CITY OF BRUNSWICK

1 W. Potomac Street • Brunswick, Maryland 21716 • (301) 834-7500

City of Brunswick Water Resource Element

INTRODUCTION

Purpose

The purpose of this element is to coordinate the City of Brunswick's land use and water resources planning efforts. The element is organized around the following three components: drinking water; wastewater; and storm water and non-point source pollution. Included within those components are discussions of the watershed resources of the region; the quality and quantity of drinking water supplies with respect to planned growth; the treatment capacity of the wastewater treatment facility and disposal of treated effluent; a review of the County's storm water management and non-point source pollution programs; and recommendations for sound land and water management practices that contribute towards the health and sustainability of our watershed systems and human communities. This water resources element was prepared to serve as the City's Water Resources Element mandated through House Bill 1141 by the Maryland State Legislature in 2006. This element is required to be submitted to the Maryland Department's of Planning and Environment for review in 2009.

Water Resources Goals

Achieving the City's water resources goals will take a coordinated effort by citizens, local government, businesses, and industry. Each has a role to play in protecting our water resources for future generations. The overarching goals for the City of Brunswick's water resources are:

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 the City of Brunswick's surface waters, ground water resources, and sensitive areas, with the goal of exceeding any regulatory requirements in place.

WR-G-03 Invest in water and sewer infrastructure that will provide adequate treatment capacity for projected demand and reduce pollutant loading to the Potomac River and area streams.

WR-G-04 Promote coordinated planning between Regional Counties, City and State agencies responsible for drinking water, wastewater, and storm water management.

WR-G-05 Engage the public in watershed conservation and promote a stewardship ethic.

Links to the Master Plan

This plan will be adopted as part of the City of Brunswick's Master Plan chapter 8 titled Water Resources. The City's current Master Plan was adopted in 2007 and provides the basis for this Water Resources Element. This element utilizes information from chapters 4 Environmental and Sensitive Areas, 5 Land Use, 7 Municipal Growth and 10 Community Facilities of the City's Master Plan. This Water Resources Element covers the jurisdiction of the City of Brunswick, Maryland and satisfies the HB 1141 requirement for the City.

Links to Other Plans

The Water Resources Element is linked to other County-produced plans such as the Water and Sewerage Master Plan and the County's Water Resource Element. The Water and Sewerage Master Plan provides a detailed description of the County's water and sewer service areas including justification for the various levels of service. The Plan includes background on the physical geography of the County (i.e. geology, climate, and hydrology) and provides detail on vulnerabilities and limitations to water and sewer service based on environmental factors.

Coordination with Frederick County

The City of Brunswick has coordinated with the County to provide qualitative and quantitative data on the City's drinking water and wastewater systems. The City has an agreement with Frederick County that storm water management is reviewed and approved by the County for development projects within the City boundaries. Policy statements and implementation strategies specific to the City will be independent of the County's Water Resources Plan and will be addressed within the City's water resources element and master plan.

Land Use Plan Analysis

The County land use plan designates the City as a Community Growth Area (CGA) where residential, commercial, and employment uses will be concentrated. The City of Brunswick Master Plan designated the City as a Priority Funding Area (PFA) and the City is in compliance with the PFA requirements. The Master Plan establishes the current zoning classifications as well as special development districts to accommodate growth within the City's boundaries. The intent of the land use plan is to direct development to designated areas while protecting the City's green infrastructure, natural resources and character. The majority of growth in the City will occur as residential use which will require connection to the sanitary sewer system. This is in contrast to the County land use around the City which is primarily agriculture. The City is better equipped to manage and protect our resources with our current codes by eliminating septic systems and

managing runoff to protect natural resources while maintaining green corridors. The City's current population is estimated at 6,167 per 2008 Annual Report. The City projects a population of 12,280 in 2030, which is an increase of approximately 6,113 people. Averaging 2.6 persons per household this population increase would result in a need for approximately 2,351 new dwelling units and approximately 500 new commercial taps. With the assumption that each new dwelling unit or tap will consume 250 gallons of water per day it is assumed that the future water resource needs of the City to be an additional 712,750 gallons of water to accommodate the projected growth by 2030 equating to a total average daily demand of approximately 1.82 mgd.

