outfall line to the Potomac River from the Ballenger/McKinney WWTP to handle the excess of treated effluent that cannot be assimilated by the Monocacy River.

Discharge permits for the Potomac River require the use of denitrification plants with filters to reduce the nitrogen loadings into receiving waters. This requirement protects downstream water users and serves to protect the Chesapeake Bay. In the future, the majority of new or expanded wastewater treatment plants will need to employ filtration and nitrification/denitrification to meet strict discharge permits.

WATER QUALITY REGULATORY FRAMEWORK

As an active participant in implementation of the 2000 Chesapeake Bay Agreement, the State of Maryland has agreed to reduce its nitrogen and phosphorus (nutrient) contributions to the Bay by a specific number of pounds to improve water quality conditions in the Bay. The State's framework for meeting nutrient reduction goals is described in the Tributary Strategies Statewide Implementation Plan. To date, Maryland has made significant progress through upgrades of major wastewater treatment plants with Biological Nutrient Removal (BNR) and Enhanced Nutrient Removal (ENR) treatment technology. These new technologies reduce the overall pounds per year of nitrogen and phosphorus that are discharged from wastewater treatment plants.

In addition to plant upgrades, Maryland has set nutrient caps on wastewater treatment plants through a point source tributary strategy. New or expanded discharges must meet these permitted limitations. Point sources are required to obtain a National Pollutant Discharge Elimination System (NPDES) discharge permit from the MDEt in accordance with federal and state law. The permit specifies the allowable ranges for chemical, physical and biological parameters of discharge. Permits are issued on a five-year planning horizon and set discharge limits for WWTPs.

To meet the rigorous water quality goals of the Chesapeake Bay Agreement, Maryland has set up the Bay Restoration Fund, a dedicated fund financed by individual households and businesses served by community sewerage systems or served by individual septic systems. The Fund is used to upgrade wastewater treatment plants to ENR technology so that they are capable of achieving effluent quality of 3.0 mg/l total nitrogen (TN) and 0.3 mg/l total phosphorus (TP). The Bay Restoration Fund appropriated approximately \$40 million towards the County's Ballenger-McKinney WWTP project. Bay Restoration funds are also used to fund the installation of nitrogen-reducing septic systems and for planting cover crops on agricultural lands to assimilate excess nutrients.

WASTEWATER TREATMENT CAPACITY AND DEMAND

The following table depicts the WWTP capacities and their current demand for the respective community growth areas. It is important to note that the wastewater treatment capacities described in Table 7 reflect current, approximate design capacities and current demand of the individual county and municipal systems. Design capacity could possibly be increased in the future, dependent upon federal, state, and local approvals. The potential demand only includes the residential development potential for the community growth areas. Table 8 indicates the projected residential development potential in the Community Growth Areas with their particular wastewater system. Due to the complex and dynamic nature of wastewater treatment, figures in Table 7 do not constitute a complete evaluation of actual capacity and demand for use in allocating capacity for specific properties.

The Planned Service area depicted on Map 6 reflects properties with sewer classifications of “1” (existing service) to PS (Planned Service). The Planned Service Area would generally be expected to have sewer service within a 20-year time frame. However, areas within a Community Growth Area may also have a No Planned Service (NPS) sewer category, indicating a longer-term time frame for public sewer service than the PS category, consistent with growth policies in the County Comprehensive Plan and the Water and Sewerage Plan.

Table 7: Current Wastewater Treatment Capacity and Demand

Wastewater Systems (community growth areas) (a)	Receiving Streams	Permitted Capacity gpd	Current Demand gpd
Monocacy River Watershed			
<u>Ballenger-McKinney System (1)</u> (Adamstown, Ballenger Creek, Buckeystown, Frederick Southeast, Frederick, Holly Hills, Libertytown, Linganore, Monrovia, New Market, Spring Ridge/Bartonsville, Urbana, Walkersville)	Ballenger-McKinney**	18 MGD (ultimate)	5,238,000
Emmitsburg (municipal)	Tom’s Creek	750,000	400,000
Frederick (municipal)	Monocacy River	8,000,000	7,329,000
Thurmont (municipal)	Hunting Creek	1,000,000	820,000
Woodsboro (municipal)	Israel Creek	250,000	77,000
Catoctin Creek Watershed			
Jefferson (1)	Catoctin Creek	300,000	179,000
Fountaindale (1)	Hollow Creek	200,000	137,000
Middletown East (municipal)	Hollow Creek	250,000	160,000
Middletown West (municipal)	Catoctin Creek	250,000	180,000
Myersville (municipal)	Grindstone Run	300,000	180,000
Potomac River direct			
Brunswick (municipal)	Potomac River	700,000	500,000
Point of Rocks (1)	Potomac River	230,000	93,000

Notes:

