

MASTER PLAN FOR WATER SUPPLY & SEWERAGE SYSTEMS



2013
ANNE ARUNDEL COUNTY, MARYLAND

**ANNE ARUNDEL COUNTY
MARYLAND**

2013

**Master Plan for
Water Supply and
Sewerage Systems**

**As Adopted by the Anne Arundel County Council Bill No. 11-13 May
20, 2013; Effective: July 7, 2013**

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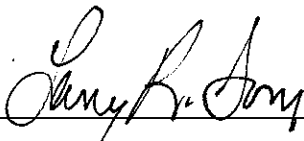
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CERTIFICATE OF CONFORMANCE

This document is consistent with the General Development Plan of Anne Arundel County and was prepared in accordance with COMAR 26.03.01.



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Date: 1.23.13

ENGINEERS STATEMENT OF CERTIFICATION

The projects proposed in the Anne Arundel County Master Plan for Water Supply and Sewerage Systems, 2013-2017 are adequate to serve the system requirements projected for the period covered by the Plan. Data furnished by the Office of Planning and Zoning, the Department of Public Works and the Health Department formed the basis for the Master Plan



Christopher J. Phipps, P. E., MD#20508
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1/24/13

Date

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INTRODUCTION

Anne Arundel County's Master Plan for Water Supply and Sewerage Systems has evolved over the past 40 years as an important policy plan for the provision of water and sewer service to County residents and for managing and directing growth and development to appropriate and suitable areas.

The County began its sewer and water operations under the direction of the Anne Arundel County Sanitary Commission in 1922. In July 1965, Anne Arundel County became a Charter Government with the election of a County Executive and a seven member County Council. With this new government, the responsibilities of providing water and wastewater facilities shifted from the Sanitary Commission to the Department of Public Works and the Planning staff. It was in 1966 that the County had in place its first Master Plan for Water Supply and Sewerage Systems (WSMP). Since its original adoption by the County Council in 1966 by Bill No. 6-68, the WSMP has had major updates and revisions to reflect changes in land use, population, environmental laws and policies, and relevant State and County laws; and revisions to water and sewer strategic plans as follows:

- 1969 – Adopted by the County Council by Bill No. 95-69
- 1971 – Adopted by County Council by Bill No. 79-71,
- 1974 – Adopted by County Council by Bill No. 25-74,
- 1976 – Adopted by County Council by Bill No. 139-76,
- 1984 – Adopted by County Council by Bill No. 25-84,
- 1990 – Adopted by County Council by Bill No. 20-90,
- 1992 – Adopted by County Council by Bill No. 32-92,
- 1993 – Adopted by County Council by Bill No. 62-93,
- 1996 – Adopted by County Council by Bill No. 92-95,
- 1999 – Adopted by County Council by Bill No. 72-99,
- 2003 – Adopted by County Council by Bill No. 98-05, and
- 2007 – Adopted by County Council by Bill No. 84-07.

As Anne Arundel County has grown over the years, the WSMP has proven to be an important and effective document, addressing and implementing the goals and policies of the County's General Development Plan, documenting existing water resources and wastewater treatment capacities, identifying needed mechanisms to meet future demand and guiding development within the County by setting the criteria for which public and private water and sewer services are provided.

This 2013 update to the WSMP reflects the land use policies of the 2009 GDP, Small Area Plans, Town Center Plans and related planning policies. As planning policies increasingly focus on protection of water resources, the focus of public utility planning will continue to shift toward enhanced treatment, new TMDL requirements, and watershed planning.

CHAPTER 1

GOALS, POLICIES, AND PROCEDURES

1.1 GOALS AND POLICIES

Title 9, Subtitle 5, Annotated Code of Maryland requires each County to develop water supply and sewerage systems in accordance with a County Master Plan which specifies the extent, adequacy, sizing, staging, and other characteristics of such facilities so that they are in compliance with State laws relating to air pollution, water pollution, environmental protection and land use. It further specifies that the extension and expansion of such water supply and sewerage systems shall be consistent with the County's General Development Plan (GDP) and adopted Land Use Plan. The County's current Land Use Plan is shown in Figure 1-1.

The State's Economic Growth, Resource Protection and Planning Act was enacted in 1992 and amended in 2000 and 2009. This legislation established statewide visions for planning, growth and resource protection. In 1997, the State enacted legislation known as the Smart Growth and Neighborhood Conservation Initiatives. This legislation created several programs to promote growth management and neighborhood conservation and directed State funding for infrastructure to Priority Funding Areas (PFAs). The County established PFAs to indicate areas where existing and planned infrastructure would support planned development (Figure 1-2). PFAs consist of existing employment areas, areas that are designated for industrial development on or before July 1, 1997, existing communities that have public sewer or public water that are developed at two dwellings per acre or greater, and areas that are zoned (Figure 1-3) or designated on the Land Use Plan for residential development at 3.5 dwellings per acre or greater that are in the existing or planned service category for public sewer.

The County's Priority Funding Area relates closely to the areas shown on the Water and Sewer Master Plan for existing and planned service. Areas that are designated as PFAs comprise 99% of the existing, capital facilities, and planned sewer service areas in the County, and 97% of the existing, capital facilities, and planned water service areas.

In 2006, the State passed new legislation requiring local jurisdictions to include a Water Resources Element in their comprehensive land use plans. The purpose of which is to ensure that future local comprehensive plans "reflect the opportunities and limitations of local and regional water resources".

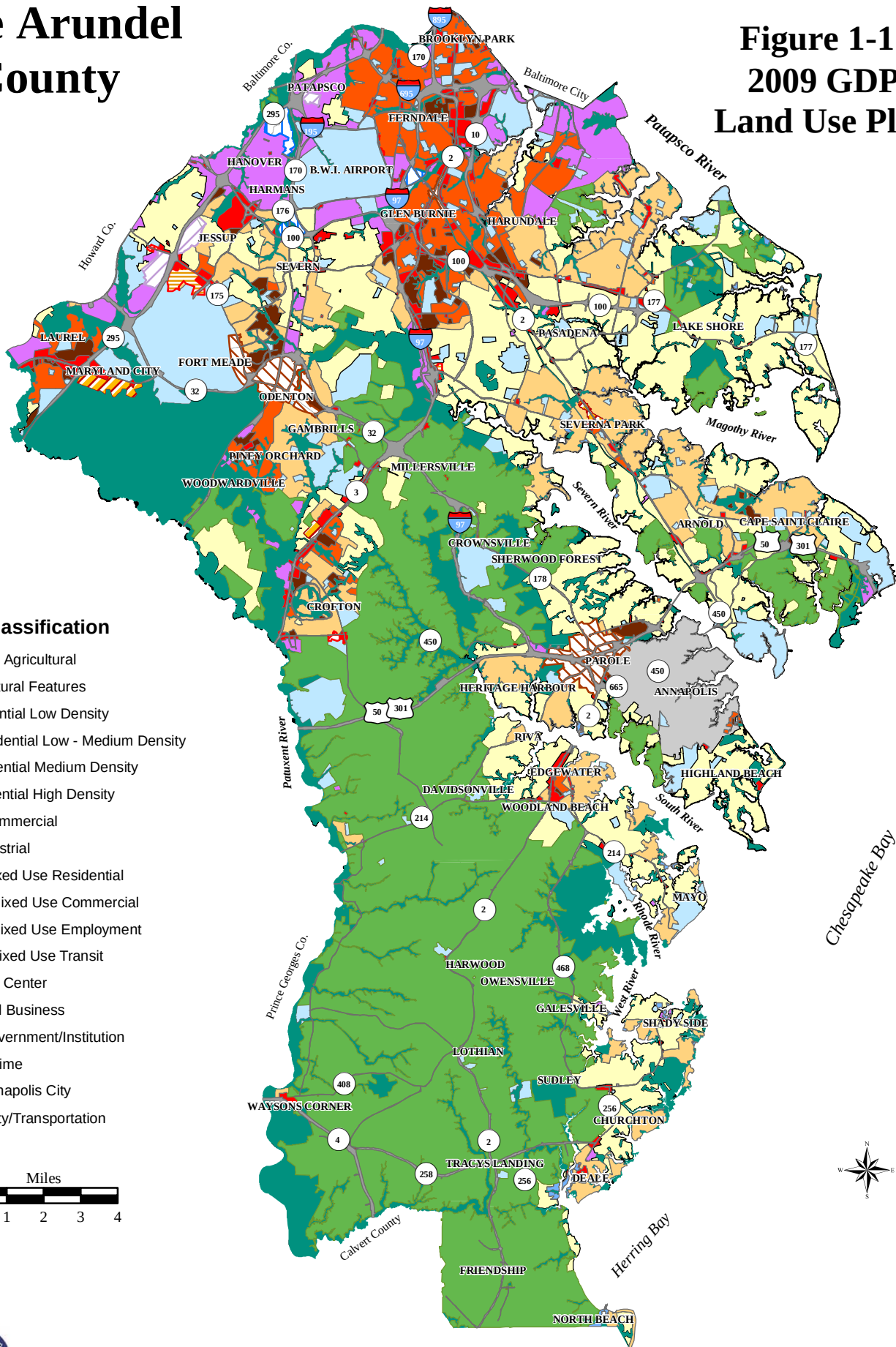
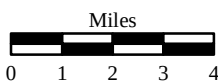
It is from the guidance of the above mentioned legislation that Anne Arundel County revisited their General Development Plan with the aid and assistance of many citizens to prepare the 2009 GDP. It contains a Water Resources Element that assesses current and projected capacities and deficiencies in water supply systems, wastewater treatment plants, and stormwater management facilities and also assesses development impacts on receiving waters based on the County's proposed Land Use Plan. In addition, the 2009 GDP includes Development Policy Areas that provide a framework for implementing the goals and policies in the GDP (Figure 1-4). The Plan defines three development policy areas that are based primarily upon the Land Use Plan, PFAs, revitalization goals, natural resources and the location of public sewer and water facilities. These areas include Targeted Growth Areas, Managed Growth Areas and Rural Areas.

Anne Arundel County

**Figure 1-1
2009 GDP
Land Use Plan**

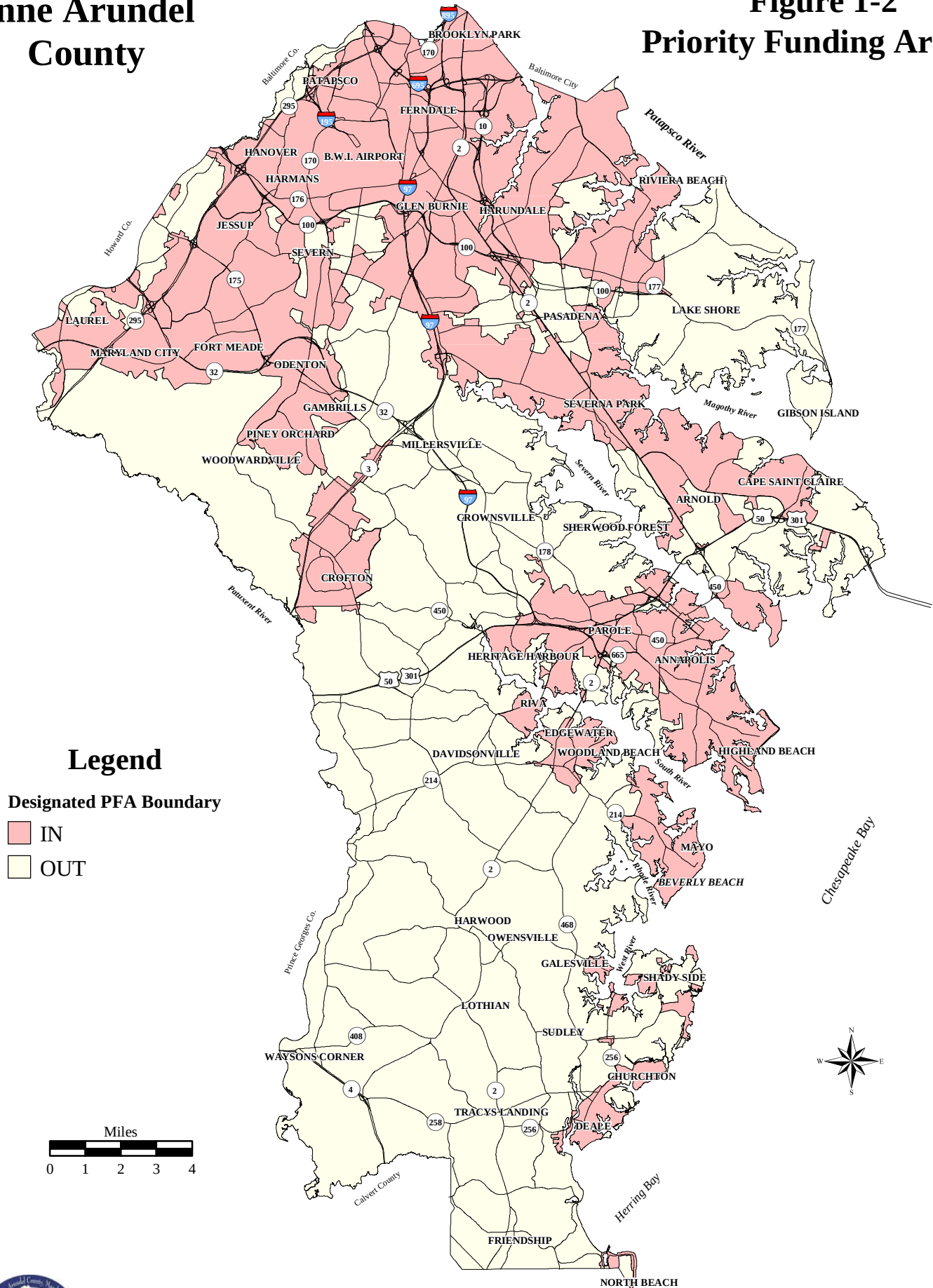
Land Use Classification

- RA - Rural Agricultural
- OSR - Natural Features
- L - Residential Low Density
- LM - Residential Low - Medium Density
- M - Residential Medium Density
- H - Residential High Density
- COM - Commercial
- IND - Industrial
- MUR - Mixed Use Residential
- MXDC - Mixed Use Commercial
- MXDE - Mixed Use Employment
- MXDT - Mixed Use Transit
- TC - Town Center
- SB - Small Business
- GOV - Government/Institution
- MT - Maritime
- CITY - Annapolis City
- UTL - Utility/Transportation



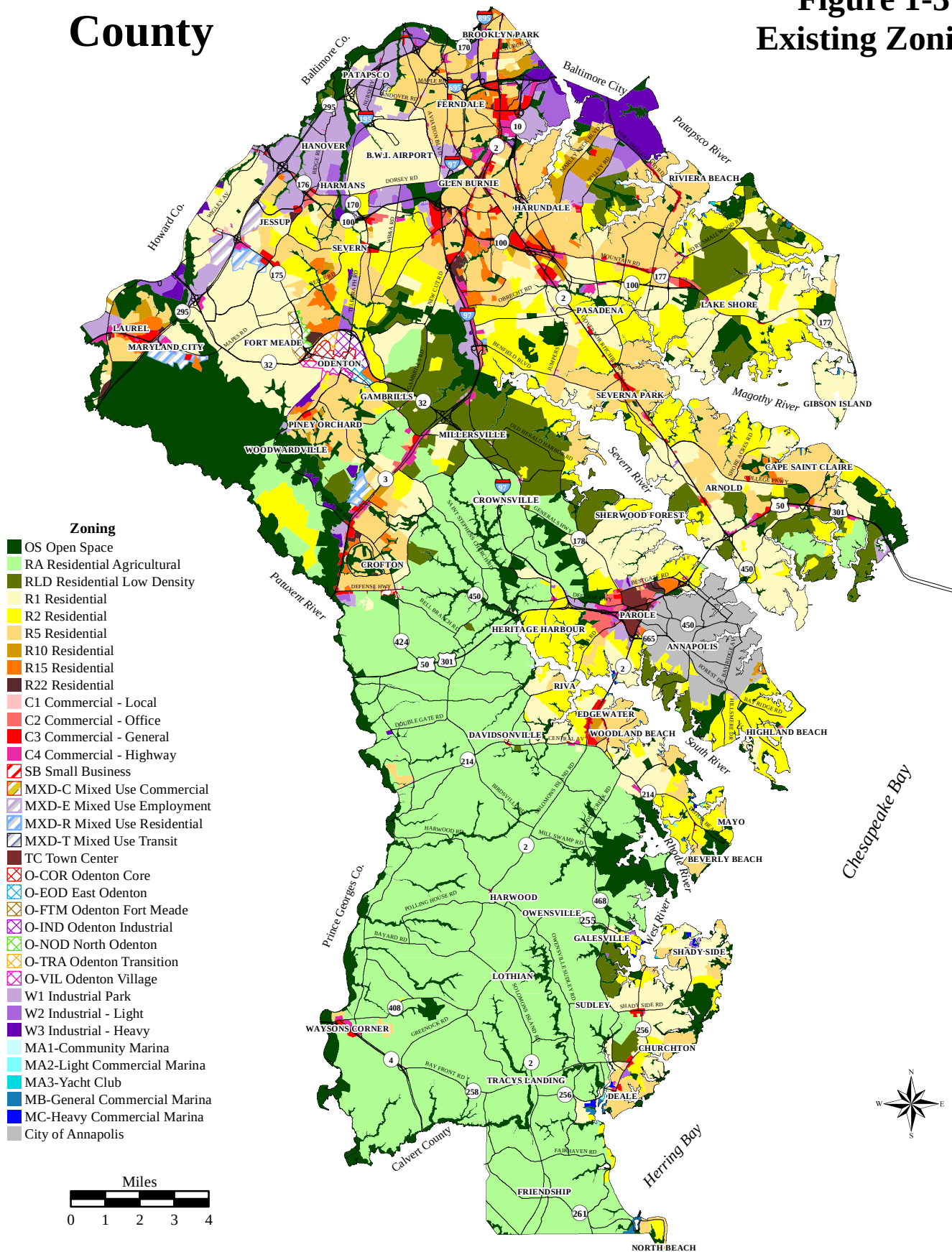
Anne Arundel County

**Figure 1-2
Priority Funding Areas**



Anne Arundel County

**Figure 1-3
Existing Zoning**



Since the adoption of the GDP in 2009, the State has passed the Sustainable Growth and Agricultural Preservation Act of 2012 which limits the number of septic systems on large-lot residential development for the purpose of reducing nitrogen pollution into the Chesapeake Bay and other waterways. Per the State requirements, the County developed Growth Tiers which identify where major and minor residential subdivisions can occur and what type of sewerage system will serve them. The legislation does not apply to commercial and industrial property. Additional State legislation adopted in 2012 requires that as of January 1, 2013, all new on-site sewage disposal systems installed must utilize Best Available Technology (BAT) for removal of nitrogen.

1.1.1 Goals and Policies of the 2009 General Development Plan

The 2009 GDP provides a vision for the future that “growth areas have the water resources and infrastructure to accommodate population and business expansion in an orderly, efficient and environmentally sustainable matter.”

The goals and policies in the 2009 GDP relevant to water and sewer planning are as follows:

Goal: Establish and maintain a Land Use Plan that achieves Smart Growth goals, balances growth and preservation and provides a higher quality of life.

Policy: Direct development and redevelopment to the County’s targeted growth areas: Town Centers, commercial revitalization districts and Mixed Use Districts.

Goal: Establish cohesive land use policies and fiscal policies that collectively will achieve sustainable communities, efficient use of public facilities, and fiscal stability.

Policy: Plan for the provision of public facilities, infrastructure and services so that the County will be able to maintain a high quality of service to serve the existing population as well as new growth.

Goal: Achieve or exceed federal and state mandated water quality standards in all watersheds in the county.

Policy: Maintain a proactive watershed planning program that integrates land use planning and water resource protection. In addition, maintain a proactive monitoring program that will assess the effectiveness of stormwater management practices and watershed restoration actions and track progress toward meeting water quality standards.

Goal: Provide and maintain a safe and adequate capacity for wastewater treatment services and water supply to meet current and future needs.

Policy: Encourage water conservation and protection of the County’s groundwater resources.

Policy: Ensure adequate capacity at the County’s water reclamation facilities.

Goal: Provide the highest level of wastewater treatment capabilities economically achievable in order to reduce pollutant loads to area tributaries.

Policy: Comply with the nutrient loads limits of all County Water Reclamation Facilities.

Goal: Achieve significant reductions in nutrient loads from onsite septic systems.

Policy: Reduce total nutrient loads from onsite septic systems within the county with particular emphasis on reduction in the Severn River, South River, Magothy River and Bodkin Creek watersheds where nutrient loads are the most significant.

Policy: For the benefit of reducing nutrient loads to local tributaries, communities served by onsite septic systems that are identified as problem septic areas, and areas with a high potential to generate significant pollutant loads from septic systems, should be placed in the planned sewer service category if it is feasible to extend public sewer or install community treatment systems in those areas, regardless of the land use plan and zoning. Extension of public sewer in such cases will not be considered justification in itself for changing the land use plan or zoning in these areas, and should not be considered as inconsistent with the general development plan.

Goal: Improve stormwater management practices throughout the county to reduce nonpoint source pollutant loads and achieve water quality standards.

Policy: Be proactive in achieving the greatest reduction in nonpoint source loads attainable.

1.1.2 Goals and Policies of the Water and Sewer Master Plan

The goals of the County's Water and Sewer Master Plan are consistent with the County's GDP and as follows:

- A. Ensure a sufficient supply of water will be collected, treated and delivered to areas programmed for service in the Master Plan.
- B. Ensure wastewater will be collected from all areas programmed for service in the Master Plan and delivered to points best suited for waste treatment and disposal or reuse.
- C. Both water and sewer services shall be monitored and maintained in a manner that strives to maximize the public health, safety and welfare for all while minimizing every environmental impact.
- D. Incorporate the State's water and sewer planning principles and Smart Growth initiatives to achieve best land management practices, highest water quality protection, and partnered financial support.

The policies that guide water and sewer planning in the County are as follows:

- A. Existing development, with septic or water supply problems, shall be given a high priority for receiving public water and sewer service upon successful petitioning requests, if within the service areas for the request. Those areas outside the service area boundaries that experience septic or well problems that cannot be remedied on-site will be supported for cluster treatment or community systems as appropriate.
- B. Service to any new developments and extensions of existing systems shall be given only to those being planned, programmed and built in accordance with County policies and ordinances.
- C. The extension of water and sewer systems shall be based on achieving planned densities adopted in the General Development Plan.
- D. Private individual and community water systems and wastewater disposal systems shall be allowed only where they conform to the General Development Plan, the Master Plan for Water and Sewer and to standard County design specifications. Private individual and community wastewater disposal systems shall not cause degradation to surface or ground waters. Private systems constructed within a Capital Facilities or Planned Service Area are considered temporary, and connection to public service must occur once the programmed facilities are in place. Further, the individual or community facilities must be removed from service permanently, in accordance with Section 1.2.1.C.
- E. In accordance with subdivision design standards and requirements, a privately operated sewage collection and treatment system must have the approval of the Department of Health, the Maryland Department of the Environment, and the Department of Public Works. An applicant must obtain approval from said agencies prior to obtaining a permit to construct. In addition, these systems must be managed by a MDE approved controlling authority
- F. Any connections to the Mayo Water Reclamation Facility are being made consistent with the Mayo Water Reclamation Subdistrict Management Plan (MWRSMF).
- G. The County may convert private community water supply and sewerage systems to public systems in order to protect human health and the environment.
- H. A high priority shall be given to actions aimed at preventing pollution of watercourses in the County.
- I. The County, in cooperation with the State, will protect and conserve its existing groundwater resources.
- J. The potential environmental impact from utility line extensions through environmentally sensitive areas will be a primary factor in determining the extension and location of lines.
- K. The County will promote water conservation to protect the water supply and minimize sewerage flows.

- L. Adequate aquifer recharge areas will be preserved. Acceptable protection methods will include, but not be limited to, the siting of parks, use of open space zoning, and managing storm water in order to ensure an adequate supply of groundwater.
- M. Public water and sewer systems may be extended to areas not programmed for construction in any service category to abate or prevent a health emergency as determined in writing by the County Health Officer. In these circumstances, an amendment to the Water and Sewer Master Plan would not be required prior to extension of the utilities. Only the immediate health emergency area is to be served. Such extension is not to be construed as a modification of the General Development Plan or character of the area being served, or of the areas adjacent to any conveyance line required to serve the affected health emergency area.
- N. Applications to connect or extend existing water systems shall meet the required domestic pressure and fire flow criteria as outlined in Appendix A.
- O. Public utilities shall be planned in advance of need and provided, where possible and consistent with the General Development Plan, in industrial areas and other non-residential areas for the diversified economic development of the County.
- P. Although forecasted system demands have been based on reasonable engineering judgment, they do not represent the impact of prolonged environmental extremities such as lack of rainfall and/or record temperatures. In this event, the Department of Public Works will manage, as need be, available resources to accommodate system demands.
- Q. Sewerage from a sewer service area shall not be conveyed into another sewer service area for purposes of treatment. Sewer Service Area boundary lines are shown on the official Master Plan for Sewer maps at the scale of 1" = 2000'. If during the planning, design and/or construction at one of the County's Water Reclamation Facilities (WRF), a proposed development requests permission to temporarily pump over established boundary lines from one sewer service area to another, the Office of Planning and Zoning in collaboration with the Department of Public Works, may grant permission under the following guidelines:
 - i. Adequate capacity in the existing adjoining service area must be demonstrated and allocating this capacity will not jeopardize any allocation for development in this area or otherwise adversely affect another property's capability to connect.
 - ii. The developer will be required to construct the necessary infrastructure for the later transfer of flow back to the original service area.
 - iii. All established utility charges and any existing or future service system expansion charges that may arise from the expansion of the WRF will be paid by the developer.
 - iv. The developer will be responsible for costs and charges associated with the temporary pump over and ultimate transfer back to the service area.

- R. Water and sewer conveyance systems may traverse or be located in areas designated in the Master Plan as Future or No Public Service; however, they shall not be available for connection to properties in the Future or No Public Service Area.
- S. Non-conventional on-site sewage disposal systems must be approved by the Anne Arundel County Department of Health.
- T. The County will maintain close cooperative working relationships with the City of Annapolis, Baltimore City, Baltimore County, Howard County, Calvert County and other surrounding counties, state and federal agencies, so that regional water and sewer problems can be solved equitably and efficiently.
- U. In the event that any word, phrase, clause, sentence, paragraph, section, or part in or of this Master Plan for Water and Sewerage, or the application thereof to any person or circumstances, is judicially determined to be invalid, then the remaining provisions and the application of such provisions to other persons or circumstances shall not be affected. The remaining provisions of the Master Plan without the word, phrase, clause, sentence, paragraph, section or part in or of the Master Plan, or the application thereof, declared invalid, would have been adopted and approved.
- V. In accordance with Subtitle 9, Section 503 of the Environmental Article, the Water and Sewer Master Plan shall be reviewed at least every three (3) years. If any amendment or revision is necessitated by this review, such will be forwarded to the Maryland Department of the Environment, plus other applicable County and State agencies. The interim amendment process is described in Section 1.6. The object of the triennial review is to comprehensively update the Master Plan to ensure that it is as current and accurate as possible. With each review, the Master Plan is subject to change in order to support the adopted General Development Plan and other relevant plans.
- W. Permanent changes in the boundary between two adjacent Sewer Service Areas shall be made by an amendment to the Water and Sewer Master Plan.
- X. Permanent changes in the boundary between two adjacent Water Pressure Zones can be granted by administrative approval and do not require an amendment to the Master Plan, as long as the affected areas of change are in the Existing Service, Capital Facilities, or Planned Service categories.
- Y. Changes from a No Public Service or a Future Service category to a Planned Service category in either a Water Pressure Zone or a Sewer Service Area shall be made by an amendment to the Water and Sewer Master Plan.
- Z. When State funding is requested for any extension of public water or sewer systems outside of the County's certified Priority Funding Area (PFA), the County must submit a request for a PFA Exception or a Determination of Extraordinary Circumstance to the State Smart Growth Coordinating Committee and / or the State Board of Public Works, in accordance with State requirements.

1.2 WATER AND SEWERAGE SYSTEMS APPLICATIONS

Procedures for filing and processing water supply and sewerage systems applications have been established as follows.

1.2.1 Private Water and Sewerage Systems

Applicants seeking private individual water supply and sewerage systems shall make application through the County Department of Health. Construction of such facilities shall meet the standards established by the Department.

A. Private Industrial, Commercial And Institutional Systems

- i. An industrial, commercial, or institutional development may be located in an area not served by public sewer provided that a private individual or multi-use system is used for the disposal of human bodily waste. Construction of such systems shall meet the standards established by the Department of Health. A mechanism for disposing of all other wastes generated by the facility must be reviewed by the Office of Planning and Zoning and approved the Department of Health before a building permit may be issued.
- ii. For septic systems having a treatment capacity in excess of 5,000 gallons per day, the Office of Planning and Zoning and the Department of Public Works shall review the request for compliance with the goals and policies of the Water and Sewer Master Plan prior to approval from the Department of Health and the Maryland Department of the Environment. Upon the approval of a subdivision plan or site development plan or a building permit utilizing a septic system with discharges greater than 5,000 gallons per day, the Master Plan table and map shall be amended administratively to note its location and maximum discharge permit.
- iii. If such request is within the provisions of Sections 1.2.2.F and/or 1.3C, public water and/or sewer must be extended in accordance with all provisions of this document and the codes and regulations of Anne Arundel County.

B. Private Community Systems

- i. Where a private community water treatment facility or sewage treatment facility is granted administrative approval by the Office of Planning and Zoning and the Department of Public Works, either in conjunction with a subdivision plan or site development plan or a building permit, the Water and Sewer Master Plan shall be amended administratively to denote the said facility.
- ii. Private community water and sewerage systems may be permitted in the Planned, Future, or No Public Service Area categories. All private community sewerage systems and individual wells and septic systems shall be considered interim when constructed or once located in a Capital Facilities or Planned Service Area.

- iii. As a condition to the approval of such systems, the applicant or his successor or assignee shall be required to discontinue their use when public systems become available and shall pay any necessary charges and assessments in accordance with Article 13, Title 5 of the Anne Arundel County Code. Provisions shall be made in the arrangement and design of such privately owned system(s) to permit connection to the public systems in the most economical and convenient manner from both a capital and long term operation and maintenance cost perspective.
- iv. Private community water and sewage systems shall be permitted to expand in areas where public facilities are not programmed for construction within the Future and No Public Service categories as set forth in the Master Plan, if the system is to provide service solely to existing development where there is a health emergency as defined and so stated in writing by the County Department of Health, and only provided such installation meets all requirements of the appropriate County and State agencies. In the event of a health emergency, any expansion shall not authorize an increase in size, or intensification of the development being served. Among other requirements, approval of private systems shall satisfy the following two conditions:
 - a. A private system turned over to the County may be cost free.
 - b. All facility design must be approved by the Department of Public Works and must strictly adhere to the County Design Manual, Standard Specifications and Details.

C. Private Individual Systems

- i. An individual water supply or individual sewerage system shall not be permitted to be installed where an adequate community or public water or sewerage facility is available. If an existing community or public water or sewerage facility is inadequate, or is not available, an individual water and sewerage system may be used. Individual water supply and sewerage systems may be permitted to be installed in any portion of the County except where otherwise prohibited provided that:
 - a. Such systems are found by the local Department of Health to be adequate, safe and in compliance with pertinent State and local regulations.
 - b. Permits for such systems installed where public facilities will be available in a Capital Facilities or Planned Service Area shall bear a notice regarding the interim nature of the permit and further state that the connection to the new public system shall be made at the property owner's expense after such system becomes available, in accordance with Article 13 of the County Code, and that the owner shall permanently disconnect and abandon the individual system in accordance with the Department of Health specifications.
 - c. If interim systems are used, provisions shall be made to locate such systems so as to permit connection to the public facilities in the most economical and convenient manner.

- d. Where a subdivision approval or any site development provides for the use of private individual water supply and/or sewerage system, in a Capital Facilities or Planned Service Area, the applicant and owner shall be informed of the interim nature of such systems. The applicant or ultimate owner shall be required to discontinue using the system and to connect to the programmed public facilities at their expense, in accordance with Article 13 of the County Code, once public water main or sanitary sewer is complete and ready for the delivery of water or the reception of wastewater. The applicant shall ensure that all property owners within the subdivision are informed that a connection to the public system is required at such time as it becomes available.
- e. If the County Health Officer finds that an interim individual water supply or individual sewerage system constitutes a nuisance or menace to health or safety, the Officer shall notify the Director of Public Works, who shall require immediate connection to the public water main or sanitary sewer. If any person fails to connect, the Department of Public Works shall make the same and charge the property owner for the cost thereof.
- f. The property owner of any existing private individual or multi-use water or sewerage system which experiences failure to the extent of being declared a health problem by the County Department of Health or the Maryland Department of the Environment shall be required to provide any necessary improvements to resolve the problem to the Office of Planning and Zoning and the Department of Public Works in conformance with all policies and design criteria of the State of Maryland and Anne Arundel County. Any increase in the physical capacity over that of the existing system that is in the Future or No Public Service Area, however, shall not authorize expansion or intensification of the development being served.

1.2.2 Public Water And Sewer Service Extensions

Applicants seeking public water supply and sewerage systems for new development shall make application through the Office of Planning and Zoning for the extension of such facilities. Construction of such facilities shall meet the standards established by the Department of Public Works. The applicant shall obtain the necessary construction permits from the Maryland Department of the Environment and/or the Water Resources Administration as required.

- A. Water service can be extended to any proposed development from a public system, provided there is a sufficient uncommitted capacity in the treatment facility and transmission lines for extending service to the proposed development, and the development is located within the Existing or Planned Service Area categories. The developer shall extend public water utilities along the front footage and/or through the developer's property, within a public easement or right-of-way, as determined necessary by the Office of Planning and Zoning and the Department of Public Works.

- B. Sewer service can be extended to any proposed development from a public system, provided the existing uncommitted capacity of the treatment facility and interceptor lines is adequate for extending service to the proposed development and provided the proposed development is located within the area shown to receive service in the Existing or Planned Service Area categories. The developer shall extend public sewer utilities along the front footage and/or through the developer's property, within a public easement or right-of-way, as determined necessary by the Office of Planning and Zoning and the Department of Public Works.
- C. As required, the developer shall be responsible for any extensions required prior to a scheduled capital facility project, as indicated by the Master Plan. Where a proposed development is located within an area programmed to receive service in the Existing, Planned, and/or Future Service category, infrastructure of sufficient capacity to serve the area upstream of the development shall be provided by the developer. The area upstream of the development will be determined by the Office of Planning and Zoning and the Department of Public Works from a pre-sketch or site plan submittal. These upstream areas will include those areas lying within the Existing and Planned Service Area categories, and all other areas within the Future Service Area category as determined by the Office of Planning and Zoning and the Department of Public Works, to the extent of reasonable needs for all major infrastructure extensions and upgrades, and at a minimum, conform to the requirements for extension as specified in 1.3C below. The design of the facilities shall be submitted to the Office of Planning and Zoning and the Department of Public Works for approval. The developer shall pay all necessary charges and assessments in accordance with Article 13, Title 5 of the Anne Arundel County Code, and also may be eligible for credits to these charges in accordance with that Article and Department of Public Works implementation policies.
- D. Areas designated in the Future and No Public Service Area categories may be considered for an amendment change to the Planned Service Area category provided the existing growth conditions warrant such a change. These conditions may be the proximity to existing water or sewer lines, appropriate zoning, availability of utility supply or reception, environmental health concerns, or long range planning initiatives. The County shall consider the construction of capped lines (i.e. dry systems) for future use when public facilities become available.
- E. Public water and sewerage systems may be extended to areas not programmed for service to abate a health emergency as determined in writing by the County Health Officer. Only the immediate health emergency area is to be served in this case. Such extension is not to be construed as a modification of the General Development Plan, zoning, or character of the area being served, or of the areas adjacent to any conveyance line required to serve the affected health emergency area. In the event of a health emergency declaration by the County Health Officer, the Office of Planning and Zoning and the Department of Public Works reserve the right to review the surrounding areas and request the extension serving the health emergency area be built to accommodate future connections if the emergency area is within the sewer service area or water pressure zone.

- F. If the parcel or minor subdivision is located within an identified water quality problem area as declared by the Department of Health, public water utilities shall be extended by the developer if the public water utility is within three hundred (300) feet of the parcel(s). Such extension will follow the guidelines and regulations as established by the Office of Planning and Zoning and the Departments of Public Works, Health and Inspections and Permits. Major subdivisions and all commercial, industrial and institutional development shall meet the requirements as set forth in Section 1.3C.
- G. Bay Restoration (Septic) Funds may be used as permitted by State law to provide funding that supports connection of existing households and businesses to public sewer where the sewer connection is consistent with the General Development Plan and the Water and Sewer Master Plan. The cost to support a sewer connection will be limited to the cost to repair or replace a conventional system with one that utilizes Best Available Technology.

1.3 REQUIREMENTS FOR SUBDIVISION AND SITE PLAN APPLICATIONS

- A. Procedures have been established for filing and processing subdivision applications, which incorporate requirements for lot size based on the availability of water and sewer service. Prior to the submission of any plat for the subdivision or re-subdivision of land in Anne Arundel County, exclusive of the City of Annapolis, the applicant should consult with the Office of Planning and Zoning to become aware of existing and proposed conditions related to water and sewer availability in the neighborhood where the subdivision is proposed. The subdivision process, detailed in the County Subdivision Regulations and the Subdivision Standard Network, generally consists of an optional pre-submittal, a sketch plan, and a final plat.
- B. Pursuant to the requirements of the Subdivision Regulations of Anne Arundel County, provisions shall be made for an adequate water supply and sewerage system for all proposed development.
 - i. Adequate public water and sewerage systems may be extended into Resource Conservation Areas of the critical area, if such extensions are necessary to connect to existing systems or to protect the public health, safety and welfare.
 - ii. The extension of adequate water and sewerage systems through Resource Conservation Areas of the critical area shall not relieve the proposed development from compliance with the Resource Conservation Area standards.
- C. Wherever adequate public water and sewage facilities exist within the Required Extension Distance (RED) zone of any proposed development, public water and sewerage systems shall be extended to the development provided:
 - i. The proposed development lies within the Service Area in which the available water and sewerage system is located.
 - ii. The area is programmed for construction within the Existing, Capital Facilities or Planned Service Area category, as set forth in the Master Plan.

iii. The site improvement would generate a waste stream flow as scheduled:

Residential¹ (gpd)	RED² zone	Com/Ind/Inst.³ (gpd)
0 thru 250	50 feet	
251 thru 999	150 feet	
1,000 thru 2,500	500 feet	1 to 2,500
2,501 thru 5,000	1,000 feet	2,501 to 5,000
5,001 thru 10,000	1,500 feet	5,001 to 10,000
Greater than 10,000	2,000 feet	Greater than 10,000

iii. The County Health Officer shall require approval blocks on the final subdivision plats.

v. Any proposed subdivision located within the Planned Service Area to be developed with individual septic systems shall be sized to County Department of Health standards based upon the maximum time period of twenty (20) years, and be subject to all provisions as set forth in Section 1.2.1C, Private Individual Systems.