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 the City of Brunswick. In addition to addressing the competing needs of residential and commercial/industrial development, the City will need to review the land use to ensure delivery of water and sewer service to a larger customer base. Alternative supplies and additional storage may be needed to augment the community systems and wastewater treatment facilities may require upgrades to reduce the concentration of pollutants in their discharge. 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. The City of Brunswick's location within the Chesapeake Bay watershed offers another major challenge. The City's major water body, the Potomac River, is directly influenced by the City with runoff and wastewater discharge going directly into the Potomac River which flows directly into the Chesapeake Bay. The challenges associated with growth are not new or unique to the City of Brunswick; in fact, communities across the country and region are dealing with many of them and have found solutions. This water resources element takes in to account the diversity of water resources issues, limitations and vulnerabilities that the City of Brunswick is facing and offers recommendations for potential solutions. This is the first attempt to develop a water resources element for the City of Brunswick. Subsequent updates to this water resources 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. 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, Maryland. Brunswick lies within the Upper Potomac River Basin, Maryland watershed code 02140301 and Catoctin Creek, Maryland watershed code 02140305. Maryland Department of the Environment (MDE) has

listed streams in the Catoctin Creek watershed as impaired for sediments, nutrients, bacteria, and impacts to biological communities. Improvements to the health of the Monocacy River and Catoctin Creek watersheds are needed to meet regulatory requirements and support a diverse ecological environment. Watersheds provide natural functions to communities such as flood control, reduction of carbon dioxide, sources of food and water, and recreational opportunities. Some of the watershed management issues that citizens, farmers, schools, governments, and businesses are tackling in the City of Brunswick include:

- Reducing urban and storm water runoff;
- Restoring stream corridors;
- Controlling sediment and erosion during the land conversion process;
- Reducing impervious surfaces in new developments;
- Protecting habitat for birds, mammals, and aquatic life;
- Conserving water; and
- Planting trees, shrubs and herbaceous plants native to the area.

DRINKING WATER ASSESSMENT

Healthy watersheds provide a safe and sustainable drinking water supply. With the City of Brunswick drawing the majority of its water supply directly from the Potomac River, water appears abundant. The perception of abundance highlights the importance of water resources planning. While water may be plentiful certain days or seasons of the year, levels or supplies may be dramatically lower than others. Summertime demand, in particular, puts pressure on our water resources when supplies are lowest, but demand is high. The drinking water assessment investigates drinking water supply and availability; drinking water demand; major issues related to drinking water; and drinking water policies and projects.

Drinking Water Supply and Availability

In the City of Brunswick, 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 bodies, 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 City'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. This section assesses the availability of ground water and surface water and presents the limitations of each.

Ground water

The available supply of ground water in the City of Brunswick 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 hydro geomorphic region. The four regions located in Frederick County are Blue Ridge, Piedmont Crystalline, Piedmont Carbonate, and Mesozoic Lowlands. The City of Brunswick lies within Piedmont Crystalline region. In addition to geology, climatic conditions impact the County's supply of ground water. 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, it was 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 watershed. (*2006 MDE An Evaluation of Water Resources in the Catoctin Creek Watershed, Frederick County, Maryland*). Groundwater limitations are accentuated during the summer months. Mid-June through mid-September is the driest time of the year and groundwater supply declines significantly during the summer quarter.

Surface Water

The most abundant surface water supply available to the City of Brunswick 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). The City's use of the Potomac River as a drinking water source is considered non-consumptive, meaning that more water is returned to the Potomac River than is withdrawn. According to the Interstate Commission on the Potomac River Basin (ICPRB), the river'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 about 7 billion gallons per day. The Potomac River supply is augmented by two back-up water supply reservoirs: Jennings Randolph located on the North Branch of the Potomac in Garrett County, MD and Mineral County, WV 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 are present. Low flow conditions result from low summer rainfall, low groundwater levels, and low precipitation levels over the previous 12 months (October 2008, ICPRB Water Supply Outlook). 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. Flow on the Potomac would need to drop below 600-700 mgd to trigger a reservoir release. The abundance and consistency of the Potomac River supply has leveraged it to become the County's principal source of public drinking water. Like groundwater levels, surface water flows vary seasonally and daily. There are periods of time when surface water levels become low or may not flow at all. Drought periods emphasize seasonal fluctuations. An additional limitation to developing a pubic 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, ten-year low flow. Without a reservoir or adequate storage, streams cannot meet the minimum required flow all of the time. *(2004, Advisory Committee on the Management and Protection of the State's Water Resources. Appendix D - Monocacy River Watershed - Pilot Study).*

Surface Water Appropriations

Surface water is appropriated by the Maryland Department of the Environment for twelve-year periods. The City holds a Water Appropriation and Use Permit (WAUP) for the Potomac River. The permitted withdrawals total 1 mgd (daily average) and 1.5 mgd (maximum daily).