** Current discharge to Monocacy River. Discharge above 15 MGD to Potomac River

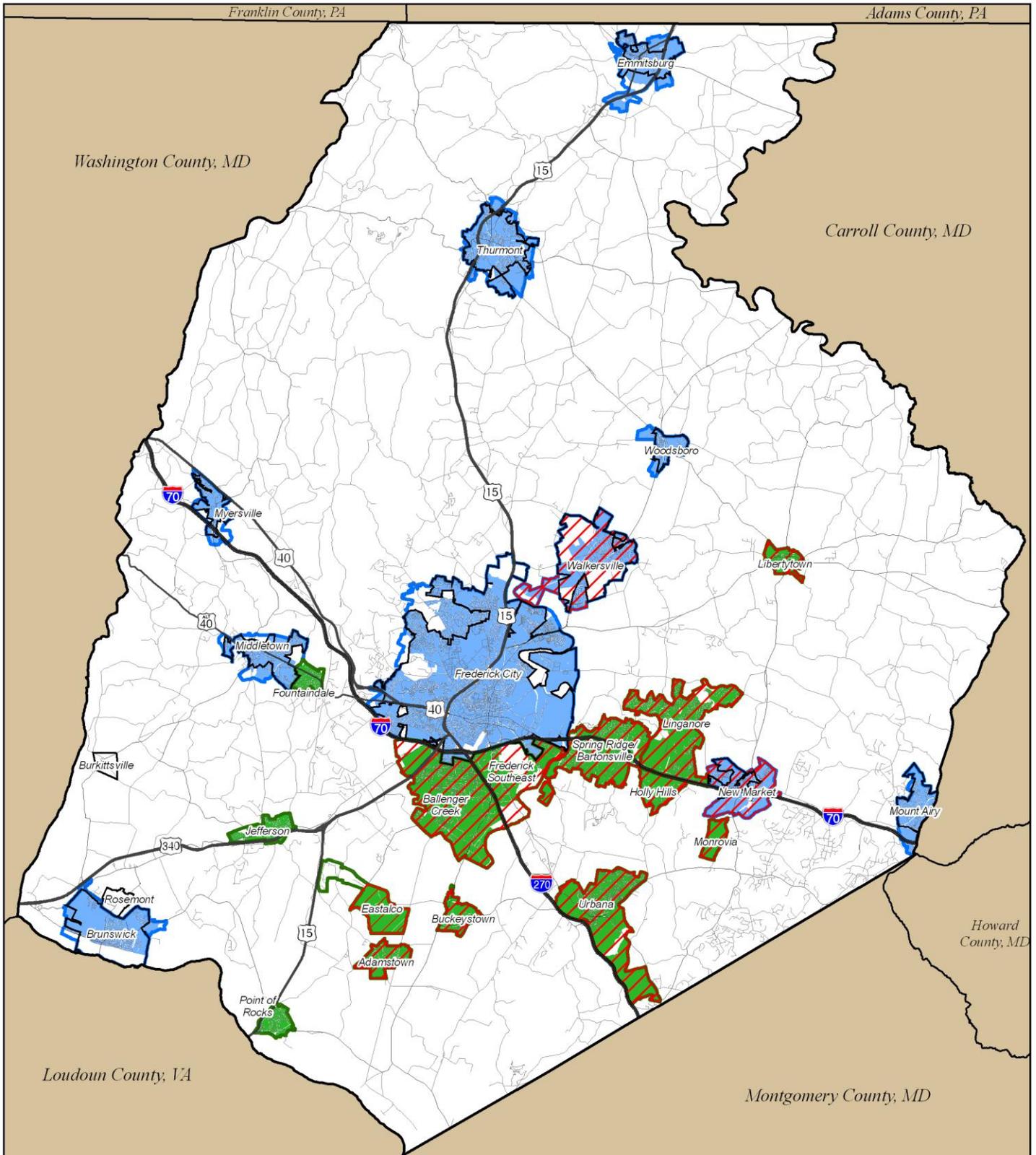
(1) Demand figures do not account for public use/health emergency reservation or taps allocated in multi-year tap agreements (MYTA)

(a) Does not include all of the county’s wastewater systems or service areas. This table only includes those systems in the Community Growth Areas designated in the Comprehensive Plan. Not to be used in determination of remaining allocable capacity.

Table 8: Residential Development Potential

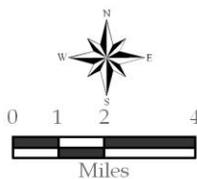
Wastewater System	Pipeline Dwellings	Undeveloped Potential Dwelling Units	Total Potential Dwelling Units
County Systems			
<u>Ballenger/McKinney System</u> (Adamstown, Ballenger Creek, Buckeystown, Frederick Southeast, Holly Hills, Libertytown, Linganore, Monrovia, New Market, Spring Ridge/Bartonsville, Urbana, Walkersville)	8,432	5,258	13,690
Jefferson	199	28	227
Fountaindale	0	20	20
Point of Rocks	97	0	97
Municipal Systems			
Brunswick	1,505	1,234	2,739
Emmitsburg	52	669	721
Frederick	5,296	4,109	9,405
Middletown East /West Plants	166	28	194
Myersville	159	14	173
Thurmont	34	2,335	2,369
Woodsboro	7	363	370
Source: 2010 County Comprehensive Plan			

Map 6: Current/Planned Wastewater Treatment Service Areas



Current/Planned Wastewater Treatment Service Areas

-  Municipalities
-  Ballenger/McKinney Wastewater Service Areas
-  Municipal Growth Areas
-  Municipal Sewer Service Areas (S1 - PS Classifications)
-  Unincorporated Growth Areas
-  Unincorporated Sewer Service Areas (S1 - PS Classifications)



Division of Planning
GIS & Data Services Section

September 3, 2010

This map is intended for Planning Purposes only. Refer to the Master Water and Sewerage Plan for specific service classifications. While efforts have been made to ensure the accuracy of this map, Frederick County accepts no liability or responsibility for errors, omissions, or positional inaccuracies in the content of this map. Reliance on this map is at the risk of the user. This map is for illustration purposes only and should not be used for surveying, engineering, or site-specific analysis.

PROFILES OF SEWER SYSTEMS

This section includes brief profiles of the County Sewer Service Areas as well as Service Areas for the individual municipal systems.

Central Frederick Service Area

The Central Frederick Service Area covers approximately 63 square miles in the center of the County and is served by three separate systems: the County's Ballenger/McKinney WWTP; the City of Frederick WWTP; and the Ft. Detrick WWTP. The service area provides existing or planned service to the following community growth areas:

- The City of Frederick (only portion of City)
- Town of Walkersville
- Ballenger Creek
- Frederick Southeast
- Adamstown/Eastalco
- Buckeystown
- Urbana
- Monrovia
- New Market
- Linganore
- Spring Ridge/Bartonsville
- Libertytown

Ballenger-McKinney WWTP

The County's Ballenger WWTP, expanded to a 6 mgd Biological Nutrient Removal (BNR) facility in 1995, and is undergoing significant improvements and expansion to reduce effluent loads while meeting projected demand. The existing facility has a collection system that conveys raw sewage from a large service area to the WWTP and currently discharges directly into the Monocacy River. The growth areas served are Adamstown, Ballenger Creek, Linganore, Libertytown, Holly Hills, Spring Ridge/Bartonsville, Walkersville, Urbana, and portions of the City of Frederick. Two residential areas in Buckeystown are served by the system although the remainder of the community utilizes onsite septic systems.

A one mgd interim expansion to the Ballenger plant was completed in 2009, increasing the WWTP's current capacity to 7 MGD. The WWTP has a Total Nitrogen Load Cap of 73,093 lbs/year and a Total Phosphorus Load Cap of 5,482 lbs/year.