D. See Section 1.2.2F for public water extensions that are within an identified water quality problem area.

1.4 REQUIREMENTS FOR BUILDING PERMIT APPLICATIONS

Building permit procedures have been established as follows:

- A. An application for a building permit must be filed prior to the start of any new construction or alterations and for all repairs involving structural replacement. Separate permits are required for plumbing and/or electrical work, and such work must be done under the supervision of a licensed master plumber and licensed master electrician, respectively. An application for a building permit must be filed by the owner, or authorized agent, with the Anne Arundel County Permit Application Center on printed forms supplied by that Department.
- B. All commercial and non-commercial building permit applications are reviewed preliminarily by the Plans Examiner in the Development Division of the Office of Planning and Zoning. Except for very minor repair work, all permits (one- and two-family dwellings, commercial and other non-residential) require the concurrence of the Office of Planning and Zoning, the Department of Public Works and the County Department of Health. For commercial structures and certain others, approval is also required from the State Highway Administration, the County Fire Prevention Bureau and other applicable agencies. In addition, construction within a four-mile radius of the Baltimore-Washington International Airport requires approval of the Airport Zoning Board. As each department approves the application, it is returned to the Permit Application Center, which issues the permit when all approvals are received.

¹ Flows to be determined using the Anne Arundel County DPW Design Manual.

² The Required Extension Distance shall be measured as the shortest straight-line distance between the existing utility line connection point and the nearest point of the property to be connected.

³ Flows to be determined using the MDE design manual "Wastewater Flows for Use in Designing On-site Sewage Systems".

- C. Where zoning and/or site complications exist, there can be extensive delays before the deficiency is corrected. If the deficiency requires a zoning special exception, and/or variance, the owner must go through the procedure of application and public hearing. Where public water and sewerage do not exist, the County Department of Health must physically test construction sites to assure that an adequate water supply and sufficient sewage disposal are possible. All proposed on-site surface or sub-surface discharge systems that exceed 2,500 GPD must be reviewed by the Office of Planning and Zoning. Submittal will require the nature of use(s) and content of expected discharge(s). Under certain conditions, the Development Division of the Office of Planning and Zoning will schedule a plan review meeting with issuance of a written list of corrections and/or use restrictions to the applicant. Any use restrictions that are imposed shall be noted to the Department of Health for future permit approvals and health/environmental monitoring purposes.
- D. After a building permit is issued, inspection will be made periodically in conformance with the Anne Arundel County Code. Upon satisfactory completion of construction, an occupancy permit will be issued. No use of the structure can be made prior to the issuance of the occupancy permit under penalty of the law.

1.5 PETITIONS FOR PUBLIC SERVICE EXTENSIONS

The petition process for extension of public water and/or public sewer services to an individual and / or community is as follows:

- A. An individual or group of property owners may petition for the extension of water and/or sewer service to their property.
- B. Four requirements must be fulfilled to receive service:
 - i. The community must be located in an area designated for service, and found to be in compliance with the General Development Plan and the policies of the Master Plan for Water Supply and Sewerage Systems from the Office of Planning and Zoning,
 - ii. A majority of property owners must favor the extension,
 - iii. The project must be financially sustaining, and
 - iv. The Department of Public Works must then designate service to the community as a capital project in the Capital Program.
- C. To obtain public water and/or public wastewater service, a majority of the affected property owners must petition for service. The petition will support a defined area from where service exists to the proposed final property to receive service.
- D. Petitions can be obtained and are to be submitted to the Anne Arundel County Department of Public Works, Financial Services Division.

- i. Once received, the petition(s) will be reviewed for validation.
- ii. Validated petitions are forwarded within the Department of Public Works to the Bureau of Engineering. The petition is also forwarded to the Office of Planning and Zoning, Long Range Planning Division, to validate its compliance with the Master Plan for Water Supply and Sewerage Systems and the General Development Plan. Recommendations from the Office of Planning and Zoning will be considered prior to the request for a Schematic Design Report. A Schematic Design Report will then be prepared showing the technical feasibility to serve the petition area and a cost analysis of the various alternatives.
- iii. The Financial Services Division determines the preliminary Front Foot Assessment (FFA) for each property. If the FFA is within the allowable limits in the County Code, the project is considered self-supporting.
- iv. If the total project cost is greater than \$250,000, prior to going to construction, a capital project must be requested in the Department of Public Works' Capital Project Budget and Program.
- v. If the project is not self-supporting, the Department of Public Works, Financial Services Division, will hold a public hearing notifying all property owners of the estimated FFA and request whether they want to continue with the project at the higher FFA. If the majority of property owners elect to continue with the project, the Department of Public Works will submit legislation to the County Council to authorize the Department of Public Works to exceed the FFA limit and allow the project to proceed. If the property owners choose not to pay the higher FFA or the County Council does not authorize the higher FFA, the project ceases.
- vi. If the petition is for service in a Future or No Public Service Area within a Sewer Service Area or Water Pressure Zone, and it is elected by the petitioning property owners to be financially acceptable, then a request for an amendment to change the Master Plan will be submitted by the Office of Planning and Zoning at the next cycle in accordance with the Master Plan policies. The request to exceed the FFA limits, if applicable, will be addressed simultaneously. Any extensions of public utilities into the petition area may not adversely affect the limits of the approved FFA.

1.6 INTERIM MASTER PLAN AMENDMENT REQUESTS

While the Master Plan for Water Supply and Sewerage Systems is updated on a comprehensive basis every three years, interim amendments may be considered semi-annually. The review and approval process for individual applications for changes to the Master Plan is outlined below.

- A. A request for amendment to the County Master Plan for Water Supply and Sewerage Systems of a property (amendment request) must be filed with the Long Range Planning Section of the Office of Planning and Zoning by either the legal owner of such property, or by his/her legally authorized representative. Each such request shall be filed by January 1 for Cycle I, and by July 1 for Cycle II of each year and shall include an explanation

of the reasons why, in the requester's opinion, the amendment sought should be made, set forth in sufficient detail to properly advise the County authorities required to review the request . Requests must be submitted using the official application form available from the Office of Planning and Zoning and on the County website.

- B. With exception of those amendment requests excepted under the procedure set forth in item 1.6F, copies of all amendment requests accepted for filing by the Office of Planning and Zoning shall be transmitted to the Department of Public Works and the County Department of Health for review and comment.
- C. During each Cycle, the Department of Public Works and the County Department of Health shall review the requests and each shall submit a report to the Office of Planning and Zoning containing at least the following information:
 - i. The technical feasibility of each request,
 - ii. Recommendations on each request, and
 - iii. Supporting data for the recommendations.
- D. After the Office of Planning and Zoning receives the information from the above mentioned Departments the Coordinator shall prepare for submission to the Planning Advisory Board a report thereon containing at least the following information:
 - i. Maps showing properties under request and the amendment sought therefore: such maps may also identify groups of such properties located close to each other and show other indications of the inter-relation of requests with respect to planning considerations;
 - ii. Recommendations on the requests;
 - iii. Supporting data for the recommendations, including any pertinent data and comments or recommendations submitted by other interested parties of County agencies.
- E. During each Cycle, the Planning Advisory Board shall:
 - i. Hold a meeting to review the amendment requests.
 - ii. Submit to the County Executive a report on all the amendment requests submitted during the preceding period except those exempted under item 1.6F and 1.6G, such report to contain the Planning Advisory Board's recommendations on such requests, appropriate maps, and supporting data.
- F. In any case where the Planning and Zoning Officer, Director of Public Works and the County Health Officer certify to the County Executive that early action upon an amendment request is required in the public interest or because of emergency, such request shall be exempted from the regular time frame and shall be processed through Section 1.5, Petitions for Public Service Extensions, in a timely manner.

- G. The Planning and Zoning Officer may also amend or correct in the text or on the maps minor omissions or errors of fact administratively between non-filing periods. The minor omissions or errors include: misspelled words, incorrect punctuation, utility lines, point data, and areas which are in the W-I and S-I time period category and are not reflected on the maps and when the data on the maps conflict with the data in the text or vice versa. Such changes shall be coordinated with the Department of Public Works. Copies of all amendments and/or corrections made under this section shall be submitted to the County Executive, County Council, Department of Public Works, County Department of Health and the Maryland State Department of the Environment. The Master copies shall be kept on file within the Office of Planning and Zoning for record.
- H. Upon approval of the current fiscal year CIP, the Master Plan of Water Supply and Sewerage Systems shall be amended automatically to include all projects included in the adopted budget. After each County Fiscal Year Budget is completed and adopted, the official Water and Sewer Master Plan Maps may be corrected to show each new Capital Facilities project or change to an existing Capital Facilities project. These changes will be forwarded to the appropriate State agencies and County officials. Once a Capital Facilities project is completed, the proper existing symbols and designations will be indicated and the appropriate Master Plan document pages will be updated to reflect the current information.
- I. Upon the report of the Planning Advisory Board, the County Executive shall review their recommendations and may submit the proposed amendment to the County Master Plan for Water Supply and Sewerage Systems to County Council for their action.
- J. Any proposed amendment submitted to the County Council must be reviewed by the Office of Planning and Zoning, the Department of Public Works, and other appropriate agencies for consistency with the General Development Plan and supplemental plans, the Master Plan for Water Supply and Sewerage Systems, the Critical Areas Program, and for technical feasibility.

1.7 MASTER PLAN REVISION

- Step 1. Preparation** - A comprehensive update to the Master Plan shall be completed every three (3) years. Additional revisions of the Master Plan may be made as the need arises, by Council amendment.
- Step 2. Review** - Before the triennial revision is introduced to the Council, it shall be reviewed by the appropriate County agencies, reviewed and provided an advisory recommendation by the Planning Advisory Board, and reviewed in preliminary form by the appropriate State agencies. In addition, the cities of Annapolis and Highland Beach, and all Federal and State institutions in the County, shall be given an opportunity to be heard.
- Step 3. Introduction** - The Master Plan shall be introduced to the County Council at least one (1) week before the day scheduled for the public hearing.

Step 4. Hearing - A public hearing shall be held on the triennial revision or any amendments to the Master Plan. The Maryland Department of the Environment shall receive prior notice of all public hearings on the Master Plan, revisions, or amendments.

Step 5. Adoption - The Master Plan shall be adopted by ordinance by the County Council.

Step 6. Final Format - After adoption, the Master Plan shall be prepared in final format.

Step 7. Final Submission - Four (4) copies of the Master Plan in its final form shall be submitted to the Maryland Department of the Environment for review; one (1) copy to be forwarded to the Maryland Department of Natural Resources, and one (1) copy to be forwarded to the Maryland Department of Planning.

Step 8. State Approval - The State of Maryland, Department of the Environment shall, within ninety (90) days after the date of being received, approve or disapprove in part, the final submitted County Master Plan, its amendments or revisions.

The Office of Planning and Zoning and Department of Public Works may annually update the Water and Sewer Master Plan Maps, without County Council or State agency approval, for the purpose of including in the Existing Service Area any additional developed areas that have connected to public water or sewer since adoption of the current Master Plan.

1.8 ORGANIZATION

Responsibilities related to water and sewerage planning in the County are shared primarily between three County agencies.

The Office of Planning and Zoning has the responsibility for developing the General Development Plan that provides the basic information for residential, industrial, and commercial growth. This Office also is responsible for preparing the Water and Sewer Master Plan, including the amendments and revisions thereto.

The Division of Community and Environmental Health, Department of Health, controls and authorizes the installation of private individual water supply and septic systems and also investigates sources of pollution.

The Department of Public Works, with information from the above agencies and other sources, is responsible for the design, administration, construction and operation of the required water and sewerage facilities, in conformance with the Water and Sewer Master Plan. The Department of Public Works furnishes technical assistance to the Office of Planning and Zoning in the preparation of the Water and Sewer Master Plan.

Management of Water and Sewer Facilities

Office Of Planning and Zoning

- Prepares General Development Plan.
- Manages Comprehensive Zoning.
- Guides Best Land Management Practices towards the goals of the County's Master Plans.
- Prepares Master Plan for Water and Sewer.
- Reviews and manages Subdivision and Land Development requests.

Department Of Public Works

- Manages design, construction, operations and fiscal administration of the public water and sewer facilities.
- Provides technical assistance to the Office of Planning and Zoning for Subdivision and Land Development reviews.
- Provides facilities planning support to the Office of Planning and Zoning in the preparation of the Master Plan for Water and Sewer.

Department Of Health

- Authorizes the installation of private water and wastewater systems and manages installation data.
- Provides plan review assistance to the Office of Planning and Zoning for Subdivision and Land Development reviews.
- Provides planning support to the Office of Planning and Zoning in the preparation of the Master Plan for Water and Sewer.

1.9 DEFINITIONS

Existing or Under Construction (W-1, S-1) - Public water or sewer service is assumed to be existing if it is in operation or under construction (notice to proceed with the construction contract has been issued) and will be placed in operation immediately after construction is completed. Development within the category must be consistent with the appropriate land use controls and zoning regulations.

Capital Facilities Area (W-2, S-2) - Capital facilities are scheduled for implementation within the next six years (0 to 6 years) and are possible within the framework of the six-year Capital Program, subject to annual budgeting, neighborhood petitions, determination of health emergencies and negotiating of Utility and Public Works agreements. Development within this category must be consistent with the appropriate land use controls and zoning regulations.

Planned Service Area (W-3, S-3) - Areas planned for public water and/or sewer service. These include both currently developed areas as well as areas planned for new growth in accordance with the General Development Plan. New development is required to connect to public utilities unless located beyond the Required Extension Distance established in this Master Plan. Water and sewer facilities are depicted on the Master Plan, and are provided by both the private sector and the County in areas designated for planned service.

Future Service Area (W-4, S-4) - Areas planned for public water and/or sewer service and where public utilities cannot easily be extended without major public or private expenditures, such as additional pump stations or other facilities. Requested public water or sewer extensions in this category will require an amendment approved by the County Council to change to the Planned Service category prior to development.

The Existing, Capital Facilities, Planned and Future Service areas are consistent with the County's planned growth areas as defined by the Targeted Growth and Managed Growth Policy Areas in the 2009 General Development Plan.

Other Service – Those areas that have water or sewer service provided by a public or private entity other than Anne Arundel County.

No Public Service Area (W-5, S-5) - These areas are served by individual septic and well systems or community systems under permit by Maryland Department of Environment. These are areas of planned low-density growth for which public facilities are not planned. These may also include preservation lands or lands protected by easement or other development restrictions that are located within a public water or sewer service area.

Service Area - That area served by, or potentially served by, a system of sanitary sewers connected to a treatment plant, or a water distribution system under the control of a single unit or agency.

Maps - The Master Plan includes separately the official map series of all County water and sewer systems at a scale of 1" = 2000 feet. The Master Plan also includes many other support maps with the plan document.

Community Sewerage System - Any system, whether publicly or privately owned, serving two or more individual lots for the collection and disposal of sewage or industrial wastes of a liquid nature, including various devices for the treatment of such sewage and industrial wastes.

Community Water Supply System - A source of water and a distribution system, including treatment and storage facilities, whether publicly or privately owned, serving two or more individual lots.

Multi-Use Sewerage System - A single system serving a single lot whether owned or operated by an individual or group of individuals under private or collective ownership and serving a group of individuals for the collection and disposal of sewage or industrial wastes of a liquid nature, including various devices for the treatment of sewage and industrial wastes having a treatment capacity in excess of 5,000 gpd.

Multi-Use Water Supply System - A single system of piping, pumps, tanks or other facilities utilizing a source of ground or surface water to supply a group of individuals on a single lot and having a supply capacity in excess of 5,000 gpd.

Non-Point Source - Pollution originating from land runoff where no specific outfall can be identified.

Individual Water Supply System - A single system of piping, pumps, tanks or other facilities utilizing a source of ground or surface water to supply only a single lot.

Individual Sewerage System - A single system of sewers and piping, treatment tanks or other facilities serving only a single lot and disposing of sewage or individual wastes of a liquid nature, in whole or in part, on or in the soil of the property, into any waters of this State or by other methods.

Controlling Authority – A unit of government, a body public and corporate, or an intercounty agency authorized by the State, County or a municipal corporation to provide for the management, operation and maintenance of a community sewerage system, shared facility or multi-use system.

1.10 GOVERNING CODES AND REGULATIONS

The above goals, policies and procedures are implemented through various ordinances, laws, codes, documents, maps and standards by the Anne Arundel County Government. These controls are designed to achieve orderly development and to ensure the physical, social and economic health of the community. The controls which pertain to water and sewer development are listed below by administrative activity:

- A. Planning and Zoning:
 - i. Anne Arundel County Code, Article 17 (Subdivision and Development)
 - ii. Anne Arundel County Code, Article 18 (Zoning)
 - iii. General Development Plan and supplemental plans
 - iv. Official Zoning Maps
 - v. Master Plan for Water Supply and Sewerage Systems

B. Public Works:

- i. Anne Arundel County Code, *Article 13 (Public Works)*
- ii. Anne Arundel County, Standard Specifications and Standard Details for Construction
- iii. Anne Arundel County, Department of Public Works, Design Guidance for Water and Wastewater Facilities, Sewage Pumping Stations and Grinder Pumps

C. Health Protection:

- i. Anne Arundel County Code, *Article 13 (Public Works)*
- ii. Code of Maryland Regulations, COMAR 26.04.02 - 26.04.04, Regulation of Water Supply, Sewage Disposal and Solid Waste

D. Fire Protection:

- i. Anne Arundel County Code, Article 12 (Public Safety)
- ii. Anne Arundel County Code, Article 15, Title 3 (Fire Prevention Code)

E. Inspections and Permits:

- i. Anne Arundel County Code, Article 15, Title 2 (Construction Codes)
- ii. Anne Arundel County Code, *Article 16, Title 2 (Grading and Sediment Control)*

CHAPTER 2

BACKGROUND INFORMATION

2.1 NATURAL FEATURES

Certain geographical and environmental factors are considered in planning water and sewer facilities including drainage patterns, soils, aquifers and surface waters and their associated floodplains and wetlands. These features help determine viable water and sewer transmission patterns and percolation characteristics.

2.1.1 Physiography, Topology and Drainage Characteristics

Anne Arundel County lies within the center of Maryland. It is bounded on the north by Baltimore City and the Patapsco River and on the east by the Chesapeake Bay. Howard County lies northwest while the Patuxent River forms the western boundary, opposite Prince Georges County. Calvert County is due south. The County's land area is approximately 265,000 acres, or 414 square miles, including the City of Annapolis. The shoreline of Anne Arundel County is highly irregular and one of the County's most distinguishing and greatest assets. The many large and small rivers, creeks and coves form over 533 miles of shoreline, an attractant to many species of plant and animal life.

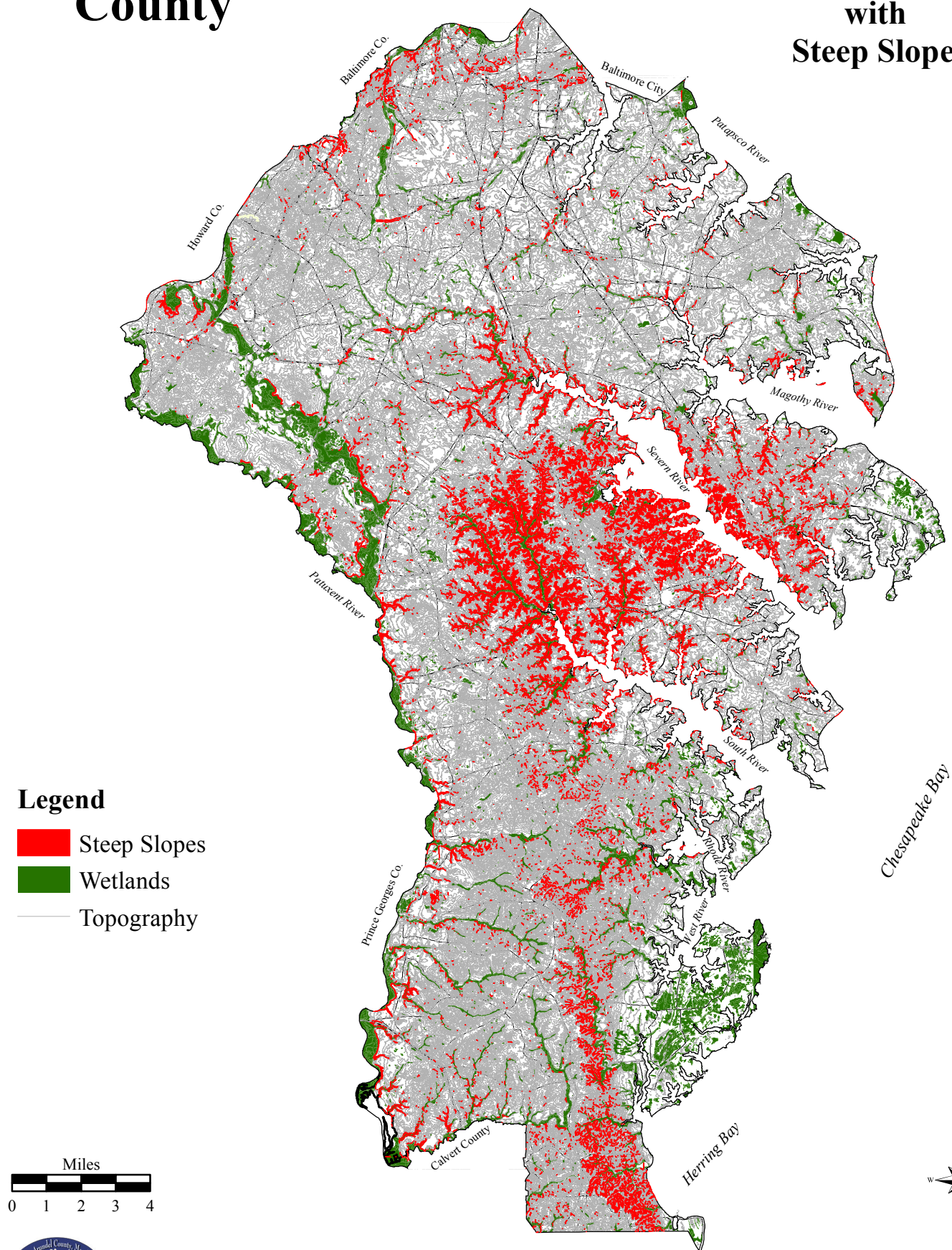
Anne Arundel County is in the mid-Atlantic Coastal Plain, east of the Fall Line. Its surface varies from flat to steeply rolling, with elevations from sea level along the Chesapeake Bay to about 300 feet above sea level in the northwest, near the Baltimore-Washington Parkway (Figure 2-1). Five tidal sub-estuaries running from the County's interior to the Chesapeake Bay cut the eastern portion of the County into a series of peninsulas. The northern portion of the County, generally north of the Magothy River and the head of the Severn River, is flat to gently rolling terrain, with some steep slopes along rivers and creeks. In a line running south from the headwaters of the Severn to the southern boundary of the County near Herring Bay is a nearly continuous area of steeply rolling terrain, with the steepest slopes along the Severn and South Rivers and along many of the smaller streams in the southern portion of the County. The peninsulas in the south are quite flat, while in the north there are somewhat higher elevations and more varied topography, again with steep slopes along the rivers and creeks. The land along the Patuxent and Little Patuxent Rivers is flat in the north and moderately rolling in the south, with a number of sharp valleys incised by the small streams running westward into the Patuxent.

The County contains twelve watersheds, the boundaries of which are shown in Figure 2-2. The designations for each are as follows:

<u>Watershed</u>	<u>Maryland Watershed Designations</u>
Patapsco River (Tidal)	02-13-09-03
Patapsco River (Non-Tidal)	02-13-09-06
Bodkin Creek	02-13-09-02
Magothy River	02-13-10-01
Severn River	02-13-10-02
South River	02-13-10-03

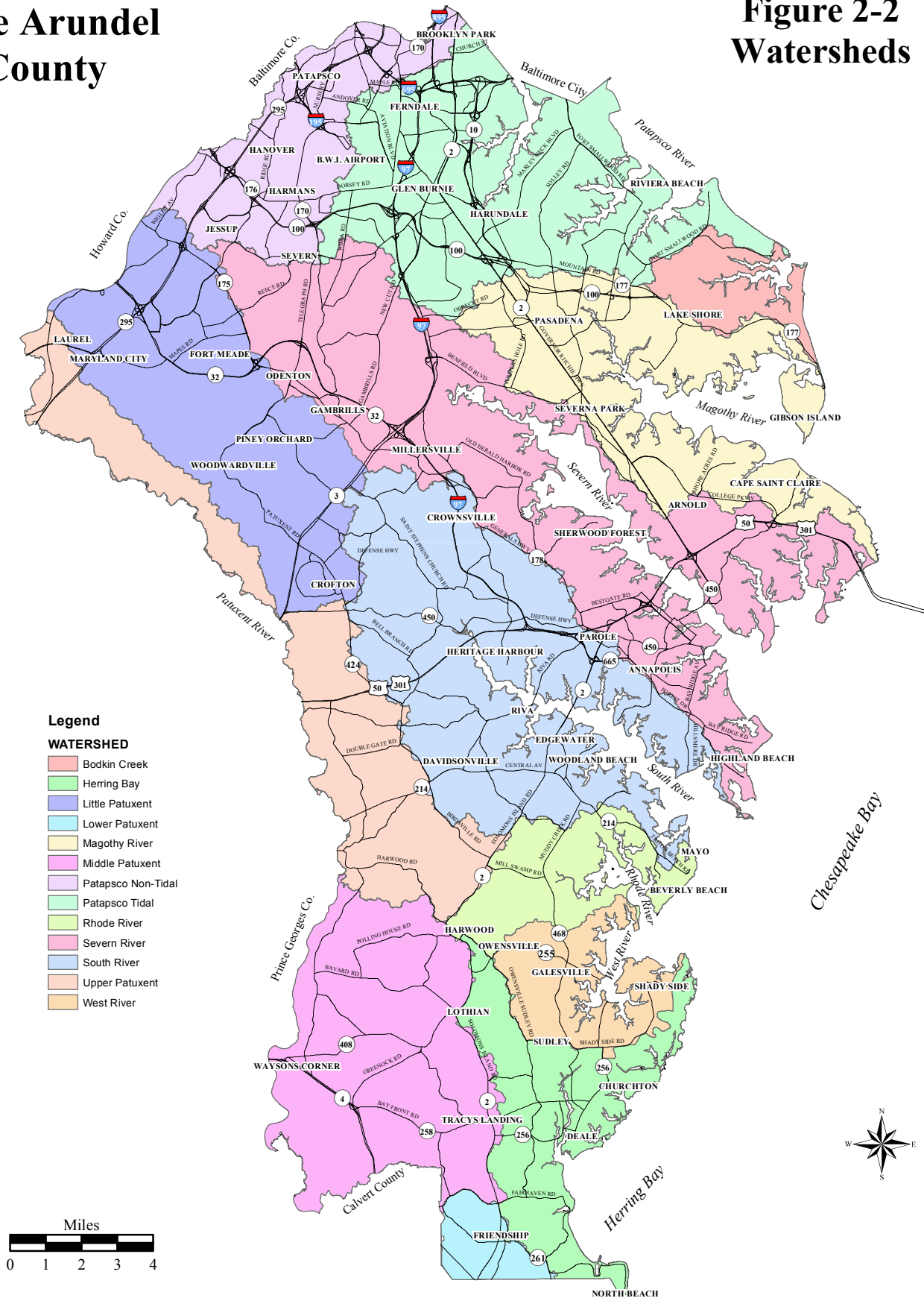
Anne Arundel County

Figure 2-1
Topography and Wetlands
with
Steep Slopes



Anne Arundel County

**Figure 2-2
Watersheds**



Rhode River	02-13-10-04
West River	02-13-10-04
Herring Bay	02-13-10-05
Upper Patuxent River	02-13-11-04
Middle Patuxent River	02-13-11-02
Little Patuxent River	02-13-11-05

2.1.2 Land Cover

The Anne Arundel County 2011 land cover data indicates that residential areas encompass about 33% of the County while commercial and industrial areas are 5% and 2% respectively (see Figure 2-3). Approximately 7% of the land area is crops and pastures, primarily located in the southern part of the County. Another 8% of the County is open space other than woodlands and wetlands. A subset of the land cover data shows that approximately 15% of the land area is impervious.

Woodlands comprise approximately 40% of the County. These coastal plain forest sites include a variety of terrain from flat wet areas to steep slopes and upland drought areas. The largest tracts of woodland are found in the southern and western portions of the County, particularly along the Patuxent, South and West Rivers; and to a lesser extent in the headwater regions of the Magothy and Severn Rivers.

The original forests of Anne Arundel County have been severely altered by tree harvesting, and little, if any, virgin stands remain. Many of the currently wooded areas were cleared at one time for farming or have been cut over several times. Hardwoods are the dominant species in the County. The oaks dominate the better-drained soils and make up a large portion of the hardwoods on the wet soils. Yellow poplar, sweetgum, dogwood and beech are other hardwoods common in the County. Virginia pine has invaded the abandoned farm fields and cut over areas, particularly on the well-drained sandy soils. There are minor stands of pitch pine and shortleaf pine, but these are neither extensive nor pure.

Non-tidal wetlands occur in flood plains and in the headwater areas of streams. Approximately 0.6% of the County has wetlands. The largest concentrations are in the South River headwaters and along the Patuxent. A portion of the forested area discussed above consists of shrub swamps, which are a type of non-tidal wetland.

There are certain wetlands that are classified as rare, threatened and endangered species or have unique habitats that receive special attention. These wetlands are called Wetlands of Special State Concern (WSSC) and are identified and regulated by the Maryland Department of the Environment. For more information, visit the State's website at <http://www.dnr.state.md.us/>.

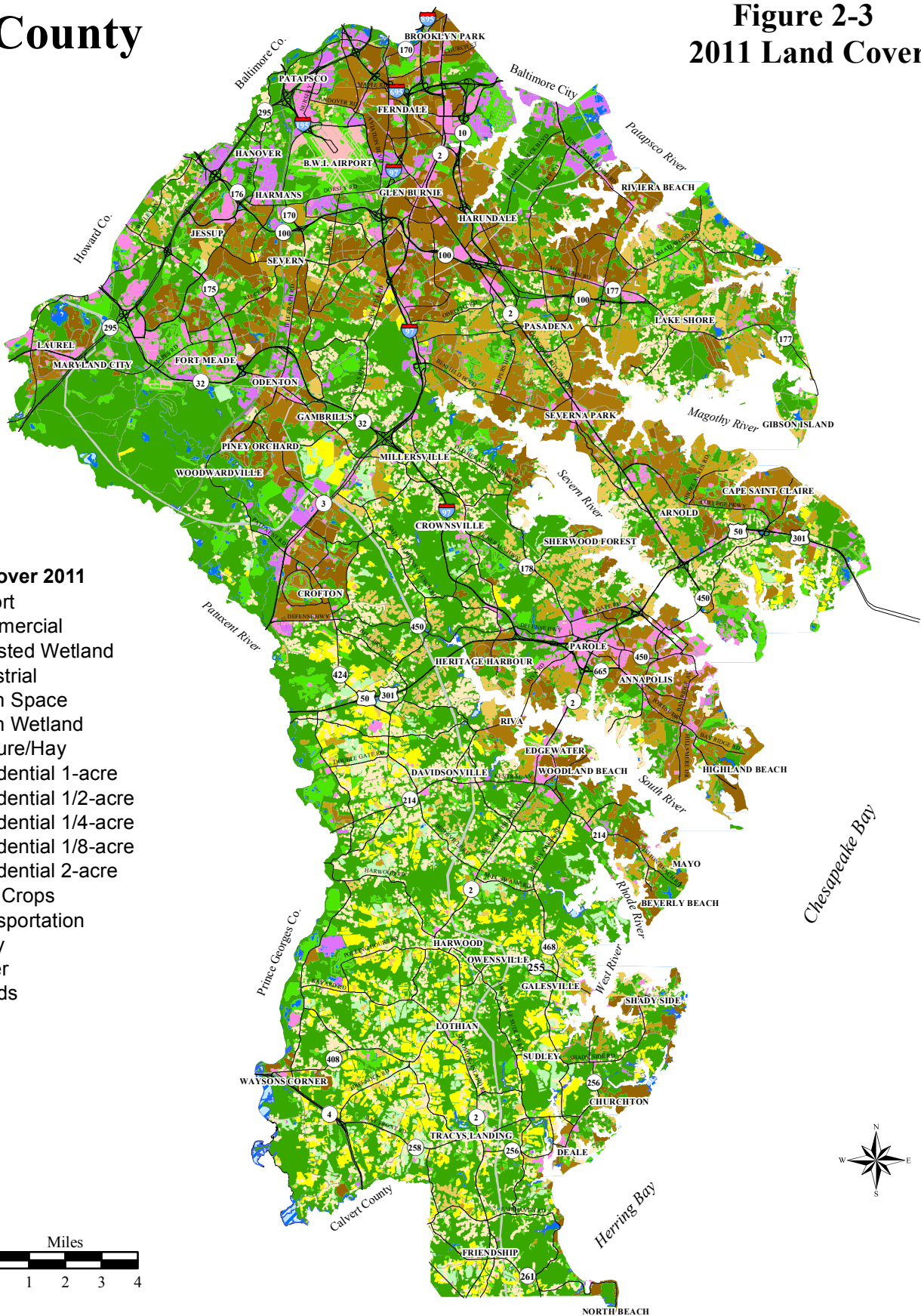
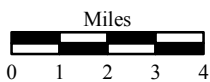
Protection of these natural features is of great importance to water quality. The County participates in programs such as the Chesapeake Bay Critical Areas Program and has regulations such as forest conservation and stream and wetland buffering to help provide this protection.

Anne Arundel County

**Figure 2-3
2011 Land Cover**

Landcover 2011

- Airport
- Commercial
- Forested Wetland
- Industrial
- Open Space
- Open Wetland
- Pasture/Hay
- Residential 1-acre
- Residential 1/2-acre
- Residential 1/4-acre
- Residential 1/8-acre
- Residential 2-acre
- Row Crops
- Transportation
- Utility
- Water
- Woods



2.1.3 Soils

The U. S. Department of Agriculture (USDA) Soil Survey for Anne Arundel County identifies specific soil types and their limitations. Soil types are important in determining whether septic systems can be used. Soils that are well drained are considered conducive for septic systems whereas soils that are characterized as poorly drained are not conducive for septic systems and often have seasonally high water tables.

The following descriptions of the soils, grouped by their USDA drainage class (see Figure 2-4) comprise the County's landscape. Drainage class (natural) refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized: Very Poorly Drained, Poorly Drained, Somewhat Poorly Drained, Moderately Well Drained, Well Drained, Somewhat Excessively Drained, and Excessively Drained. For more specific information on individual soil types see the USDA website at <http://soildatamart.nrcs.usda.gov>.

Very Poorly Drained - The soils within this drainage class make up approximately two percent of the County. They are in Hydrologic Soil Group D, tidally flooded and are on level slopes ranging from 0 to 1 percent. The soil types in this group include Mispillion and Transquaking soils and the Nanticoke and Mannington soils and are found along the coastal shoreline of the County.

Poorly Drained – Approximately 11 percent of the soil types are within this drainage class. Soils within this drainage class are in Hydrologic Soil Groups B/D, C/D and D. The soil types in this group include Colmantown Fine Sandy Loam, Colmantown Silt Loam, Colmantown-Urban Land Complex, Fallsington Sandy Loam, Fallsington-Urban Land Complex, Shadyoak-Elkton Complex, Shadyoak Elkton Urban Land Complex, Shrewsbury Loam, Widewater and Issue soils and the Zekiah and Issue soils. These soils are found along the streams within the County and are on nearly level slopes averaging between 0-5 percent.

Somewhat Poorly Drained - The soils within this drainage class make up approximately four percent of the County. The soils in this group are generally within Hydrologic Soil Group C and are nearly level on slopes ranging from 0 to 10 percent. The soil types in this group include Adelphia-Holmdel-Urban Land Complex, Cumberstone-Mattapex Complex, Cumberstone-Mattapex-Urban Land Complex, Deale-Shadyoak-Urban Land Complex and Deale-Shadyoak Complex. The soils in this class are found in the Deale-Shadyside area south of the Rhode River, the Rose Haven area, the Broadneck area in the vicinity of the Chesapeake Bay Bridge, adjoining Mill and Whitehall Creeks and the Crofton area.

Moderately Well Drained – Approximately 12 percent of the soil types within the County are within this drainage class. The soil types include Adelphia-Holmdel, Alloway-Sassafras Complex, Alloway-Sassafras-Urban Land Complex, Codorus and Hatboro, Dodon Very Fine Sandy Loam, Donlonton-Urban Land Complex, Donlonton Fine Sandy Loam, Mattapex Silt Loam, Mattapex-Butlertown Complex, Mattapex-Butlertown Urban Land Complex,

Pepperbox Loamy Sand, Pepperbox-Urban Land Complex, Russett Fine Sandy Loam, Russett-Alloway-Hambrook Complex, Russett-Alloway-Urban Land Complex, Russett-Urban Land Complex, Woodstown Sandy Loam and Woodstown-Urban Land Complex. These soils are found in the northernmost part of the County and are on nearly level to strongly sloping ground. The soils within this drainage class range from moderate to rapidly permeable and are generally within Hydrologic Soil Groups B and C however, the Pepperbox soils are within Group A.