Source Water Protection

The quality of drinking water varies by source. Different issues exist for ground and surface water sources. The exception of groundwater in karst aquifers, which is under the influence of surface water, surface water is more vulnerable to contamination from land use practices. 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 when septic systems are nearby. Common water quality concerns are listed below:

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

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 require that public systems conduct a Source Water Assessment to better understand the vulnerabilities of their source. The State of Maryland has prepared Source Water Assessments (SWA) for all public systems in the state. These plans list in detail the vulnerabilities of the supply and offer recommendations for continued protection. Two, Source Water Assessment were performed by MDE titled "Potomac River Source Water Assessment for Maryland Plants City of Brunswick" and "Source Water Assessment for City of Brunswick Yourtee Springs". The SWA recommendations have been incorporated into the polices and actions of this element. "The Source Water Assessment for City of Brunswick Yourtee Springs"

prepared by MDE in June, 2005 concluded that the City of Brunswick's Yourtee Spring water supply is not susceptible to contamination by inorganic compounds, volatile organic compounds, synthetic organic compounds, radionuclides or microbiological contaminants. The recharge area above the springs is nearly 100% forested and is the primary reason for the excellent water quality from the spring. Continued preservation of this forested land is critical for maintaining the excellent water quality from this source. The City has indicated to Washington County an interest in increased source water protection through wellhead, springhead or headwater protection ordinances to better protect Yourtee Springs. With our groundwater well located outside of City's boundary, Washington County regulations and ordinances are needed for adequate source water protection of that part of the City's water supply system.

Drinking Water Demand

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 extends beyond the City to portions of Knoxville, New Addition, Washington County (Brownsville area) and the Village of Rosemont. In 2005 the City passed Ordinance 430 which established procedures to consider water taps outside the City's boundary. Currently the Mayor and Council have a policy of no expansion of the water system outside the City's corporate limits. The drinking water supply system serves a population of approximately 6,707 people with a current demand of 0.62 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 (WTP) is 1.5 mgd. The development of Brunswick Crossing, which will add 1,818 residential dwelling units and commercial and office uses to the community, will increase the drinking water demand by 0.45 mgd for a total average daily demand of 1.1 mgd and 1.82 mgd maximum daily demand. To handle the additional demands of Brunswick Crossing, a 1 million gallon elevated storage tank has been built and plans for expansion to the WTP have been approved. The planned improvements for the WTP include a third 500,000 gpd Trident Microfloc unit will be installed to increase the plants daily capacity to 1.5 mgd. Additionally, the water treatment plant building will be expanded and a fourth concrete base will be installed to facilitate future plant expansion of a fourth Trident unit. The WTP expansion will start in 2009 and be completed by spring 2011. The City projects the future plant expansion of the WTP to a 2 mgd capacity will need to occur between 2020 and 2025. The existing clearwell, decant tank, backwash, waste sludge and recycle pumps are adequate to serve the expanded capacity, however the existing 320 gpm finished water pumps will be replaced with three 525 gpm pumps. This will allow the plant to operate two pumps to meet demand and reserve the third for backup. A twelve inch dedicated supply line from the WTP to the City's reservoir was installed in 2009. The existing booster pump capacity shall be increased to accommodate the increased flows. It is anticipated that an additional two 600 gpm pumps will be installed to provide for the increased flow and backup. The City had water storage capacity of 3.25 million gallons with the existing tank and reservoir. The City completed maintenance and new cover installation on the reservoir in 2009 bringing the total

storage capacity for the City to 4.25 million gallons. The City estimates that drinking water demand will reach 1.82 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 will continue to utilize the Maryland Department of the Environment Source Water Assessment reports to pursue all measures necessary to protect their water sources**.** The City will also continue to maintain the Water Emergency Response Plan. One of the City's greatest concerns related to their drinking water supply is ensuring that there will be reliable quantities of quality water to supply future growth. Other limitations are related to the capacity of their treatment facility to meet 2030 projections.