Construction is underway for expansion on the adjacent McKinney site south of Ballenger Creek for what will be known as the Ballenger-McKinney WWTP. This will increase the design capacity from 7 mgd to 15 mgd. The expansion will include an upgrade to Enhanced Nitrogen Removal (ENR) treatment requirements. MDE has approved a maximum-average daily design flow of 18 mgd for the Ballenger-McKinney WWTP, which is based on a maximum nutrient loading allocation of 219,280 lbs/year total nitrogen (TN) and 16,446 lbs/year total phosphorus (TP). The treatment plant will only be permitted a maximum 15 mgd discharge to the Monocacy River while discharges in excess of 15 mgd will be diverted to the Potomac River through a proposed Potomac River outfall system. Any expansions beyond 18 MGD will require additional nutrient allocation.

Concurrently, the County will be decommissioning four County-owned WWTPs and diverting their flow to the Ballenger-McKinney WWTP. Since these smaller plants were not required to meet BNR or ENR treatment requirements, this diversion reduces both nutrient and conventional effluent loading to the smaller streams and the Chesapeake Bay. These WWTPs include the Urbana High School, New Market, Monrovia, and the Reich's Ford Road Landfill. In the last 15 years, five other WWTPs have been decommissioned and diverted; they include

Lake Linganore WWTP, Spring Ridge WWTP, Pinecliff WWTP, Buckingham Hills WWTP, and Libertytown WWTP.

The County's goal is to ultimately obtain credit from the decommissioning projects to apply to the Ballenger-McKinney WWTP nutrient capacity, which may be needed beyond the current planning horizon. Based on current flow projections and the WWTP's ENR design, the MDE approved Ballenger-McKinney WWTP nutrient allocation of 219,280 lbs/year total nitrogen (TN) and 16,446 lbs/year total phosphorus (TP) will be adequate to 2030 and possibly beyond. The decommissioning plants and the Ballenger-McKinney WWTP are all located within the Monocacy River watershed. The County's Division of Utilities and Solid Waste Management (DUSWM) anticipates that 20-year (2010 to 2030) capacity utilization at Ballenger-McKinney WWTP will be between 12 to 18 MGD.

Limitations to future service:

- Middle Bush Creek Interceptor – decommissioning of New Market and Monrovia WWTPs is subject to completion of this project which is completely developer funded, the design of which is almost complete, with right of ways secured.
- Urbana Growth Area – limited additional development due to the size of the Urbana Interceptor that crosses Monocacy Battlefield; capacity for employment development along I-270 corridor, but allocation depends on the type of end users – LI users vary dramatically in their water/sewer use.

City of Frederick WWTP

The City of Frederick operates a wastewater treatment plant (WWTP) located on Gas House Pike at the confluence of Carroll Creek and the Monocacy River. The plant serves an estimated population of 63,520 people. The current design capacity of the plant is 8 mgd. The plant is in the planning stage of an upgrade to Enhanced Nitrogen Removal (ENR) treatment. Construction is anticipated to begin in 2009 and be completed by 2011. The pollutant loading caps once the plant is upgraded to ENR are 97,458 lbs/year for total nitrogen (TN) and 7,309 lbs/year for total phosphorus (TP). At completion, the WWTP will be capable of achieving an effluent with a TN limit of 3.0 mg/L and TP limit of 0.3 mg/L.

The City uses up to 300,000 gpd of treated effluent for spray irrigation at its Clustered Spires Municipal golf course from March 1 through November 30. To continue to meet demand, the City is evaluating inflows to the plant; in particular, they are reviewing peak flows and future/projected flows. The City is also looking at the feasibility of expanding the capacity of its WWTP versus investing in capacity through the County's Ballenger/McKinney plant.

Fort Detrick WWTP

Fort Detrick maintains its own system serving 430 on-post residents and approximately 7,000 employees. The design capacity of the Fort Detrick WWTP is 2 mgd with an average daily flow of 0.9 mgd and an average peak flow of 1.4 mgd. Raw sewage flows by gravity to a pumping station located at the southwest corner of the post. From there it is pumped to the treatment plant located on the Monocacy River upstream of the City's WWTP. All biological waste is decontaminated prior to entering the wastewater system.

Plans are under review for construction of a bio-defense research center. The existing treatment facility is expected to have adequate capacity for these additional planned uses. Fort Detrick plans to expand their treatment plant to 3.0 mgd in the future.

Town of New Market/Monrovia Service Area

The County maintains two wastewater treatment plants that serve this area; the Monrovia WWTP located on Bush Creek south of I-70 and the New Market WWTP located on Davis Branch north of I-70. Bush Creek flows directly into the Monocacy River near MD 355 and the Monocacy Battlefield. Davis Branch enters Bush Creek near MD 75. Both plants are planned for decommissioning once the Middle Bush Creek Interceptor project is completed; at that time, wastewater will be transported to the Ballenger-McKinney WWTP.

Jefferson Service Area

The County operates the 300,000 gpd Jefferson WWTP, which serves the unincorporated community of Jefferson. The plant currently discharges treated effluent to Catoctin Creek.

Fountaindale Service Area

The County's Fountaindale WWTP was originally built in 1968 and replaced in 2008 with an expanded 250,000 gpd facility. In 2007, the average daily inflow was 142,000 gpd with average flow exceeding capacity in March and April of that year. The current permit is still for the 200,000 gpd. The excess capacity was gained to aid in mitigating issues that may arise in the future. Portions of the sewer collection system were renovated in 2006.

Point of Rocks Service Area

The County-operated Point of Rocks WWTP serves the unincorporated Point of Rocks community situated on the Potomac River. The system was developed in the early 1980s and has a 230,000 gpd capacity with discharge to the Potomac River. The plant received an average daily flow of 93,000 gpd in 2007; flows through the plant were greatest in March of that year. Generally, the plant has no difficulties in meeting its permit requirements.

The population of Point of Rocks is 1,395 and average flow per capita is 66 gpd, which gives no indication of significant I&I problems with the system. The community is expected to have an ultimate population of approximately 2,000 people.

City of Brunswick/Knoxville Service Area

The City of Brunswick provides sewerage service to city residents. Their WWTP is located between the C&O Canal National Historical Park towpath and the Potomac River; treated effluent is discharged to the Potomac. In addition to the WWTP expansion for Brunswick Crossing in May of 2008, the plant also went online as Frederick County's first Enhanced Nitrogen Removal (ENR) treatment facility.

The design capacity of the upgraded plant is 1.4 mg, doubling the plant's previous capacity of 700,000 gallons/day. Nutrient reduction is five-fold with the new technology. The ENR plant is anticipated to generate less than 3.0 mg/L Total Nitrogen and 0.3 mg/L Total Phosphorus.