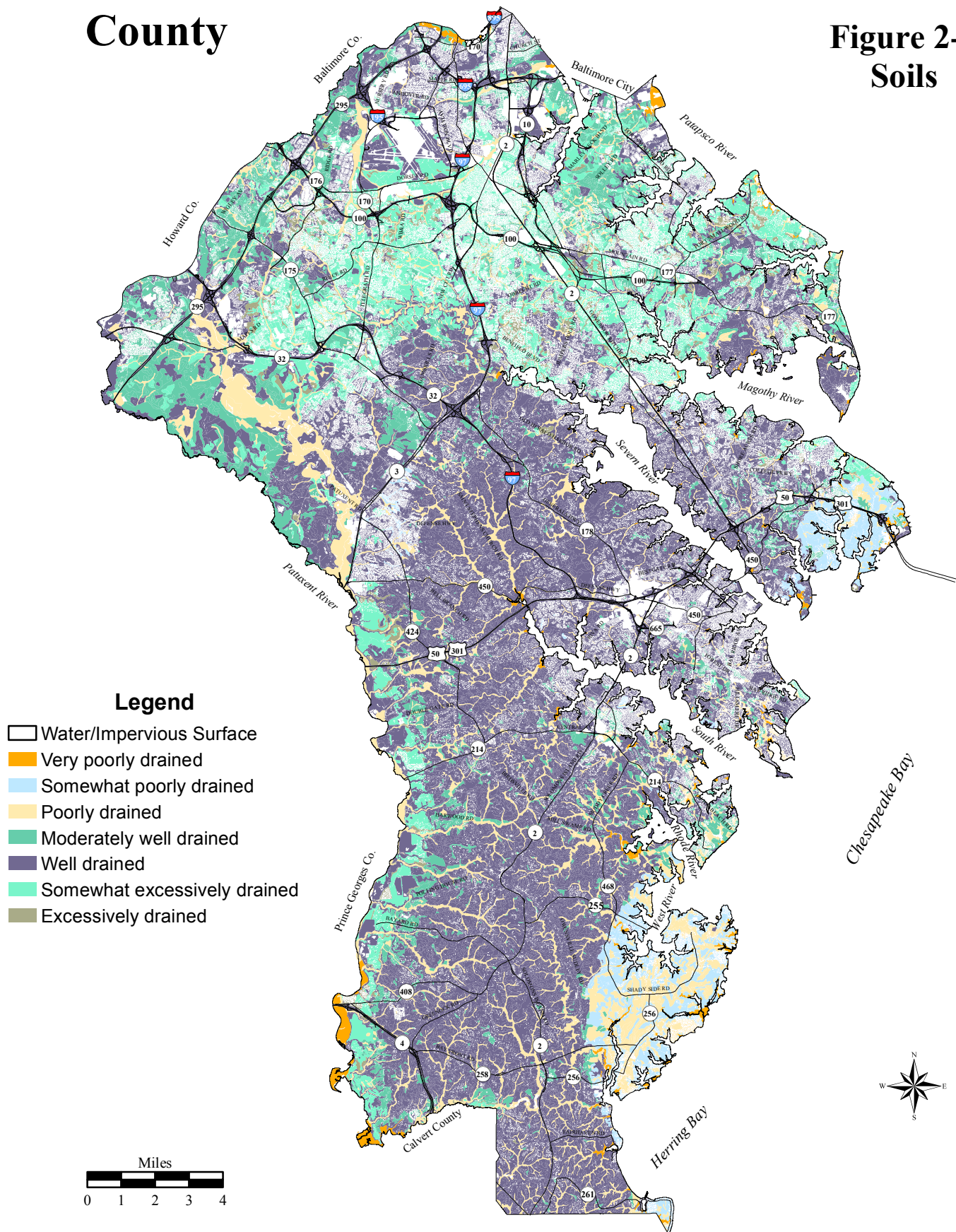
Well Drained – Over half of the County (55 percent) soils are within this drainage class. The majority are in Hydrologic Soil Group B and the remaining soil types are in Group C. These soil types include the Annapolis Loamy Sand, Annapolis Fine Sandy Loam, Annapolis-Urban Land Complex, Chillum Loam, Chillum-Urban Land Complex, Collington-Wist Complex, Collington-Urban Land Complex, Collington and Annapolis soils, Collington, Wist and Westphalia soils, Comus and Codorus soils, Downer-Hammonton Complex, Downer-Hammonton-Urban Land Complex, Downer-Phalanx Complex, Howell-Annapolis Complex, Howell and Annapolis soils, Howell-Dodon Complex, Howell and Dodon soils, Marr-Dodon Complex, Marr and Dodon soils, Marr-Dodon-Urban Land Complex, Matapeake Silt Loam, Matapeake-Urban Land Complex, Mattapeake and Mattapex, Pits, gravel, Sassafras Fine Sandy Loam, Sassafras Loam, Sassafras-Hambrook Complex, Sassafras and Croom soils, Sassafras-Urban Land Complex, Tinton Loamy Sand, Tinton-Urban Land Complex, Udorthents Refuse Substratum, Udorthents Loamy, Udorthents Reclaimed Gravel Pits and the Udorthents Loamy Sulfidic Substratum. This drainage class is found throughout the County and has slow to moderate permeability. The majority of the soils are flat to gently rolling with slopes averaging between 0-15 percent. Some of the soils are found on steep slopes between 15-25 percent include Annapolis Fine Sandy Loam (AsE), Collington, Wist and Westphalia (CSE), Howell and Annapolis (HME), Howell and Dodon (HOE), Marr and Dodon (MDE), Sassafras and Croom (SME), Udorthents Loamy (UoE) and Udorthents Loamy Sulfidic Substratum (UxE). Soil types Annapolis Fine Sandy Loam (AsF), Collington, Wist and Westphalia (CSF), Marr and Dodon (MDF) and Sassafras and Croom (SMF) are generally on slopes between 25-40 percent while Annapolis Fine Sandy Loam (AsG) and Collington, Wist and Westphalia (CSG) soils are found on severely steep slopes between 40-80 percent.

Somewhat Excessively Drained – Approximately 14 percent of the soil types within the County are within this drainage class. These soils are found along the Patuxent River and north of Fort Meade, have a rapid permeability and are in Hydrologic Soil Group A. These soils include the Evesboro-Galestown Urban Land Complex, which are found on slopes between 15-25 percent. The group also includes the Galestown Loamy Sand, Patapsco-Evesboro-Fort Mott Complex, Patapsco-Fort Mott Complex and the Patapsco-Fort Mott-Urban Land Complex soils, which are found on relatively flat slopes between 0-15 percent.

Excessively Drained – Only two percent of the County soils are within this drainage class, which includes the Evesboro-Galestown Urban Land Complex, Evesboro and Galestown soils. These soils are found along the Patuxent River in the southwestern portion of the County and in the northern part of the County south of the Baltimore Washington International Thurgood Marshall Airport between Fort George G. Meade and the Patapsco River. These soils are within Hydrologic Soil Group A, have a rapid permeability and have slopes that average between 0-15 percent.

Anne Arundel County

**Figure 2-4
Soils**



2.1.4 Aquifers

The Patuxent, Patapsco, Magothy and Aquia are the most important aquifers formed by the sand and gravel deposits underlying Anne Arundel County. Figure 2-5 depicts these aquifer outcrop areas.

According to a 2007 report titled *Optimization of Ground Water Withdrawals in Anne Arundel County, Maryland, from the Upper Patapsco, Lower Patapsco, and Patuxent Aquifers projected through 2044* (RI No. 77) prepared by the Maryland Geological Survey in cooperation with Anne Arundel County's Department of Public Works, approximately 46 million gallons per day (MGD) were withdrawn from these aquifers in 2002. Of that amount, public wells within the County pumped 26 MGD from the Patapsco and Patuxent aquifers. Average-day demand is projected to increase to nearly 73 MGD by 2040 with maximum-day withdrawal of 140 MGD.

Studies by the MGS, *Groundwater Supplies in Anne Arundel County*, Bul. 26, 1962, indicate the geologic and climatic conditions favor the availability of groundwater in the County. Subsequent investigations substantiate these conclusions. However, if the rate at which the groundwater is pumped exceeds the rate of replacement by precipitation or recharge by stream flow, a problem of brackish water intrusion may occur along the shoreline in shallow parts of the aquifers. Most of the waters in the Chesapeake Bay and its tributaries contain chloride concentrations of 5,000 to 10,000 parts per million (ppm), which is about one-third to one-half that of ocean water.

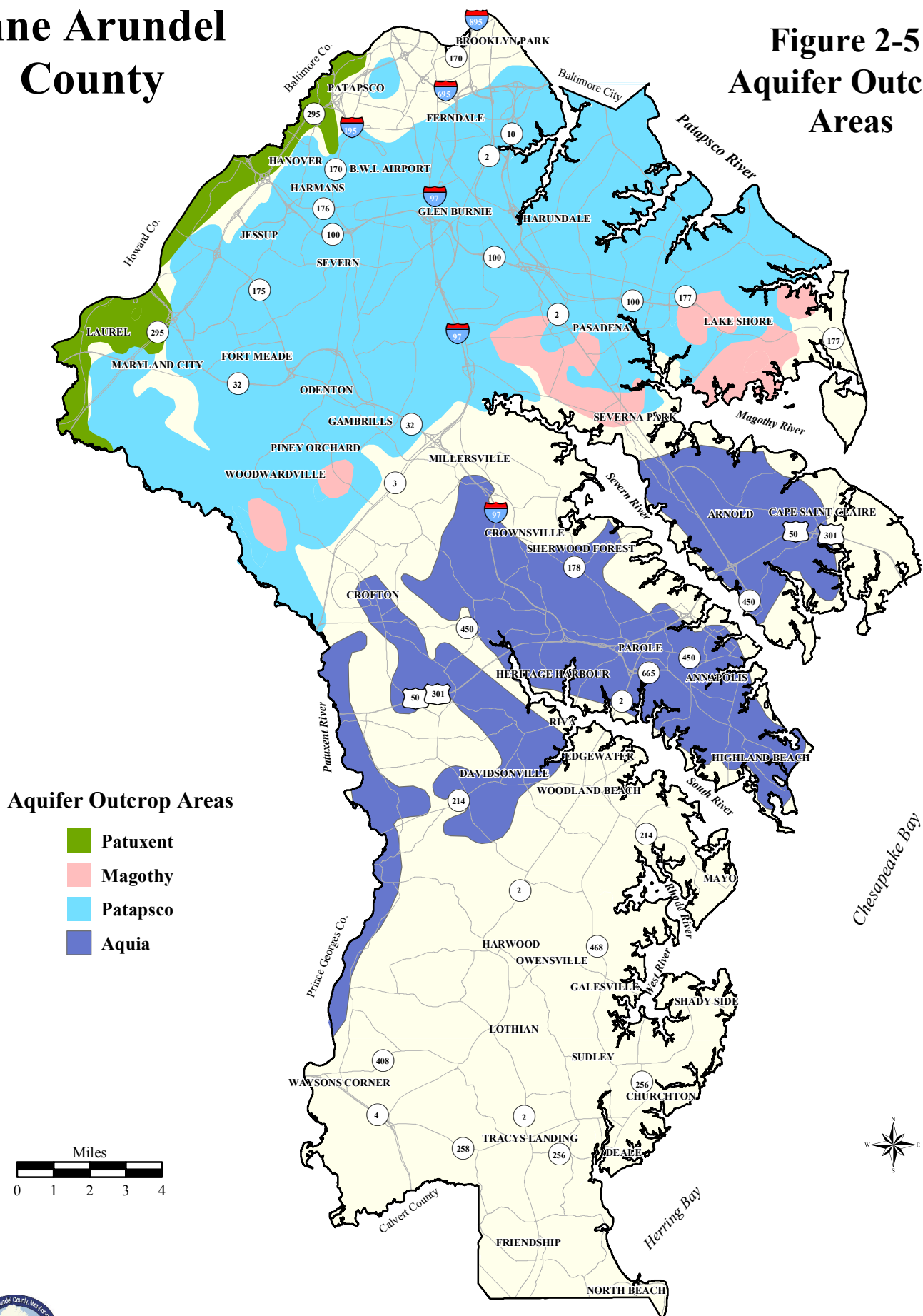
The Patuxent formation, the oldest unconsolidated deposit, ranges between 100 and 300 feet thick and consists of sand, gravel, and variegated clay. It is also the deepest aquifer dipping toward the southeast at a rate of 85 to 90 feet per mile. It outcrops in bands several miles wide roughly parallel to the Fall Line along Anne Arundel County's western and northwestern boundary. The recharge area in Anne Arundel County consists of approximately 10 square miles of a 120-square mile total outcrop area. The MGS indicates as much as 16 MGD could be withdrawn from the Patuxent aquifer in Anne Arundel County.

The Patapsco formation consists of sand and variegated clay deposits with some thin lenses of iron-cemented sandstone. The thickness of the aquifer ranges between 200 and 300 feet. The outcrop area of 85 square miles extends across the northern end of the County; another 55 square miles of outcrop area is in Prince George's County. A Maryland Geological Survey study indicates that approximately 64 MGD could be withdrawn from the Patapsco aquifer in Anne Arundel County.

The Aquia formation, the uppermost aquifer, consists of glauconitic quartz sand with a few clay layers and provides much of the water for Anne Arundel County south of Davidsonville and Annapolis. The formation has an average thickness in the County of 120 feet and dips southeastward 15 to 20 feet per mile. The total area of the Aquia outcrop is 65 square miles through the central portion of the County in a wide band that extends from the western areas of Davidsonville through the Parole area to the southern shore of the Magothy River. Another 45 square miles of recharge area is located in Prince George's County. The outcrop areas provide recharge for the aquifers whose major source of water is precipitation either directly in the County recharge areas, seepage from adjacent confining beds, or by flow from outcroppings in other jurisdictions. Some infiltration may also occur from area streams.

Anne Arundel County

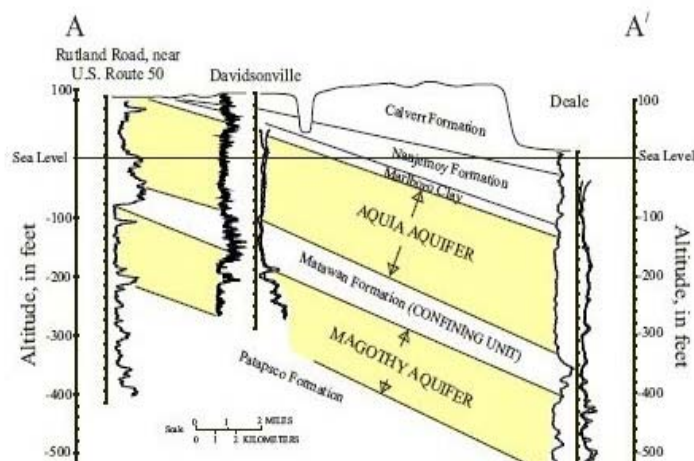
**Figure 2-5
Aquifer Outcrop Areas**



The principal source of water in the Annapolis area is the Magothy formation. The formation consists of beds of gray sand and gravel inter-bedded with thin layers of black clay. The formation has an average thickness of 175 feet. The aquifer is recharged where it crops out, an area of approximately 70 square miles in Anne Arundel County and another 8 square miles in Prince George's County. In 1974, the Maryland State Department of Natural Resources indicated that the Magothy aquifer is capable of yielding 60 MGD in the Annapolis area. However, the amount of water withdrawn must be properly managed to prevent the possibility of brackish water from the Chesapeake Bay or its tributaries from being induced into the aquifer. Figures 2-6a, 2-6b and 2-6c, provided by the Maryland Geologic Survey, show hydrogeologic profiles of the aquifer formations.

Deposits of marine or estuarine terrace materials of Pleistocene age occur in Anne Arundel County along the Bay and Patuxent River. These deposits may be 50 feet thick. In addition to the artesian aquifers described in preceding paragraphs, unconfined aquifers, or water-table aquifers are formed in the shallow sediments. Historically, dug wells were common in these sandy deposits where there is a sufficiently high water table.

Figure 2-6a
Hydrogeologic Section A – A' from Rutland Road to Deale



The recharge areas of the major aquifers also may provide a water source for shallow wells in Anne Arundel County. While the water-table aquifers may provide a significant quantity of water in some areas, they may be more susceptible to contamination.

The Optimization of Ground Water Withdrawals in Anne Arundel County, Maryland, from the Upper Patapsco, Lower Patapsco, and Patuxent Aquifers report projects the increase in demand could result in water levels falling below the regulatory management levels in some areas, well operational problems, increased pumping costs and reduced stream baseflow. The water-supply potential was evaluated for the Upper and Lower Patapsco and the Patuxent aquifers by simulating ground-water flow models. The results of the study indicate that sufficient ground water is available to supply the projected demand through 2040 at 73 MGD while supplying water to other users in Anne Arundel County and the surrounding counties at permitted levels. Meeting the projected demand and minimizing impacts will require construction of new wells and well fields, redistributing withdrawals to other wells and careful well-field design.

Figure 2-6b
Hydrogeologic Section A-A' from Northern Charles County to Southwestern Baltimore County

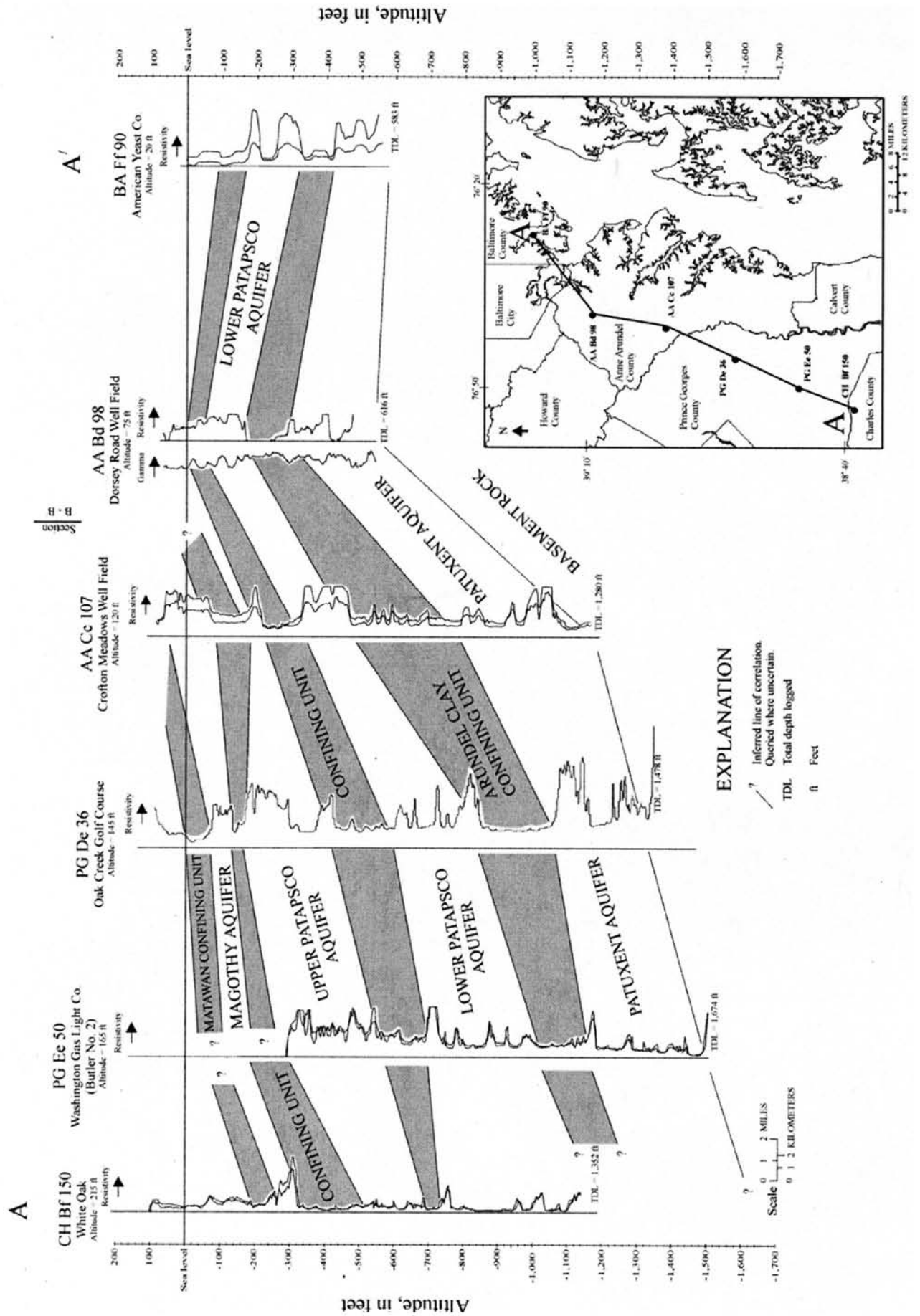
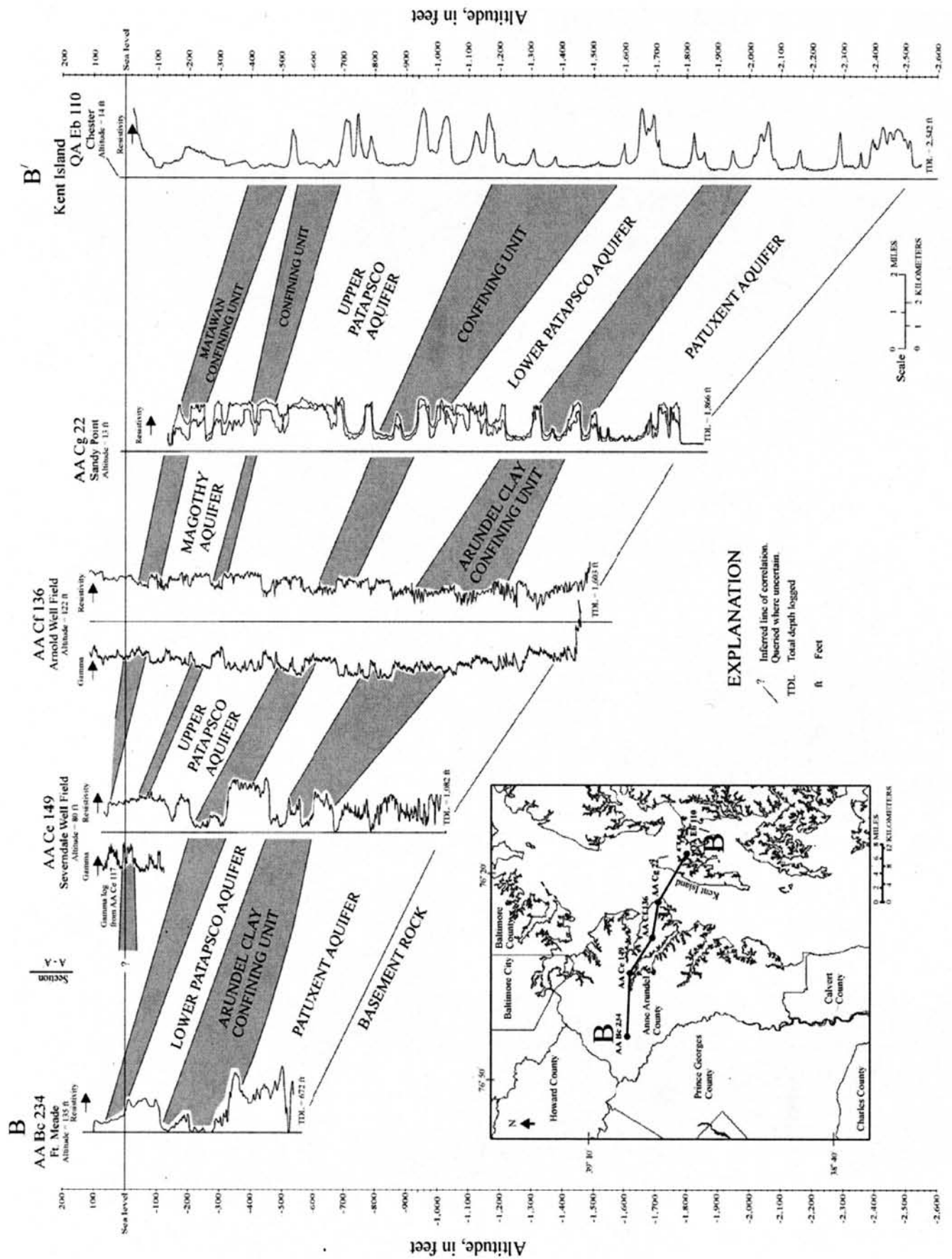


Figure 2-6c
Hydrogeologic Section B-B' from Ft. Meade, Anne Arundel County to Kent Island, Queen Anne's County



2.2 GROUND WATER QUALITY

The County facilities use water from deep wells in the Patapsco, Patuxent and Aquia aquifers as a water supply source. No Federal or State standards have been established for raw ground water (in the ground). There are standards that apply to a public drinking water source, but these are applied within the water distribution system, not in the ground. However, there are regulations concerning discharge of pollutants to ground water. The Water Resources Administration in the Department of the Environment is responsible for the regulation of these discharges.

2.2.1 Wellhead Protection Studies

The Federal government requires each State to conduct assessments for the susceptibility of public drinking water sources to various contaminants. Source Water Assessments have been completed for all of the County's facilities. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to each source, 2) identification of potential sources of contamination within the areas, and 3) determination of the susceptibility of each water supply to contamination.

The wells serving the County's facilities pump water from confined and semi-confined aquifers. The confined aquifers are well protected from activity on the land surface because the confining layers provide a barrier for water movement from the surface into the aquifer. A contaminant at the surface could impact the water supply by direct injection into the aquifer from within the wellhead protection area (WHPA) via poorly constructed wells, abandoned wells, and underground injection wells drilled into the aquifer.

The *Source Water Assessment for the Severndale and Arnold Plant Wells in Anne Arundel County, MD* was conducted in 2005 by MDE. No potential sources of contamination were identified within the WHPA for the Arnold and Severndale plant wells that serve the Glen Burnie-Broadneck Water Systems. The only potential contamination threat to aquifers is unused wells or improperly constructed wells located within the WHPA. It is recommended that these wells be abandoned per State well construction regulations.

The *Source Water Assessment for the Community Water Systems using Confined Aquifers in Anne Arundel County, MD* was conducted in 2004 by MDE. It assessed the water supply systems for Crofton-Odenton, Gibson Island, Herrington Harbour (Rose Haven), and Herald Harbor. The study of these community water supplies determined that they were not susceptible to contaminants originating at the land surface. Unused wells or improperly constructed wells may provide a pathway for contaminants in the upper aquifer to reach deeper confined aquifers. It is suggested that the proper abandonment of unused wells is needed to protect the drinking water sources.

The County undertook a study in 1991 in conjunction with the Maryland Geological Survey (MGS) of the Department of Natural Resources and the Public Drinking Water Program (PDWP) of MDE to determine qualitative zones of aquifer vulnerability through ground-water flow and particle tracking. The study area focused on the area surrounding the northern County public supply wells that draw on the Lower Patapsco aquifer that have identified known sites of surface and sub-surface contamination.

The well fields studied were: the three (3) major well fields - Dorsey, Harundale and Sawmill - and six (6) individual production wells located at Philip Drive, Crain Highway, Elvaton Road, Quarterfield Road, Glendale Avenue and Thelma Avenue.

The results of the study produced the following:

- a. An aquifer vulnerability map depicting four (4) qualitative degrees of aquifer vulnerability to potential contamination,
- b. A set of maps depicting a 1-year, 10-year and 20 year zone of transport along with the zones of contribution (recharge), and a
- c. Written report detailing methodology and findings.

The major findings indicated:

- a. The overall water quality of the Lower Patapsco aquifer is good, although some contaminants have been determined at several sites.
- b. The water produced from the aquifer in 1991 was water that entered the ground after 1945.
- c. Particle tracking from known contaminant sites posed no threats to the production wells currently in use, as most contamination sites are down-gradient of the production wells. Releases from contamination sites up-gradient of the Glendale and Sawmill wells would, without remediation, pose a threat; however, the Sawmill wells have been abandoned.
- d. Particle tracking indicated that the time for groundwater to flow from land surface to the wellhead at the 1990 extraction appropriation rates range from less than 10 years to as long as 60 years, depending on the location of the well.

Developing more detailed data and the ability to perform broader analyses on the Wellhead Protection initiatives, the County contracted URS Corporation in 2001 to study the Glen Burnie and Annapolis well sites. The study is comprised of two component parts. The first is the source water area assessment and the second component is a framework for developing proper land management tools for groundwater protection. The *Wellhead Protection Plan for the Glen Burnie Study Area, Broad Creek Pressure Zone, and City of Annapolis Study Area* was completed in June 2003 by URS Corporation. The confined aquifer wells in the Annapolis area were assessed as having low susceptibility to contaminants originating at the land surface due to the protected nature of confined aquifers. The confined wells in the Glen Burnie area were found to have a moderate susceptibility to contaminants due to naturally occurring radionuclides and a high percentage of industrial, commercial, and institutional land uses. The semi-confined well's (Glen Burnie area) susceptibility to contaminants ranged from low to high (four low, two moderate, and two high). The moderate rankings were the result of naturally occurring radionuclides and a high density of potential contamination sources. The high rankings came from naturally occurring radionuclides, anthropogenic contaminants (i.e., resulting from influence of human beings on nature), contamination source density, and land use. Many recommendations are presented that include, proper land use and zoning considered around the County wellheads, development of a County Wellhead Protection Fund, and education of best land management practices to those existing homeowners and businesses within the closest and thus, highest range of susceptibility for point source contamination.

2.3 SURFACE WATER QUALITY STANDARDS

Water quality standards and criteria for surface waters are designed to protect and enhance beneficial uses, which include fishing, boating, swimming, scenic enjoyment, habitats for aquatic life and water fowl, and use as a public water supply. Standards have been established for the State's waters, which protect them for all of these uses.

The State water quality standards consist of two parts:

- a. The designated uses of the waters involved, and
- b. The water quality criteria for the waters based upon these uses.

Designated use classifications have been established for water contact recreation and aquatic life (Use I), shellfish harvesting (Use II), natural trout (Use III), and recreational trout (Use IV). Every waterway in the County is at least Use I. Designated water use classifications for County waterways can also be found in Code of Maryland Regulations 26.08.02.08.

Water quality standards specific to each of the designated uses have been established and are listed in the Code of Maryland Regulations 26.08.02.03 - Surface Water Quality Criteria. The water quality criteria for Toxic Substances may also be referenced in this section of Maryland State Code.

2.4 SHELLFISH WATERS

The Maryland Department of the Environment (MDE) is responsible for regulating the production and storage of shellfish obtained from any waters of the State. It has the authority to restrict the use of any area for catching or storing shellfish if investigations indicate that the waters are polluted to the extent there is a hazard to public health. MDE evaluates water quality in Use II waters for compliance with water quality standards for shellfish harvesting. Based on this research, MDE has designated portions of these waters as restricted, conditionally approved, or approved. In those waters classified as restricted, no shellfish harvesting is permitted. Those waters classified as conditionally approved are closed to shellfish harvesting for a period of three days after rain events of one inch or more over a 24-hour duration. There are no restrictions on shellfish harvesting in the approved waters.

MDE publishes a map summarizing current shellfish harvesting closure areas. The map and a detailed description of the location of the restricted and conditionally approved shellfish waters are available by visiting the MDE web site at <http://www.mde.state.md.us/>.

2.5 POPULATION AND LAND USE

2.5.1 Population

The total population of Anne Arundel County including the City of Annapolis in the 2010 Census was 537,656 persons. Projected population of approximately 586,475 is expected by the year 2035. Historically, Anne Arundel County developed largely as a suburb of Baltimore City.

Residential and commercial expansion extended southward along the County's major highways toward the waterfront. In recent years however, the County has been experiencing significant growth pressures from the Washington D.C. Metropolitan Area. Based on the 2010 Census, Anne Arundel County remains fifth largest in population within the State of Maryland, representing 9.3 percent of the State's total population. Montgomery, Prince George's and Baltimore Counties and the City of Baltimore out rank Anne Arundel County in resident population.

The rate of population growth in the County has overall been declining since 1970. However, in absolute numbers the County's growth has remained one of the highest of the jurisdictions in Maryland. The components of population change are births, deaths and net migrations. According to the U.S. Census Bureau, over the 40 year period from 1970 to 2010, the County's population increased by 239,614 persons. This represents an 81 percent increase or an average annual increase of 2.02 percent. Between 1970 and 2000, the annual increase for the 30-year period was 2.16 percent. Estimates for the period 2000-2010 indicate that the growth was approximately 69 percent net natural increase (births minus deaths) and 31 percent net migration. Also, during the period from 2000 to 2010 the rate of growth declined to its lowest level since 1910. The dramatic slowdown is attributed to the economic recession that began in 2007. Over a 25-year period from 2010 to 2035, it is projected that the County will experience a net increase of 48,819 persons, representing a 9.1 percent increase in total population.

TABLE 2-1
Anne Arundel County Population and Household Trends and Forecasts, 2000-2035

Year	Total Households	Average Household Size	Population in Households	Group Quarters Population	Total Population	Change from Previous Period	Percent Change From Previous Period
2000	178,670	2.651	473,666	15,990	489,656	28,755	6.24%
2005	192,450	2.586	497,710	15,990	513,700	24,044	4.91%
2010	212,562	2.459	522,685	14,971	537,656	23,956	4.66%
2015	221,136	2.426	536,413	14,971	551,384	13,728	2.55%
2020	228,130	2.397	546,474	14,971	561,445	10,061	1.82%
2025	234,070	2.373	555,490	14,971	570,461	9,016	1.61%
2030	239,616	2.354	564,161	14,971	579,132	8,671	1.52%
2035	244,583	2.337	571,504	14,971	586,475	7,344	1.27%

Sources:

- a. U.S. Census Bureau, 2000 & 2010 Censuses SF1 Population, Group Quarters and Households.
- b. Anne Arundel County Office of Planning and Zoning, Forecast for 2015-2035 adjusted for Census 2010 SF1 Population and Households
- c. Anne Arundel County Office of Planning and Zoning, Round 7C Population and Household Forecasts, February 2, 2010

2.5.2 Land Use

The existing land-use pattern in Anne Arundel County reflects several of the historic stages of the County's growth and development:

- a. The rural areas of South County's long-established settlements along the Chesapeake Bay shore;

- b. Suburban and exurban development in the interior and along transportation routes;
- c. The older, more densely populated suburbs of North County;
- d. Port-oriented industrial development; and
- e. Industrial expansion in the Fort Meade-BWI area in the western part of the County.

A general description of the County's existing land use indicates a variety of development types, ages, qualities and conditions, and also demonstrates the close inter-relationship between living places and working places, between land use and transportation. Two notable features of the existing land-use pattern are its low-density, and the presence of sizable undeveloped areas throughout the County. Figure 2-7 is a general map showing the existing land use in the County.

Existing land use acreages are shown in Table 2-2 below. Residential land uses (multi-family, single family, and townhouse dwellings) account for approximately 36 percent of the total land area. Agricultural lands comprise nearly 10 percent of the land area, while open space and park and recreational land comprises more than 17 percent. Industrial, office and retail uses combined comprise only about 5 percent of the total land area, and another 6 percent consists of government and institutional uses. Transportation corridors account for 6 percent of the area while the City of Annapolis occupies nearly 2 percent of the County. Approximately 18 percent of the land is vacant. Of that, approximately 6% is within the public sewer service area and 5% is within the public water service area. Table 2-3 shows the break-down of acres of vacant land by sewer service area and water pressure zone within the Existing, Capital Facilities, Planned or Future Service categories.

TABLE 2-2
Existing Land Use Acreage 2012

Land Use Category	Acreage	Percent of Total
Single Family Residential	88,384	33.4
Town House Residential	3,819	1.5
Multiple Family Residential	1,958	0.7
Office	1,237	0.5
Retail	6,099	2.3
Industrial	5,975	2.3
Government and Institutional	16,527	6.2
Recreation and Parks	8,290	3.1
Open Space	36,890	13.9
Agricultural	25,684	9.7
Transportation	17,147	6.5
Vacant	47,934	18.1
City of Annapolis	4,886	1.8
Total	264,830	100.0

Source: Anne Arundel County Office of Planning and Zoning, 2012.

Anne Arundel County

**Figure 2-7
2012 Existing Land Use**

Land Use 2012

- Agricultural
- City of Annapolis
- Industrial
- Government/Institutional
- Multiple Family Dwelling
- Natural Open Space
- Office
- Recreation and Parks
- Retail
- Single Family Dwelling
- Townhouse
- Transportation/Utility
- Vacant
- Water

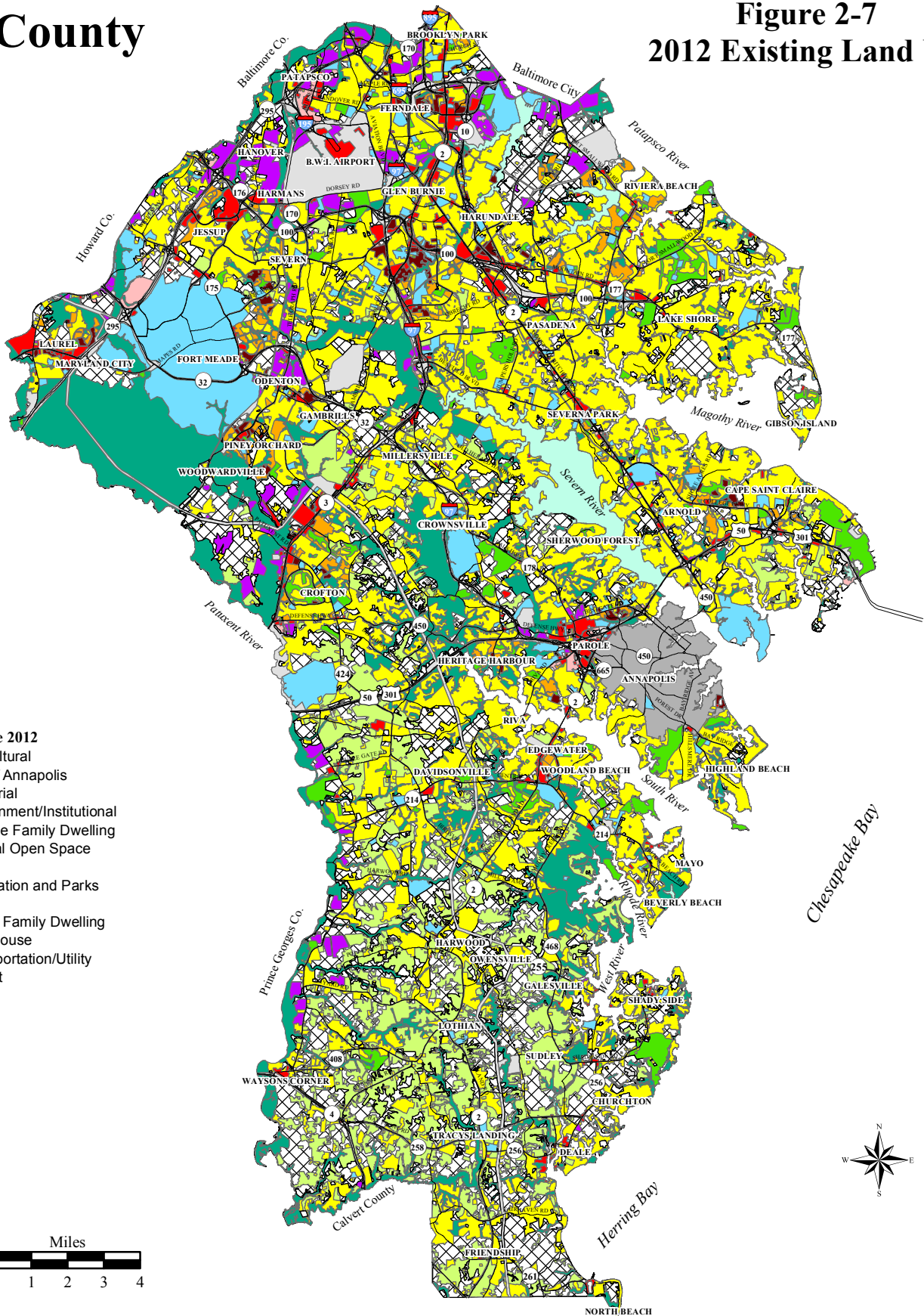
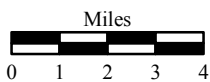


TABLE 2-3
Vacant Land by Sewer Service Area and Water Pressure Zone

Sewer Service Area	Vacant Land* (acres)	Water Pressure Zone	Vacant Land* (acres)
Annapolis	854	Airport Square	1,356
Baltimore City	2,121	City of Annapolis	6
Bodkin Pt.-Pinehurst	0	Broad Creek	744
Broadneck	2,549	Broadneck	1,562
Broadwater	1,805	Brooklyn Park (North)	10
Cox Creek	3,952	Brooklyn Park (South)	4
Fort George Meade	0	Crofton	916
Maryland City	1,173	Fort George Meade	0
Mayo-Glebe Heights	451	Gibson Island	418
Patuxent	2,086	Glen Burnie High	1,324
Piney Orchard	199	Glen Burnie Low	4,245
Rose Haven	43	Herald Harbor	45
Total	15,233	Jessup	1,098
		Kings Heights / Odenton	918
		Maryland City	918
		Rose Haven	5
		Total	13,569

*Amount of undeveloped land in the Existing, Capital Facilities, Planned, and Future Service categories.