Water Conservation

While water consumption by individual households in The City of Brunswick 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 the City of Brunswick. Brunswick 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. Water conservation measures lower consumer rates and utility bills while placing less pressure on precious resources. The City of Brunswick realizes 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 - Drinking Water Assessment

To achieve water resources goals related to the drinking water assessment, four (4) policies and five (5) action items have been identified. Completion of the action items and adherence to the policy statements will be monitored regularly by the City through review and update of the Water Resources Element, a component of the City's Master Plan.

Drinking Water (DW) Policies

DW-P-01 Diversify sources of public drinking water and explore alternatives in order to meet future demand.

DW-P-02 Demand management strategies and conservation measures (water pricing, recycling, and reuse) should be employed to maximize use of existing resources.

DW-P-03 New development should be staged according to the availability and adequacy of drinking water service.

DW-P-04 Encourage and support research on and monitoring of local ground water conditions, aquifer recharge, watersheds and streams.

Drinking Water (DW) Action Items

DW-A-01 Initiate a comprehensive water conservation education program for citizens and businesses of the City of Brunswick stressing summertime (peak) demand management and an overall household reduction in water use (in gpd).

DW-A-02 Develop a water-resources-based GIS database for staff to review in regard to development plans and proposals.

DW-A-03 Initiate a citywide source water protection effort.

DW-A-04 Continue to work with Washington and Frederick County and Maryland Department of the Environment to identify appropriate protection measures in the wellhead, springhead, and headwater areas that lie outside of the City boundaries to protect the City's existing water sources.

DW-A-05 Provide continued coordination with Frederick County to collect and share consistent drinking water data.

DW-A-06 Acquire additional water appropriations to accommodate future growth.

DW-A-07 Proceed with Water Treatment Plant expansion to provide future capacity of 2.0 mgd as growth demands.

WASTEWATER TREATMENT ASSESSMENT

The City of Brunswick wastewater systems will continue to experience pressure from population and employment growth in Brunswick. As growth pressures place demand on facilities and infrastructure, the state and federal government will place more stringent restrictions on the levels of pollutants permitted to enter local waterways via treated effluent. This section of the Water Resource Element addresses wastewater treatment and disposal. 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 the City's wastewater systems; and the impact of individual septic systems. The section concludes with a list of 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

The Wastewater Treatment Plant (WWTP) is a point source of pollution in the City of Brunswick. The treated effluent is discharged directly into the Potomac River. Discharge permits for the Potomac River require the use of denitrification plants with filters. 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 detail in the Tributary Strategies Statewide Implementation Plan. To date, Maryland has made significant progress through upgrades of major wastewater treatment plants to 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 to tributaries of the Bay. 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 Maryland Department of the Environment 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 Wastewater Treatment Plants. 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. 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).

Wastewater Treatment Capacity and Demand

Brunswick/Knoxville Service Area

The City of Brunswick provides sewerage service to city residents. The City's Wastewater Treatment Plant (WWTP) is located between the C&O Canal National Historical Park (NHP) towpath and the Potomac River; treated effluent is discharged to the Potomac River. In addition to the WWTP expansion for Brunswick Crossing in January 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 mgd; this is double 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 TN and 0.3 mg/L TP. The average inflow to

Brunswick's plant was 500,000 gallons/day between 2005 and 2007. Remaining capacity was 200,000 gallons/day. The Brunswick Crossing development alone is projected to generate 450,000 gallons/day of wastewater flow. This exceeded the available capacity of the treatment plant and required an expansion as part of the property's annexation. Brunswick officials anticipate that demand will reach 1.7 mgd by 2030. Developers will be required to fund wastewater improvements as part of annexation and development. For the Cooper property development to occur, the developer would be required to build a second wastewater treatment plant, which would serve Cooper, Galyn Manor, and the eastern portion of the City's growth area. This facility was indicated on the City's 2007 Master Plan. A new WWTP will need to comply with the Maryland Tributary Strategy that no new point source discharges can occur without offsetting the new loading. If the new WWTP performs better than the current point source cap which assumes 1.4 MGD at 4 mg/L N the existing WWTP capacity could expand to meet expected demand by 2030. The existing treatment plant is located within the C&O Canal NHP where the opportunity for expansion is restricted. There are approximately 10 existing septic systems located within city limits. The City continues to work with these individuals to bring them into the City's wastewater 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. For FY 2009, the City has $250,000 in their capital improvements plan for I&I work.

Implementation - Wastewater Assessment

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

Wastewater (WW) Policies

WW-P-01 New development should to be staged according to the availability and adequacy of drinking water and wastewater service.