Brunswick officials anticipate that demand will reach 2.0 mgd by 2030. Since the existing WWTP cannot be expanded due to its location along the C&O Canal the City anticipates the need for a second WWTP on the eastern side of the City. This facility is indicated on the City's 2007 Master Plan.

There are approximately 20 existing septic systems located within city limits. The City continues to work with these individuals to bring them into the City's system. One residential septic was

taken offline in 2007 and another is planned in the capital improvements plan for 2008. A commercial property is also planned for connection to the City's sewer system this year.

The City oversees a continuous sewer maintenance program that identifies and eliminates inflow and infiltration (I&I) issues.

Town of Emmitsburg Service Area

The Town of Emmitsburg, population 2,900, owns and operates a 750,000 gpd wastewater treatment facility located on Tom's Creek. Average flow to the facility was 483,000 gpd during 2006-2007 including inflow and infiltration. Remaining capacity was 267,000 gpd.

Emmitsburg is permitted to use a maximum of 54.5 million gallons of treated effluent for spray irrigation for local agricultural use between May and September of each year. The remainder of their effluent is discharged into Tom's Creek, a trout stream that drains to the Monocacy River. There are currently no TMDL's established for Tom's Creek near the Emmitsburg facility.

To address inflow and infiltration (I&I), the Town is actively pursuing a program to identify sources of I&I and to implement improvements to reduce the associated flow. Additionally, the Town reports that a treatment design for a new plant is complete and awaiting commitment from the Maryland Department of Environment.

Town of Middletown Service Area

The Town of Middletown operates two treatment plants (East and West WWTPs) that serve properties within its corporate limits. Both treatment plants have a combined treatment capacity of 600,000 gpd. Average daily demand to the systems is currently 398,000 gpd and is projected to increase to 833,000 gpd by 2030 with ultimate demand at plan build-out totaling 850,000 gpd.

The West WWTP (discharging to Catocin Creek) was constructed in 1976 and has a design capacity of 250,000 gpd. Average daily flow between 2005 and 2007 was 182,000 gpd. In 2007, the plant had additional capacity of 68,000 gpd that could accommodate up to 272 equivalent dwelling units (EDU's).

The East WWTP (discharging to Hollow Creek) has a design capacity of 350,000 gpd, but is permitted to discharge 250,000 gpd. The plant was constructed in 2000 to reduce flows to the older West WWTP. Average daily flow to the plant between 2005 and 2007 was 160,000 gpd. The additional capacity of 90,000 gpd could accommodate up to 360 EDU's. The plant was designed so that it can be expanded to a 700,000 gpd plant in the future, subject to permit requirements. Construction of a new aeration tank and clarifier would be required.

The current population of Middletown is 4,150 and there are 1,496 sewer service customers. While Middletown is capable of providing wastewater service to its current population, expansion and upgrades will be required to meet their 2030 demand. The Town conducts I&I studies and corrective construction on a 5-year rotating basis.

Town of Mount Airy Service Area

The Town of Mount Airy operates a wastewater treatment plant that is located in Carroll County, Maryland and discharges to the South Branch of the Patapsco River. The facility employs BNR treatment technology and has a 1.2 mgd design and permitted discharge capacity. Upgrade to ENR treatment technology is planned. Average treatment plant inflow for 2006 and 2007 was 0.704 mgd, as reported in their 2007 Capacity Management Plan. The town has

between 0.3345 mgd and 0.4049 mgd remaining capacity for wastewater treatment and discharge. Average flow in 2008 was 0.6615 mgd.

Mt. Airy has set a cap on residential building permits issued per year to regulate allocation of sewer taps. There are no limits set for commercial or industrial uses. The town estimates that pipeline development and proposed development would require 92,489 gpd of future wastewater treatment. This figure incorporates future residential and employment development.

Town of Myersville Service Area

The Town of Myersville, population 1,530, provides sewer service to households and businesses within its corporate limits. There is one individual septic system grandfathered in town. Wastewater is treated at the Myersville WWTP located on the north side of Milt Summers Road, south of I-70. The treatment capacity of the plant is 300,000 gpd. Effluent from the tertiary treatment facility is discharged to Grindstone Run, a tributary of Catoctin Creek.

The average flow to the plant between 2005 and 2007 was 176,900 gpd. Remaining capacity was 123,100 gpd. Current demand has increased to 183,000 gpd and the town projects that demand will continue to increase to 420,000 gpd by 2030 with ultimate demand at plan build-out projected to be 450,000 gpd. The Town's treatment plant experiences problems due to inflow and infiltration. They have set a goal to reduce I&I to 10% system loss.

Town of Thurmont Service Area

The Town of Thurmont provides sewer service to the Catoctin Mountain Park Visitor Center, Camp Misty Mount, Catoctin High School, and households and businesses within its corporate limits. There are nineteen individual septic systems grandfathered in town.

Wastewater is treated at the Thurmont WWTP, which was upgraded for biological nutrient removal (BNR) in 1996. The plant has a treatment capacity of 1 mgd. Effluent from the facility is discharged to Hunting Creek, a tributary of the upper Monocacy River. The Town has entered into an agreement with MDE to study implementation of Enhanced Nitrogen Removal (ENR) at the treatment plant. ENR would assist the Town in meeting effluent nutrient goals of 3.0 mg/L total nitrogen (TN) and 0.3 mg/L total phosphorus (TP). These requirements are provided in the Bay Restoration Act and ENR Strategy.

The average flow to the plant (2005-2007) was 0.82 mgd. Remaining capacity in 2007 was 0.18 mgd. The town projects that demand will increase to 0.945 mgd by 2030. To accommodate projected growth, the Town is considering expansion of its treatment capacity to 1.33 mgd.

The Town's wastewater collection system is the main constraint on growth in Thurmont. The system has a serious infiltration and inflow (I&I) problem that presents capacity problems at the treatment plant during heavy rain events. Water enters the system through cracks in pipes and through manhole covers in the street. Sewage backups in residences have resulted from the I&I problem and treatment has been compromised at the plant. MDE issued a Consent Order in 2005 limiting new connections to the wastewater system until the problems were resolved. Additionally, strict nutrient limits were imposed on the plant requiring the town to upgrade to ENR treatment technology. The town estimates that once repairs and upgrades are complete and the Consent Order is lifted, the plant could have up to 195,000 gpd excess capacity, which could accommodate 780 additional dwellings.