The 2009 General Development Plan and the County's 16 Small Area Plans have adopted goals and policies that will channel growth to sites that lie within the sewer and water service areas and along major transit routes. The Town Center Areas (Parole, Odenton and Glen Burnie) will seek to incorporate the concept of mixed use, along with a number of other targeted sites such as existing and planned Mixed Use-zoned sites and Commercial revitalization districts. These areas will utilize the existing infrastructure (sewer, water, roads, mass transit) while seeking to minimize distances between services, work and home. The Small Area Plans identify best use of infill lots, community design, and rehabilitation efforts, ultimately leading to sound fiscal and environmental growth. With the primary goal to direct growth away from areas not served by water and sewer, preservation of the County's rural heritage, and the commitment to the restoration of its streams and rivers and protection of the Chesapeake Bay, the County will seek a balance between development and preservation. See Figure 1-1 that depicts the County's planned land use adopted in the 2009 General Development Plan and Figure 1-3 for current zoning in the County.

TABLE 2-4
Land Use and Zoning

2009 GDP Land Use	Acreage	Percent of Total Acreage	Existing Zoning 2012	Acreage	Percent of Total Acreage
Rural	84,222	31.8	RA, RLD	95,918	36.2
Residential	84,452	31.8	R1, R2, R5, R10, R15, R22	102,593	38.7
Commercial	5,247	2.0	C1, C2, C3, C4, SB	7,310	2.8
Industrial	9,521	3.6	W1, W2, W3	12,706	4.8
Mixed-Use	1,665	0.6	MXD-C, MXD-E, MXD-R, MXD-T	1,574	0.6
Town Center	2,440	0.9	TC, O-COR, O-EOD, O-FTM, O-IND, O-NOD, O-TRA, O-VIL	2,214	0.8
Maritime	544	0.2	MA1, MA2, MA3, MB, MC	552	0.2
Natural Features	41,591	15.7	OS, Water	37,139	14.0
City of Annapolis	4,921	1.9	City of Annapolis	4,894	1.9
Government / Institution	21,594	8.0	Total	264,900	100
Utility / Transportation	9,252	3.5			
Total	265,449	100			

CHAPTER 3 WATER SUPPLY SYSTEMS

3.1 GENERAL INFORMATION

The County's water system contains interconnections between pressure zones, twelve areas established for the purpose of providing adequate water supply facilities (see Section 3.6 for a more detailed description). The remaining land is either served by the City of Annapolis, Fort Meade or is designated as Rural. The boundaries of these pressure zones are shown on adopted Master Plan Maps of the Water System W-1 through W-12 and also on Figure 3-1.

The County has developed a plan for all significant aspects of its water supply and distribution system for current and future users. The planning process ensures that there will be an adequate supply of the highest quality water to meet the demands of its customers. The plan has enabled the County to optimize groundwater utilization and to develop a supplemental water purchase policy from the City of Baltimore consistent with forecasted interim and long-term demands for water.

The water plan is a detailed engineering study of the County's water supply system. In 1989, PSC Engineers and Consultants, Inc. completed a study for the Anne Arundel County Department of Public Works (County), titled, *Water Supply Systems Analysis*, which had been the basis for the County's water master plan for approximately fourteen years. In 2003, O'Brien & Gere Engineers conducted another study for the County, titled, *Comprehensive Water Strategic Plan*. The *2003 Strategic Plan* coordinates the findings of planning projections, peaking characteristics, demand forecasting, groundwater projections, hydraulic modeling analyses and criteria for system improvements to develop a proposed capital improvement schedule which includes cost estimates and an implementation time frame. Background research for the *2003 Strategic Plan* included an unaccounted-for water investigation and existing facilities evaluation. The *2003 Strategic Plan* is available at the County Department of Public Works, Bureau of Engineering. A new Comprehensive Water Strategic Plan is currently underway.

The County purchases some water from Baltimore City, which comes from surface water sources. Agreements between Anne Arundel County and Baltimore City provide the rights to purchase up to 32.5 million gallons per day (MGD) maximum day rate. Currently, the Baltimore City supply makes up approximately 5% of the water used by the County. In 2012, the County produced approximately 32.2 MGD (average day) and 37.4 MGD (max day) from groundwater sources while receiving 1.9 MGD (average day) and 3.0 MGD (max day) from Baltimore City. Additional details about the Baltimore City water system are documented in a study completed by the City, titled, *Baltimore Water Supply and Distribution System, The Preliminary Central System Report of January 1989*. Rummel, Klepper & Kahl, LLP conducted a new water supply study for Baltimore City in 2003. For details, contact the Baltimore City Department of Public Works, Bureau of Engineering. For groundwater management and monitoring purposes, a network of observation wells in major aquifers has been installed in coordination and agreement with the Maryland Department of the Environment and Maryland Geological Survey and has been monitored since the early 1990s.

3.2 FUTURE DEMAND PROJECTIONS

3.2.1 Introduction

Facility planning in the County has been done in accordance with the needs identified in the *1989 Water Supply Systems Analysis* report. These needs were based on demand projections developed by consolidating planning criteria from the Department of Utilities and the Office of Planning and Zoning (organizational structure of that time period). The Department of Public Works (DPW) and Office of Planning and Zoning (OPZ) in conjunction with O'Brien & Gere Engineers developed new demand projections for the *2003 Comprehensive Water Strategic Plan*. These demands were calculated for the planning period (2000 to 2025) and for build-out conditions (estimated at 2043). A "revised build-out" condition has been included with this Master Plan update. This was completed to reflect changes in the Water Pressure Zone boundaries since the *2003 Comprehensive Water Strategic Plan* as well as the County's current Zoning Map.

3.2.2 Approach to Demand Projections

The *2003 Strategic Plan* used a "Zoning" approach for calculating demand projections. This approach used zoning information along with flow factors (Appendix A) and timing based on the County's service area timing categories (Existing, Planned, Future, etc.). Demands at 2010 and ultimate conditions (build-out) were calculated for each pressure zone based on the timing categories and based on "percent developed" values provided by OPZ.

Using these calculated demands, the build-out year was determined to be 2043 by linear extrapolation as shown in Figure 3-2. This was accomplished by adding the actual 2000 demand of 32.1 MGD (average day) to the Brooklyn Park demand of 0.89 MGD to get 33 MGD, and this point was used to draw a straight line through the 2010 projected demand of 40.4 MGD (average day) until the line intersected system build-out at 64.6 MGD (at the time of the 2003 Strategic Plan, the Brooklyn Park pressure zone was owned, operated and supplied by Baltimore City; although Brooklyn Park continues to be supplied by Baltimore City, the County now owns and operates the system). To validate the year 2043 as build-out, two additional curves were developed. A linear projection of historical water production using the years 1983 through 2000 resulted in a build-out year of 2074. Another linear projection using the slope for the years 1983 to 1988 was projected from the year 2000 production rate, resulting in a build-out year of 2034. This projection would reflect a period of high growth similar to the period from 1983 to 1988. For this reason, the 2043 build-out year was adopted based on these comparisons and the work conducted by OPZ, DPW, and O'Brien & Gere Engineers.

The GIS layers were also converted into a form that could be incorporated into the WaterCAD model. The ultimate build-out demand in GIS was the basis for input to the model. The task involved extracting the ultimate build-out demand associated with each polygon in a projected demand layer and allocating these demands to appropriate junctions in the model. In addition to a build-out model, a 2010 model was created using a similar procedure. Both of these models were used to analyze the water system and establish a strategic plan for the planning period (2000 to 2025). For more details, refer to Chapter 3 and Appendix 3.3 of the *2003 Strategic Plan*.

Figure 3-1 Water Pressure Zones and Timing Categories (11x17)

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The methodology for the revised build-out calculation is the same methodology incorporated in the *2003 Comprehensive Water Strategic Plan* using the proposed Water Pressure Zone Boundaries and current Zoning.

3.2.3 Results of Demand Projections

Demands from year 2000 and calculated demand projections for the years 2010 and 2043 from the *2003 Strategic Plan* are given in Table 3-1. As well, the “modified” demand projections from the *1989 Water Supply System Analysis* report are shown for comparison purposes (for more information on the “modified” demand projections and the “Limited Service Territory Rationale” from the 1989 report, see page 3-3 of the *1996 County Master Plan*). From Table 3-1, the actual 2000 demand for the County was approximately 25% less than what was projected in the 1989 study, while the build-out demand projections are within 5% of each other. This 25% shortfall is due to a slower than anticipated growth in the County as compared to the 1983 to 1988 period as shown in Figure 3-2. The average day demand projection of 39.5 MGD (year 2010) is slightly higher but generally agrees with the projection of 38.2 MGD provided by the Office of Planning and Zoning (OPZ) for the previous 1999 County Master Plan. The OPZ projections were based on more recent population projections (adopted from the 1997 General Development Plan) than those that were used for the *1989 Water Supply Systems Analysis* report.

Peaking factors were adopted for the *2003 Strategic Plan* based on the *1989 Water Supply Systems Analysis* report and the *2001 Water Calibration Report* by Pitometer Water Services. The maximum day and peak hour demand projections for the County are presented in Table 3-1.

In addition, the average day, maximum day, and peak hour demand projections for each pressure zone are presented in Table 3-2 at five-year increments for the planning period and build-out. These projections were based on a linear interpolation of three data points from the *2003 Strategic Plan*: existing 2000 demand, 2010 demand projections, and 2043 demand projections.

TABLE 3 -1
Comparison of “Modified” Water Demand Projections from the 1989 Strategic Plan and
Water Demand Projections from the 2003 Strategic Plan

Demand Period		Average Day (MGD)		Maximum Day (MGD)		Maximum Hour (MGD)	
Water Systems Analysis Report, 1989 (PSC)	Comprehensive Water Strategic Plan, 2003 (OBG)	PSC Plan	OBG Plan	PSC Plan	OBG Plan	PSC Plan	OBG Plan
“Modified” Interim Demand (Year 2000)	Actual Production (Year 2000)	44.3	32.1	87.1	56.5	125.4	111.7
N/A	Interim Scenario (Year 2010)	N/A	39.5	N/A	74.8	N/A	129.4
“Modified” Ultimate Demand (After 2010)	Build-out Scenario (estimated at 2043)	70.4	63.7	138.5	122.4	199.4	208.6

Source: Water Supply System Analysis Report (1989) by PSC Engineering & Consultants, Inc and Comprehensive Water Strategic Plan (2003) by O’Brien & Gere Engineers

N/A: Not Available

Note: The 2003 demand projections listed do not include the Brooklyn Park, Rose Haven or Fort Meade Private water systems. See Table 3-2 for these projections.

Figure 3-2 Anne Arundel County Average Day Demand Projection

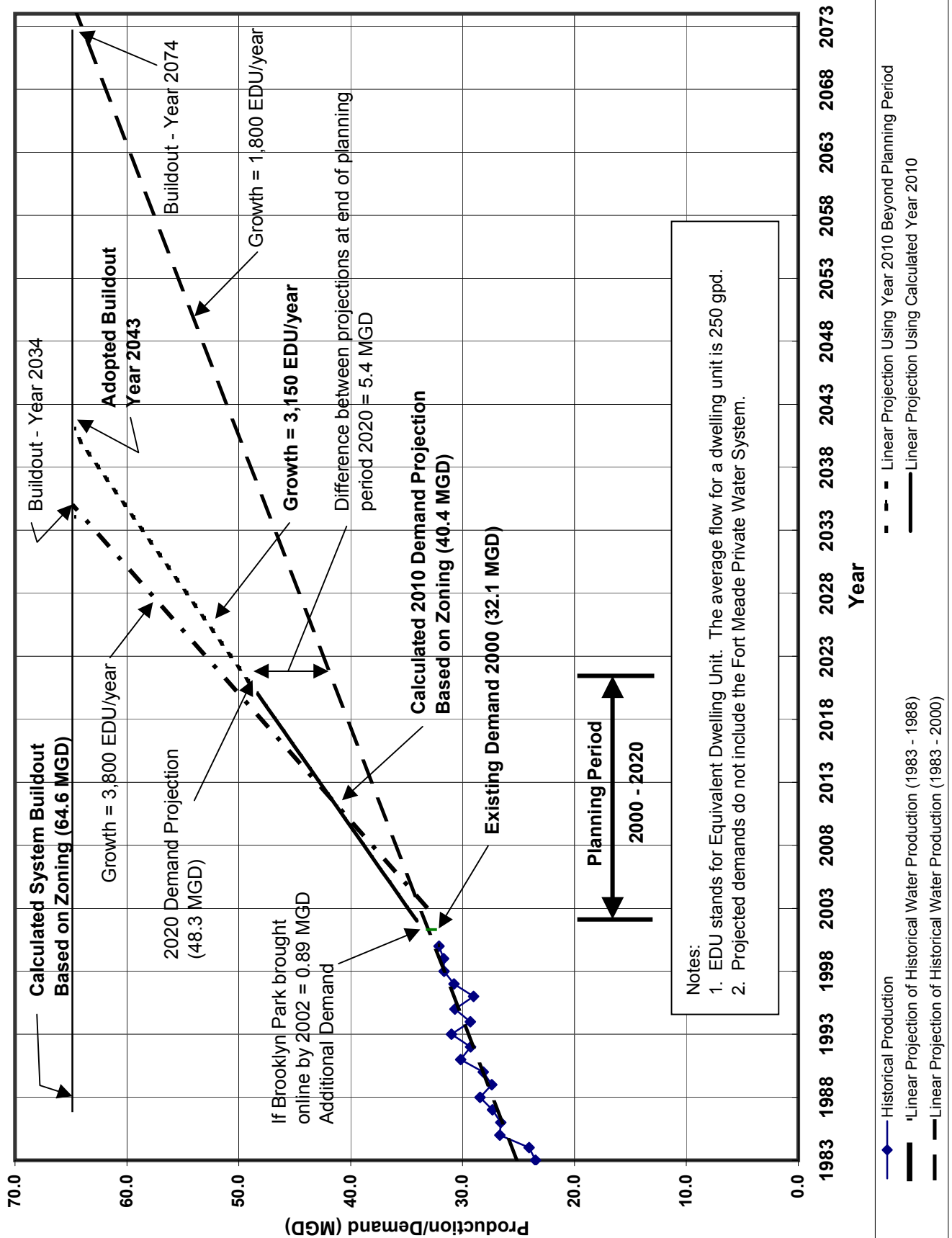


TABLE 3-2
Annual Average and Maximum Day and Peak Hour
Demand Projections Based on Zoning

			Projected Annual Avg Day Demand (MGD) ¹				
Water Pressure Zone	2000 ²	2012 ³	2015	2020	2025	2043	Revised Buildout ⁸
Airport Square ⁴	1.73	3.12	2.06	2.16	2.26	2.61	6.04
Broad Creek ⁵	2.09	2.27	3.39	3.85	4.31	6.00	6.57
Broadneck	16.09	2.59	4.23	4.63	5.02	6.44	5.83
Glen Burnie Low		9.65	15.18	15.92	16.66	19.32	21.49
Brooklyn Park (supplied by Baltimore City)	n/a	0.50	0.88	0.88	0.88	0.89	0.89
Crofton	1.54	1.84	2.07	2.25	2.43	3.07	3.64
Gibson Island	0.08	0.08	0.10	0.11	0.12	0.17	0.17
Glen Burnie High ⁴	6.10	4.42	9.31	10.32	11.34	14.92	13.04
Herald Harbor	0.14	0.13	0.19	0.21	0.23	0.32	0.32
Jessup	1.33	1.32	1.73	1.86	2.00	2.49	4.11
Maryland City	0.89	1.25	1.69	1.96	2.23	3.20	4.34
Kings Heights / Odenton	2.11	2.48	3.12	3.46	3.80	5.04	8.71
Rose Haven	n/a	0.03	0.07	0.07	0.08	0.10	0.10
Fort Meade Private ⁶	3.30	3.63	3.77	3.92	4.07	4.62	4.62
TOTAL (with Fort Meade Private)	35.4	33.3	47.8	51.6	55.4	69.2	79.9
TOTAL (without Fort Meade Private)	32.1	29.68	44.0	47.7	51.4	64.6	75.3
			Projected Maximum Day Demand (MGD)				
Water Pressure Zone	Max Day Factor		2015	2020	2025	2043	Revised Buildout ⁸
Airport Square ⁴	1.7		3.50	3.67	3.84	4.44	10.27
Broad Creek ⁵	2.5		8.48	9.63	10.78	15.00	16.43
Broadneck	2.5		10.58	11.58	12.55	16.10	14.58
Glen Burnie Low	1.7		25.81	27.06	28.32	32.84	36.53
Brooklyn Park (supplied by Baltimore City)	1.7		1.50	1.50	1.50	1.51	1.51
Crofton	2		4.14	4.50	4.86	6.14	7.28
Gibson Island	2.5		0.25	0.28	0.30	0.43	0.43
Glen Burnie High ⁴	1.7		15.83	17.54	19.28	25.36	22.17
Herald Harbor	2		0.38	0.42	0.46	0.64	0.64
Jessup	2		3.46	3.72	4.00	4.98	8.22
Maryland City	2		3.38	3.92	4.46	6.40	8.68
Kings Heights / Odenton	2		6.24	6.92	7.60	10.08	17.42
Rose Haven	2.5		n/a	n/a	n/a	n/a	0.25
Fort Meade Private ⁶	1.7		6.41	6.66	6.92	7.85	7.85
TOTAL (with Fort Meade Private)			89.9	97.4	104.9	131.8	152.3
TOTAL (without Fort Meade Private)			83.5	90.7	97.9	123.9	143.9
			Projected Peak Hour Demand (MGD)				
Water Pressure Zone	Peak Hour Factor		2015	2020	2025	2043	Revised Buildout ⁸
Airport Square ⁴	2.37		4.88	5.12	5.36	6.19	14.31
Broad Creek ⁵	3.68		12.48	14.17	15.86	22.08	24.18
Broadneck	3.94		16.67	18.24	19.78	25.37	22.97
Glen Burnie Low	3.49		52.98	55.56	58.14	67.43	75.00
Brooklyn Park (supplied by Baltimore City)	N/A		N/A	N/A	N/A	N/A	N/A
Crofton	3.96		8.20	8.91	9.62	12.16	14.41
Gibson Island	5.88		0.59	0.65	0.71	1.00	1.00
Glen Burnie High ⁴	2.37		22.06	24.46	26.88	35.36	30.90
Herald Harbor	4.58		0.87	0.96	1.05	1.47	1.47
Jessup	2.52		4.36	4.69	5.04	6.27	10.36
Maryland City	3.26		5.51	6.39	7.27	10.43	14.15
Kings Heights / Odenton	4.14		12.92	14.32	15.73	20.87	36.06
Rose Haven ⁷	N/A		N/A	N/A	N/A	N/A	N/A
Fort Meade Private ⁶	N/A		N/A	N/A	N/A	N/A	N/A
TOTAL (without Fort Meade Private)			141.5	153.5	165.4	208.6	244.8

Notes: N/A - not available 1. Five year incremental demand projections were calculated by linearly interpolating three data points from 2003 Comprehensive Water Strategic Plan (2000 production data, 2010 projected demands, and build-out 2043 projected demands). Two data points were used for Broadneck and Glen Burnie Low (2010 and 2043 projected demands). 2. Year 2000 reflects actual production data. Combined Broadneck and Glen Burnie Low was 16.09 mgd. Basis of projections from 2003 Water Strategic Plan. 3. Year 2012 reflects actual demand data from water billing records. 4. Glen Burnie High and Airport Square demands based on boundary shift where the Airport Sq. zone annexes approx. 10 miles of pipe from Glen Burnie High zone. Projections for these zones were derived by equal intervals using 2 data points. 5. Annapolis Neck area included in Broad Creek projected demands (Max day = 0.8 MGD at 2010). 6. Fort Meade is a PRIVATE system, but has been included as it was in the 2003 Strategic Plan. Demand projections and Peaking factors are approximate. 7. Projected demands for Rose Haven were not included in the 2003 Water Strategic Plan. 8. Revised Buildout Projection based on Current Zoning and Proposed Pressure Zone Boundaries based on the methodology used by the 2003 Comprehensive Water Strategic Plan by O'Brien and Gere.

The 1989 “Modified” demand totals have been the basis for the County’s capital improvement program throughout the 1990’s, but the County has been able to limit infrastructure improvements by relying on the Baltimore City supply which has reduced capital expenditures. Having this flexibility from an operational standpoint as well as from a capital planning point of view has been beneficial to the County especially since demands have not increased as projected in the 1989 study. However, due to increasing concerns over the reliability and future quality of the Baltimore City supply as well as incurred capital costs (i.e. 72-inch City Zone 1 main break under Baltimore Harbor), the *2003 Strategic Plan* promotes a self-reliance strategy by expanding County infrastructure to further reduce reliance on the City. Increased autonomy will also protect the County from increased usage fees imposed by Baltimore City. Aging City infrastructure is likely to lead to regular rate increases in the future as well as potential water quality concerns. However, the expansion of County infrastructure is limited by the maximum groundwater supply potential of 111 MGD identified in the *1989 Water Supply Systems Analysis* report and in the *2003 Strategic Plan*. See Section 3.3 below for more details.

The results of the Federal Government’s 2005 Base Realignment and Closure (BRAC) program are expected to represent the largest single employment growth activity in Maryland since World War II. It has been projected that as many as 22,000 new jobs will locate in the County within the next 5 to 7 years as a result of BRAC, and that as many as 4,500 new households will locate in the County in relation to the BRAC job expansion. The Office of Planning and Zoning anticipates that the available land inventory in the County will be adequate to meet the growth demand without requiring major changes in the County’s Land Use Plan or in zoning. However, BRAC-related growth may accelerate development demand over the next several years. The County will continue to closely monitor its land inventory and infrastructure capacities in relation to BRAC impacts and identify alternatives as needed. Potential alternatives for optimizing the County’s public water system are discussed in Section 3.5.

As shown in Table 3-3, total population and household projections are given for each pressure zone for the planning period (2010 to 2035). This information was not used to calculate the demand projections for the *2003 Strategic Plan* but is given here for informational purposes and to support the projected growth of 3,150 EDU/year presented in Figure 3-2.

TABLE 3-3
Population and Household Projections, 2010 - 2035

	POPULATION					
WATER PRESSURE ZONES	2010	2015	2020	2025	2030	2035
Airport Square	20,634	21,526	22,601	22,237	23,545	23,794
Broad Creek	38,848	39,222	39,649	40,033	40,156	40,604
Broadneck	45,225	45,850	46,586	47,368	47,880	48,588
Brooklyn Park (North)	3,271	3,269	3,268	3,268	3,273	3,309
Brooklyn Park (South)	6,115	7,238	7,383	7,568	7,607	7,685
Crofton	26,392	26,685	26,885	26,966	26,970	27,289
Gibson Island	272	272	272	271	271	277
Glen Burnie High	65,422	65,947	66,775	67,631	68,249	69,034
Glen Burnie Low	132,166	134,290	136,205	138,332	139,776	141,636
Herald Harbor	1,942	1,942	1,967	2002	2,048	2,120
Jessup	10,881	12,105	13,292	14,203	15,645	15,937
Kings Heights/Odenton	44,836	47,304	48,631	49,478	51,021	51,848
Maryland City	16,278	16,358	16,403	16,440	16,948	17,081
Rose Haven	442	442	441	440	440	445
Ft. Meade (Private)	8,792	9,184	9,551	9,938	10,308	10,464
City of Annapolis	38,394	39,445	40,497	41,548	42,600	42,600
Rural	77,745	80,306	81,038	81,736	82,395	83,765
COUNTY TOTAL	537,656	551,384	561,444	570,461	579,131	586,474
	HOUSHOLDS					
WATER PRESSURE ZONE	2010	2015	2020	2025	2030	2035
Airport Square	7,779	8,294	8,908	9,300	9,544	9,802
Broad Creek	17,985	18,437	18,872	19,285	19,474	19,659
Broadneck	17,233	17,762	18,316	18,850	19,270	19,698
Brooklyn Park (North)	1,223	1,249	1,270	1,300	1,321	1,344
Brooklyn Park (South)	2,407	2,948	3,067	3,202	3,270	3,355
Crofton	10,225	10,516	10,760	10,939	11,056	11,181
Gibson Island	232	236	238	239	240	241
Glen Burnie High	25,063	25,789	26,570	27,267	27,929	28,592
Glen Burnie Low	51,341	53,028	54,647	56,213	57,403	58,571
Herald Harbor	888	908	928	949	971	992
Jessup	2,290	2,838	3,402	3,835	4,563	5,080
Kings Heights/Odenton	17,793	19,087	19,903	20,507	21,422	22,006
Maryland City	6,642	6,739	6,816	6,887	7,206	7,377
Rose Haven	210	211	212	213	214	214
Ft. Meade (Private)	2,571	2,727	2,877	3,034	3,192	3,307
Annapolis City	17,845	18,013	18,182	18,351	18,351	18,520
Rural	30,837	32,354	33,061	33,699	34,191	34,643
COUNTY TOTAL	212,562	221,136	228,030	234,070	239,616	244,583

Sources: 1. Projections based on Census 2010 SF-1 Data, change rate with 2010 Projections provided in the County's Round 7C, February 2010 and applied to the Round 7C data for years 2015-2035. 2. City of Annapolis P&Z

3.3 GROUNDWATER SOURCES AND APPROPRIATIONS

3.3.1 Hydrogeology of Anne Arundel County

Anne Arundel County is underlain by a wedge-shaped mass of stratified unconsolidated sedimentary deposits, the Coastal Plain sediments, which dip and thicken to the southeast. The wedge thickens from about 50 feet in the northwestern part of the County to as much as 1800 feet below ground level in the southeastern part of the County. It consists of layers of sand, silt, clay, and gravel and overlies much older consolidated bedrock, which has little or no water supply potential for the County.

The water-bearing aquifers which overlay bedrock are from oldest to youngest, the Patuxent, Lower Patapsco, Upper Patapsco, Magothy and Aquia. The four deepest aquifers are the sources of water supply for most of Anne Arundel County. The Aquia aquifer is an important source of water supply for more isolated areas in the central and southern parts of the County. The water bearing capacity of these aquifers varies from place to place due to a number of factors, chiefly the aquifer transmissivity. Transmissivity is a natural property of the aquifer that is dependent on the composition and thickness of the aquifer. As transmissivity increases, the ability of the aquifer to transmit water increases and the effect of water withdrawals on local surface water levels decreases. For more information on historical pumpage from these aquifers in Anne Arundel and other surrounding counties, refer to the 2001 Maryland Geological Survey (MGS) report by Achmad and Andreasen, titled, *Groundwater Levels and Pumpage Trends in the Major Coastal Plain Aquifers of Southern Maryland Between 1970 and 1996*.

3.3.2 Existing and Future Groundwater Potential

The County well fields and water supply wells are summarized in Table 3-4. Existing well field locations are shown in Figure 3-3 and listed in Table 3-4. Sites for future potential well fields are also shown in Figure 3-3 and are listed in Table 3-5. These tables are based on the 2003 *Strategic Plan* and will be updated once the current Strategic Plan has been completed.

The location and withdrawal potential of future well fields is primarily based on work by Mack and Achmad in a 1986 MGS report, titled, *Report of Investigation No. 46 - Evaluation of the Water-Supply Potential of Aquifers in the Potomac Group of Anne Arundel County, Maryland*. Earth Data, Inc. (EDI) further evaluated this work in the 1989 *Water Supply Systems Analysis* report by PSC Engineers. In addition, well allocation studies were also conducted by EDI for the planned Crofton and Arnold WTP expansions, titled, *The Results of an Investigation to Determine the Availability of a Phase I, 10 MGD and Phase II, 20 MGD Groundwater Supply in the Crofton Meadows Area* (1990) and *The Results of an Investigation to Determine the Availability of Phase I, 8.0 MGD and Final Phase 16 MGD Groundwater Supply at the Arnold Wellfield* (1993). In addition to the above studies, the MGS studied the Patapsco formation in the Glen Burnie area a few years after the 1986 study in the *Report of Investigation No. 54* (Achmad and Grufron, 1991). MGS also conducted a study of salt-water intrusion in the Broadneck, Annapolis Neck, and Mayo Peninsulas (Fleck, Andreasen, and Smith, 1996).

Anne Arundel County

Figure 3-3
Existing and Proposed
Well Fields

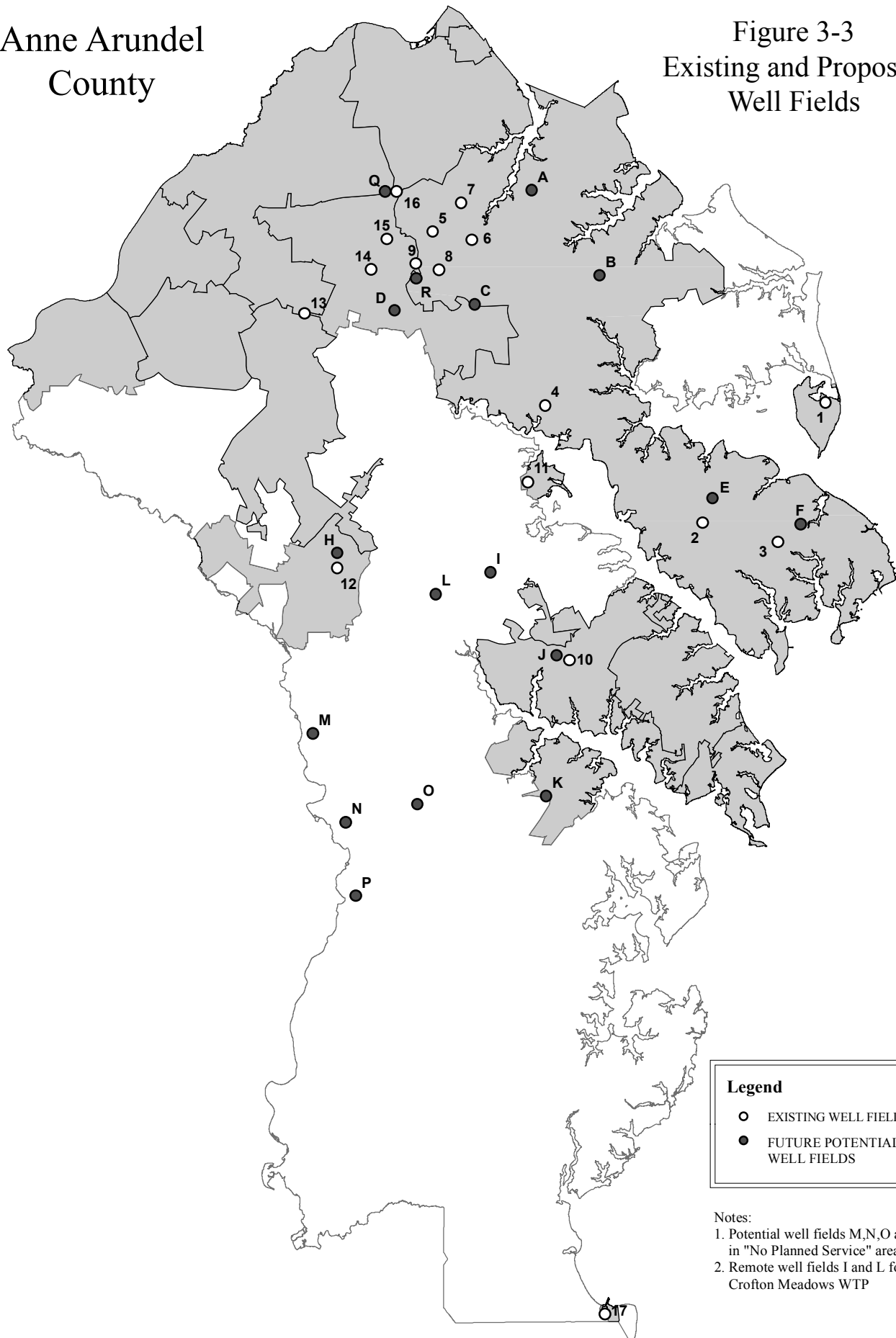


TABLE 3-4
Existing Well Fields
(per the 2003 Strategic Plan)

Pressure Zone	Existing Well Field No.(Fig. 3-3)	Facility Name	# of Production Wells (well #'s)	Aquifer ⁴	Permit Annual Avg. (MGD)	Permit Monthly Max. (MGD)	Total Well (MGD)	Best Well Out (MGD)	Groundwater Appropriation Permit #	GAP Expiration Date	Notes
Gibson Island (156 Zone)	1	Gibson Island WTP	2 (1, 3)	Upat	0.11	0.5	1.0	0.5	AA1971G034 (04)	Nov-16	
		SUBTOTAL	2		0.11	0.5	1.0	0.5			
Broadneck (220 Zone)	2	Arnold WTP	4 (1, 2, 3, 6)	Upat	1.5	3.5	5.3	3.96	AA1982G036 (06)	Feb-07	
		Arnold WTP	2 (4 & 5)	Lpat	2.2	4.5	6.5	3.24	AA1987G069 (02)	Feb-07	
		Facility Total			3.7	8	11.8	7.2			
	3	Amberley WTP	2 (1, 2)	Upat	1.056	1.6	3.2	1.6	AA1982G034 (05)	Feb-07	1
		SUBTOTAL	8		4.76	9.6	15.0	8.8			
Glen Burnie Low (220 Zone)	4	Severndale WTP	5 (4, 5, 6, 7, 8)	Lpat	7	8	8.0	5.56	AA1953G008 (07)	Oct-18	
		Severndale WTP	1 (3)	Upat	0.45	0.5	0.5	0	AA1953G108 (03)	Oct-18	
		Severndale WTP	1 (9)	Ptxn	1.6	2.4	2.4	0	AA1953G208 (02)	Oct-18	
		Facility Total			9.05	10.9	10.9	5.56			
	5	Phillip Drive SCW	1	Lpat	0.9	1	-	-	AA1982G042 (02)	Dec-04	2
	6	Harundale WTP	4 (1, 2, 3, 4 R)	Lpat	2.2	2.6	2.2	1.1	AA1982G037 (03)	Aug-17	
	7	Glendale SCW	1	Lpat	0.775	0.79	1.1	0	AA1982G043 (02)	Dec-04	
	8	Elvaton Rd SCW	1	Upat	0.9	1	0.9	0	AA1982G039 (02)	Dec-04	
	9	Crain Highway SCW	1	Lpat	0.9	0.972	-	-	AA1982G044 (02)	Dec-04	3
		SUBTOTAL	15		14.73	17.26	15.1	6.66			
Broad Creek (210 Zone)	10	Broad Creek 1 or 2 WTP	3 (1, 2, 3)	Upat	2.88	4.32	3.3	2.0	AA1968G006 (06)	Aug-08	
		Broad Creek 1 or 2 WTP	2 (4, 5)	Lpat	1	1.5	6.9	3.3	AA1986G070 (03)	Aug-08	
		Facility Total			3.88	5.82	10.2	5.3			
		SUBTOTAL	5		3.88	5.82	10.2	5.3			
Herald Harbor (240 Zone)	11	Herald Harbor WTP	2 (1, 2)	Lpat	0.16	0.26	1.2	0.6	AA1982G031 (03)	Aug-17	
		SUBTOTAL	2		0.16	0.26	1.2	0.6			
Crofton/KH/Odenton (290/330 Zone)	12	Crofton Meadows 1 or 2 WTP	5 (1, 2, 3, 7, 9)	Ptxn	2.5	3.5	7.1	5.1	AA1972G005 (05)	Dec-08	1
		Crofton Meadows 1 or 2 WTP	4 (4, 5, 6, 8)	Lpat	3.2	5.1	7.6	5.6	AA1972G105 (02)	Dec-08	
		Facility Total			5.7	8.6	14.7	10.7			
		SUBTOTAL	9		5.7	8.6	14.7	10.7			
Glen Burnie High (295 Zone)	13	Telegraph Road SCW	1	Lpat	1	1.1	1.1	0	AA1981G026 (03)	Mar-17	
	14	Stevenson Road SCW	1	Lpat	0.7	0.9	0.8	0	AA1981G025 (02)	Feb-05	
	15	Quarterfield Rd SCW	1	Lpat	0.9	1	-	-	AA1982G045 (03)	Feb-11	3
	16	Dorsey Road WTP	7 (2R, 18, 19, 20, 21, 22, 23)	Ptxn	3	3.5	5.6	4.6	AA1969G019 (05)	Jul-05	
		SUBTOTAL	10		5.6	6.5	7.5	4.6			
Rose Haven (120 Zone)	17	Rose Haven WTP	2 (1, 2)	Aquia	0.08	0.135	0.57	0.29	AA1948G001 (05)	15-Aug	
		SUBTOTAL	2		0.08	0.135	0.57	0.29			
TOTAL WELL			53		35.0	48.7	65.3	37.5			

Notes:

1. These wells are used as back-up facilities
2. SCWs currently inactive due to radium content in groundwater.
3. Well no longer exists as a production well.
4. Patuxent Aquifer (Ptxn); Lower Patapsco Aquifer (Lpat); Upper Patapsco Aquifer (Upat); Aquia Aquifer (Aquia)

**TABLE 3-5
Future Potential Well Fields**

Pressure Zones	Well Field (Fig. 3-3)	Wellfield Name	Potential Average Day Withdrawal ² (MGD)				
			Ptxn	Lpat	Upat	Mag	Total
Glen Burnie Low (220 Zone)	A	Marley	1.5				1.5
	B	Brookfield	1.5				1.5
	C	Olde Mill ¹		1			1
	R	Crain Hwy		0.9			0.9
	SUBTOTAL		3	1	0	0	4
Glen Burnie High (295 Zone)	D	New Cut ¹	2	2			4
	Q	Dorsey	0.6				0.6
		SUBTOTAL	2.6	2	0	0	4.6
Broadneck (220 Zone)	E	Arnold ⁴	3.5	0			3.5
	F	Amberley ⁴		2			0
	SUBTOTAL		3.5	2	0	0	3.5
Crofton (290 Zone) and Kings Heights / Odenton (330 Zone)	H	Crofton Meadows (local) ³	2.67	2.4			5
	I	Crownsville (remote)	2				2
	L	Chesterfield (remote)	2	2	2		6
	SUBTOTAL		6.67	4.4	2	0	13.07
Broad Creek (210 Zone)	J	Broad Creek	2	1.33			3.33
	K	Withernsea			2	3	5
		SUBTOTAL	2	1.33	2	3	8.33
Rural (no planned service)	M	Governor Bridge			3		3
	N	Patuxent Manor				2	2
	O	Davidsonville				2	2
	P	Harwood				2	2
	SUBTOTAL		0	0	3	6	9
TOTAL (w/ Rural)			17.8	10.7	7.0	9.0	42.5
TOTAL (w/out Rural)			17.8	10.7	4.0	3.0	33.5

Notes:

1. Olde Mill former name was Shipley's Choice; New Cut former name was Aurora Hills
2. Future groundwater potential values have been modified to reflect that wells have been constructed since 1989 groundwater study conducted by Earth Data, Inc. (EDI) for PSC Engineers "Water System Supply Analysis" report. Also, additional groundwater studies have been conducted since the 1989 study (EDI; 1990, 1993, 2003).
3. Old Crofton and Conway locations identified in 1989 groundwater study are considered as Crofton Meadows "local" for 2003 Strategic Plan. Refer to the 1990 Earth Data Inc. report entitled, "The Results of an Investigation to Determine the Availability of a Phase I, 10 MGD and Phase II, 20 MGD Groundwater Study in the Crofton Meadows Area" and the 1991 O'Brien & Gere Engineers report entitled, "Crofton Meadows Water Treatment Plant Well Siting Study."
4. Amberley wellfield not needed for 16 MGD Arnold WTP per 1993 Earth Data, Inc. report entitled, "The Results of an Investigation to Determine the Availability of a Phase I, 8 MGD and Final Phase 16 MGD Groundwater Supply at the Arnold Wellfield". As well, the report recommended that the final phase should come from Patuxent aquifer.