WW-P-02 Reduce the few remaining septic system properties in the City.

WW-P-03 Establish and promote residential, commercial and industrial water conservation measures in order to reduce inflow to the wastewater treatment facility.

WW-P-04 Reduce inflow and infiltration (I&I) into the wastewater collection system.

WW-P-05 Coordinate with Frederick County to evaluate solutions that ensure future wastewater capacity and adequate management planning.

WW-P-06 Reduce point source pollution that results from wastewater disposal.

Wastewater (WW) Action Items

WW-A-01 To reduce I&I, Continue with the City's I&I program funding.

WW-A-02 Work with the Health Department to identify, prioritize and begin retrofitting failing septic systems using the Bay Restoration Fund (flush tax) and other programs to connect septic system properties to the City's wastewater system.

WW-A-03 Continue operations of the Enhanced Nitrogen Removal (ENR) Wastewater Treatment Plant (WWTP) with use of the best technologies available to reduce nitrogen and phosphorus pollution.

WW-A-04 Work with Maryland Department of the Environment (MDE) to determine limitations of the Brunswick WWTP point source cap on maximum discharge to accommodate future growth.

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 and watersheds. Land disturbance and conversion tend to exacerbate impacts, while forest and wetland protection maintain or improve watershed health and function. The City's land use plan has an opportunity to mitigate non-point source pollution through concentration of growth, recommendation of best management practices, and protection of natural resources. The MDE, Water Management Administration (WMA) adopted a general permit on April 14, 2003. The City of Brunswick is under the NPDES Phase II MS4 permit adopted by WMA. The City has an agreement with Frederick County for review of all new development for stormwater compliance. This section of the Water Resource Element provides an assessment of the County's Stormwater Management Program. 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, stormwater 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, compacted or clay soils, and roads) direct ground water recharge is impeded and the volume of stormwater runoff to neighboring areas increases. Non-point source pollution is detrimental to water quality and wildlife habitat and in our region 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. The City preformed a Nonpoint Source Analysis of the current land use versus build-out of the City Boundary. The land use categories used are consistent with the City's Master Plan and determined water and wastewater demands for this element. (Appendix – City of Brunswick Nutrient Loading Analysis – Summary Results and Graphs)

Frederick County's Stormwater Management Program

Frederick County first adopted stormwater management (SWM) regulations in 1984 and maintains its current program in accordance with Environmental Article, Title 4, 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 stormwater runoff. Proper management of stormwater 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. The County continues to work with the development community to implement the goals of the 2000 Maryland Stormwater Design Manual. Enhancements will continue to be made as the manual is updated 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. The City will continue to work to address stormwater management earlier in the process to achieve the best product at the end of the process.

Watershed Restoration Efforts

The County approaches watershed restoration through new stormwater management ponds, stormwater management pond retrofits, Low Impact Development (LID), stream restoration/bank stabilization, and buffer enhancement. These approaches include a myriad of techniques. For example, LID techniques include rain gardens, bio-filtration swales, and tree boxes. 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 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. 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 examples of tools the City can promote to maintain the quality and quantity of the resource and ensure it is available for our diverse needs.

Implementation – Managing Stormwater and Non-point Source Pollution

To achieve water resources goals related to managing stormwater and non-point source pollution, three policies and one action item have been identified. Completion of the action items and adherence to the policy statements will be monitored regularly by the City through review and update of the Water Resources Element, a component of the City's Master Plan.

Stormwater (SW) Policies

SW-P-01 Encourage innovative technologies for storm water management through coordination with Frederick County.

SW-P-02 The protection of ground and surface water quality shall be a factor in the approval of residential and non-residential development.

SW-P-03 Minimize impervious cover within residential and non-residential development in order to reduce storm water runoff.

Stormwater (SW) Action Items

SW-A-01 Continue routing stormwater management issues through Frederick County for review and approval to insure compliance with current stormwater management regulations.

SW-A-02 Continue to manage existing infrastructure to insure functioning properly.

SW-A-03 Continue tree plantings and buffer restoration wherever possible.

SW-A-04 Utilize and refine the Non-point Source Analysis to encourage low impact development and protect the City's natural resources.

IMPLEMENTATION

In addition to applying water resources-related policy recommendations and executing action items, implementation of the City's Water Resources Element occurs through its Capital Improvements Program.