Other limitations to provision of wastewater service in Thurmont include the inability to expand at the current WWTP site, nutrient loading caps and infrastructure needs of the collection

system. The town estimates that the current site could accommodate a 30-50% expansion, but growth beyond that would require a new location. Any expansion would require evaluation of nutrient loading to Hunting Creek and permits from MDE are not assured. Finally, the existing collection system is nearing flow capacity and significant upgrades to existing lines are anticipated as well as construction of new lines to serve planned development.

Town of Woodsboro Service Area

The Town of Woodsboro, population 961, constructed its sewerage system in 1980 in response to failing septic systems. Initially the plant was constructed to serve approximately 650 people. An upgrade in 2004 increased the design capacity to 250,000 gpd. The improvements provide capacity for 1,000 sewer connections; at present there are 438 existing connections to the system. Therefore, development of Woodsboro's growth area is not constrained by sewer service.

The WWTP is a Sequencing Batch Reactor (SBR) system plant located at the end of Council Drive discharging to Israel Creek, a tributary of the Monocacy River. Discharge is approximately 9.5 miles north of the City of Frederick and Fort Detrick water intakes on the Monocacy.

INDIVIDUAL SEPTIC TREATMENT SYSTEMS

Residences and businesses outside of the County's community sewerage service areas treat their wastewater with individual septic systems. The Health Department estimates that there are approximately 33,000 residential septic systems in Frederick County.

There are areas of the County where septic systems are failing; poor soil conditions are the primary cause but lack of regular pumping and inspection by homeowners are also to blame. Sand mound (above-ground) systems can be employed in some of these areas. In some cases, soil conditions preclude the use of any on-site septic disposal system. According to the County's Environmental Health Department failing systems are prevalent in Adamstown, Bartonsville, Buckeystown, Burkittsville, Creagerstown, Lewistown, Myersville (south of town), Rocky Ridge, and Wolfsville.

New technologies can limit the nitrogen loads from onsite septic systems. The Bay Restoration Fund has made available grants through the local Health Department and Canaan Valley Institute to upgrade or replace existing septic systems to reduce nitrogen loading to the Bay.

Town of Burkittsville

All of the existing 74 residences and other uses in Burkittsville rely on individual septic systems and there are no plans to develop any kind of community wastewater treatment system. There is virtually no development potential for new residential uses as almost all of the undeveloped land in the Town are part of larger farms under agricultural preservation easements. A town survey conducted in 1996 indicated some degree of concern by residents of both the adequacy of septic systems and the wells. There have been reports of septic system failures and well contamination though no formal surveys have been conducted by the Health Department to document the extent of the problems. There are a number of factors that will contribute to septic issues in Burkittsville:

- Average lot sizes are less than the one (1) acre minimum required for well/septic systems
- Age of the existing systems
- Soil conditions

MAJOR WASTEWATER ISSUES

Inflow and Infiltration (I&I)

I&I pose major challenges to community sewerage systems. Inflow of storm water through sump pumps and downspouts into sewer pipes and infiltration of groundwater through leaky pipes introduce large amounts of clean water to the sanitary sewer system causing overflows and an increase in the amount of water to be treated. These conditions can cause overflow where raw sewage bypasses the treatment facility and is discharged directly into a stream. Overflow places public health at risk and violates state and federal water quality regulations.

Water Quality

Frederick County's major waterways – Catoctin Creek and the Monocacy River – have limited assimilative capacity for pollution. TMDL's are forthcoming, which will set waste load allocations to meet local water quality standards. Permitted point source effluent load limits (from WWTPs) have been reached on Catoctin Creek and are unlikely to be raised. Similar restrictions exist on the lower section of the Monocacy River near Frederick City. Septic systems are often located in soils that are poor with infiltration problems resulting in nutrient pollution to local streams. Failing septic systems negatively impact groundwater quality and eventually surface water quality.

Public Investment

Public sewer systems will require major investments in new treatment technologies, such as ENR, and infrastructure in order to meet future demand and nutrient caps on wastewater discharge.

IMPLEMENTATION OF WASTEWATER ASSESSMENT

To achieve water resources goals related to the wastewater assessment, the following policies and action items have been identified. Completion of the action items and adherence to the policy statements will be monitored regularly by the County through review and update of this Water Resources Element and the County's Comprehensive Plan.

WASTE WATER POLICIES

- WR-P-10 Prohibit the construction of new sub-regional wastewater treatment plants.
- WR-P-11 Promote measures to reduce inflow and infiltration into the wastewater collection system.
- WR-P-12 Coordinate with Frederick County municipalities to evaluate solutions that ensure future wastewater capacity and adequate management planning.
- WR-P-13 Where feasible as part of wastewater treatment plant improvements, exceed state and federal regulatory requirements.
- WR-P-14 Recognize and support the use of new septic system technologies and the use of alternatives to septic systems.

WASTE WATER ACTION ITEMS

- WW-A-01 Explore funding sources and programs to address inflow and infiltration problems in wastewater collection systems.
- WW-A-02 Identify and prioritize retrofitting failing septic systems using the Bay Restoration Fund (flush tax) and other programs.
- WW-A-03 Require that new septic systems use the best technologies available to reduce nitrogen pollution.
- WW-A-04 Identify means to reduce pharmaceuticals and other components believed to be endocrine disrupters out of the County's wastewater streams and/or develop treatment strategies, which have been demonstrated to remove or destroy the contaminants.

MANAGING STORMWATER AND NON-POINT SOURCE POLLUTION

The use of land for development, industry, transportation and agriculture contributes non-point source pollution to our streams. Land disturbance related to development tend to exacerbate stream impacts, while forest and wetlands protection maintain or improve watershed health and function. The County's Plan has an opportunity to mitigate non-point source pollution through concentration of growth into existing built-up areas, recommendation of best management practices, and protection of natural resources.

This section of the WRE provides an assessment of the County's Stormwater Management Program and discusses the impact of the County's land use plan on impervious cover and non-point source loads to local streams and watersheds. It concludes with a list of policies and action items for future implementation.

NON-POINT SOURCE POLLUTION

Non-point source pollution is transported to surface and ground water as a result of storm events. Stormwater transports sediment, nutrients, fertilizers, bacteria, heat, salt, oil, grease and other contaminants across the land to local streams and water bodies. On naturally vegetated (forests, meadows) and agricultural lands, storm water permeates the soil and many pollutants are captured and filtered. Healthy streamside buffers and forest stands are particularly effective in this function. In developed areas, where much of the landscape is impervious (rooftops, driveways, parking lots, and roads) direct ground water recharge is impeded and the volume of storm water runoff to streams increases.