Table 3-6 displays both the existing and future well potential for the County. A total future groundwater potential of 126 MGD (maximum day) is derived in Table 3-6 by combining an existing 62 MGD well production capability and a future well potential of 64 MGD. Note that some of the existing well totals in Table 3-6 are limited to the planned ultimate treatment capacity of the facility even though the total existing well production capability (Table 3-4) may be greater. Of the 126 MGD groundwater potential, 13.5 MGD (well M, N, O, and P) is located in the rural service area (no planned service). At this time it is considered infeasible to utilize these resources due to the long distances required to convey the raw water to existing treatment facilities. For this reason, only 112 MGD (maximum day) is considered readily available to the County for planning purposes. Note that the future max day well potential of 51 MGD does not consider those additional wells that would be required to provide a firm pumping capacity at each facility. For this reason, to utilize the potential groundwater supply of 112 MGD, new well facilities in excess of 51 MGD capacity would need to be constructed. As shown in the MGS

groundwater study (Mack and Achmad, 1986), future groundwater potential is subject to future withdrawal rates by “other users” within and outside the County as described in Section 3.3.3 below.

TABLE 3-6
Maximum Day Groundwater Supply (Existing and Future Conditions)
(per the 2003 Strategic Plan)

Pressure Zone	Facility Name	Max Day Existing Well ¹		Future Max Day Withdrawal (Table 3-5)			Max. Day Existing & Future
		No.	(MGD)	Ltr.	Avg. Day x 150%	(MGD)	
Gibson Island 156	Gibson Island ¹	1	0.4				0.4
Broadneck 220	Arnold	2	11.8	E	3.5 x 1.5 =	5.3	17.1
	Amberley WTP ²	3	-	F	-	-	-
Glen Burnie Low 220	Severndale ¹	4	8.0				8.0
	Phillip Drive ⁴	5	0.0				0.0
	Harundale WTP	6	2.2				2.2
	Glendale SCW ¹	7	0.6				0.6
	Elvaton Rd SCW	8	0.9				0.9
	Crain Highway SCW ⁴	9	0.0	R	0.9 x 1.0 =	0.9	0.9
	Marley Creek			A	1.5 x 1.5 =	2.3	2.3
	Brookfield			B	1.5 x 1.5 =	2.3	2.3
	Olde Mill			C	1.0 x 1.5 =	1.5	1.5
Broad Creek 210 (220 future)	Broad Creek 1 & 2; (3 future)	10	10.2	J	3.33 x 1.5 =	5.0	15.2
	Withernsea			K	5 x 1.5 =	7.5	7.5
Herald Harbor 240	Herald Harbor WTP	11	1.2				1.2
Crofton 290	Crofton Meadows	12	14.7	H	5 x 1.5 =	7.5	22.2
	Crownsville			I	2 x 1.5 =	3.0	3.0
	Chesterfield			L	6 x 1.5 =	9.0	9.0
Glen Burnie High 295	Telegraph Road SCW	13	1.1				1.1
	Stevenson Road SCW	14	0.8				0.8
	Quarterfield Rd SCW	15	0.0				0.0
	Dorsey Road WTP	16	5.6	Q	0.6 x 1.5 =	0.9	6.5
	New Cut			D	4 x 1.5 =	6.0	6.0
Kings Hts/Odenton 330	Kings Heights WTP ³	-	3.6				3.6
Rose Haven 120	Rose Haven WTP	17	0.6				0.6
Rural (no planned service)	Governor Bridge			M	3 x 1.5 =	4.5	4.5
	Patuxent Manor			N	2 x 1.5 =	3.0	3.0
	Davidsonville			O	2 x 1.5 =	3.0	3.0
	Harwood			P	2 x 1.5 =	3.0	3.0
TOTAL (w/ Rural)			61.7			64.5	126.2
TOTAL (w/out Rural)			61.7 ⁽¹⁾			51.0	112.7

Notes:

1. Used lower value of planned ultimate treatment capacity (61.7 MGD total) rather than existing well capacity (65.3 MGD total).
2. Amberley facility to be eliminated after Arnold expanded to 16 MGD.
3. Kings Heights facility has been demolished. A new 3.8 MGD facility proposed at build-out.
4. SCW eliminated due to radium content in ground water.

Optimizing the use of existing and potential County supply wells will minimize reliance on the Baltimore City Central Water System. Any deficiency between future demands and the County’s ability to develop new well fields in the southern part of the County can be met by

purchasing water from Baltimore City up to the supplemental agreement flow rate of 32.5 MGD (maximum day) as described in Section 3.4.

3.3.3 Groundwater Studies

The original MGS groundwater model that was used to study Anne Arundel County (Mack and Achmad, 1986) was developed based on the hydrogeologic framework known at the time (well data from 1977) and water use projections known at the time. For the following reasons, the County initiated a new countywide groundwater study with MGS:

- a. Significant advances in the known hydrogeologic framework of the aquifers in Anne Arundel County have been made since the 1986 MGS study. MGS has performed studies on the Patapsco formations in the Glen Burnie area (Achmad and Grufron, 1991). MGS has studied water quality and flow in relation to salt water intrusion for the Broadneck, Annapolis Neck, and Mayo Peninsulas (Fleck, Andreason, and Smith, 1996). In addition, well level observation and pumpage trends have been studied in detail by MGS over the past 30 years (Achmad and Hansen, 2001).
- b. The total available groundwater potential for the County public water system is dependent on “other users” within and outside Anne Arundel County. Water use projections for “other users” as well as the County public water system have probably changed since the 1986 groundwater study. Pumpage projections used in the 1986 *Report of Investigation No. 46* can be found in that report on Table 7 “Pumping Rates Used to Simulate the Stressing of the Aquifers in the Year 2000” (in fact, these pumpage rates more closely reflect recently calculated build-out projections for the year 2043 than current production rates). A total annual average day pumpage rate of 83 MGD for the Department of Utilities (organizational structure at the time), 19.7 MGD for “other users” within the County, and 15.6 MGD for “other users” outside the County was used to simulate stressing of the Patuxent, Lower Patapsco, Upper Patapsco, and Magothy aquifers. Approximately 30% of the simulated pumpage came from “other users” located within and around Anne Arundel County. These projections from the 1986 study need to be verified with current pumpage rates and projections of future withdrawal as it could significantly affect the potential groundwater availability for the County.
- c. In addition, computer-modeling capabilities were also limited at the time of the 1986 study. Significant advances in technology will allow computer optimization of well withdrawal rates and locations to minimize draw down of the aquifers.

MGS completed a countywide groundwater study in 2007, which can be used to verify the future groundwater potential estimates presented in Table 3-6. The updated groundwater model will be used to complete the following objectives:

- a. Update current and projected pumpage rates for “other users” within and outside the County as well as County projections.

- b. Using computer optimization, develop optimum well withdrawal rates and select future sites that can reduce draw down in the aquifers in order to comply with the 80% management level required by the Maryland Department of the Environment (MDE). Potentially, the County would like to consolidate several of the smaller facilities proposed in the *2003 Strategic Plan* in the Glen Burnie area into one larger facility.
- c. Evaluate changes in water budget as recharge from outcrop areas increases to supply greater pumpage demands.
- d. Incorporate and verify results from previous well allocation studies that have been conducted for select plant expansions (i.e. Arnold, Crofton, and others).

3.3.4 Groundwater Appropriation Permits

Projections for safe groundwater withdrawal in Anne Arundel County are based on a hydraulic model used by the MDE. Rates and quantity of proposed withdrawal are designed to utilize the most productive portions of the aquifers and avoid saltwater intrusion. The maximum day groundwater withdrawals considered in the hydraulic model for existing and future well fields are described in Table 3-6. MDE issues groundwater appropriations permits by aquifer with limits on annual average day and maximum monthly withdrawal rates as shown in Table 3-4. For this reason, multiple permits may be required at a single production facility depending on the number of aquifers being utilized. The individual requirements of each permit vary. The majority of the Groundwater Appropriation Permits have been renewed since *the 2003 Strategic Plan* was completed, with current expiration dates ranging from November 2013 to December 2022. Tables 3-4 and 3-6 will be updated once the current *Strategic Plan* has been completed.

3.3.5 Groundwater Level Monitoring Program

For groundwater management and monitoring purposes, a network of observation wells in major aquifers has been installed in coordination and agreement with the MDE and MGS and has been monitored since the early 1990s. A report is submitted annually by MGS entitled, *Hydrographs and Tables Showing Ground-water Level Records for Selected Observation Wells in Anne Arundel County and Hydrographs Showing Surface-water Flow in Sawmill Creek*. In general, pumpage from County well fields have caused cones-of-depression to develop at Arnold, Broad Creek, Crofton Meadows, Dorsey, and Severndale (Curtin, 2000; Achmad and Hansen, 2001). Water level trends over the five-year period prior to the 2002 report are either flat or decline at rates up to 1.5 feet per year (Fewster and Andreasen, 2002). Water levels measured in observation wells generally do not exceed 75 feet below sea level in any of the aquifers; however pumping levels in production wells may be significantly deeper. The combination of relatively deep aquifers and shallow water levels results in a substantial amount of available draw down, especially in the Lower Patapsco and Patuxent aquifers, which could be used for additional withdrawal.

3.3.6 Land Subsidence Monitoring

In 1996, the MGS completed a study of land subsidence within Anne Arundel County titled, *Monitoring for Land Subsidence in the Arnold, Broad Creek, and Crofton Meadows Well Fields of Anne Arundel County* (Mack). The study led to the design of an early detection system for land subsidence. Precision benchmarks at sites considered most susceptible to land subsidence were established along with a schedule of monitoring the benchmarks to detect any changes over time. It has been determined that current water extraction is of no threat to any land subsidence at this time. As future withdrawals increase, the established monitoring system will detect subsidence in time to allow the Department of Public Works to redistribute pumpage to alternative well-fields before any structural damage to surface infrastructure might occur. The Office of Planning and Zoning maintains a copy of this report.

3.3.7 Wellhead Protection Program

In its continual effort to promote safe management of the land surface around public wells, the Public Drinking Water Program of the MDE has developed a model ordinance as a tool for local governments to use to protect their water supplies. The model ordinance provides an overlay-zoning district that restricts the kind of development that can occur within a wellhead protection district. The State recognizes that due to unique conditions within different local jurisdictions, additional or fewer safeguards may be needed than those proposed in the model. Significant work has already been done in collaboration with the State to identify potential contaminant sources in the County and to perform a hydro-geological study of the County. This work has established the groundwork for the County to pursue a wellhead protection program using the State's model ordinance as a guideline. See Chapter 2 Section 2.2, Ground Water Quality, for more information.

In addition to the wellhead protection program conducted in cooperation with the State, the County Department of Health currently maintains a Groundwater Protection Plan (for private water supplies), which documents and summarizes Health Department policies and programs regarding on-site sewage disposal systems and the protection of groundwater where public sewer is not available. The plan and policies are outlined in Appendix D.

3.4 SUMMARY OF INTERJURISDICTIONAL WATER AGREEMENTS

The County has entered into several different agreements in order to ensure supplemental water sources are available in times of need and to provide water to large customers.

3.4.1 Supplemental Source Agreements:

- a. Baltimore City (First Zone) - The agreement signed November 17, 1971, by representatives of Baltimore City and Anne Arundel County, provides for the purchase of water from the City's First Zone, which originates at the Montebello WTP. Currently, the agreement allows Anne Arundel County to receive up to 17.5 MGD of maximum day flow.

- b. Baltimore City (Second Zone) - The agreement signed October 22, 1969, by representatives of Baltimore City, Baltimore, Howard and Anne Arundel Counties, provides for the purchase of water from the City's Second Zone, which originates at the Ashburton WTP. Currently, the agreement allows Anne Arundel County to receive 10.0 MGD during average day conditions and 15.0 MGD during maximum day conditions.

3.4.2 Customers

- a. State of Maryland - Jessup Correctional Facility - This refers to UA #92065 executed by the State, County, MES, and the State Board of Public Works on April 9, 1992. To meet the State's need for more water to meet increased demands at the prison complex, the County agreed to provide expanded service. This entailed the construction of the Nursery Road Booster Pump Station and the Montevideo Booster Pump Station. This enabled the County to provide a maximum of 2.1 MGD at standard County rates. The State paid for construction in lieu of capital connection fees.

3.5 STRATEGIC PLANNING AND WATER SYSTEM OPTIMIZATION

The Department of Public Works is continually analyzing and optimizing water system operations and infrastructure to ensure a safe, reliable, and cost-effective source of public drinking water for existing and future customers. As part of this process, the County converted their existing water computer models in 1999 to a more advanced WaterCAD modeling platform. In 2003, the County completed the first major water system study using these new Water CAD models. The *2003 Comprehensive Water Strategic Plan* focuses on ways to meet interim (2010) and build-out (2043) demands, consolidate facilities, and increase the County's well supply potential while reducing reliance on the Baltimore City supply. In addition, as noted in Section 3.3.3, the County hired the Maryland Geological Survey (MGS) to perform a comprehensive groundwater study as an update to the 1986 MGS groundwater study. In an effort to reduce operations and maintenance (O&M) costs, the County is continually focused on ways to standardize equipment, consolidate facilities, and optimize pressure zone boundaries. Distribution and transmission system piping and pump station facilities financed by the development community or the County's Utility Enterprise Fund will continue to be reviewed with optimization and reduction of O & M costs in mind. Facilities will be planned with the potential future service area taken into consideration as well as implementation of project phasing to service the existing, interim and future conditions.

3.5.1 Hydraulic Modeling

Through the mid 1990s, the County utilized a water model that resided within a more comprehensive allocation program called the Sewer and Water Allocation Management and Planning System (SWAMP). The SWAMP system was developed in the 1980's, and it enabled the County to assign demands at nodes throughout the water distribution system at different commitment levels. These commitment levels are related to the various stages of review for subdivision projects. As a result, simulations can be performed to include all existing demands

and any variation of projects that are permitted, allocated, in sketch and concept review phases. Furthermore, the existing demands are based on an average of the eight most recent billing cycles for each customer in the County. This ensures that nodal demands incorporated in the model are reflective of actual conditions. For more information regarding SWAMP see Appendix B.

In the late 1990s, the Planning Section within the Bureau of Engineering contracted Pitometer Pipeline Services to conduct a comprehensive calibration project to update the water model's accuracy. This project included extensive field testing to verify physical characteristics of the water distribution system such as pipe friction factors (C-factors), master meter accuracies, closed valves and potential un-accounted for water. As part of the calibration project the DOS-based, non-graphical hydraulic model within the SWAMP system was converted to WaterCAD, a windows-based graphical model that is capable of performing extended period simulations (EPS). This conversion included importing digital versions of the current water overlay maps, which greatly enhanced the County's desktop modeling abilities, thereby increasing efficiency. For more information on the Pitometer project, refer to the series of reports entitled, *Hydraulic Model Calibration - Phase I* (2001) and *Hydraulic Computer Analysis - Phase II and III* (2001).

With the newly updated and calibrated WaterCAD model, the County contracted O'Brien and Gere to conduct a new comprehensive water strategic plan to update the 1989 strategic plan as described below.

3.5.2 Strategic Planning

The Planning Section within the Department of Public Works initiates and develops water strategic planning for infrastructure expansion pertaining to all aspects of its water supply and distribution system to meet existing and future demands. In 1989, PSC Engineers completed a detailed engineering study which established the basis for the County's Water Master Plan throughout the 1990s. In 1999, Wallace, Montgomery & Associates completed a regional strategic plan to address low-pressure problems and major development projects in the mid-west portion of the County. In 2003, O'Brien & Gere Engineers completed a comprehensive water strategic plan, which incorporated findings from the 1989 and 1999 studies and evaluated the water system for 2010 and build-out conditions (2043). A new Comprehensive Water Strategic Plan is currently underway.

3.5.2.1 The 1989 Anne Arundel County Water Supply Systems Analysis

The County completed a detailed engineering study of the County's water supply system, titled, *Water Supply Systems Analysis*, prepared in 1989 by PSC Engineers & Consultants, Inc. otherwise known as the *1989 Strategic Plan*. The report, among other things, included a strategic plan (Chapter 11), which coordinated the findings of planning projections, peaking characteristics, short-term and long-term demand forecasts, potential groundwater projections, hydraulic modeling analyses and criteria for system improvements. Background research included unaccounted-for water investigations and projections, assessment of rehabilitation practices, water conservation alternatives, aquifer protection, treatment process evaluation and recommendations, and optimization of human resources through consolidation of system facilities. Each water pressure zone was analyzed using hydraulic modeling techniques of the

County's Sewer and Water Allocation, Management and Planning System (SWAMP). The pressure zone models were then consolidated into one major facility model of the entire County system to assess potential zone consolidation and the ability to convey excess potential groundwater sources from the southern pressure zones (Crofton and Arnold) to the northern pressure zones. The Analysis resulted in the determination of the size and siting of future consolidated system facilities including major transmission mains, pumping stations, water treatment facilities and storage facilities. The results obtained were then used to develop a long-term capital water development plan based on the available ground water sources of the County and the surface water supply available for purchase in view of water agreements between the County and the City of Baltimore.

3.5.2.2 *Midwest Corridor Strategic Plan*

To supplement the *1989 Strategic Plan*, and to address other immediate concerns, the County initiated a localized strategic plan in 1999 for the mid-western portion of the County. This study was conducted by Wallace, Montgomery and Associates and is known as the *Midwest Corridor Strategic Plan*. This study was needed to evaluate alternatives for providing increased pressures to areas of higher elevation within the 295 Zone. There were existing subdivisions as well as planned subdivisions that would be better served by the adjacent 350 or 400 Zones. A result of this study was the siting of a 350 Zone Arundel Mills elevated tank after it was determined that its original location along Nursery Road was within the BWI Airport's flight zone. In conjunction with the *Midwest Corridor Strategic Plan*, Harms Engineers conducted a study of the Arundel Mills development. The findings of these studies resulted in the County extending the 350 Zone south of MD 100 incorporating the entire Arundel Mills project and much of the Dorchester residential project. The developer incurred the cost of much of this needed infrastructure, and supplemented with other County funded infrastructure, existing and potential low-pressure conditions were avoided. Developer infrastructure included the Harman's BPS which boosts water from the 295 Zone to the 350 Zone and related miscellaneous transmission piping for serving the area. The developer also provided land for siting the 350 Zone Arundel Mills elevated tank.

The *Midwest Corridor Strategic Plan* also identified transmission mains that would need to be constructed along Donaldson Avenue (Project W7775, completed in 2007) and Disney Road in conjunction with the Fort Meade BPS (Project W7934), now referred to as the Disney Road BPS. These projects as well as other miscellaneous piping projects would allow the Telegraph Road corridor to be incorporated into the 350 Zone. One of these projects was the Telegraph Road Tie Line, which allows flow to be transferred from the 330 Zone to the 295 Zone (see Section 3.6.7.4 for a description of improvements at the Telegraph Road SCW).

3.5.2.3 *The 2003 Comprehensive Water Strategic Plan*

In 2003, the County completed a detailed engineering study of the County's water system, titled, *Comprehensive Water Strategic Plan*, prepared by O'Brien & Gere Engineers. Projects presented in the *1999 Midwest Corridor Strategic Plan* were re-evaluated during the *2003 Comprehensive Water Strategic Plan*. The study includes a strategic plan (Chapters 6 and 7), which coordinates the findings of planning projections, peaking characteristics, demand forecasting, groundwater supply projections, hydraulic modeling analyses, and criteria for system improvements. Background research included unaccounted-for water investigations and

facility assessments. The *2003 Strategic Plan* developed interim (2010) and build-out (2043) water demands for the County based on zoning projections. Using hydraulic modeling software (WaterCad), separate computer models were combined in order to reflect the interconnected water pressure zones and were analyzed for the interim and build-out periods. The analysis resulted in the sizing and siting of future consolidated system facilities including major transmission mains, pumping stations, water treatment facilities and storage facilities. Emphasis was placed on reducing reliance on the Baltimore City supply by continued development of the County's well supplies to the greatest extent possible. The resulting capital improvement projects (CIPs) were then used to develop a long term capital water development plan based on the available ground water sources in the County, the surface water supply from the City of Baltimore, and the projected capital budget throughout the planning period. See Table 3-7 "Proposed New Facilities and Expansion Schedule" for a schedule of proposed County facilities (as presented in the *2003 Strategic Plan*). The total County maximum day supply is compared with the total demand projection at five-year increments, resulting in a Baltimore City maximum day reliance flow rate. Particular large-scale CIPs were phased over several years based on demand projections and capital budget limitations. The County Water Master Plan Maps, W-1 through W-12, incorporate the findings of the strategic plan study as well as the ongoing CIP program.

3.5.2.4 New Comprehensive Water Strategic Plan

A new Comprehensive Water Strategic Plan is currently underway. Similar to the *2003 Strategic Plan*, the new *Strategic Plan* will include water demand projections, an existing system analysis, a future system analysis and development of a revised CIP.

3.5.3 Water System Optimization

3.5.3.1 Water Treatment Plants

The *2003 Comprehensive Water Strategic Plan* identified the production facility infrastructure necessary for meeting expected growth while optimizing the use of potential County groundwater sources. By fully utilizing available County groundwater sources, the amount of water purchased from the City of Baltimore can be minimized. The *2003 Strategic Plan* also identified locations throughout the County that were suitable for centralizing water production facilities in relation to where adequate groundwater resources are anticipated. In general, the *2003 Strategic Plan* focused on three objectives: (1) centralize facilities when possible, (2) create flexibility whereby water could be easily transmitted across zones via transmission mains and (3) reduce reliance on the City of Baltimore. As a result, the County will focus development of several existing production facilities and several proposed new facilities as described in Table 3-7 "Proposed New Facilities and Expansion Schedule". The major focus will be on the following two major production facilities:

- a. Arnold expansion (8 to 16 MGD), which was completed in 2012.
- b. Crofton Meadows II expansion (5 to 25 MGD), currently 15 MGD; develop remote Chesterfield well field (3 MGD)

In addition to these two expansions, several new facilities and expansions are proposed during the 25-year planning period to meet the projected demands and reduce reliance on the City:

- a. Withernsea (5 MGD)
- b. Dorsey expansion or new facility (3.5 to 6.0 MGD)
- c. Broad Creek III by 2015 (7.8 MGD); abandon Broad Creek I (-2.1 MGD)
- d. Marley Creek (2.3 MGD)
- e. New Cut (6 MGD)
- f. Crofton Meadows II expansion (25 to 30 MGD); Chesterfield well field (3 to 9 MGD)
- g. Broad Creek expansion (7.8 to 15.5 MGD); abandon Broad Creek II (-4.0 MGD)

After the planning period, the following additional expansions and new facilities are proposed by build-out (projected date 2043):

- a. New Kings Heights facility (3.8 MGD)
- b. Withernsea expansion (5 to 7.5 MGD)
- c. New Brookfield facility (2.3 MGD)
- d. Crofton Meadows II expansion (30 to 33 MGD); develop Crownsville well field (3 MGD)
- e. New Old Mill facility (1.5 MGD)

At build-out conditions, excess flow from Crofton, Broad Creek, and Withernsea would be conveyed by transmission mains to the northern portions of the County to meet maximum day demands (excess flow from Broad Creek and Withernsea would be conveyed to Arnold clear well which would then be conveyed north to Glen Burnie). Groundwater well and pumping capacity for each of the following water treatment plants is summarized in Table 3-4, which will be updated once the new *Strategic Plan* has been completed.

3.5.3.1.1 *Arnold*

The Arnold Water Treatment Plant (WTP) is located in the Broadneck 220 Zone. The Arnold facility has a 3.0 MG ground storage tank. Treatment provided includes aeration, pre-chlorination, chemical addition, coagulation, sedimentation, fluoridation, disinfection and filtration. Iron sludge is sent to the sanitary sewer. As recommended in the 2003 Strategic Plan, the 8 MGD plant has been expanded to its ultimate capacity of 16 MGD under CIP W8018. In conjunction with the proposed Arnold expansion, a major 36-inch transmission main has been constructed to convey water to the Glen Burnie Low Zone as discussed in section 3.5.3.2. By expanding to 16 MGD, the Arnold WTP will be able to supply the Glen Burnie Low Zone at 12.4 MGD (average day) and 7.0 MGD (max day).

For build-out conditions, similar flow rates to the Glen Burnie Low Zone are planned, but the increased demand in the Broadneck Zone could potentially be supplemented by flow conveyed from the Broad Creek Zone via a proposed transmission main across the Severn River. The Amberley WTP, located near the Arnold WTP, was used in the past to meet peak demands but will not be used in the future due to the Arnold WTP expansion.

TABLE 3-7
Proposed New Facilities and Expansion Schedule
(Per the 2003 Strategic Plan)

Water Supply Source	2002 Production	2012 Production	2015 Production	2020 Production	2025 Production	2030 Production	2035 Production	2040 Production	Targeted Ultimate Production (MGD)
<i>Maximum Day Demand (system-wide)</i>	62.0	81.5	89.0	96.4	103.9	111.3	118.8	126.3	130.7
<i>Maximum Day Demand (independent pressure zones)</i>	5.5	7.5	0.5	0.6	0.7	0.8	0.8	1.0	1.1
<i>Maximum Day Demand (combined zones)</i>	56.5	74.0	88.4	95.8	103.2	110.5	117.9	125.3	129.7
Broadneck – 220									
Amberley WTP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Arnold WTP	8.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
<i>Zone Total</i>	<i>8.0</i>	<i>16.0</i>	<i>16.0</i>	<i>16.0</i>	<i>16.0</i>	<i>16.0</i>	<i>16.0</i>	<i>16.0</i>	<i>16.0</i>
Glen Burnie Low - 220									
Brookfield WTP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	2.3
Harundale WTP	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Marley Creek WTP	0.0	0.0	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Olde Mill WTP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5
Severndale WTP	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Elvaton Road SCW*	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Glendale SCW*	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Phillips Drive SCW*	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Crain Highway SCW*	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
<i>Zone Total</i>	<i>13.3</i>	<i>13.3</i>	<i>15.6</i>	<i>15.6</i>	<i>15.6</i>	<i>15.6</i>	<i>15.6</i>	<i>17.9</i>	<i>19.4</i>
Glen Burnie High - 295									
New Cut WTP	0.0	0.0	0.0	6.0	6.0	6.0	6.0	6.0	6.0
Dorsey Road WTP	2.9	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Quarterfield Road SCW*	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Stevenson Road SCW	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
<i>Zone Total</i>	<i>4.7</i>	<i>7.8</i>	<i>7.8</i>	<i>13.8</i>	<i>13.8</i>	<i>13.8</i>	<i>13.8</i>	<i>13.8</i>	<i>13.8</i>
Crofton - 290									
Crofton Meadows I & II WTP*	5.0	25.0	25.0	28.5	30.0	30.0	30.0	30.0	33.0
Kings Heights/Odenton - 330									
Kings Heights WTP	2.0	0.0	0.0	0.0	0.0	3.8	3.8	3.8	3.8
Airport Square – 350									
Telegraph Road SCW	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Broadcreek – 220									
Broad Creek I and II WTP	6.1	4.0	4.0	4.0	0.0	0.0	0.0	0.0	0.0
Broad Creek III WTP	0.0	0.0	7.8	7.8	15.5	15.5	15.5	15.5	15.5
Withernsea	0.0	5.0	5.0	5.0	5.0	5.0	5.0	7.5	7.5
<i>Zone Total</i>	<i>6.1</i>	<i>9.0</i>	<i>16.8</i>	<i>16.8</i>	<i>20.5</i>	<i>20.5</i>	<i>20.5</i>	<i>23.0</i>	<i>23.0</i>
Independent									
Herald Harbor WTP	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Gibson Island WTP	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Rose Haven WTP	0.0	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Total Baltimore Supply	22.5	10.9	6.3	4.2	6.3	9.9	17.2	19.8	19.7

*Crofton Meadows WTP expanded to 30 MGD by 2020, but the system is only capable of consuming 28.5 MGD from that source in 2020.

	Severn River crossing completed; excess Broad Creek supply available to rest of system
	Supply capacity brought online
	Supply capacity taken offline

3.5.3.1.2 *Crofton Meadows*

The Crofton Meadows facility is located in the Crofton 290 Zone. The Crofton Meadows I WTP was constructed in 1973 with a treatment capacity is 4.2 MGD. . In 1996, the Crofton Meadows II WTP was constructed with a treatment capacity of 5.0 MGD, with provisions at the site to expand to 30 MGD. Total treatment capacity of both plants combined is currently 15.0 MGD with the completion of the Phase I expansion (CIP W7786), with Crofton Meadows I used to meet peak demand throughout the year. Treatment provided (at both facilities) includes aeration, pre-chlorination, chemical addition, coagulation, sedimentation, filtration, fluoridation, and disinfection. Iron sludge is sent to the sanitary sewer.

The *2003 Strategic Plan* proposed incremental expansions of the Crofton Meadows II WTP with an ultimate capacity of 33 MGD at build-out. The Crofton Meadows I WTP may be abandoned as a result of the Crofton Meadows II WTP phase 1 expansion to 15 MGD. Phase II would consist of a 15 to 25 MGD expansion, requiring approximately 3.5 MGD from a remote well field in the Chesterfield area. Ultimately, the Crofton Meadows II WTP would be able to supply the following zones during maximum day conditions: Kings Heights/Odenton (330), Maryland City (369), Jessup (400), most of Airport Square (350) reducing reliance on the Baltimore City supply at Nursery Road, and potentially Fort Meade Private (288/391). The timing and need of these subsequent expansions is dependent upon the County's disposition of the Fort Meade (Private) water system. The Federal Government has considered privatizing the operation and maintenance of Fort Meade's water system; however, to date, final decision to privatize has not been made. It has been determined through other studies that, should the County pursue operation and maintenance of Fort Meade's system, it would be more cost effective for the County to abandon Fort Meade's existing production facility and supply the area with water from the Crofton Meadows II WTP. This would require the Crofton Meadows future expansion schedule to be accelerated. As many as eight total wells would be constructed through the Chesterfield area toward the Crofton Meadows WTP to provide optimal use of available draw down. At build-out conditions, it is proposed that the Crofton Meadows II WTP be expanded from 30 MGD to an ultimate capacity of 33 MGD. This would require developing additional remote wells at the Crownsville area to provide the additional 3 MGD.

3.5.3.1.3 *Broad Creek (Annapolis)*

The Broad Creek facility is located in the Broad Creek 210 Zone. The Broad Creek I WTP was originally constructed in 1967 and upgraded in 1983. Current treatment capacity is approximately 2.1 MGD. The Broad Creek II WTP was built in 1989 with a treatment capacity of 4.0 MGD in order to meet the incumbent growth in the Parole Town Center and the South River Colony subdivision. The Broad Creek I and II WTPs have a combined treatment capacity of approximately 6.1 MGD, with Broad Creek I used to meet peak demands throughout the year. Treatment provided includes aeration, pre-chlorination, chemical addition, coagulation, sedimentation, filtration, fluoridation, and disinfection. Sludge is sent to the sanitary sewer.

To meet interim demands, which include a potential Annapolis Neck demand of 0.8 MGD, the *2003 Strategic Plan* proposed that the aging Broad Creek I WTP be abandoned and a new Withernsea WTP be constructed with a treatment capacity of 5 MGD. The Broad Creek II WTP and Withernsea WTP would have a combined treatment capacity of 9 MGD. In order to reduce reliance on the Baltimore City supply at Fort Smallwood and to phase out the Broad Creek II

WTP, it is proposed that a Broad Creek III WTP be constructed by 2015 so that excess flow could be conveyed to the Arnold WTP via a transmission main across the Severn River. The Broad Creek III WTP would have a treatment capacity of 7.8 MGD by 2015 and an ultimate capacity of 15.5 MGD by 2025, at which time the Broad Creek II WTP could be abandoned. At build-out conditions the Withernsea WTP would be expanded from 5 to 7.5 MGD. At that time, the Broad Creek III WTP and the Withernsea WTPs would have a combined capacity of 23 MGD, which could satisfy build-out demands and have 7.5 MGD excess capacity to be conveyed to the Arnold WTP for conveyance to the Glen Burnie Low Zone. An alternative approach would be to not build a Withernsea WTP and accelerate the Broad Creek III WTP as described in Section 3.6.2.5.

3.5.3.1.4 *Severndale*

The Severndale WTP is located in the Glen Burnie Low 220 Zone. The facility is located off of Benfield Road along Southway in the community of Severndale. The original plant was constructed in 1961 at 3.5 MGD and was expanded to 7 MGD in 1969. In 1992, the plant was expanded again, to its current capacity of 8 MGD along with a new high lift pumping station. This expansion increased production that otherwise would have been provided by the City of Baltimore. Treatment provided includes aeration, pre-chlorination, chemical addition, sedimentation, filtration, fluoridation, and disinfection. Sludge is sent to the sanitary sewer. Transmission mains have recently been constructed to Ritchie Highway to optimize production capability of the expanded plant.

3.5.3.1.5 *Dorsey*

The Dorsey WTP is located in the Glen Burnie High 295 Zone. The facility has a current treatment capacity of approximately 3.5 MGD and a high lift pumping capacity of 8 MGD. Up to 3.3 MGD is fed from the Glen Burnie Low (220 Zone) to the Dorsey clear well via a 16-inch main so that a total maximum day supply of 6.8 MGD can be supplied to the Glen Burnie High (295 Zone). Capacity of the Dorsey WTP is sometimes limited to approximately 2.9 MGD due to surface sweep and mud ball accumulation in the pressure filters located on the south treatment train. Current treatment provided includes aeration, pre-chlorination, chemical addition, sedimentation, filtration, fluoridation, and disinfection. Sludge is sent to the sanitary sewer.

To meet future demands for the Glen Burnie High 295 Zone, it would be preferable to construct a new Dorsey WTP as opposed to upgrading the existing water treatment plant due to the condition of the aging facility. Due to site constraints, it has also been determined that expansion of the existing facility is not feasible. As a result, Capital Project W7995, to upgrade the existing facility, was recommended for termination in the FY2007 budget.

3.5.3.1.6 *Harundale*

The Harundale WTP is located in the Glen Burnie Low 220 Zone. The facility was originally constructed in 1947 and has a treatment capacity of 2.2 MGD. Treatment currently consists of aeration, pre-chlorination, chemical addition, sedimentation, filtration, fluoridation, and disinfection. The Harundale WTP was upgraded in 1996 and 1998, and the infrastructure is considered to be in good condition.

3.5.3.1.7 *Kings Heights*

The Kings Heights WTP was located in the Kings Heights / Odenton 330 Zone along Bruce Avenue in Odenton Heights. This plant was demolished in 2005. Based on the *2003 Strategic Plan*, the following conditions will warrant that a new 3.8 MGD Kings Heights facility be constructed by the year 2030: (1) Demands reach current projections, (2) Minimizing flow from Baltimore City is a top priority such that the Nursery Road supply is kept as low as 4 MGD maximum day, and (3) Fort Meade “Private” is taken over by the County.

3.5.3.1.8 *Herald Harbor*

The Herald Harbor WTP is located in the Herald Harbor 240 Zone. The facility has a current treatment capacity of 0.58 MGD. The treatment facility has been upgraded under Project W7930 with a new package flocculation, sedimentation, gravity, and filtration plant within the existing building. A second backwash decant tank was also installed.