Capital Improvement Program

There are forty-two (42) projects identified in the City of Brunswick Capital Improvements Program, Fiscal Years 2009 – 2013 related to water resources. There are thirty three (33) water and sewer projects and nine (9) related to stormwater management restoration projects.

Water & Sewer projects relate to replacement of lines, plant improvements, meter replacements and inflow & infiltration and the stormwater management restoration projects include stormdrain, curb, bridge and culvert improvements.

Appendix City of Brunswick Nutrient Loading Analysis - Summary Results

Land Use and Septic Systems (See Scenario Descriptions Below)

	2007 LU, 2007 BMPs (Acres)	2007 LU, Trib Strat BMPs (Acres)	Scenario 1 Trib Strat BMPs (Acres)	Scenario 2 Trib Strat BMPs (Acres)	Scenario 3 Trib Strat BMPs (Acres)	Scenario 4 Trib Strat (Acres)
Development	0	682	1,307	0	0	0
Agriculture	0	0	0	0	0	0
Forest	0	534	604	0	0	0
Water	0	237	237	0	0	0
Other	0	922	227	0	0	0
Total Area	0	2,375	2,375	0	0	0
Residential Septic (EDUs)	0	12	2	0	0	0
Non-Residential Septic (EDUs)	0	1	0	0	0	0

Total Nitrogen Loading

	2007 LU, 2007 BMPs (Lbs/Yr)	2007 LU, Trib Strat BMPs (Lbs/Yr)	Scenario 1 Trib Strat BMPs (Lbs/Yr)	Scenario 2 Trib Strat BMPs (Lbs/Yr)	Scenario 3 Trib Strat BMPs (Lbs/Yr)	Scenario 4 Trib Strat (Lbs/Yr)
Development NPS	0	4,739	9,275	0	0	0
Agriculture NPS	0	0	0	0	0	0
Forest NPS	0	1,075	1,216	0	0	0
Other Terrestrial NPS	0	6,788	1,633	0	0	0
Total Terrestrial Load	**0**	**12,603**	**12,124**	**0**	**0**	**0**
Residential Septic (EDUs)	0	124	20	0	0	0
Non-Residential Septic (EDUs)	0	9	0	0	0	0
Total Septic Load	**0**	**133**	**20**	**0**	**0**	**0**
Total NPS Nitrogen Load	**0**	**12,736**	**12,144**	**0**	**0**	**0**
Total PS Load	**0**	**5,114**	**17,047**	**0**	**0**	**0**
Total Nitrogen Load (NPS+PS)	**0**	**17,850**	**29,191**	**0**	**0**	**0**

Total Phosphorus Loading

	2007 LU, 2007 BMPs (Lbs/Yr)	2007 LU, Trib Strat BMPs (Lbs/Yr)	Scenario 1 Trib Strat BMPs (Lbs/Yr)	Scenario 2 Trib Strat BMPs (Lbs/Yr)	Scenario 3 Trib Strat BMPs (Lbs/Yr)	Trib Strat BMPs (Lbs/Yr)
Development NPS	0	406	817	0	0	0
Agriculture NPS	0	0	0	0	0	0
Forest NPS	0	12	13	0	0	0
Other Terrestrial NPS	0	626	146	0	0	0
Total Terrestrial Load	**0**	**1,044**	**977**	**0**	**0**	**0**
Total PS Load	**0**	**384**	**1,279**	**0**	**0**	**0**
Total Phosphorus Load (NPS+PS)	**0**	**1,428**	**2,256**	**0**	**0**	**0**

Impervious Cover and Open Space

		2007 LU, 2007 BMPs	2007 LU, Trib Strat BMPs	Scenario 1 Trib Strat BMPs	Scenario 2 Trib Strat BMPs	Scenario 3 Trib Strat BMPs	Scenario 4 Trib Strat BMPs
	Total Impervious Cover	0	363	420	0	0	0
Open Space	Agriculture	0	0	0	0	0	0
	Forest	0	534	604	0	0	0

Scenario Description	Scenario List
Year 2007 with 2007 Level of BMP Implementation	2007 LU, 2007 BMPs
Year 2007 with TS BMP Implementation	2007 LU, Trib Strat BMPs
Buildout of 2009 City Boundary	Scenario 1
Scenario 2 Description	Scenario 2
Scenario 3 Description	Scenario 3
Scenario 4 Description	Scenario 4

2007 w/ Trib Strategy BMPs" does NOT include septic denitrification. Local jurisdictions may include the information if available