Non-point source pollution is detrimental to water quality and wildlife habitat and in our region and its cumulative impacts are degrading the Chesapeake Bay. Since land use conditions affect the amount and extent of non-point source pollution, future development patterns should take into account their potential impact in order to protect the Chesapeake Bay resource.

IMPERVIOUS COVER

Overall watershed imperviousness has been linked to a wide range of negative impacts to stream hydrology, stream morphology, biological habitat, and water quality. Research reveals that when impervious cover within a watershed exceeds approximately 10%, sensitive stream elements are degraded. In cold-water regions supporting native brook trout reproduction, impervious cover greater than 1% results in the loss of native trout populations. Once imperviousness reaches 25 to 30%, studies show that most indicators of stream quality shift to a poor condition as a result of severe impacts from erosion, channel instability, severe habitat degradation and decreasing biological integrity.

Frederick County's impervious cover was calculated from a direct measurement of detailed 2005 Planimetric data from aerial photography. Planimetric data depicts man-made and natural features and includes such things as buildings, roads and other paved surfaces, trees, water, etc. To yield more precise results, Planimetric data also captured additional features including railroads, sidewalks, and quarries. Methodologies were derived from the Center for Watershed Protection's *Impervious Cover and Land Use in the Chesapeake Bay Watershed, 2001* and the US EPA Office of Research and Development, Ecosystems Research Division's *Estimating Impervious Cover from Regionally Available Data, 2005*. This provides a baseline to compare to future build-out

conditions from the 2010 County Comprehensive Plan.³ This analysis also identifies which watersheds would be approaching or exceeding the 10% and 25% thresholds, where mitigation measures would be a priority.

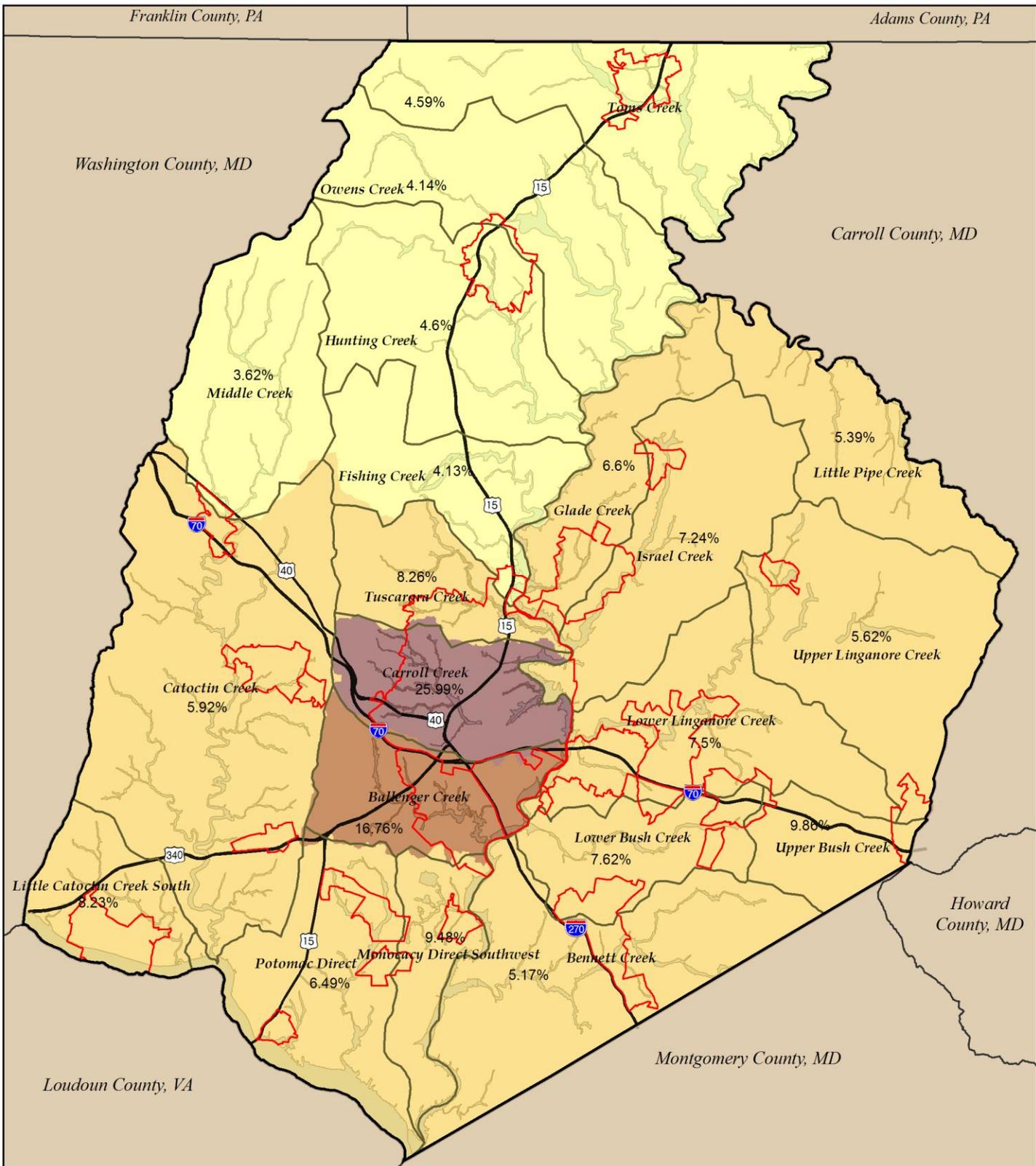
Table 9: Existing Impervious Cover (2005)

Watershed	% Impervious	Watershed	% Impervious
Ballenger Creek	16.7	Lower Bush	7.6
Bennett Creek	5.1	Lower Linganore	7.5
Carroll Creek	25.9	Middle Creek	3.6
Catoctin Creek	5.9	Monocacy Direct	9.4
Fishing Creek	4.1	Potomac Direct	6.4
Glade Creek	6.6	Owens Creek	4.1
Hunting Creek	4.6	Toms Creek	4.5
Israel Creek	7.2	Tuscarora Creek	8.2
Little Catoctin	8.2	Upper Bush Creek	9.8
Little Pipe	5.3	Upper Linganore Creek	5.6

As expected, developed watersheds, such as Carroll Creek and Ballenger Creek, which include the City of Frederick, had the greatest level of impervious cover at 25.9% and 16.7% respectively. Suburban or developing watersheds like Lower Bush and Upper Bush Creek, Tuscarora Creek, and Lower Linganore Creek are very near the 10% threshold. These watersheds should remain a priority for restoration efforts such as stream buffer plantings, storm water retrofits and other best management practices. Only five (5) of the County’s watersheds have impervious cover less than 5% and efforts should be made to maintain these low values through the land use planning process.