3.5.3.1.9 *Gibson Island*

The Gibson Island WTP is located in the Gibson Island 156 Zone. The facility has a current treatment capacity of 0.3. A new treatment and chemical handling system has been initiated under Project W7776. As the County is no longer providing water to the Gibson Island golf course, the overall demand in Gibson Island has decreased significantly. Therefore, the capacity of the new treatment plant will be less than the current capacity of 0.3 MDG.

3.5.3.1.10 *Rose Haven*

The Rose Haven WTP is in Rose Haven 130 Zone. The facility has a current treatment capacity of 0.25 MGD with a projected build-out demand of 0.10 MGD. Treatment consists of chlorination and fluoridation.

3.5.3.1.11 *Self Contained Wells*

The County normally operates four self-contained wells (SCWs) in the Glen Burnie Low 220 Zone and the Glen Burnie High 295 Zone. In the past, treatment generally consisted of disinfection and fluoridation, with aeration at the Glendale SCW. Radium has been detected above acceptable levels at some of the wells listed in Table 3-8. A reverse osmosis treatment systems, to lower radium level, was installed at Glendale facility in 2003, under CIP W7976 and this well is now back in service. Permits continue to be maintained at some of the “out of service” facilities, in the event that they are reactivated in the future.

TABLE 3-8
Status Of Self Contained Wells

Self Contained Wells	Pressure Zone	Capacity (MGD)	Out of Service Due to Radium Level	Comments
Crain Highway	220	0.96 (+)	Yes	Abandoned & Demolished
Glendale	220	0.79	No	Treatment System installed in 2003; back in service
Elvaton Road	220	0.86	No	Stand-by facility
Phillip Drive	220	0.86	Yes	Treatment would be required to reactive
Quarterfield Road	295	1.0	Yes	Abandoned & Demolished
Stevenson Road	295	0.64	No	
Telegraph Road	295	0.96	No	

3.5.3.2 *Transmission System*

North-South Transmission Main Arteries

The 1989 and 2003 strategic plans focused development of two main arteries for conveying water from Crofton to Glen Burnie and from Arnold to Glen Burnie. These two north-south arteries would allow potential excess groundwater sources to be conveyed from the southern pressure zones to the northern pressure zones, reducing dependency on Baltimore City. Existing and proposed east-west distribution mains in the 295 Zone will hydraulically link Crofton and Arnold even though it is not intended to convey water from one facility to the other.

Broad Creek to Arnold to Glen Burnie Transmission Mains

The Arnold to Glen Burnie transmission system has been completed under series of projects: W7510, W7780, W7782, and W7783. The entire project consists of approximately 57,000 LF of 36-inch diameter piping. The general alignment begins at the Arnold WTP and continues along College Parkway to Ritchie Highway. The alignment continues north along the Ritchie Highway corridor to Mountain Road where it terminates with a connection to an existing 30-inch main. This transmission main will allow the 16 MGD Arnold WTP to convey approximately 7.0 MGD (maximum day) and 12.4 MGD (average day) to the Glen Burnie Low 220 Zone. This would limit the City Zone 1 supply at Fort Smallwood to approximately 6 MGD (maximum daily flow).

Similar flow rates to the Glen Burnie Low Zone are proposed at build-out conditions by utilizing excess production in the Broad Creek 210 Zone. The 2003 *Strategic Plan* proposed that 33,800 LF of 24-inch main be constructed across the Severn River by 2015 to connect the Broad Creek Zone to the Broadneck Zone. A low-head booster station at the Broad Creek WTP would convey water to the Arnold GST where it could be distributed to the Broadneck or Glen Burnie Low Zone via the Arnold BPS. By 2015, it is estimated that up to 14 MGD (maximum day) could be conveyed north to the Glen Burnie Low Zone by utilizing excess capacity from the Broadneck and Broad Creek Zones. This would eliminate the need for the Fort Smallwood (City Zone 1) connection to meet maximum day demands for the remainder of the planning period (2015 to 2025), assuming the Marley Creek WTP (2.3 MGD) is constructed in this time period. However, at build-out conditions it is projected that up to 10 MGD would be needed from the City Zone 1 supply at Fort Smallwood, assuming that Marley Creek, Brookfield, and Old Mille WTPs (6.1 MGD total) are constructed in the Glen Burnie Low Zone.

Crofton to Glen Burnie Transmission Mains (Fort Meade Private/Jessup/Maryland City/Glen Burnie High/Airport Square)

The Crofton to Glen Burnie transmission system is under development as a series of the following projects: W7656, W7657, W7784, and W7932. Currently projects W7656 and W7657 have been completed which consists of 21,000 LF of 36-inch water main from the Crofton Meadows II WTP to Chapelgate Road, located in the Kings Heights/Odenton 330 Zone. Project W7784 will continue with 32,000 LF of 36" main from Chapelgate Road to the proposed Disney Road BPS (formerly the Fort Meade BPS) on Disney Road, near the intersection with Disney Estates Circle. Project W7932 consists of approximately 7,000 LF of 24-inch main that will run from the proposed Disney Road BPS (CIP W7934) to Rockenbach Road in the Jessup 400 Zone. The 2003 *Strategic Plan* also proposed that a 24-inch main be constructed along Mapes Road (MD 198) from the programmed 36-inch transmission main (Project W7784) at Chisholm Avenue to the Fort Meade Private WTP. By continuing 12,500 LF of 16-inch main from the Fort Meade WTP location to the Maryland City 369 Zone, the Crofton Meadows II WTP could provide redundancy to this zone. To boost water coming from the Crofton Meadows

II WTP, the proposed Laurel Heights BPS would be constructed in the Maryland City (369 Zone). However, there are no current plans for the County to take over the Fort Meade system at this time. If the County were to provide service to Fort Meade in the future, these and other projects would need to be considered. In the mean time, CIP W8016 has been initiated in an effort to provide the Maryland City 369 Zone with a second supply source. CIP W8016 consists of approximately 22,000 of 24-inch water transmission main from MD 175, along MD 32 towards MD 198 in the Maryland City 369 Zone.

Broad Creek to Annapolis Neck Transmission Main

The *1989 Water Supply System Analysis* report proposed that a 16-inch transmission main be constructed from the Broad Creek area to the Annapolis Neck area. In the past, the County did not anticipate the need to construct the costly extensions to serve this area but identified this project as an eventual need. The County is currently looking at different alternatives to supply this area. For planning purposes, the *2003 Strategic Plan* assumed that the Annapolis Neck area would be served by the end of the planning period (2020) due to petition.

Conclusions

The completion of the entire above transmission main infrastructure will provide the County with a consolidated system that maximizes use of known groundwater sources in the southern pressure zones and minimizes the number of required production facilities in the County, thus reducing capital and operational costs.

3.6 WATER PRESSURE ZONE DESCRIPTIONS

The current boundaries of the water pressure zones are different from previous County Master Plans (prior to 1999) because they now represent pressure zones and not water service areas. As the County's water distribution system has developed, interconnections have been constructed that essentially connect all served areas, excluding Broad Creek, Gibson Island, Herald Harbor and Rose Haven. Therefore, although water may be produced at a specific point it is widely distributed throughout the County eliminating defined water service areas. The current water pressure zones are listed in Table 3-9. As well, several County-operated "sub-zones" and the City of Annapolis systems are listed. For each pressure zone, storage tank overflow elevations (OFE) and the County design criteria for the maximum first floor elevation (FFE) are also listed in Table 3-9. Table 3-10 lists the existing and future required water system storage tanks for water that is supplied by Anne Arundel County.

TABLE 3-9
Anne Arundel County Water Pressure Zones

County Water Pressure Zones	OFE* (feet)	Max FFE* (feet)	Water Pressure Sub-Zones	Gradient (feet)	Max FFE * (feet)	Major Private Systems within Pressure Zones ¹
Airport Square	350	230	Ridge Forest ²	380	260	The Provinces; Lake Village
Broad Creek	210	90	Heritage Harbor	285	150	
Broadneck / Glen Burnie Low	220	100	Marley Neck Suction Side ³	190	70	
Brooklyn Park ⁴	350/190	230/70				
Crofton	290	170				
Gibson Island	156	35				
Glen Burnie High	295	175				
Herald Harbor	240	120				
Jessup	400	280				The Provinces
Kings Heights/Odenton	330	210	Millersville	360	240	Pioneer City; Still Meadows; Fort Meade ⁵
Maryland City	369	250				Fort Meade ⁵
Rose Haven	130	10				
City of Annapolis - not served by County	173	--				U.S. Naval Academy

Notes: * OFE = Overflow Elevation; FFE = First Floor Elevation (recommended)

1. Major private systems considered greater than 0.1 mgd
2. The Ridge Forest 380 sub-zone is currently supplied by the Airport Square 350 Zone. After completion of a proposed 12- inch loop main around Clark Road and Ridge Road, the Ridge Forest area could be incorporated into the Jessup 400 Zone and the Ridge Forest BPS could be abandoned or kept as a back-up facility
3. Marley Neck area is fed by the suction side of the Fort Smallwood BPS (Baltimore City Zone 1)
4. Supplied by Baltimore City's First and Second Pressure Zones
5. The Fort Meade Private Water System is located between the Maryland City 369 Zone and the Kings Heights/Odenton 330 Zone. This system is divided into a north 391 Zone and a south 288 Zone

TABLE 3-10
Water System Storage Facilities

Water Pressure Zone / Facility	200' Map	Existing Capacity (MG)	Proposed Capacity (MG)	Proposed Year to Construct ¹	Total Capacity At Build-Out (MG)
Airport Square 350 Zone					
Arundel Mills ET	F7	2.00			2.00
Meade Village ET ²	H9				³
Disney Road ET		2.00			2.00
<i>Total for Zone</i>					4.00
Ridge Forest BPS (Subzone of 350)					
Ridge Forest BPS HPT	G8	0.002			
Broad Creek 210 Zone					
Broad Creek ET	Q20	0.50			⁴
Broad Creek II WTP GST	Q20	3.00			3.00
Central Avenue ET	P24	0.75			⁴
Annapolis Neck ET			1.00	2020+	1.00
Lincoln Heights ET			1.50		1.50
Riva Farms ET			1.00		1.00
<i>Total for Zone</i>					6.50
Heritage Harbor (Subzone of 210)					
Heritage Harbor HPT	P20	0.012			⁴
Heritage Harbor ET			1.00		1.00
<i>Total for SubZone</i>					1.00
Broadneck 220 Zone					
Amberley ET ²	V17	0.50			⁴
Arnold ET	T16	1.00			1.00
Arnold WTP GST	U16	3.00			3.00
Belvedere SP ²	T14	0.10			⁴
Anne Arundel Comm. College ET			1.00	2020+	1.00
Cape Saint Claire ET			2.00		2.00

Water Pressure Zone / Facility	200' Map	Existing Capacity (MG)	Proposed Capacity (MG)	Proposed Year to Construct ¹	Total Capacity At Build-Out (MG)
<i>Total for Zone</i>					7.00
Glen Burnie Low 220 Zone					
Crain Highway ET	L8	1.00			1.00
Jacobsville ET	R9	2.00			2.00
Jumpers Hole ET	O12	1.00			1.00
Olde Mill ET	M9	1.00			1.00
Pasadena ET ²	P11	0.50			(3)
Severndale WTP GST	P13	3.00			3.00
Brookfield WTP GST			2.00	2020+	2.00
Marley Creek WTP GST			2.00		2.00
Fort Smallwood Road ET			2.00		2.00
Selby Grove / Elvaton ET			2.00		2.00
<i>Total for Zone</i>					16.00
Crofton 290 Zone					
Crofton Meadows II WTP GST	J17	2 @1.50			3.00
Crofton Meadows ET	J17	1.00			⁴
Crofton Sphere ET	J19	0.50			0.50
<i>Total for Zone</i>					3.5
Gibson Island 156 Zone					
Gibson Island GST	W13	0.17			0.17
<i>Total for Zone</i>					0.17
Glen Burnie High 295 Zone					
Bay Meadow ET (2)	N5	0.50			⁴
Dorsey Road WTP GST	L7	1.00			1.00
Ferndale SP	L5	0.50			0.5
Hammonds Lane GST	M3	1.50			1.50
Linthicum ET	K4	1.50			1.50
Millersville ET	M11	2.00			2.00
Shipleys ET	H7	2.00			2.00
New Cut WTP GST			2.50	2017	2.50
<i>Total for Zone</i>					11.00
Harold Harbor 240 Zone					
Harold Harbor ET	O15	0.50			⁴
Harold Harbor ET			1.00		1.00
<i>Total for Zone</i>					1.00
Jessup 400 Zone					
Jessup ET	F7	2.00			2.00
<i>Total for Zone</i>					2.00
Kings Heights / Odenton 330 Zone					
Kings Heights ET	I13	1.00			1.00
Piney Orchard ET	H13	2.00			2.00
Crofton / Waugh Chapel ET			2.00	2014	2.00
Mayfield Industrial Park Site ET			1.00	2020+	1.00
<i>Total for Zone</i>					6.00
Millersville BPS (Subzone of 330)					
Millersville HPT	I12	0.008			
Maryland City 369 Zone					
Maryland City ET	B12	1.50			1.50
Bacontown ET			2.00		2.00
<i>Total for Zone</i>					3.50
Rose Haven 130 Zone					
Rose Haven ET	R39	0.25			0.25
<i>Total for Zone</i>					0.25

Notes: 1. Proposed construction years to be re-evaluated in the new *Strategic Plan*. 2. Tank is submerged (below hydraulic grade of zone) and is therefore out of service. 3. Tank has been demolished. 4. Tank to be replaced or abandoned.

Legend: BPS = Booster Pump Station, ET = Elevated Tank, GST = Ground Storage Tank, HPT = Hydropneumatic Tank, SP = Standpipe, WTP = Water Treatment Plant

3.6.1 Airport Square 350 Water Pressure Zone

3.6.1.1 General Description

The Airport Square 350 water pressure zone is situated in the northwestern portion of the County. The area currently served within the 350 pressure zone is generally bounded by Aviation Boulevard to the east; Howard and Baltimore Counties to the west; Baltimore County to the north; along Dorsey Road and then meandering south along the 295, 330, and 400 pressure Zones. With the completion of a 20-inch main along Donaldson Avenue in 2007 (CIP W7775), a portion of the 350 / 295 pressure zone boundary was changed to incorporate the Telegraph Road corridor, south of Donaldson Avenue, into the 350 Zone.

The Airport Square water pressure zone encompasses approximately 12,993 acres of land. The zone includes the Baltimore Washington International Airport, community of Hanover, the Arundel Mills Mall, and the portions of Jessup and Severn including the residential communities of the Provinces and Meade Village and the Telegraph Road corridor south of Donaldson Avenue to the Telegraph Road booster pump station.

The topography of the area varies from elevation 5 to 270 feet, while piping elevations range from 11 to 257 feet indicating those elevations currently served. Static pressures generally range from 150 psi to over 50 psi. According to the County's design criteria, the highest ground elevation that can be served from the 350 Zone is 230 without providing supplemental means of pressure.

3.6.1.2 Projected Population Growth and Demands

The 350 Zone boundary shift, along Telegraph Road, has changed the population forecasts significantly. The population is projected to increase by 3,269 people over the planning period as shown in Table 3-3. According to the County's Land Use Plan, industrial park uses are planned in the areas west and north of BWI Airport and the remaining portions of the water pressure zone are planned primarily for low to medium density residential uses, with some additional commercial and the office development around Arundel Mills Mall. The Dorchester Planned Unit Development and portions of the Arundel Preserve mixed-use development are located in this pressure zone as well.

As shown in Table 3-2, the average and maximum day demands in the Airport Square 350 Zone were projected at 2.61 MGD and 4.44 MGD, respectively, at build-out (2043) in the 2003 *Strategic Plan* revised average and maximum day build-out demands have been projected at 6.04 MGD and 10.27 MGD, respectively, for this Master Plan. See Table 3-2 for demand projections for this zone for the planning period. For more details on demand projection methodology, see Section 3.2.

3.6.1.3 Groundwater Pumping and Water Treatment Facilities

Currently, there is no water production capability within the 350 pressure zone. Typically, water servicing the zone is received from 1) the City of Baltimore via a connection near the Nursery Road BPS on Hammonds Ferry Road and/or 2) the Glen Burnie High 295 Zone via the Harmans BPS located at the intersection of Dorsey Road and Ridge Road. (The source within Baltimore City is the Ashburton WTP Second Zone, which supplies a reservoir that operates at a maximum

hydraulic gradient elevation of 355 feet.) In 2006, the 54-inch water main from Baltimore City to the Nursery Road BPS was taken out of service for repair. As a result, the County installed “temporary” BPSs on Aviation Boulevard, Andover Road and at Severn Danza Park to supplement the water supply to the 350 Zone from the 295 Zone. Although not used on a regular basis, these BPSs are still in place and can be used as needed.

3.6.1.4 *Storage and Distribution Facilities*

The transmission and distribution system in the 350 Zone consists of approximately 82 miles of pipelines that range in diameter from 6 inch to 30 inch. The Nursery Road BPS, located near the connection to the City on Hammonds Ferry Road, was constructed in anticipation of construction of an elevated storage tank and reduced pressure from Baltimore City due to increased Anne Arundel County and Howard County demands. The pump station has a firm pumping capacity of 16.8 MGD. The Nursery Road BPS conveys water from Baltimore City to the 2 MG Arundel Mills ET. The above-mentioned “temporary” BPSs are expected to be utilized in the future to reduce dependence on Baltimore City. Water from the 350 Zone is then boosted to the Jessup ET (400 Zone) by the Montevideo BPS. The Arundel Mills ET and Harmans BPS were constructed in an effort to supply the Arundel Mills Mall and Severn area in the 350 Zone independently by sources other than Baltimore City. The Harmans BPS conveys water from the Shipley’s ET (295 Zone) to the Arundel Mills ET (350 Zone) with one 1,500 gpm, 70' TDH, 40 Hp pump with VFD drives and two 2,500 gpm, 94' TDH, 100 Hp pumps with VFD drives. The two larger pumps are for fire flow conditions.

The Ridge Forest BPS is located at the intersection of Ridge Road and Ridge Forest Way. The booster station supplies water from the Airport Square (350 Zone) to the Ridge Forest (380 Zone). This zone is a closed system servicing a residential development of approximately 110 homes as well as a new development area. The County plans to eventually supply this zone by the Jessup (400 Zone) as described in Section 3.6.9.5.

The former Meade Village 0.25 MG elevated tank has been demolished. A new elevated tank is proposed for the Meade Village area as described in Section 3.6.1.5. See Table 3-10 for more information on the existing and future required storage tanks for this zone.

3.6.1.5 *Strategic Plan for Infrastructure and Capital Improvements*

Pressure Zone Boundary Changes

Per the recommendation of the 1999 *Midwest Corridor Strategic Plan* and the 2003 *Strategic Plan* the Telegraph Road corridor, south of Donaldson Avenue was incorporated into the Airport Square 350 Zone in 2007. This was accomplished by constructing a 20-inch main along Donaldson Avenue (W7775) and the addition of 330 to 350 Zone booster pumps at the Telegraph Road SCW facility. The Telegraph Road self-contained well continues to supply the Glen Burnie High 295 Zone.

Some of the projects that were proposed in the 1999 *Midwest Corridor Strategic Plan* were studied again for the 2003 *Comprehensive Water Strategic Plan*. The 2003 *Strategic Plan* verified the transmission main sizes proposed in the 1999 *Midwest Corridor Strategic Plan* for the proposed Disney Road BPS (formerly Fort Meade BPS). CIP Project W8010 consists of the design and construction of approximately 5,000 LF of 30-inch main along Disney Road, from the

proposed Disney Road BPS to the 30-inch transmission main in MD 175. This project also includes approximately 3,700 LF along Disney Road, from Disney Estates to Citadel Road. These projects will ultimately allow an expanded Crofton Meadows WTP to supply the expanded southern region of the Airport Square 350 Zone at two locations 1) the Disney Road BPS and 2) the Telegraph Road BPS.

Storage Requirements for the 350 Zone

As the original 0.25 MG Meade Village ET had become submerged with its overflow elevation at 301.9 feet, it has recently been demolished. Due to a predicted storage deficit by build-out, the *2003 Strategic Plan* recommended that a new 2 MG Meade Village ET be constructed in the vicinity of the recently demolished Meade Village ET. Approximately 4,000 LF of 12-inch main is proposed to connect the new Meade Village ET to the proposed 12-inch main at Severn Road. See Table 3-10 for more information on existing and future required storage tanks for this zone. Also, see Table 3-16 at the back of this chapter for a list of water capital projects.

3.6.2 Broad Creek 210 Water Pressure Zone

3.6.2.1 General Description

The Broad Creek 210 water pressure zone is situated in the central portion of the County surrounding the City of Annapolis. The area currently served within the 210 pressure zone is generally bounded by the City of Annapolis to the east, South Haven Road and St. George Barber Road at Riva Road to the west, Defense Highway and Bestgate Road to the north and South River Colony to the south. Figure 3-1 shows the 210 Zone in relation to the other pressure zones.

The Broad Creek Zone encompasses over 13,020 acres of land not including the City of Annapolis. The pressure zone covers the Annapolis Neck, Edgewater and the Parole Growth Management Area (PGMA). The PGMA is a designated Town Center, which includes commercial, office and high density residential uses.

The topography of the area varies from elevation 5 to 155 feet, while piping elevations range from 3 to 143 feet indicating the elevations served within the zone. Static pressures generally range from 85 psi to 35 psi. Overflow elevation of the elevated storage tank is currently 210 feet with a low water elevation equal to 170 feet. According to County design criteria, the highest ground elevation that can be served from the 210 Zone is 90 feet without providing supplemental means of pressure. There are areas with elevations exceeding 90 feet located along Bestgate Road, Severn Grove Road, the Rolling Knolls area, and South River Colony, some of which require individual booster pumps. It is proposed in the *2003 Strategic Plan* to raise the Broad Creek Zone from 210 to 220 to address these areas of high elevation. See Section 3.6.2.5 for more details on the Broad Creek Zone strategic plan. As well, much of the Heritage Harbor peninsula is above the 90 feet elevation so this “sub-zone” operates at a 285 feet gradient by means of the Heritage Harbor Water BPS and hydro-pneumatic tank.

3.6.2.2 Projected Population Growth and Demands

The population in the Broad Creek Zone is projected to increase by 1,310 people over the planning period as shown in Table 3-3. Planned growth will occur primarily in the Parole Town

Center and in Edgewater. A large mixed use development known as the Annapolis Town Center at Parole is currently being developed and includes condominiums, retail and office uses. Additional commercial development and redevelopment is planned along MD 2 in Edgewater. The medium density residential communities of Edgewater and Woodland Beach are not programmed to petition for water service.

As shown in Table 3-2, the average and maximum day demands in the Broad Creek 210 Zone are projected at 6.0 MGD and 15.0 MGD, respectively, at build-out (2043), as calculated for the 2003 Strategic Plan. Revised average and maximum day build-out demands of 6.57 MGD and 16.43 MGD, respectively, were calculated for this Master Plan. See Table 3-2 for demand projections for this zone for the planning period. For more details on demand projection methodology, see Section 3.2.

3.6.2.3 *Groundwater Pumping and Water Treatment Facilities*

The Broad Creek I and II WTPs provide water to the 210 pressure zone and are located along Harry S. Truman Parkway adjacent to MD 50. A total of five groundwater wells supply either plant, which combined, have a treatment capacity of 6.1 MGD. The Broad Creek I WTP is used to meet peak demands throughout the year. Treatment capacity of the Broad Creek II WTP is rated at 4.0 MGD. Treatment provided includes aeration, pre-chlorination, chemical addition, coagulation sedimentation, fluoridation, disinfection and filtration. See Section 3.5.3.1.3 for more details on the Broad Creek WTPs.

3.6.2.4 *Storage and Distribution Facilities*

Existing storage and distribution facilities in the zone include the Heritage Harbor Water BPS and 12,000 gallon hydro-pneumatic tank, the Central Avenue 0.75 MG elevated tank, the Broad Creek 0.5 MG elevated tank, and 3.0 MG of ground storage at the Broad Creek II WTP. See Table 3-10 for more information on existing and future required storage tanks for this zone. The distribution system consists of approximately 94 miles of water mains that range in diameter up to 20 inches.

3.6.2.5 *Strategic Plan for Infrastructure and Capital Improvements*

Projects Not Implemented

Most of the projects identified in the 1989 *Water Supply Systems Analysis* report for this zone have not been implemented. In recent years, the County did not anticipate the need for costly extensions to serve the Annapolis Neck area. However, the County is still looking into alternatives to provide service to this area. For planning purposes, the 2003 *Strategic Plan* assumed that the Annapolis Neck area would be served by the end of the planning period (2020) through the petition process. Approximately 14,800 LF of 20-inch main would need to be constructed along Forest Drive and 10,700 LF of 16-inch main along Forest Drive, Bay Ridge Road, and Annapolis Neck Road. Another significant project identified in the 1989 *Water Systems Analysis Report* would be to connect the 210 Zone to the 290 Zone in Crofton. This would require construction of major transmission mains and a booster pump station. At the time of the 2003 *Strategic Plan*, this project was not considered, rather, connecting the Broad Creek Zone to the Broadneck Zone was proposed as described below.

Proposed Concept for the Broad Creek Zone

In the Broad Creek Zone, there are areas that exceed 90 feet in elevation (the County's design criteria for maximum first floor elevation). Excluding areas adjacent to the Broad Creek facility where pumping pressures exceed 210 feet, these areas are located along Bestgate Road, Severn Grove Drive, the Rolling Knolls area, and South River Colony, some of which require individual booster pumps. It is proposed in the *2003 Strategic Plan* to raise the Broad Creek Zone from 210 to 220 to address these areas of high elevation. In order to reduce reliance on the Baltimore City supply (Zone 1) at the Fort Smallwood BPS, the *2003 Strategic Plan* proposed that excess water produced in the Broad Creek and Broadneck zones could be conveyed north to the Glen Burnie Low Zone. The 16 MGD Arnold WTP could convey 7 MGD (max day) to the Glen Burnie Low Zone through transmission mains up the Ritchie Highway corridor. By 2015, it is proposed that approximately 38,000 LF of 24-inch main be constructed from the Broad Creek WTP, across the Severn River, and tie into the Arnold ground storage tank where it could be conveyed to the Glen Burnie Low Zone. At that time, excess water produced in the Broad Creek Zone could also be conveyed to the Glen Burnie Low Zone. This excess would be provided by a new Withernsea WTP and Broad Creek III WTP as well as the existing Broad Creek II WTP as described below.

The *2003 Strategic Plan* proposed that the Broad Creek I WTP (2 MGD) be taken out of service and a new 5 MGD Withernsea WTP be constructed at the intersection of MD 2 and MD 214. Total production capability in the zone would then be 9 MGD including the Broad Creek II WTP (4 MGD). By 2015, the *2003 Strategic Plan* proposed that a new 8 MGD Broad Creek III WTP be constructed at a new site or at the abandoned Broad Creek I site. By 2015, approximately 8 MGD could be conveyed to the Arnold GST during maximum day conditions. Combined with the excess capacity due to the Arnold expansion (6 MGD), a total of 14 MGD (maximum day) could be conveyed to the Glen Burnie Low Zone eliminating the need for the City Zone 1 connection at Fort Smallwood. By 2025, it is proposed that the Broad Creek III WTP be expanded to 15.5 MGD and the Broad Creek II WTP be taken out-of-service. By 2040, it is proposed that the Withernsea WTP would be expanded to a final 7.5 MGD production allowing a total of 7.5 MGD to be conveyed to the Arnold ground storage tank, which would then be conveyed to the Glen Burnie Low zone. At build-out conditions, approximately 8 MGD would be needed from the City Zone 1 connection at Fort Smallwood under this scenario.

Alternative Concept for the Broad Creek Zone

An alternative not proposed in the *2003 Strategic Plan* is to construct a 5 MGD Broad Creek III WTP by 2010 instead of the Withernsea WTP (the Withernsea plant could be delayed until 2025 or not built altogether. By not building the Withernsea WTP, potential groundwater sources within the Broad Creek Zone would not be utilized, but this alternative promotes a centralized Broad Creek III treatment facility for the zone until build-out). Pending a site evaluation, a 5 MGD Broad Creek III WTP would be constructed at the Broad Creek I/II sites. Broad Creek I could then be demolished (the site evaluation would consider that the existing elevated tank would be removed and replaced off-site by the proposed Lincoln Heights ET). By 2015, Broad Creek III would be expanded to 13 MGD and by 2025 expanded to 20.5 MGD if space at the site permits (alternately, a 5 MGD Withernsea WTP could be constructed by 2025 and Broad Creek III would remain at an ultimate capacity of 15.5 MGD). After Broad Creek III was expanded to 20.5 MGD by 2025, the Broad Creek II WTP could be demolished (excluding the 3 MG ground

storage tank). By 2025, Broad Creek III would utilize approximately 5 MGD from the Chestertown and/or Crownsville raw water well fields, which are currently planned for the Crofton Meadows WTP expansion for 2025 and beyond. By build-out, the Broad Creek III WTP could be expanded to an ultimate capacity of 23 MGD. Approximately 7.5 MGD (total) would come from the Chestertown and/or Crownsville well fields at build-out conditions. By not building a new Withernsea WTP, water production in the Broad Creek Zone can be centralized throughout the planning period and at build-out conditions. This concept agrees with current and previous Master Plans to consolidate facilities in order to reduce capital expenditure and increase operational efficiency. This concept would limit the Crofton Meadows expansion to 25 MGD at build-out, requiring approximately 11 MGD (max day) from the Nursery Road BPS (City Zone 2), well under the current supplemental agreement of 15 MGD (max day). This plan would also require approximately 10 MGD from the Fort Smallwood connection (City Zone 1) at build-out conditions. The MGS investigated these and other issues in the 2007 Countywide groundwater study.

Storage Deficit in the Broad Creek Zone

The 2003 *Strategic Plan* also identified that a storage deficit of 2.3 MG would exist at build-out (1.5 MG if the Annapolis Neck area is not connected). It was identified that the 0.75 MG Central Avenue ET would become submerged due to the higher hydraulic gradient required at the Withernsea WTP. As well, it was proposed that the 0.5 MG Broad Creek ET would be taken out of service because it is hydraulically too close to the Broad Creek WTP. Even though the Broad Creek II WTP is proposed to be taken out of service around 2025, the 3 MG ground storage tank would still be utilized to satisfy storage requirements. As recommended in the 2003 *Strategic Plan*, CIP project (W7996) has been initiated for the design and construction of a 2.0 MG elevated tank in the Broad Creek Zone. This tank will be located on Defense Highway, north of Bestgate Road.. A 1 MG elevated tank is recommended to be constructed in the vicinity of the Bay Forest Shopping Center for providing service to the Annapolis Neck area. The proposed Annapolis Neck ET would have an OFE of 205 feet due to the hydraulic gradient drop from the Broad Creek WTP. Also, a 1 MG elevated tank is recommended in the vicinity of the Riva Farms subdivision to replace the Central Avenue elevated tank. The County has initiated a Site Study (W7996) for the proposed Riva Farms ET and Heritage Harbor ET.

The storage analysis conducted in the 2003 *Strategic Plan* for the Heritage Harbor subsystem indicated the following storage deficit: 0.8 MG at present, 0.9 MG at 2010, and 1.2 MG at build-out. To satisfy the storage requirement, a 1 MG elevated tank, with an OFE of 285 feet, is recommended at the Maryland Renaissance Festival area. Existing fire pumps would make up the remaining 0.2 storage deficit remaining at build-out. Water quality considerations indicate that for the interim period a tank larger than 1 MG would be difficult to “turn over”. For this reason, only a 1 MG elevated tank is recommended. As noted in the previous paragraph, a Site Study has been initiated for the Heritage Harbor ET. The existing 12,000-gallon hydro-pneumatic tank could be taken out of service after the new, elevated tank is constructed. See Table 3-10 for more information on the existing and future required storage tanks for this zone. See Table 3-16 at the back of this chapter for a list of water capital projects for this area.

3.6.3 Broadneck/Glen Burnie Low 220 Water Pressure Zone

3.6.3.1 General Description

The Broadneck / Glen Burnie Low 220 water pressure zone is the largest pressure zone within the County's public water system. It encompasses over 46,479 acres of land and extends from Pasadena to the Broadneck peninsula. The two major segments of the pressure zone are described below. Figure 3-1 shows the Broadneck / Glen Burnie 220 Zone in relation to the other pressure zones.

Broadneck 220 Zone (General Description)

The Broadneck 220 water pressure zone is situated in the eastern central portion of the County. Division valves located at Old County Road and Round Bay Road separate the Broadneck 220 Zone from the Glen Burnie Low 220 Zone. The Broadneck Zone is generally described as the Broadneck peninsula south of Cypress Creek. It includes the communities of Arnold and Cape Saint Claire as well as the Anne Arundel Community College's main campus and the David Taylor Naval Research Center.

The topography of the area varies from elevation 5 to 160 feet, while piping elevations range from 0 to 150 feet indicating those elevations served within the zone. Static pressures generally range from 85 psi to 30 psi. Overflow elevation of the elevated storage tank is 220 feet with a low water elevation equal to 190 feet. According to the County's design criteria, the highest ground elevation that can be served from the Broadneck 220 Zone is 100 feet without providing supplemental means of pressure. There are areas with elevations exceeding 100 feet located throughout the pressure zone. The County has studied this problem in great detail and was, at one time, planning to raise the Broadneck 220 Zone to a 260 Zone by raising the Arnold Elevated Tank 40 feet. However, the project was canceled as described in Section 3.6.3.5. The 2003 *Strategic Plan* made some piping recommendations in the zone, but significant improvements to the areas of high elevation were not realized.

Glen Burnie Low 220 Zone (General Description)

The Glen Burnie Low water pressure zone is situated in the north central portion of the County. The pressure zone is generally bounded by Cypress Creek to the south, the Severn River and MD 3 to the west, Lake Shore to the east and Baltimore City to the north. It includes the communities of Severna Park, Pasadena, Harundale and the Glen Burnie Town Center.

The topography of the area varies from elevation 0 to 170 feet, while piping elevations range from 4 to 140 feet indicating those elevations served within the zone. Static pressures generally range from 95 psi to 40 psi. Overflow elevation of the elevated storage tank is 220 feet with a low water elevation equal to 184 feet. According to the County's design criteria, the highest ground elevation that can be served from the 220 Zone is 100 without providing supplemental means of pressure.

3.6.3.2 Projected Population Growth and Demands

Population within the Broadneck / Glen Burnie Low Zone is projected to increase by 10,742 people over the planning period as shown in Table 3-3. The majority of land within the pressure zone is planned for low to low-medium residential use, with some rural land use densities

planned in the southern portions of the Broadneck peninsula. Higher density residential uses are planned in the Harundale area and in Glen Burnie. Light to heavy industrial use is designated along Marley Neck Boulevard and Fort Smallwood Road. In addition, two large residential developments, Tanyard Cove and Tanyard Springs, are being completed in the Marley Neck area. Additional infill development will occur along Solley Road in Pasadena and in Severna Park and Broadneck. New industrial and office uses may develop in the Marley Neck area. Redevelopment and commercial revitalization are planned in the Glen Burnie Town Center, the Riviera Beach business district along Fort Smallwood Road, the Mountain Road business corridor, the Sun Valley / Jumpers Hole Road commercial area in Pasadena and in the Severna Park business area along Ritchie Highway.

As shown in Table 3-2, the average and maximum day demands in the Broadneck Zone are projected at 6.44 MGD and 16.10 MGD, respectively, at build-out (2043), as calculated for the 2003 Strategic Plan. Revised average and maximum day build-out demands of 5.83 MGD and 14.58 MGD, respectively, were calculated for this Master Plan. The average and maximum day demands in the Glen Burnie Low Zone are projected at 19.32 MGD and 32.84 MGD, respectively, at build-out (2043), as calculated for the 2003 Strategic Plan. Revised average and maximum day build-out demands of 21.49 MGD and 14.58 MGD, respectively, were calculated for this Master Plan. See Table 3-2 for demand projections for this zone for the planning period. For more details on demand projection methodology, see Section 3.2.

3.6.3.3 *Groundwater Pumping and Water Treatment Facilities*

Broadneck 220 Zone (Groundwater and Treatment)

There are two water treatment plants serving the Broadneck 220 pressure zone: the Arnold WTP and Amberley WTP. The Arnold WTP located along Jones Station Road has six groundwater wells with a total and firm well capacity of 11 MGD and 7.6 MGD respectively. The 8 MGD plant has been expanded to its ultimate capacity of 16 MGD under CIP W8018. Treatment provided includes aeration, pre-chlorination, chemical addition, coagulation, sedimentation, fluoridation, disinfection and filtration. For more details on the Arnold WTP, see section 3.5.3.1.1.

The Amberley WTP, located along St. Margarets Road and MD 50, has two groundwater wells with a total and firm well capacity of 3.2 MGD and 1.6 MGD respectively. The plant has a rated plant capacity of 1.44 MGD. Treatment provided includes aeration, pre-chlorination, chemical addition, sedimentation, filtration, disinfection and fluoridation. The Amberley WTP serves as a standby facility and is used for emergency operations only.

Glen Burnie Low 220 Zone (Groundwater and Treatment)

There are two water treatment plants serving the Glen Burnie Low 220 pressure zone: the Severndale WTP and the Harundale WTP. The Severndale WTP located near Benfield Road along Southway in the community of Severndale has seven groundwater wells with a total and firm well capacity of 12 MGD and 9 MGD respectively. The plant has a rated treatment capacity of 8 MGD. Treatment provided includes aeration, pre-chlorination, chemical addition, sedimentation, fluoridation, disinfection and filtration. See section 3.5.3.1.4 for more details on the Severndale WTP.

The Harundale WTP, located at the end of East Way in Harundale has four groundwater wells with a total and firm pumping capacity of 2.4 MGD and 1.4 MGD respectively. The plant has a rated treatment capacity of 2.1 MGD. Treatment provided includes aeration, pre-chlorination, chemical addition, sedimentation, disinfection and fluoridation. See section 3.5.3.1.6 for more details on the Harundale WTP.

There are two available SCWs in the Glen Burnie Low 220 Zone, Glendale and Elvaton. The Glendale SCW is located between Delaware and Bunch Avenues in Glen Burnie and has a pumping capacity of 0.79 MGD. The Elvaton SCW is located on Elvaton Road near Wende Way in Glen Burnie. Treatment provided includes chemical addition, disinfection, and fluoridation at both SCWs, with aeration and reverse-osmosis also included at Glendale SCW. For more details on the self contained wells and the status this capital project, see section 3.5.3.1.10.