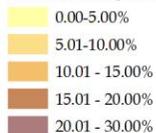
³ 2008. Chesapeake Bay Program web site. <http://www.chesapeakebay.net/nutrients>. “Nutrients”.

Map 7: Estimated Impervious Coverage



Impervious Coverages - Existing Land Cover

% of land in impervious cover



Community Growth Areas
Subwatersheds



Division of Planning
GIS & Data Services Section

April 8, 2010

While efforts have been made to ensure the accuracy of this map, Frederick County accepts no liability or responsibility for errors, omissions, or positional inaccuracies in the content of this map. Reliance on this map is at the risk of the user. This map is for illustration purposes only and should not be used for surveying, engineering, or site-specific analysis.

NUTRIENT POLLUTION

Excessive amounts of nutrients, particularly nitrogen and phosphorus, are the main cause of the Chesapeake Bay's poor health.³ Nutrient pollution leads to algae growth and oxygen depletion, which create an uninhabitable environment for most aquatic life. The County's 2010 Plan and the 'Previous Plan' (regions plans adopted 1997 to 2008) were evaluated to determine the impact from the build out of the projected land uses on nitrogen and phosphorus pollution and to illuminate the differences in pollution loading that would result from the two plans. The methodology for pollutant load estimation was provided by MDE and incorporated loading rates by land use category derived from the Chesapeake Bay Program Watershed Model (Phase 4.3) for the Potomac River basin. The County land use plan designations were grouped into the land use categories developed by MDE for pollutant loading calculations as shown on Table 12. Municipal land use plans designations were consolidated into an equivalent county plan designation for the analysis.

Data on the number of existing septic systems in the county was provided by the Frederick County Health Department for use in the nutrient loading calculations. The projected number of septic systems was estimated by determining the annual number of lots recorded for Agricultural and Resource Conservation zoned properties over the past nine years. From these lots were subtracted existing houses to derive a net number of new septic systems. The annual average of this net number was then used to project the number of new septic systems for the next 20 years.

The current land use/cover conditions are derived from the Maryland Department of Planning (MDP) 2002 land use/cover analysis from the interpretation of high altitude photography. Generally, only land uses greater than 10 acres in size are identified. The grouping of such large areas into a single land use category can result in the overstatement of the acreage contained in actual land uses. The current land use/cover conditions (2002) are compared with projected build out conditions from both the Previous Plan and the 2010 Plan. Summary results for nitrogen and phosphorus loads are provided in Tables 10 and 11 below.

³ 2008. Chesapeake Bay Program web site. <http://www.chesapeakebay.net/nutrients>. "Nutrients".

Table 10: Nitrogen Loading Summary

Land Use	Existing Conditions (2002) (lbs/year)	Previous Plan Build Out (lbs/year)	2010 Plan Build Out (lbs/year)	Change [previous Plan to 2010 Plan] (lbs/year)
Residential	364,275	384,835	337,920	-46,916
Commercial	39,452	31,081	35,063	3,982
Industrial	25,091	68,567	52,263	-16,304
Institutional	23,439	22,734	25,571	2,837
Extractive	10,817	33,604	34,100	496
Agriculture (cropland/pasture)	2,556,792	2,438,396	2,643,673	205,277
Forest	292,766	248,083	228,091	-19,992
Transportation		90,629	91,444	815
Water	23,498	28,785	28,785	-
Septic System Loads (residential & non-residential)	320,736	375,817	363,382	-12,435
Total Nitrogen Load	3,656,866	3,722,531	3,840,292	117,761

Table 11: Phosphorous Loading Summary

Land Use	Existing Conditions (2002) (lbs/year)	Previous Plan Build Out (lbs/year)	2010 Plan Build Out (lbs/year)	Change (lbs/year)
Residential	33,007	35,089	30,796	-4,029
Commercial	2,998	2,362	2,665	303
Industrial	2,047	5,594	4,264	-1,330
Institutional	2,032	1,971	2,217	246
Extractive	1,021	3,171	3,218	47
Agriculture (cropland/pasture)	263,655	258,074	279,801	21,726
Forest	3,210	2,720	2,501	-219
Transportation		6,208	6,263	56
Water	1,626	1,304	1,996	0
Total Phosphorus Load	309,594	317,186	333,721	16,536

Table 12: Comparison of County Land Use Designation and MDP/MDE Land Cover Categories

County Land Use Plan Designation		MDP/MDE Land Use/ Land Cover Category
2008	2010	
Low Density Residential	Low Density Residential	Low Density Residential
Rural Hamlet	Rural Community	Low Density Residential
Rural Neighborhood	Rural Residential	Low Density Residential
Rural Subdivision		Low Density Residential
Medium Density Residential	Medium Density Residential	Medium Density Residential
High Density Residential	High Density Residential	High Density Residential
General Commercial	General Commercial	Commercial
Village Commercial	Village Commercial	Commercial
Highway Service	Mixed Use Development	Commercial
Commercial Rural		Commercial
Office/Research Industrial	Office/Research Industrial	Industrial
Limited Industrial	Limited Industrial	Industrial
General Industrial	General Industrial	Industrial
Institutional	Institutional	Institutional
Mineral Mining	Mineral Mining	Extractive
Public Parkland/Open Space	Public Parkland/Open Space	Deciduous Forest
Resource Conservation	Natural Resource	Deciduous Forest
Agricultural/Rural	Agricultural/Rural	Cropland/Pasture
Right-of-Way	Right-of-Way	Transportation

FREDERICK COUNTY'S STORMWATER MANAGEMENT PROGRAM

Frederick County first adopted storm water management (SWM) regulations in 1984 and maintains its current program in accordance with Environmental Article, Title 4, and Subtitle 2 of the Annotated Code of Maryland. The purpose of the County's program is to protect and maintain the public health, safety, and general welfare by establishing minimum requirements and procedures to control and minimize the impacts associated with increased storm water runoff. Proper management of storm water runoff minimizes damage to public and private property, controls stream channel erosion, reduces local flooding, and maintains after development (as nearly as possible) the predevelopment runoff characteristics.