3.6.3.4 Storage and Distribution Facilities

Broadneck 220 Zone (Storage and Distribution)

Existing water storage and distribution facilities of the zone include: the Arnold 1 MG elevated tank, the Arnold 3.0 MG ground storage tank, the 0.10 MG Belvedere stand pipe, the 0.5 MG Amberley elevated tank, and a distribution system network of pipelines that range in diameter from 6 inch to 20 inch. The Arnold 3.0 MG ground storage tank is located at the Arnold WTP, and the 0.5 MG Amberley elevated tank is located at the Amberley WTP. The Amberley elevated tank was used when the area operated at a gradient of 180 feet, but when converted to a 220 Zone, it was taken out of service. See Table 3-10 for more information on the existing storage tanks for this zone. The distribution system consists of approximately 148 miles of water mains ranging in size up to 36 inches.

Glen Burnie Low 220 Zone (Storage and Distribution)

Existing water storage and distribution facilities of the zone include: the Fort Smallwood BPS, the Jacobsville 2 MG elevated tank, the Crain Highway 1 MG elevated tank, the Old Mill 1 MG elevated tank, the Jumpers Hole 1 MG elevated tank, and a distribution system network of approximately 454 miles of pipelines that range in diameter from 6 inch to 54 inch. The Severndale WTP has a 3.0 MG ground storage tank at the Severndale high service pump station. See Table 3-10 for more information on the existing storage tanks for this zone.

Additionally there are five active flow transfer points that receive/discharge flow from/to other zones:

- a. The County receives water from Baltimore City (Zone 1) via a connection at Fort Smallwood Road near the County/City border. Flow received from the City (up to 17.5 MGD by agreement) is pumped through the Fort Smallwood BPS into the Glen Burnie Low 220 Zone. The BPS is controlled by water levels sensed in the Crain Highway or the Jacobsville Elevated Tanks. The Marley Neck Suction Side area is connected to the suction side of the Fort Smallwood BPS at an approximate gradient of 190 feet.
- b. Under normal operating conditions, up to 3.3 MGD (normally 2 MGD) is sent to the Dorsey Road WTP from the 220 Zone via a 16-inch main by throttling a control valve at the Dorsey plant. Conversely, flow can be sent to the 220 Zone from the Dorsey plant via the same 16-inch main.

- c. The Shipley's BPS conveys approximately 1.7 MGD from the 220 Zone to Millersville ET in the 295 Zone.
- d. The Old Mill Control Valve conveys approximately 1.9 MGD from the 295 Zone to the 220 Zone.
- e. Quarterfield temporary BPS, located near the intersection of Quarterfield Road and Pamela Drive, conveys approximately 1.8 MGD from the 220 Zone to the 295 Zone.

3.6.3.5 Strategic Plan for Infrastructure and Capital Improvements

Broadneck 220 Zone (Strategic Plan)

Arnold to Glen Burnie Transmission Mains

The CIP included a series of transmission mains (W7783, W7510, W7782, W7780) that now connect the Arnold WTP to the 42-inch transmission main at Marley Neck Boulevard in the Glen Burnie Low Zone. The transmission main projects located in the Broadneck Zone include the 36-inch Arnold WTP to Ritchie Highway Transmission Main (W7783) and the 36-inch Ritchie Highway Transmission Main-LWR (W7510). Transmission main projects W7782 and W7780 are located in the Glen Burnie Low Zone. These projects are consistent with the objectives of the *1989 Water Supply Systems Analysis Report* and the *2003 Strategic Plan* to increase transmission flexibility across pressure zones and reduce reliance on the City of Baltimore. For more details on these transmission main projects, see Section 3.5.3.2.

Proposed Arnold WTP Expansion

The *2003 Strategic Plan* also proposed the continued expansion of the Arnold WTP from 8 MGD to 16 MGD, which has now been completed. By expanding to 16 MGD, the Arnold WTP will be able to supply the Glen Burnie Low Zone at 12.5 MGD (average day) and 7.0 MGD (max day). For build-out conditions, similar flow rates to the Glen Burnie Low Zone would be available, but the increased demand in the Broadneck Zone would need to be supplemented by flow conveyed from the Broad Creek Zone via a new transmission main across the Severn River. The *2003 Strategic Plan* proposed that 38,000 LF of 24-inch main be constructed by 2015 to connect the Broad Creek Zone to the Broadneck Zone. For additional discussion on this project, see Section 3.6.2.5.

Low Pressure Issues in the Broadneck 220 Zone

It has been identified that there are numerous developed and undeveloped areas within the Broadneck 220 pressure zone that have inadequate domestic water pressure. In 1995, there were 2,362 dwellings above ground elevation 100 feet (the County's design criteria for maximum first floor elevations) and 955 dwellings above ground elevation 120 feet. Based on a full tank (220 feet), 100 feet ground elevations have 52-psi static water pressure, while 120 feet ground elevations have 44-psi static water pressure. Based on a tank half full (202 feet), ground elevations 100 feet have 44-psi static water pressure, while elevations 120 feet have 36-psi static water pressure. From April 1991 to September 1995, there were 118 reported complaints due to low water pressure problems.

To address this problem, the County hired Whitman, Requardt and Associates to perform an engineering study. The result of this work is presented in two 1995 reports entitled, *Arnold Elevated Water Storage Tank - Final Feasibility Report* and *Arnold 220 Zone Service Water Booster System Investigation*. The County also hired Gannett-Fleming for additional services.

The result of this study is presented in a 1998 report entitled, *Arnold Service Area Pressure Study Report*. Project W7448 was initiated to raise the Arnold Elevated Tank 40 feet to an overflow elevation of 260 feet. This would have increased the range of acceptable domestic pressures from homes with first floor elevations of 100 feet to those with 140 feet. This project would have resulted in excessive pressures in low lying areas (approximately 1,407 dwellings based on the 1995 report), which would have required pressure reducing valves at individual dwelling or on distribution mains at specific locations. In 2000, the County decided to delay the project indefinitely for the following reasons: excessive number of potential high pressure areas after raising the Arnold ET to 260 feet, concerns with over-pressurizing homes resulting in water damage (similar to when the Amberley 180 Zone was converted to a 220 Zone), questionable data regarding the location and elevation of low water pressure complaints, and questions regarding why there are fewer complaints after pump upgrades were made at the Arnold facility in the 1990's. In 1999, McCrone, Inc. conducted the *Cape St. Claire Water Study* at the proposed gradient of 260 feet. The Cape St. Claire community has petitioned for public service and is designated as a planned service area. The study recommended several 12-inch loop mains and the rest of the system as 8-inch mains throughout the community. The study also recommended that an elevated storage tank be located in the Cape St. Claire area for fire flow and emergency storage.

The *2003 Strategic Plan* evaluated the Broadneck Zone at a gradient of 220 feet per County instruction. Several pipeline projects were recommended, but they do not significantly improve the borderline pressures in the model. It was recommended that 10,500 LF of 12-inch main along St. Margarets Road and Old Mill Bottom Road and 2,100 LF of 12-inch main along Ritchie Highway be constructed to connect existing mains on Baltimore-Annapolis Blvd. and Campus Drive. These projects would make loops with existing mains at Forest Meadows, Amberley, and Brentwood of St. Margarets subdivisions. While this would be beneficial, the County will need to further evaluate the benefit of these proposed pipeline improvements.

Proposed Storage in the Broadneck Zone

The *2003 Strategic Plan* evaluated the Broadneck Zone at a 220 feet gradient and recommended a 2 MG Cape St. Claire ET along College Parkway (alternately, the elevated tank could be constructed at the Nike Missile site but would require an additional 5,500 LF of 16-inch main). This new, elevated tank is recommended due to the combined projected storage deficits in the Broadneck and Glen Burnie Low Zones. The *2003 Strategic Plan* recommended that half of the 3 MG Arnold ground storage tank be re-allocated to the Glen Burnie Low Zone. This plan is contingent on completing the series of 36-inch TM projects that will connect the Broadneck Zone to the Glen Burnie Low Zone

Proposed Projects at Build-out in the Broadneck Zone

For build-out conditions (2043), the *2003 Strategic Plan* proposed that 18,000 LF of 16-inch main be constructed parallel to the existing 16-inch main from the Arnold ET to the Arnold WTP and to the proposed Cape St. Claire ET. These mains would be required due to high head losses resulting in the existing 16-inch discharge mains. In addition, it is proposed that a 1 MG ET be constructed at the Anne Arundel Community College (AACC) for build-out conditions. The total storage requirement of 6.8 MG at build-out conditions would be met with the following tanks: 2.2 MG of the 3 MG Arnold ground storage tank (0.8 allocated to Glen Burnie Low), the 1 MG Arnold ET, the 0.1 Belvedere standpipe, the proposed 2 MG Cape St. Claire ET, and the

proposed 1 MG AACC ET. See Table 3-10 for more information on the existing and future required storage tanks for this zone.

Glen Burnie Low 220 Zone (Strategic Plan)

Storage Deficit in the Glen Burnie Low Zone

The 2003 *Strategic Plan* also identified the following storage deficits: 2.2 MG at present and 8 MG by build-out conditions. These projections assume the Arnold ground storage tank provides 1.5 MG (0.8 MG by build-out) of storage for the Glen Burnie Low Zone as noted above. It also assumes the 36-inch Arnold to Glen Burnie TM projects are completed. To satisfy the storage deficit for the Glen Burnie Low Zone, a 2 MG elevated tank is proposed on Fort Smallwood Road, and a second 2 MG elevated tank is proposed on Jumpers Hole Road. For build-out conditions, the following existing and proposed storage facilities would satisfy the total storage requirement of 16.9 MG:

- i. 0.8 MG of the 3 MG Arnold GST,
- ii. The 3 MG Severndale GST,
- iii. The 2 MG Jacobsville ET,
- iv. The 1 MG Crain Highway ET,
- v. The 1 MG Jumper's Hole ET,
- vi. The 1 MG Old Mill ET,
- vii. The proposed 2 MG Fort Smallwood ET,
- viii. The proposed 2 MG Selby Grove ET,
- ix. The proposed 2 MG Marley Creek GST, and
- x. The proposed 2 MG Brookfield GST (total 16.8 MG)

See Table 3-10 for more information on the existing and future required storage tanks for this zone.

Proposed Treatment Facilities in the Glen Burnie Low Zone

The 2003 *Strategic Plan* proposed that approximately 6 MGD of potential groundwater sources are available for use within the Glen Burnie Low Zone that could reduce reliance on the City Zone 1 supply at the Fort Smallwood BPS. Three treatment facilities are proposed by build-out conditions:

- i. 2.3 MGD Marley Creek WTP,
- ii. The 2.3 MGD Brookfield WTP, and
- iii. The 1.5 MGD Old Mill WTP.

Separate production facilities are proposed in the Glen Burnie Low Zone due to limited groundwater availability in the Patuxent and Lower Patapsco aquifers.

Future Pressure Zone Boundary Change in the Glen Burnie Low Zone

DPW has identified areas along East West Blvd, Jumpers Hole Road, and Obrecht Road in the Glen Burnie Low 220 Zone that are above the maximum first floor elevation (FFE) criteria of 100 feet. In fact some of the subdivisions in this area exceed the maximum FFE criteria as much as 30 feet. These subdivisions are now on private well and septic, but if they were to be served by the County water system in the future they would need to be incorporated into the Glen Burnie High 295 Zone which has a maximum FFE criteria of 175 feet. A 12-inch loop main would be required along East West Boulevard, Jumpers Hole Road, and Obrecht Road, as a

future project should these subdivisions petition for public water service. As such, this area was included in the Glen Burnie High 295 water pressure zone boundary on the 2007 Master Plan Maps. See Table 3-16 at the back of this chapter for a list of water capital projects.

3.6.4 Brooklyn Park North (190) and South (350) Water Pressure Zone

3.6.4.1 General Description

The Brooklyn Park 350 / 190 Zone is approximately 810 acres and is located in the northern portion of the County, bordering Baltimore City. Although the Brooklyn Park system is supplied by Baltimore City water, the County owns and operates the distribution system. There are no storage facilities in the system. Figure 3-1 shows the Brooklyn Park Zone in relation to the other pressure zones.

The system is divided into two pressure zones. North Brooklyn Park is the first pressure zone, extending from the City boundary to approximately Orchard Avenue, and has ground elevations ranging from just under 10 feet to 100 feet (hydraulic gradient around 190 feet). The second pressure zone, with ground elevations from 80 to 165 feet, extends south from Orchard Avenue down to Walton Avenue (hydraulic gradient around 350 feet). The 30-inch trunk main (first pressure zone) and 20-inch trunk main (second pressure zone) from Baltimore City, supplies water to these pressure zones.

3.6.4.2 Projected Population Growth and Demands

Population in the Brooklyn Park Zone is projected to increase by 1,487 people over the planning period as shown in Table 3-3. Most of the land is developed, primarily with residential uses. Commercial uses are concentrated along the Ritchie Highway corridor. Most of the new growth will come from redevelopment and infill-development.

As shown in Table 3-2, the average and maximum day demands in the Brooklyn Park Zone are projected at 0.89 MGD and 1.51 MGD, respectively, at build-out. See Table 3-2 for demand projections for this zone for the planning period. For more details on demand projection methodology, see Section 3.2.

3.6.4.3 Strategic Plan for Infrastructure and Capital Improvements

The County completed the Brooklyn Park Water System Rehabilitation Project under CIP W7829. This project included new master meter vaults at the County/City boundary and pipeline cleaning and relining work. New master meters were installed at the following four locations along the County/City boundary in order for the County to take over the system:

- a. Levin Road Master Meter - this 20-inch City-to-County supply from the Baltimore City second pressure zone will feed the Southern Brooklyn Park 350 Zone. From the 350 Zone, the 20-inch main will feed the Glen Burnie High 295 Zone.
- b. Second Avenue Master Meter - this 12-inch City-to-County supply from the Baltimore City first pressure zone will feed the North Brooklyn Park 190 Zone.
- c. Townsend Avenue Master Meter - this 12-inch County-to-City supply will feed water from the South Brooklyn Park 350 Zone to the City Second Pressure Zone.
- d. Sixth Street Master Meter - this 12-inch County-to-City supply will feed water from the South Brooklyn Park 350 Zone to the City second pressure zone.

The 2003 Strategic Plan did not recommend any strategic planning or capital improvements for the Brooklyn Park system since the County had already initiated CIP W7829.

3.6.5 Crofton 290 Water Pressure Zone

3.6.5.1 General Description

The Crofton 290 water pressure zone is situated in the west-central portion of the County. The area currently served within the 290 pressure zone is generally bounded by MD 3 to the west-northwest, Underwood Road to the east and MD 450 to the south. The area encompasses approximately 5,220 acres of land and consists primarily of the community of Crofton. Figure 3-1 shows the 290 Zone in relation to the other pressure zones.

The topography of the area varies from elevation 30 to 200 feet, while piping elevations range from 45 to 175 feet indicating those elevations served within the zone. Static pressures range from 100 psi to 50 psi. The overflow elevation of the elevated storage tanks is currently 290 feet with a low water elevation equal to 255 feet. According to the County's design criteria, the highest ground elevation that can be served from the 290 Zone is 170 without providing supplemental means of pressure.

3.6.5.2 Projected Population Growth and Demands

Population in the Crofton Zone is projected to increase by 1,053 people over the planning period as shown in Table 3-3. Much of the new residential growth is attributed to the Two Rivers Planned Unit Development where over 2,000 age-restricted units are planned. Remaining areas are planned for low to medium density residential use, with commercial uses along MD 3.

As shown in Table 3-2, the average and maximum day demands in the Crofton Zone are projected at 3.07 MGD and 6.14 MGD, respectively, at build-out (2043), as calculated for the 2003 Strategic Plan. Revised average and maximum day build-out demands of 3.64 MGD and 7.28 MGD, respectively, were calculated for this Master Plan. See Table 3-2 for demand projections for this zone for the planning period. For more details on demand projection methodology, see Section 3.2.

3.6.5.3 Groundwater Pumping and Water Treatment Facilities

There are two water treatment plants serving the 290 pressure zone; the Crofton Meadows I and II WTP. The Crofton Meadows I WTP is used to meet peak demands throughout the year. Total treatment capacity of the Crofton Meadows I and II WTPs is 9.2 MGD. For a detailed description of the Crofton Meadows facilities, see Section 3.5.3.1.2.

3.6.5.4 Storage and Distribution Facilities

Existing water storage and distribution facilities of the zone include the 1 MG Crofton Meadows ET, two 1.5 MG ground storage tanks (3 MG total, which are shared with the 330 Zone), and the 0.5 MG Crofton Sphere. The distribution system consists of a 75-mile network of water mains that range in diameter up to 36 inches. See Table 3-10 for more information on the existing storage tanks for this zone.

3.6.5.5 Strategic Plan for Infrastructure and Capital Improvements

The 1989 *Water Supply Systems Analysis* report identified several infrastructure improvements in the 290 pressure zone. In 1996, the Crofton facility was expanded to 9.2 MGD by constructing the 5.0 MGD Crofton Meadows II WTP, which has provisions at the site to expand to 30 MGD. The 2003 *Strategic Plan* proposed to expand to 33 MGD by build-out (2043). The Crofton Meadows II WTP would then be able to supply the following zones during maximum day conditions: Crofton (290), Kings Heights/Odenton (330), Maryland City (369), Jessup (400), most of Airport Square (350), and the Fort Meade Private (288 / 391) water system pending a takeover by the County. This expansion would allow the County to significantly reduce its dependency on Baltimore City (Zone 2) at the Nursery Road BPS connection. By build-out conditions, Crofton Meadows II would be expanded to an ultimate capacity of 33 MGD by utilizing the proposed Chesterfield and Crownsville remote well fields. Groundwater potential in the Crofton area is approximated at 21 MGD (max day). For a 25 MGD plant capacity, 3 MGD would be required from the Chesterfield remote well field. If expanded to 33 MGD, an additional 6 MGD would be required from the Chesterfield well field and 3 MGD from the Crownsville remote well field. This plan would be consistent with the County's efforts to increase connectivity across pressure zones, increase reliability, consolidate facilities, and reduce reliance on the City. For a detailed description and strategic plan for the Crofton Meadows facilities, see Section 3.5.3.1.2.

The total volume of storage geographically located in the 290 Zone is 4.5 MG. However, one of the two 1.5 MG ground storage tanks at the Crofton Meadows facility is theoretically allocated for the Kings Heights / Odenton 330 Zone even though the two ground storage tanks are hydraulically connected. For this reason, the theoretical storage capacity in the 290 Zone is 3.0 MG including the 0.5 MG Crofton Sphere, one 1.5 MG ground storage tank, and the existing 1 MG Crofton ET. The 1 MG Crofton ET is located too close to the plant and does not experience significant turnover. The County requested that this tank be eliminated and a new tank built further out into the system as needed. The 2003 *Strategic Plan* recommended a new 2 MG Crofton ET located in the northern part of the 290 Zone. The construction of Crofton / Waugh Chapel ET has been initiated under CIP W7996. The ET will be located on Evergreen Road, west of MD Route 3 in Gambrills. With an overflow elevation of 330 feet, this ET will supply both the 290 and the 330 pressure zones. This could replace the 1 MG Crofton ET and accommodate the calculated 0.4 MG storage deficit at build-out. See Table 3-10 for more information on the existing and future required storage tanks for this zone.

The proposed Two Rivers Planned Unit Development will be served via a 16-inch main connecting to the existing 290 Zone near the intersection of MD 3 and MD 424. This proposed transmission main will convey water along Conway Road, from the 290 Zone to the proposed Two Rivers booster pump station to be located near the intersection of Conway and Bragers Roads. A 1 MGD elevated storage tank, to be located on Conway Road, approximately 3,500 feet west of Brager Road, has also been proposed as part of the Two Rivers project. For a list of water capital projects, see Table 3-16 at the back of this chapter.

3.6.6 Gibson Island 156 Water Pressure Zone

3.6.6.1 General Description

The Gibson Island 156 water pressure zone is situated in the east-central portion of the County at the mouth of the Magothy River. The area currently served within the 156 pressure zone is generally confined to Gibson Island and encompasses approximately 927 acres of land. Figure 3-1 shows the 156 Zone in relation to the other pressure zones.

The topography of the area varies from elevation 2 to 131 feet, while piping elevations range from 5 to 130 feet indicating those elevations served within the zone. Static pressures generally range from 67 psi to 12 psi. The overflow elevation of the elevated storage tank is currently 156 feet. According to the County's design criteria, the highest ground elevation that can be served from the 156 Zone is 36 without providing supplemental means of pressure. Areas above elevation 36 will require individual booster pumps to ensure adequate domestic pressure is provided.

3.6.6.2 Projected Population Growth and Demands

The population growth and demand in the Gibson Island pressure zone is relatively stable. The area is developed with low density residential uses and while there is some infill development potential, additional growth is not anticipated.

As shown in Table 3-2, the average and maximum day demands in the Gibson Island Zone are projected at 0.17 MGD and 0.43 MGD, respectively, at build-out (2043), as calculated for the 2003 Strategic Plan. See Table 3-2 for demand projections for this zone for the planning period. For more details on demand projection methodology, see Section 3.2.

3.6.6.3 Groundwater Pumping and Water Treatment Facilities

There is one water treatment plant serving the 156 pressure zone: the Gibson Island WTP. The Gibson Island WTP located along Mountain Road has two groundwater wells with a total and firm well capacity of 0.8 MGD and 0.4 MGD respectively. The current treatment capacity is 0.30 MGD. Treatment provided includes aeration, pre-chlorination, chemical addition, sedimentation, fluoridation, disinfection and filtration. The Gibson Island WTP will be upgraded in the near future as described in Section 3.6.6.5.

3.6.6.4 Storage and Distribution Facilities

Existing water storage and distribution facilities of the zone include: the Gibson Island 0.17 MGD ground storage tank and a distribution system network of pipelines that range in diameter from 4 inch to 8 inch totaling 8 miles. See Table 3-10 for more information on the existing storage tank in this zone.

3.6.6.5 Strategic Plan for Infrastructure and Capital Improvements

The Gibson Island WTP upgrade has been completed under project W7776. The project included upgrades to the treatment and chemical handling systems. The 2003 Strategic Plan did not make any recommendations for the Gibson Island water system as storage and treatment capacity were in range for the build-out scenario. It was reported in the 2003 Strategic Plan that the Gibson Island had a much larger unaccounted-for water ratio than other zones. It was

suspected that the hydrant meter at the golf course was under-registering. As the golf course now provides its own water supply, and has been removed from the County water system, the demand on the WTP has been significantly reduced. See Table 3-16 at the back of this chapter for a list of water capital projects.

3.6.7 Glen Burnie High 295 Water Pressure Zone

3.6.7.1 General Description

The 295 water pressure zone is situated in the north central portion of the County and is partitioned into three distinct areas, two of which are centered around the Dorsey WTP. The northeast partition is generally bounded by Baltimore City to the east, the 350 Zone to the west, Baltimore County to the north and the 220 pressure zone to the south. The southwest partition is generally bounded by MD 3 and the 220 Zone to the east, the 350 Zone to the west, Dorsey Road and the 350 Zone to the north, and the Severn Run Environmental Area to the south. The southeast partition is generally bounded by Chalet Drive and Foxwell Road to the east, MD 3 to the west, Old Mill Road to the north and Benfield Boulevard to the south. Figure 3-1 shows the 295 Zone in relation to the other pressure zones.

The Glen Burnie High pressure zone contains approximately 18,152 acres of land. It includes portions of the Linthicum, Ferndale, Glen Burnie, Severn and Millersville communities.

The topography of the area varies from elevation 10 to 250 feet, while piping elevations range from 5 to 202 feet indicating those elevations currently served. Static pressures range from 125 psi to 24 psi. The overflow elevation of the elevated storage tanks is currently 295 feet with a low water elevation equal to 260 feet. According to the County's design criteria, the highest ground elevation that can be served from the 295 Zone is 175 without providing supplemental means of pressure.

3.6.7.2 Projected Population Growth and Demands

Population in the Glen Burnie High Zone is projected to increase by 2,853 people over the planning period as shown in Table 3-3. See Table 3-3 for more details on population and household projections for the Glen Burnie High 295 Zone. According to the County's Land Use Plan, land in this pressure zone is planned for medium density residential use in the greater Glen Burnie area and for lower density residential use in the Severn area south of MD 100. Commercial uses and redevelopment are planned along the Ritchie Highway, Crain Highway and Quarterfield Road corridors.

As shown in Table 3-2, the average and maximum day demands in the Glen Burnie High Zone are projected at 14.92 MGD and 25.36 MGD, respectively, at build-out (2043), as calculated for the 2003 Strategic Plan. Revised average and maximum day build-out demands of 13.04 MGD and 22.17 MGD, respectively, were calculated for this Master Plan. See Table 3-2 for demand projections for this zone for the planning period. For more details on demand projection methodology, see Section 3.2.

3.6.7.3 Groundwater Pumping and Water Treatment Facilities

The Dorsey Road WTP provides water to the 295 pressure zone and is located along Dorsey Road adjacent to I-97. Currently six wells provide raw water to the plant, which has a treatment capacity of approximately 3.5 MGD. The plant also receives up to 3.3 MGD (normally 2.5 MGD) from the Glen Burnie Low Zone (220 Zone) for re-distribution into the 295 Zone. This is received in the plant's clear well and is, therefore, mixed with the treated raw water supply. See Section 3.5.3.1.5 for a detailed description of the Dorsey WTP.

There are two self-contained wells (SCWs) that serve the 295 Zone: (1) the Stevenson Road SCW and (2) the Telegraph Road SCW (The Quarterfield Road SCW is no longer in service). The SCWs provide chemical addition, disinfection and fluoridation. Rated capacities of the Stevenson Road and Telegraph Road SCWs are 0.64 MGD and 0.96 MGD respectively. See Section 3.5.3.1.10 for more details on the self-contained wells in the County water system.

3.6.7.4 Storage and Distribution Facilities

Existing water storage and distribution system facilities in the 295 Zone include: the Hammonds Lane BPS (City Zone 2), the Ordnance Road BPS (City Zone 1), the Shipley's Choice BPS, the new Harmans BPS, the 2 MG Millersville ET, the 2 MG Shipley's ET, the 1.5 MG Linthicum ET, and the 0.5 MG Ferndale Stand Pipe. See Table 3-10 for more information on the existing storage tanks for this zone. The distribution system consists of approximately 237 miles of water mains that range in size up to 30 inches. There are seven flow transfer locations for the 295 Zone (excluding division valve locations):

- a. Under normal operating conditions, up to 3.3 MGD (normally 2.5 MGD) is sent to the Dorsey Road WTP from the 220 Zone via a 16-inch main by throttling a control valve at the Dorsey plant. Conversely, flow can be sent to the 220 Zone from the Dorsey plant via the same 16-inch main during emergency situations.
- b. The Shipley's BPS conveys approximately 1.7 MGD from the 220 Zone to Millersville ET in the 295 Zone. The booster station consists of one 800-gpm pump and one 1250-gpm pump.
- c. The Old Mill Control Valve discharges approximately 1.9 MGD from the 295 Zone to the 220 Zone (the Old Mill BPS was converted to the Old Mill Control Valve station in 1995).
- d. The Harmans BPS conveys approximately 0.7 to 3.0 MGD from the 295 Zone to the Arundel Mills ET in the 350 Zone (higher flow rates tend to lower the level of the Shipley's ET).
- e. The 20-inch Hammonds Lane connection from Baltimore City's Second Zone. Typically, the Hammonds Lane BPS is not operated due to the hydraulic gradient difference between the City Zone 2 (350'+/-) and the County (295'+/-).
- f. The 20-inch Ordnance Road connection from Baltimore City's First Zone.
- g. With the incorporation of the Telegraph Road corridor into the 350 Zone, booster pumps have been installed at the Telegraph Road SCW house to boost water from the 330 Zone to the new 350 Zone. The Telegraph Road SCW will continue to provide service to the Glen Burnie High 295 Zone at that time.
- h. Quarterfield temporary BPS, located near the Quarterfield Road and Pamela Drive intersection, conveys approximately 1.8 MGD from the 220 Zone to the 295 Zone.

3.6.7.5 Strategic Plan for Infrastructure and Capital Improvements

Pressure Zone Boundary Changes

As proposed in the 1999 Midwest Corridor Strategic Plan, a distribution main along Donaldson Avenue was constructed in 2007, in order to incorporate the Telegraph Road Corridor into the 350 Zone. The completion of this project shifted the western boundary of the 295 Zone east of Telegraph Road.

DPW has identified areas along East West Boulevard, Jumpers Hole Road, and Obrecht Road in the Glen Burnie Low 220 pressure zone that are above the maximum first floor elevation (FFE) criteria of 100 feet. In fact some of the subdivisions in this area exceed the maximum FFE criteria as much as 30 feet. These subdivisions are now on private well and septic, but if they were to be served by the County water system in the future, they would need to be incorporated into the Glen Burnie High 295 pressure zone which has a maximum FFE criterion of 175 feet. Therefore, this area has now been incorporated into the 295 Zone. A 12-inch loop main is proposed along East West Boulevard, Jumpers Hole Road and Obrecht Road as a future project should these subdivisions petition for public water service.

Proposed Projects

The 2003 Strategic Plan proposed the following interim improvements in the Glen Burnie High Zone: expand the Dorsey WTP, expand the Shipley's Choice BPS, and complete the Quarterfield Road 12-inch main extension. To satisfy increasing demands, the Dorsey Road WTP would be expanded from 3.5 to 6.0 MGD or re-built entirely. For a detailed description of the strategic plan for the Dorsey WTP, see Section 3.5.3.1.5. The 2003 Strategic Plan proposed that the existing pumps at the Shipley's Choice BPS did not have adequate capacity and head that new pumps with a firm pumping capacity of 2.6 MGD replace the existing pumps. Approximately 1,750 LF of 12-inch main was also proposed along Quarterfield Road between Thompson Avenue and Danza Road. The completion of this main will provide redundancy to the Ridgeway area within the 295 Zone. The Telegraph Road SCW currently supplies this area.

The 2003 Strategic Plan proposed the following projects be completed after the interim period: the proposed New Cut WTP by 2020; 4,500 LF of 20-inch main along New Cut Road by 2020; 3,000 LF of 12-inch main at the Shipley's ET by build-out; 7,100 LF of 16-inch main and 15,300 LF of 12-inch main from the Hammonds Lane BPS by build-out. Based on available groundwater sources and increased demand in the 295 Zone, the 2003 Strategic Plan recommended that a 6 MGD New Cut WTP be constructed in the vicinity of New Cut Road, south of the New Cut Farms subdivision. In order to be consistent with the Master Plan objective of facility consolidation, the County will continue to evaluate the need for a new treatment facility versus expanding existing facilities, with respect to localized impacts of increased groundwater withdrawal. The 2007 Countywide groundwater study by MGS addresses these types of issues. The 2003 Strategic Plan also proposed a 2.5 MG ground storage tank at the New Cut WTP by 2017 to satisfy build-out storage requirements. See Table 3-10 for more information on the existing and future required storage tanks for this zone. In addition, 12-inch and 16-inch mains at the Hammonds Lane BPS are proposed by build-out, which would allow the Hammonds Lane BPS (City Zone 2) to supply the Linthicum ET at 6 MGD and allow the Ordnance Road BPS (City Zone 1) to be taken off-line. Another option would be to leave the Ordnance Road BPS as a backup facility and configure the new transmission mains differently for build-out conditions. See Table 3-16 for a list of water capital projects.

3.6.8 Herald Harbor 240 Water Pressure Zone

3.6.8.1 General Description

The Herald Harbor 240 water pressure zone is situated in the central portion of the County along the south bank of the Severn River. The area currently served within the 240 pressure zone is generally confined to the Herald Harbor community, encompassing approximately 529 acres. Figure 3-1 shows the 240 Zone in relation to the other pressure zones.

Topography of the area varies from elevation 0 to 165 feet, while piping elevations range from 1 to 160 feet indicating those elevations served within the zone. Static pressures generally range from 100 psi to 35 psi. The overflow elevation of the elevated storage tank is currently 240 feet with a low water elevation equal to 211 feet. According to the County's design criteria, the highest ground elevation that can be served from the 240 Zone is 120 without providing supplemental means of pressure.

3.6.8.2 Projected Population Growth and Demands

The population in the Herald Harbor Zone is relatively stable with a projected increase of 154 people over the planning period as shown in Table 3-3. The area is planned for low density residential uses and while there is some infill development potential, a large amount of additional growth is not anticipated.

As shown in Table 3-2, the average and maximum day demands in the Herald Harbor Zone are projected at 0.32 MGD and 0.64 MGD, respectively, at build-out (2043), as calculated for the 2003 Strategic Plan. See Table 3-2 for demand projections for this zone for the planning period. For more details on demand projection methodology, see Section 3.2.

3.6.8.3 Groundwater Pumping and Water Treatment Facilities

There is one water treatment plant serving the 240 pressure zone: the Herald Harbor WTP. The Herald Harbor WTP located along Mountain Road has two groundwater wells with a total and firm well capacity of 1.2 MGD and 0.6 MGD, respectively. Current treatment capacity is 0.50 MGD. Treatment provided includes aeration, pre-chlorination, chemical addition, sedimentation, fluoridation, disinfection and filtration. A new treatment system has recently been completed as described in Section 3.6.8.5.

3.6.8.4 Storage and Distribution Facilities

Existing system facilities of the zone include: the Herald Harbor 0.5 MG elevated tank and a distribution system network of pipelines that range in diameter from 4 inch to 12 inch (approximately 12 miles total). See Table 3-10 for more information on the existing storage tank in the zone.

3.6.8.5 Strategic Plan for Infrastructure and Capital Improvements

A new treatment system has been completed at the Herald Harbor WTP under project W7930. A new package floc, sedimentation, and gravity filtration plant have been constructed within the existing building and an additional backwash tank has been installed.

The storage analysis conducted in the *2003 Strategic Plan* for the Herald Harbor Zone indicated a storage deficit of 0.17 MG at 2010 and 0.33 MG at build-out. To satisfy the storage requirement, the *2003 Strategic Plan* recommended a 1 MG elevated tank to replace the existing 0.5 MG elevated tank. However, another option would include keeping the existing 0.5 MG elevated tank in service (depending on its condition) and installing new fire flow pumps with a back-up generator and small ground storage tank. Fire flow accounts for approximately 80% of the storage requirement for the Herald Harbor pressure zone. See Table 3-10 for more information on the existing and future required storage tanks for this zone. See Table 3-16 at the back of this chapter for a list of water capital projects.

3.6.9 Jessup 400 Water Pressure Zone

3.6.9.1 General Description

The Jessup 400 water pressure zone is situated in the western portion of the County. The area currently served within the 400 pressure zone is generally bounded by Baltimore-Washington Parkway (Route 295) to the east, Howard County to the west, Montevideo Road to Clark Road along the north and Fort Meade to the south. Figure 3-1 shows the 400 Zone in relation to the other pressure zones.

The Jessup water pressure zone contains approximately 4,285 acres of land. The zone encompasses the community of Jessup and also includes the National Business Park employment center, Arundel Preserve mixed-use development, and the Maryland House of Corrections.

The topography of the area varies from 30 to 320 feet in elevation, while piping elevations range from 148 to 289 feet indicating those elevations served in the zone. Static pressures range from 160 psi to 35 psi. The overflow elevation of the elevated storage tank is currently 400 feet with a low water elevation equal to 365 feet. According to the County's design criteria, the highest ground elevation that can be served from the 400 Zone is 280 without providing supplemental means of pressure. There are areas with elevations exceeding 280 that are located within the northeast quadrant of the Route 295 and MD 175 intersection. If this area is developed, the gradient will have to be increased to approximately 440 feet by means of a regional booster pump station or individual booster pumps.

The Provinces private water system exists partially within the Jessup 400 Zone and the Airport Square 350 Zone. Currently, there is no plan to take over the Provinces system, but based on currently programmed projects such as the Fort Meade BPS (Project W7934) and other planned transmission main projects, the County would be in a good position to take over this system if the community petitioned the County. See Section 3.6.9.5 for more details.

3.6.9.2 Projected Population Growth and Demands

Population in the Jessup Zone is projected to increase by 4,881 people over the planning period as shown in Table 3-3. Much of this land in this pressure zone is planned for low-density residential use, particularly north of MD 175. However, the area also includes the planned mixed-use developments known as Clarks 100 and Parkside. Long-range plans also include redevelopment along MD 175 to create a small business center.

As shown in Table 3-2, the average and maximum day demands in the Jessup Zone are projected at 2.49 MGD and 4.98 MGD, respectively, at build-out (2043), as calculated for the 2003 Strategic Plan. Revised average and maximum day build-out demands of 4.11 MGD and 8.22 MGD, respectively, were calculated for this Master Plan. See Table 3-2 for demand projections for this zone for the planning period. For more details on demand projection methodology, see Section 3.2.

3.6.9.3 *Groundwater Pumping and Water Treatment Facilities*

There is no water production capability within the 400 pressure zone. All water servicing the zone is received from the adjacent 350 pressure zone via the Montevideo Water Booster Pumping Station (BPS). In the future, the expanded Crofton Meadows WTP as described in Section 3.6.9.5 will also supply this zone.

3.6.9.4 *Storage and Distribution Facilities*

Existing water system facilities of the zone include the Montevideo Water BPS and the 2 MG Jessup ET. The distribution system consists of approximately 15 miles of water mains that range in diameter up to 20 inches (the Arundel Mills ET is geographically located within the 400 Zone boundary but is hydraulically connected to the 350 pressure zone). A single 30-inch main crossing the Baltimore/Washington Parkway (Route 295) along Wright Road provides suction for the Montevideo BPS. From there, water is boosted from the 350 Zone to the Jessup ET (400 Zone) which conveys water south to the Maryland City (369 Zone) through a 20-inch main and a control valve at MD 32. In addition, the Maryland House of Corrections is the largest user in this. See Table 3-10 for more information on the existing storage tanks for this zone.