The County implemented the policies, practices, principles, and methods of the *2000 Maryland Stormwater Design Manual* through the County's Stormwater Management Ordinance and its Design Manual in 2001. The Board of County Commissioners adopted the County's *Storm Drainage and Stormwater Management Design Manual* in 2003. In May 2010 the County adopted a new Stormwater Management Ordinance to comply with the Stormwater Management Act of 2007.

The County will also continue to educate both the development community and the general public in ways to determine the proper type of design for site-specific areas, as well as in facility installation timetables and maintenance issues. Staff will continue to work to address storm water management earlier in the process to achieve the best product at the end of the process.

Many opportunities exist to educate citizens, business owners and community leaders that water is a limited natural resource fundamental to healthy, sustainable communities, both human and biological. Water conservation, low impact development, water reuse, and the reduction of water use during summer months (or peak demand management) are a few examples of tools the County can promote to maintain the quality and quantity of the resource and ensure it is available for our diverse needs

WATERSHED RESTORATION EFFORTS

The County approaches watershed restoration through new storm water management systems, storm water management pond retrofits, Low Impact Development (LID), stream restoration/bank stabilization, and buffer enhancement.

The County tracks all restoration projects for the purpose of regulatory compliance and reports on them in its National Pollutant Discharge Elimination System, Municipal Separate Storm Sewer System (NPDES MS4) Annual Report. Monitoring results, community outreach efforts, management programs, and overall watershed health and progress are also tracked.

The Chesapeake Bay Agreement (1983), which established the Chesapeake Bay Program, initiated many of the comprehensive efforts regionally to protect and restore watersheds. With the Chesapeake 2000 agreement (C2K), new goals were set to improve water quality and wildlife habitat throughout the Bay watershed; the momentum that resulted from C2K engaged the Frederick County community and inspired many of the programs in place today. Some of the County's recent efforts include:

- Completion of Upper and Lower Monocacy River Watershed Restoration Action Strategies;
- Watershed assessments for Bush, Bennett, Ballenger, and Linganore Creeks;
- Development of a Source Water Protection Plan for Lake Linganore;

- Adoption of a Countywide Stream Buffer Protection Ordinance;
- Initiation of routine stream monitoring in three highest priority watersheds;
- Coordination of the Monocacy-Catoctin Watershed Alliance; and
- Extensive public education and outreach (conferences, fairs, workshops, videos, fact sheets).

Presidential Executive Order No. 13508, issued May 12, 2009, and the subsequent *Strategy for Protecting and Restoring the Chesapeake Bay Watershed* ushered in a new federal commitment to address the Bay's declining water quality. The progress of restoration efforts over the past several decades has not been sufficient to fully restore and protect the Chesapeake Bay Watershed. The Executive Order and the federal *Strategy* recognize the need to fundamentally shift efforts, take bold action and increase accountability to restore and protect water quality and wildlife habitat in the Chesapeake Bay Watershed.

A Total Maximum Daily Load (TMDL) for sediment and the nutrients nitrogen and phosphorus will be issued by the US EPA in late 2010 for the entire Chesapeake Bay Watershed. The TMDL sets a pollution 'budget' for all land uses and sectors, and allocates pollutant loads among all contributors, such as land development, wastewater, stormwater and agriculture. The Bay TMDL is required under the federal Clean Water Act and is designed to restore water quality and the living resources in the Chesapeake Bay and all its tributaries. The states in the Bay watershed will be crafting Watershed Implementation Plans to detail efforts that are programmed and needed to meet the Chesapeake Bay TMDL.

IMPLEMENTATION

To achieve water resources goals related to managing storm water and non-point source pollution, the following policies and action items have been identified. Completion of the action items and adherence to the policy statements will be monitored regularly by the County through review and update of the Water Resources Element and the County's Comprehensive Plan.

STORM WATER POLICIES

- WR-P-15 Require the use of innovative technologies for storm water management.
- WR-P-16 Minimize impervious cover related to new development located within watersheds that have greater than 10% impervious cover.
- WR-P-17 As part of the construction of new County roads, government buildings and facilities use innovative storm water management practices and technologies.
- WR-P-18 Integrate watershed planning and management in the comprehensive planning process.

STORM WATER ACTION ITEMS

- SW-A-01 Develop a GIS database to refine methods for calculating impervious cover to provide baseline data and aid in prioritizing restoration efforts.
- SW-A-02 Develop an action plan to improve watershed health in watersheds where impervious cover is reaching or exceeding 10%.
- SW-A-03 Develop a strategy for protecting native brook trout populations that includes an impervious cover threshold, minimum distance between roads and habitats, and reduced road density for those watersheds where native brook trout are present.
- SW-A-04 Continue to retrofit untreated impervious surface area in the County with storm water management in accordance with the NPDES permit.
- SW-A-05 Increase staffing and capabilities for storm water management inspections and the review of sediment control and grading plans.
- SW-A-06 Investigate the feasibility of a Storm water Management Utility Fee to pay for inspection/enforcement.
- SW-A-07 Incorporate the use of non-structural storm water management best practices (vegetated swales, rain gardens, cooling buffers and bio-retention) with maintenance and monitoring agreements.
- SW-A-08 Reduce regulatory barriers to implementation of low impact development measures and create incentives to facilitate their use where appropriate.
- SW-A-09 Continue to explore and implement new techniques and technologies to reduce the impacts to streams during mass grading for development.
- SW-A-10 Work with Natural Resources Conservation Service and Maryland Department of Agriculture to identify additional incentives or measures that would reduce direct cattle access to streams.
- SW-A-11 Showcase examples of low impact development and environmental site design techniques to increase public awareness of best practices.
- SW-A-12 Expand the County's watershed planning and management capabilities.

- SW-A-13 Amend County ordinances to reference storm water management best management practices and implement the 2007 Storm Water Management Act guidelines.
- SW-A-14 Continue implementation of the Lower and Upper Monocacy River Watershed Restoration Action Strategies (WRAS) and the Maryland Chesapeake Bay Tributary Strategies.
- SW-A-15 Monitor pollutant loads and conduct Use Attainability Analyses on those watersheds with Total Maximum Daily Loads (TMDL's).
- SW-A-16 Develop a monitoring system of local ground water conditions, aquifer recharge, watersheds and streams.