3.6.9.5 *Strategic Plan for Infrastructure and Capital Improvements*

Most of the projects identified in the *1989 Water Supply Systems Analysis* report for this zone have been completed. The Disney Road BPS (formerly Fort Meade BPS) is currently programmed as Project W7934 and will provide redundant supply to the Jessup ET using the Crofton Meadows WTP for its source. This is contingent upon completion of the 36-inch transmission main between Piney Orchard Parkway and Odenton Road, via Patuxent Road North (Project W7784). Completion of these projects will enable the County to supply the 400 and 369 Zones with water from Crofton Meadows WTP, thereby reducing reliance on the City of Baltimore, which is consistent with previous Master Plans. To convey water from the Disney Road BPS to the Jessup Zone, approximately 2,250 LF of transmission main, from Disney Road to Rockenbach Road, is programmed as Project W7932. The MD 175 to MD Route 295 has been completed with the portion of the 24-inch main that crosses MD Route 295 being constructed as part of the developer-funded Arundel Preserve Water Extension Project. It has also been proposed that 3,900 LF of 12-inch main be cleaned and re-lined at Jessup Road due to high head losses originally predicted in the computer model by Pitometer in a 2001 report, entitled, *Hydraulic Computer Analysis - Phase II and III*.

In addition, the *1999 Midwest Corridor Strategic Plan* indicated that certain portions of the Dorchester subdivision will require service at an approximate 440 gradient. Therefore, it will be necessary to create a 440 Zone within the 400 Zone on the east side of Route 295 near MD 175. It is expected that the development community will provide such infrastructure as timing of development dictates.

The *1999 Midwest Corridor Strategic Plan* also recommended that a 16-inch loop main be constructed south of the Arundel Mills Mall area along Clark Road and Ridge Road from the existing 24-inch main within Maryland Route 175. The 16-inch loop main would be separated from the Arundel Mills by a future division valve but could provide redundant service to the area in an emergency situation. The 16-inch loop main would also allow the Ridge Forest community to be supplied by the 400 Zone instead of being supplied by the 350 Zone via the Ridge Forest BPS. After completion of the proposed 16-inch main, the Ridge Forest BPS would be taken out-of-service or kept as a back-up facility. The Provinces private water system is located south of the Ridge Forest subdivision. The proposed 12-inch main along Ridge would intersect the Provinces private water system allowing an easy connection if the County is petitioned to take over the system. Currently, there are no plans to take over the Provinces private water system.

The storage analysis conducted for the *2003 Strategic Plan* for the 400 Zone did not reveal any storage deficits through build-out conditions.

See Table 3-10 for more information on the existing storage tanks for this zone. See Table 3-16 at the back of this chapter for a list of water capital projects.

3.6.10 King Heights / Odenton 330 Water Pressure Zone

3.6.10.1 General Description

The Kings Heights / Odenton 330 water pressure zone is located in the central portion of the County. The zone is situated between Fort Meade and the Patuxent Wildlife Refuge to the west, Gambrills to the east and Crofton to the south. The water pressure zone is approximately 8,640 acres. It includes the Odenton Town Center and the Piney Orchard and Seven Oaks Planned Unit Developments.

The topography of the area varies from elevation 50 to 240 feet, while piping elevations range from 77 to 236 feet indicating those elevations that are served within the zone. Static pressures range from 110 psi to 45 psi. The overflow elevation of the elevated storage tank is currently 330 feet with a low water elevation equal to 295 feet. According to the County's design criteria, the highest ground elevation that can be served from the 330 Zone is 210 without providing supplemental means of pressure. There are areas with elevations exceeding 210 that are located northeast of MD 32 adjacent to the Millersville Landfill, including the Bridlewood or Sappington Hill subdivision. To increase pressures to these areas, the County constructed the Millersville BPS (Project W7883), effectively creating the Millersville 360 sub-zone.

3.6.10.2 Projected Population Growth and Demands

Population within the Kings Heights / Odenton Zone is projected to increase by 6,442 people over the planning period as shown in Table 3-3. Planned growth in the area will be concentrated along MD 175 and within the Odenton Town Center, which will include a mix of high density residential, office, retail and civic uses. The Piney Orchard and Seven Oaks PUDs are near their build-out potential.

As shown in Table 3-2, the average and maximum day demands in the Kings Heights / Odenton Zone are projected at 5.04 MGD and 10.08 MGD, respectively, at build-out (2043), as calculated for the 2003 Strategic Plan. Revised average and maximum day build-out demands of 8.71 MGD and 17.42 MGD, respectively, were calculated for this Master Plan. See Table 3-2 for demand projections for this zone for the planning period. For more details on demand projection methodology, see Section 3.2.

3.6.10.3 Groundwater Pumping and Water Treatment Facilities

The Crofton Meadows II WTP, located in the 290 Zone, supplies water to the 330 Zone via the existing 36-inch transmission main from the Crofton Meadows II WTP northwest along Waugh Chapel Road to Chapelgate Road. This transmission main was the first phase of a series of transmission mains to connect the Crofton Meadows WTP with the 330, 350, and 400 Zones. This is consistent with the County's 1989 and 2003 strategic plans to provide transmission flexibility across pressure zones and reduce reliance on the City of Baltimore. In addition, water can be conveyed from the 330 Zone to the 350 Zone via the Telegraph Road Tie Line and the recently installed booster pumps located at the Telegraph Road SCW site.

3.6.10.4 Storage and Distribution Facilities

Existing water storage and distribution facilities of the zone include the Millersville BPS, the Telegraph Road BPS, the 2 MG Piney Orchard ET, and the 1 MG Kings Heights ET. See Table 3-10 for more information on the existing storage tanks for this zone. In addition, the Crofton Meadows II WTP has 3 MG of ground storage. The distribution system consists of approximately 120 miles of water mains that range in diameter up to 36 inches. The County constructed the Millersville BPS (Project W7883) to increase pressures to the Bridlewood and Sappington Hill areas near the Millersville Landfill. The Millersville sub-zone operates at a gradient of 360 feet. A hydro-pneumatic tank provides storage for the Millersville 360 sub-zone.

3.6.10.5 Strategic Plan for Infrastructure and Capital Improvements

Proposed Transmission Mains

Consistent with the 1989 *Water Supply Systems Analysis* report, the 2003 *Comprehensive Water Strategic Plan* focused on transmitting water from the Crofton Meadows II WTP (290 Zone) to all of the water pressure zones located on the west side of the County, thus reducing reliance on Baltimore City. To date, a 36-inch transmission main has been constructed from the Crofton Meadows facility to Piney Orchard Parkway at Old Waugh Chapel Road (330 Zone). With the completion of several projects in the 295 Zone, the 330 Zone is now connected to the 350 Zone. Construction of the proposed 36-inch transmission main, between Piney Orchard Parkway and Odenton Road, via Patuxent Road North, to the proposed Disney Road BPS (W7934) on Disney Road, is programmed under contract W7784. The completion of this transmission will allow the County to utilize excess production capability proposed at the Crofton Meadows. This improvement would allow up to 16 MGD to be conveyed through the 330 Zone to the 400, 369, 295 and 350 pressure Zones.

In the northwest portion of the 330 Zone, an existing 12-inch main along Town Center Boulevard provides water to the Seven Oaks PUD area. In order to provide redundancy and increased flows to this area by 2010, the 2003 *Strategic Plan* recommended that approximately 400 LF of 16-inch main be constructed from the proposed 36-inch main (Project W7784) at MD

175 to Charter Oaks Boulevard. However, due to change of alignment, this area will now be interconnected with the proposed 36-inch transmission main at Charter Oaks Boulevard, Blue Water Boulevard, Odenton Road and south of MD 32.

Proposed Projects at Build-out

As recommended in the 2003 *Strategic Plan* recommended, the existing Kings Heights WTP has been abandoned. At build-out, it was proposed that a new 3.8 MGD Kings Heights WTP be constructed. As well, a new 1 MG elevated tank was proposed at the Mayfield Industrial Park site. See Table 3-10 for more information on the existing and future required storage tanks for this zone. Approximately 9,600 LF of 16-inch main is proposed along Telegraph Road, Bruce Avenue, and Odenton Road to connect the proposed Kings Heights WTP with the proposed elevated tank. The proposed 3.8 MGD Kings Heights WTP for build-out conditions does not necessarily comply with the objective of facility consolidation. The need and timing of this facility is dependent on several factors:

- a. Actual build-out year,
- b. The level of desired dependency on the Baltimore City connection at the Nursery Road BPS,
- c. If the County considers the take over of the Fort Meade private water system at some point in the future,
- d. The cost effectiveness of conveying raw water from the Kings Heights area to the Crofton Meadows WTP or treating raw water from a withdrawal point in the Kings Heights area, and
- e. The ability to increase groundwater withdrawal at the Crofton Meadows raw water wells beyond what is currently predicted.

The 2007 Countywide groundwater study, conducted by the Maryland Geological Survey (MGS), evaluates the issue of facility consolidation.

Millersville Transmission Main Contingency Plan

In the 1990s, there were concerns about potential contamination of private wells near the Millersville Landfill. The County conducted a water modeling analysis to determine what size main would be required to supply water from the 330 pressure zone to the Vella Verdi and Aurora Hills subdivisions located at the intersection of Gambrills Road and Dicus Road. It was determined in the analysis that a dead-end water main could lead to poor water quality and sediment build-up in the main. It was concluded that the proposed 16-inch water main should continue north along Gambrills Road to Pasture Brook Road, connecting the 330 pressure zone to the 295 pressure zone. This plan would be consistent with the Master Plan initiative of pressure zone connectivity as well as potentially supplying these subdivisions in the event of contamination. During this same period, studies were conducted to remedy low water pressure problems in high elevation areas within the 330 pressure zone around Sappington Hills subdivision west of Burns Crossing Road and the Millersville Landfill. As well, fire flow tests indicated that a proposed County storage building at the Millersville Landfill would have inadequate water pressure. As a result, the Millersville 360 pressure sub-zone was created by constructing the Millersville BPS. While this alleviated low-pressure problems, the proposed 16-inch main was not constructed due to a well sampling effort, which indicated that well contamination was not present in those areas near the Millersville Landfill. However, plans for

the 16-inch main will remain as a contingency plan and will be designated as a “future” project for planning purposes. See Table 3-16 at the back of this chapter for a list of water capital projects.

3.6.11 Maryland City 369 Water Pressure Zone

3.6.11.1 General Description

The Maryland City 369 water pressure zone is situated in the western portion of the County. The area served within the 369 pressure zone is generally bounded by Baltimore-Washington Expressway (Route 295) to the east, Howard County to the west, MD 32 to the north and the Patuxent River to the south. The pressure zone consists of approximately 4,748 acres of land and includes the communities of Maryland City and Russett as well as the Laurel Race Track and the MD 198 commercial corridor. It is anticipated that in the future, water service will cross the BW Parkway and serve additional properties along the MD 198 corridor. Figure 3-1 shows the 369 Zone in relation to the other pressure zones.

The topography of the area varies from 105 to 305 feet, while piping elevations range from 120 to 300 feet indicating those elevations served within the zone. Static pressures generally range from 100 psi to 30 psi. The overflow elevation of the elevated storage tank is currently 369 feet with a low water elevation equal to 339 feet. According to the County’s design criteria, the highest ground elevation that can be served from the 369 Zone is 250 without providing supplemental means of pressure.

3.6.11.2 Projected Population Growth and Demands

Population within the Maryland City Zone is projected to increase by 615 people over the planning period as shown in Table 3-3. Residential areas in the pressure zone are primarily developed. Growth will occur east of the BW Parkway along MD 198, where the Arundel Gateway mixed use development is planned. The Laurel Race Track may be redeveloped to include retail uses and possibly a hotel, and revitalization or redevelopment may occur on commercial properties along MD 198.

As shown in Table 3-2, the average and maximum day demands in the Maryland City Zone are projected at 3.20 MGD and 6.40 MGD, respectively, at build-out (2043), as calculated for the 2003 Strategic Plan. Revised average and maximum day build-out demands of 4.34 MGD and 8.68 MGD, respectively, were calculated for this Master Plan. See Table 3-2 for demand projections for this zone for the planning period. For more details on demand projection methodology, see Section 3.2.

3.6.11.3 Groundwater Pumping and Water Treatment Facilities

There are no water production capabilities within the 369 pressure zone. All water servicing the zone is received from the adjacent 400 pressure zone via a control valve along Brock Bridge Road at MD 32. Therefore, two main supply sources provide water to the 369 pressure zone: (1) Baltimore City Zone 2 at the County’s connection at the Nursery Road BPS, and (2) the Dorsey Road Water Treatment Plant (WTP).

3.6.11.4 Storage and Distribution Facilities

Existing water storage and distribution system facilities in the zone include: the Maryland City 1.5 MG elevated tank and a control vault at MD 32 (at the 400 pressure zone boundary). The distribution system consists of approximately 37 miles of water mains that range in diameter up to 20 inches. See Table 3-10 for more information on the existing storage tank for this zone.

3.6.11.5 Strategic Plan for Infrastructure and Capital Improvements

The 369 Zone is served by a single 20-inch main from the Jessup 400 Zone. As part of the goal to increase hydraulic connectivity across all pressure zones, the *2003 Strategic Plan* proposed a 24-inch transmission main, along MD 32, (W8016) to interconnect the programmed 36-inch transmission main from Odenton to Disney Road (W7784) to the 369 Zone via the proposed 3 MGD Laurel Heights BPS. This station would boost water from the 330 feet (Kings Heights / Odenton Zone) to 369 feet (Maryland City Zone).

The storage analysis conducted in the *2003 Strategic Plan* for the Maryland City 369 Zone indicated the following storage deficit: 0.1 MG at present, 0.5 MG at 2010 and 1.9 MG at build-out. To satisfy the storage requirement, a 2 MG elevated tank is recommended at the Bacontown subdivision where high elevations exist. See Table 3-10 for more information on the existing and future required storage tanks for this zone. See Table 3-16 at the back of this chapter for a list of water capital projects.

3.6.12 Rose Haven 130 Water Pressure Zone

3.6.12.1 General Description

The Rose Haven 130 water pressure zone is approximately 102 acres situated in South County on the southeastern tip on the Chesapeake Bay at the Calvert County boundary line. Rose Haven was previously within the Rural Service Area. County upgrade and takeover of the Rose Haven private system was originally requested and approved in 1994 as a result of petitions by the citizens of the communities of Rose Haven and Holland Point. Figure 3-1 shows the 130 Zone in relation to the other pressure zones.

The topography of the area varies from elevation 0 to 8 feet. Static pressures currently range from 32 psi to 28 psi. The overflow elevation of the elevated storage tank is currently 73.5 feet. Upon completion of the proposed system, static pressures will range from 56 psi to 52 psi.

According to the County's design criteria, the highest ground elevation that can be served from the 130 Zone is 10 without providing supplemental means of pressure.

According to the General Development Plan of the County and the South County Small Area Plan, a majority of the land use for this zone is designated as low-density residential use.

3.6.12.2 Projected Population Growth and Demands

No significant increase in population or water demand is anticipated within Rose Haven.

Demand projections for Rose Haven were not included in the *2003 Strategic Plan*. As shown in Table 3-2, average and maximum day build-out demands in the Rose Haven Zone are projected at 0.32 MGD and 0.64 MGD, respectively. See Table 3-2 for demand projections for this zone for the planning period. For more details on demand projection methodology, see Section 3.2.

3.6.12.3 Groundwater Pumping and Water Treatment Facilities

Existing System: With the completion of Capital project W7575, the following pumping and treatment facility improvements were achieved:

- a. A new 0.25 MGD water treatment plant that is being located adjacent to the existing plant, which will allow abandonment of the existing facility,
- b. Two groundwater wells capable of producing 0.25 MGD each and,
- c. A new liquid chlorination system.

3.6.12.4 Storage and Distribution Facilities

Existing System: With the completion of capital project W7575, the water storage and distribution facilities now includes a new 0.25 MG elevated tank with overflow elevation of 130 feet and a distribution system network of pipelines that range in diameter from 6 to 12 inch.

3.6.12.5 Strategic Plan for Infrastructure and Capital Improvements

Due to the limited growth potential of this area and because capital projects had already been initiated under project W7575, the *2003 Strategic Plan* did not evaluate the Rose Haven Zone. See Table 3-16 at the back of this chapter for a list of water capital projects.

3.6.13 Annapolis City 173 Water Pressure Zone

3.6.13.1 General Description

The Annapolis City 173 water pressure zone is situated in the central portion of the County and serves the City of Annapolis. The area currently served within this pressure zone includes all customers served by and in the City of Annapolis.

The water system serving the City of Annapolis is not owned or maintained by the County, however, MDE requires that the County's Water and Sewer Master Plan include the City.

3.6.13.2 Projected Population Growth and Demands

Population within the 173 Zone is projected to increase from approximately 38,394 in 2010 to 42,600 by the year 2035. The City of Annapolis is primarily developed. However, redevelopment of property and several annexations from the County have occurred in recent years. Almost all of the City's growth potential could be accommodated within four areas labeled "Opportunity Areas" in the City's Comprehensive Plan. Combined, the four areas could accommodate up to 95% of residential growth projections, or 1,770 new residential units. The Outer West Street corridor represents 78% of growth projections; Forest Drive represents 8%; West Annapolis represents 6%; and the Bay Ridge Opportunity Area represents 4%. Another 5% of growth projections may come from infill development and development of vacant land. This land-used based projection assumes a maximum build-out scenario and assumes expansion of the City boundary by 106 acres in two annexation areas, as defined in the Comprehensive Plan. The projected water demands for this zone from 2010 to 2035 are shown below in Table 3-11.

TABLE 3-11
City Of Annapolis Water Demand Projections

Year	Average Daily Flow (MGD)	Maximum Daily Flow (MGD)	Peak Hourly Flow (MGD)
2010	4.09	6.48	10.52
2015	4.25	6.74	10.94
2020	4.42	7.00	11.38
2025	4.60	7.29	11.83
2030	4.78	7.58	12.31
2035	4.98	7.88	12.80

3.6.13.3 Groundwater Pumping and Water Treatment Facilities

The Annapolis Water Treatment Plant (WTP) provides water to the City's 173 pressure zone and is located along MD 450 just east of I-97 within Anne Arundel County limits. The WTP has a hydraulic capacity of 8.0 MGD. With the completion in 2010 of two raw water wells in the Lower Patapsco aquifer, the WTP now has a total of seven wells in three aquifers. In 2010, the City also completed projects to replace the 1 MG open finished water storage clearwell with two enclosed 1MG clearwells.

To address the fact that the existing WTP is at the end of its useful life, the City is building a new 8 MGD WTP adjacent to the existing facility under the FY12 and FY13 Capital Improvement Programs (CIP's). The project is expected to be completed in 2015.

3.6.13.4 Storage and Distribution Facilities

The existing water system facilities of the zone include five elevated tanks with overflow elevation 173, five distribution pumps and approximately 140 miles of water mains that range in size up to 24-inch. The elevated tanks include a standpipe on Jefferson Street, an elevated tank on the Naval Academy Stadium site, two elevated tanks at the intersection of Janwal Street and Barbud Lane and an elevated tank on Edgewood Drive at the site of the Back Creek Nature Park. The combined total volume of the water tanks is 5.5 MG, though useable volume is approximately 4 MG. In addition, the Water Treatment Plant has two 1 MG finished water storage tanks (useable with backup power). In addition to the new WTP, the City is completing a new Supervisory Control and Data Acquisition (SCADA) system for the tanks that will better communicate data back to the WTP, including tank levels that allow control of the WTP pumps.

3.6.13.5 Strategic Plan for Infrastructure and Capital Improvements

The City of Annapolis has updated the computer model of the water distribution system. The model is used in conjunction with asset management tools in place and under development to identify needed capital improvements for the system. The model outputs and asset management and assessment tools are used to update the distribution system improvement program. The objectives of the programs are to determine the extent and priority of pipeline improvements needed; enhance distribution system performance now and in the future; evaluate the need for, size, style and location of new water storage tanks; and evaluate the monitoring and control functions needed at existing and new elevated tanks. The City of Annapolis Capital Water Projects from FY13 through FY18 are detailed at the end of this chapter.

3.7 PRIVATELY OPERATED FACILITIES

There are over 530 wells in the County that are operated privately or by another non-County entity. These facilities typically maintain their own water treatment facilities. The Environmental Protection Agency and the Maryland Department of the Environment categorize these into three types:

- a. Community Water Systems (CWS) - those systems that serve the same people year-round such as homes or businesses,
- b. Non-Transient Non Community Water Systems (NTNC) – those systems that serve the same people but not year-round such as schools, and
- c. Transient Non-Community Water Systems (TNCWS) – those systems that do not consistently serve the same people such as parks, restaurants or gas stations

The non-County community water systems and non-transient non community water systems are listed in Table 3-12. For more information on transient non-community water systems, visit EPA's website at <http://www.epa.gov/safewater/dwinfo/index.html>.

3.7.1 Fort Meade Private Water System

The Fort Meade Private Water System includes six groundwater wells, a low-lift pumping station, a water treatment plant, two high-lift pumping stations, two booster stations, four elevated tanks, four ground storage tanks and the water distribution system. The system's primary source of water is the surface water from the Little Patuxent River, which provides approximately 80 percent of the water used at Fort Meade. The remaining 20 percent is provided by groundwater pumped from the six wells. The combined capacity of the storage tanks is approximately 3.3 MG. The Fort Meade system consists of two pressure zones: 391 Zone to the north and the 288 Zone to the south. Per the 2003 Strategic Plan, the projected average and maximum day build-out demands for the Fort Meade system are 4.62 MGD and 7.85 MGD, respectively. Figure 3-1 shows the Fort Meade Private Zone in relation to the other pressure zones.

Howard County is designing a 4.9 mgd reclaimed water system to include an outfall diversion structure, pumping station, distribution network, and elevated storage tank for the Fort Meade campus expansion in Anne Arundel County. The project is expected to utilize 1.62 MGD of reclaimed water from Howard County's Little Patuxent Water Reclamation Plant (LPWRP) effluent line beginning in 2014 and gradually increasing to approximately 5.0 mgd by 2025.

TABLE 3-12
Non-County Water Systems

System Name	Source Name	System Type	Average GPD	Aquifer Formation	Well Depth
Annapolis Area Christian School	Annapolis Christ School Well	NTNC	3000	Patapsco	353
Baldwin Memorial U. M. Church / Day Care	Baldwin Child Care Center	NTNC	1500	Magothy	94
Bill's North Odenton Shopping Center	Bills North - Old Well	NTNC	6000	Patapsco	118
Bill's North Odenton Shopping Center	Bills North-New Well	NTNC	6000	Patapsco	230
Boones Mobile Estates	Tennis Court Well	CWS	75000	Aquia	265
Boones Mobile Estates	Tower Well	CWS	75000	Aquia	235

Boones Mobile Estates	WWTP Well	CWS	75000	Aquia	223
Brightview Business Center	Brightview Well 1	NTNC		Patapsco	248
Cape Kids Corner	Cape Kids Corner Well	NTNC	1300	Magothy	210
Cape St. Claire Shopping Center	Cape St. Claire SC Well 1	NTNC	23700	Aquia	94
Cape St. Claire Shopping Center	Cape St. Claire SC Well 2	NTNC	23700	Aquia	96
Cape St. Claire Shopping Center	Cape St. Claire SC Well 3	NTNC	23700	Aquia	95
Cape St. Claire Shopping Center	Cape St. Claire SC Well 4	NTNC	1000	Magothy	232
Chesapeake Bay Foundation	CBF Cistern	NTNC		Unknown	
Chesapeake Bay Foundation	CBF New Well	NTNC		Aquia	84
Chesapeake Complex	Bodkin Elementary Well 2	NTNC	41000	Patapsco	590
Christopher's Market	Well	NTNC		Aquia	160
City of Annapolis	Annapolis Well 2	CWS	188,566	Magothy	258
City of Annapolis	Annapolis Well 5	CWS	260,162	Magothy	248
City of Annapolis	Annapolis Well 6	CWS	292,430	Magothy	242
City of Annapolis	Annapolis Well 7	CWS	266,212	Magothy	345
City of Annapolis	Annapolis Well 10	CWS	1,095,700	Upper Patapsco	520
City of Annapolis	Annapolis Well 11	CWS	1,095,700	Upper Patapsco	495
City of Annapolis	Annapolis Well 12	CWS	368,000	Lower Patapsco	1171
City of Annapolis	Annapolis Well 14	CWS	372,000	Lower Patapsco	1093
Concourse Commercial Condo, Inc.	Concourse Comm. Condo Well	NTNC	4000	Patapsco	242
Crofton Children's Center	Crofton Children's Center Well	NTNC	1500	Magothy	152
Crownsville State Hospital	Crownsville Well 4	CWS	215000	Magothy	312
Crownsville State Hospital	Crownsville Well 5	CWS	215000	Magothy	269
Davidsonville Elementary	Davidsonville Well 2	NTNC	2900	Magothy	343
Davidsonville UMC and Crossroads Childcare	Church and Childcare Well	NTNC		Magothy	180
Deale Elementary	Deale Elementary Well 1	NTNC	6000	Aquia	204
Edgewater Elementary	Edgewater Elementary New Well	NTNC	5000	Aquia	95
Elvaton Christian Academy	Well	NTNC	200	Patapsco	96
Epping Forest	Epping Forest Well 2	CWS	42000	Magothy	100
Epping Forest	Epping Forest Well 3	CWS	42000	Magothy	192
Fleck Machine Company, Inc.	Fleck Machine Well	NTNC	300	Patuxent	255
Fort George G. Meade	Fort Meade Well 1	CWS	3300000	Patuxent	594
Fort George G. Meade	Fort Meade Well 2	CWS	3300000	Patuxent	604
Fort George G. Meade	Fort Meade Well 3	CWS	3300000	Patuxent	672
Fort George G. Meade	Fort Meade Well 4	CWS	3300000	Patuxent	692
Fort George G. Meade	Fort Meade Well 5R	CWS	3300000	Patuxent	733
Fort George G. Meade	Fort Meade Well 6	CWS	3300000	Patuxent	748
Fort George G. Meade	Little Patuxent River	CWS	5200000	Little Patuxent	
Fort Smallwood Elementary	Fort Smallwood Elementary Well	NTNC	5000	Patapsco	290
Galilee Lutheran Church and Daycare	Well	NTNC		Patapsco	
Gambrills Business Park	New Well – (A + B) – Lower Patapsco	NTNC		Patapsco	230
Gambrills Business Park	TNC Well	NTNC		Patapsco	410
Greater Annapolis Veterinary Hospital	Vet Hospital Well	NTNC	1000	Aquia	230
Hartge Yacht Yard	Hartge Yacht Yard Garage Well	NTNC	1500	Aquia	170
Hartge Yacht Yard	Hartge Yacht Yard Pad Well	NTNC	1500	Aquia	115
Headquarters I / Headquarters II	HQ Well 1 (401)	NTNC	1200	Patapsco	142
Headquarters I / Headquarters II	HQ Well 2 (407)	NTNC	1200	Patapsco	157
Headquarters I / Headquarters II	HQ Well 4 (413)	NTNC	1800	Patapsco	146
Headquarters I / Headquarters II	HQ Well 5 (408 New)	NTNC	1800	Patapsco	360
Herald Harbor	Herald Harbor Well 1	CWS	160000	Patapsco	678
Herald Harbor	Herald Harbor Well 2	CWS	160000	Patapsco	716

Herrington Harbor - North	Canvas Shop Well	NTNC	7000	Aquia	220
Herrington Harbor - North	New Marina Office Well	NTNC	7000	Aquia	234
Herrington Harbor - North	Old Marina Office Well	NTNC	7000	Aquia	265
Herrington Harbor - North	Poolhouse Well	NTNC	7000	Aquia	220
Herrington Harbor - North	West Marine Well	NTNC	7000	Aquia	225
HH & P IV, LLC	Well	NTNC		Unknown	323
HH & P IV, LLC	Power Tech Well	NTNC	3000	Magothy	328
Holiday Mobile Estates, Inc.	Holiday Well 1R	CWS	125000	Patuxent	307
Holiday Mobile Estates, Inc.	Holiday Well 2R	CWS	125000	Patuxent	275
Homestead Gardens	Homestead Potable Water Well	NTNC		Aquia	225
I-97 Office Complex	Building 1110 Well	NTNC		Patapsco	380
I-97 Office Complex	Building 1111 Well	NTNC		Patapsco	284
I-97 Office Complex	Building 1120 Well	NTNC		Patapsco	357
I-97 Office Complex	Building 1121 Well	NTNC		Patapsco	347
I-97 Office Complex	Building 1127 Well	NTNC		Patapsco	343
I-97 Office Complex	Building 1131 Well	NTNC		Patapsco	328
Indian Creek Lower / Middle School	Indian Creek School New Well	NTNC	1500	Patapsco	445
Indian Creek Upper School	Well	NTNC	10000	Patapsco	409
Jemal's Bay 50 Plaza	Jemal's NTNC Well	NTNC		Magothy	345
Jemal's Bay 50 Plaza	Jemal's TNC Well	NTNC		Magothy	332
Kaufmann's Office Building	Well 1	NTNC	2400	Patapsco	349
Kids Farm - Mayo	Kids Farm - Mayo Well	NTNC	150	Aquia	91
Kids Farm, Childcare, Davidsonville	Kids Farm Well 1	NTNC	1000	Aquia	118
KinderCare Learning Center #1061	KinderCare Learning Ctr. Well	NTNC	1800	Patuxent	362
Knollwood Manor	Knollwood Manor Well C	CWS	7500	Patapsco	260
Lake Shore Christian Academy	LSCA Church & Parsonage Well	NTNC	600	Magothy	0
Lake Shore Christian Academy	LSCA School Well	NTNC	300	Magothy	87
Lake Shore Elementary	Lake Shore Elementary New Well	NTNC	3000	Patapsco	640
Lake Village Townhomes	Lake Village Well 1	CWS	160000	Patuxent	333
Liberty Marina	Well 1	NTNC	4500	Aquia	42
Liberty Marina	Well 2	NTNC		Aquia	
Long Point Mall	Well 1	NTNC	6000	Patapsco	
Lothian Elementary	Lothian Elementary Well	NTNC		Magothy	304
Lula G. Scott Community Center	Lula G. Scott New Well	NTNC		Aquia	186
Lyons Creek Estates	Lyons Creek Emergency Well	CWS	38000	Aquia	284
Lyons Creek Estates	Lyons Creek New Production Well	CWS	66000	Magothy	505
Maryland Environmental Service	MES HQ Well	NTNC	6000	Patapsco	420
Maryland Manor Mobile Home Park	Maryland Manor Well 2	CWS	80000	Magothy	285
Maryland Manor Mobile Home Park	Maryland Manor Well 3	CWS	80000	Magothy	297
Maryland Manor Mobile Home Park	Maryland Manor Well 4	CWS	16000	Magothy	439
Mayo Apartments	Laundromat Well	CWS	4600	Aquia	347
Mayo Apartments	New Mayo Apt Well	CWS		Aquia	70
Mayo Elementary	Mayo Elem. New Well	NTNC	4500		160
McDonald's #21058	Well 1	NCNC	1000	Patuxent	218
Millersville Elementary	Millersville Elementary Well	NTNC	6000	Magothy	125
Montessori Intl. Children's House	Montessori Well (New)	NTNC	1600	Aquia	140
Mount Carmel Day Nursery	New Well	NTNC	1100	Unknown	537
Northrop Grumman - Oceanic	New Well	NTNC	40000	Patapsco	856
Northrop Grumman - Oceanic	Northrop Grumman Well 2	NTNC	60000	Patapsco	545
Open Door Christian School	Well	NTNC		Patapsco	
Opportunity Builders, Inc.	Opportunity Builders Well	NTNC	5000	Patapsco	393
Ourisman Automotive	Honda BLD Well	NTNC	2700	Patapsco	172
Ourisman Automotive	VW BLD Well	NTNC	2700	Patapsco	268
Patuxent Mobile Estates	Patuxent MHP Well 1	CWS	40000	Magothy	335

Patuxent Mobile Estates	Patuxent MHP Well 2	CWS	40000	Magothy	400
Regency Park Assisted Living Residence	Regency Park Well	CWS		Patapsco	171
Ridgeview Plaza	Ridgeview Plaza Backup Well	NTNC	18000	Patuxent	466
Ridgeview Plaza	Ridgeview Plaza Primary Well	NTNC	18000	Patuxent	530
Rio Vista Plaza Mobile Home Park	Rio Vista Plaza MHP 3	CWS	10000	Aquia	190
Rio Vista Plaza Mobile Home Park	Rio Vista Plaza MHP 4	CWS	10000	Aquia	190
Rose Haven	Rose Haven 1	CWS	80000	Aquia	350
Rose Haven	Rose Haven 2	CWS	80000	Aquia	353
Sandy Point State Park Marina	Well 2	NTNC	29000	Magothy	278
Sandy Point State Park Marina	Well 3	NTNC	29000	Magothy	278
Severn Water Company	Severn Water Company Well 1	CWS	560000	Patapsco	265
Severn Water Company	Severn Water Company Well 1	CWS	560000	Patapsco	220
Severna Park Children's Centre, Inc.	Severna Park Children's Ctr.	NTNC	1700	Patapsco	155
Shady Side Elementary	Shady Side Elementary New Well	NTNC		Aquia	310
Sherwood Forest Water Company	Sherwood Forest Well 1	CWS	100000	Magothy	175
Sherwood Forest Water Company	Sherwood Forest Well 2	CWS	100000	Magothy	154
Smithsonian Enviro. Research Center	SERC Educ. Center Well	NTNC		Magothy	348
Smithsonian Enviro. Research Center	SERC Main Campus Well	NTNC	1500	Aquia	70
South Shore Elementary	South Shore Elem. New Well	NTNC	4500	Patapsco	280
Southern High School	Southern High Well 2	NTNC		Magothy	495
Southern High School	Southern High Well 1	NTNC	25000	Magothy	497
Southern Middle School	Southern Middle School Well	NTNC	3500	Aquia	380
St. Andrew's School	Well 2	NTNC	8500	Aquia	125
St. Margaret's Learning Center	Church And Parish Well	NTNC		Magothy	265
Summerhill Mobile Home Park	Summerhill New Well	CWS	20000	Magothy	212
Summerhill Mobile Home Park	Summerhill Old Well	CWS	20000	Magothy	210
Sylvan Shores Services Co.	Sylvan Shores Main Well	CWS	55000	Magothy	325
Tebbston On Magothy	Tebbston On Magothy Well	CWS	3200	Magothy	142
Tender Years Child Care	Tenders Years Child Care Well	NTNC	800	Aquia	180
The Key School	2nd Grade/New Manse Bldg Well	NTNC	7300	Magothy	332
The Key School	Carroll House Well	NTNC	7300	Magothy	337
The Provinces	Provinces 1 - Cadmium Well	CWS	415000	Patuxent	540
The Provinces	Provinces 2	CWS	415000	Patuxent	556
The Provinces	Provinces 3`	CWS	415000	Patuxent	526
The Summit School	Main House Well	NTNC		Aquia	150
The Summit School	Student Activity Center Well	NTNC	500	Aquia	340
Traceys Landing Elementary	Traceys Landing Elementary	NTNC		Aquia	332
U.S. Naval Academy	USNA Well 15	CWS	1750000	Patapsco	593
U.S. Naval Academy	USNA Well 16	CWS	1750000	Patapsco	598
U.S. Naval Academy	USNA Well 17	CWS	1750000	Patapsco	693
Veterans Plaza	Veterans Plaza Well	NTNC		Magothy	125
Wayson's Mobile Court	Wayson's Well 1	CWS	57000	Aquia	157
Wayson's Mobile Court	Wayson's Well 2	CWS	57000	Aquia	153
Wayson's Mobile Court	Wayson's Well 3	CWS	57000	Aquia	156
Wayson's Mobile Court	Wayson's Well 4	CWS	57000	Aquia	124
Wee Lad & Lassie Early Learning	Wee Lad & Lassie New Well	NTNC	300	Aquia	130
Welsh's Trailer Park	Welsh's Trailer Park Well	CWS	5200	Patapsco	165
Wonder Years - Broadwater Creek Academy	Well	NTNC		Aquia	196
Wonder Years - London Towne Academy	Well 1	NTNC		Aquia	

3.8 DRINKING WATER STANDARDS

3.8.1 Brief History of Federal Drinking Water Regulations

In 1974, the Safe Drinking Water Act (PL93-523) was passed. Through this Act, the Environmental Protection Agency (EPA) was required to establish national drinking water standards, which became effective June 24, 1977. Most implementation and enforcement responsibilities were given to the State.

In 1986, Congress passed the Safe Drinking Water Act Amendments, which formalized the implementation process, setting definite goals and deadlines for EPA to establish additional water quality standards.

In 1996, the Safe Drinking Water Act was re-authorized. There were three major changes to this Act. First, a more realistic schedule for the establishment of new water quality standards was adopted. Second, a requirement for certain utility owners to protect groundwater sources through “wellhead protection studies” was included. Finally, the 1996 Act required most water system owners to distribute water quality information to all of their customers through a “Consumer Confidence Report”.

3.8.2 State Regulatory Agency

The Maryland Department of the Environment (MDE) has responsibility for all aspects of ground water resource management as well as the inspection of public water supply systems. This includes the issuance of permits for the appropriation of ground water. It also includes the routine monitoring of water systems through site inspections and water quality analysis.

The Maryland Department of Health and Mental Hygiene assists MDE by performing lab analyses and managing a program to certify water quality laboratories. The Maryland Geological Survey assists MDE by monitoring groundwater levels and pumpage trends as well as testing for certain constituents in the groundwater supply such as radionuclides.

Monitoring and testing the public water supply is a continual effort for the County. As the EPA establishes new water quality regulations and standards, MDE provides direction to the County on implementation of the federal drinking water standards. The County’s Annual Drinking Water Quality Report can be found at www.aacounty.org/dpw/utilities/waterquality.cfm.

3.8.3 Primary and Secondary Standards

The EPA has established a set of primary and secondary drinking water standards for municipal water systems. Enforceable by law, the primary drinking water standards set limits for certain contaminants that can be found in public water systems: microorganisms, disinfection byproducts, disinfectants, organic and inorganic chemicals, and radionuclides. The maximum contaminant level (MCL) or treatment technique (TT) is given for each contaminant, which is enforceable by law. The maximum contaminant level goal (MCLG) is also defined but is not enforceable by law. In order to comply with these standards, the required sampling and analyses vary greatly, depending on the type of analyses. Some analyses are required on a daily basis for

every water system, while other analyses are performed only once every three years, and only on the largest systems.

Secondary standards are unenforceable federal guidelines regarding certain substances that may affect the general quality of potable water. These standards are suggested as recommended levels that result in a generally accepted water quality. Above these levels, the taste, color, and odor generally becomes objectionable to the general public.

The EPA in conjunction with state and local agencies and institutions continually evaluates the primary drinking water standards to promote human health and safety. The EPA issues new water quality rules periodically, requiring the County's monitoring and testing efforts to continually evolve. EPA's current National Primary and Secondary Drinking Water Standards can be found at www.epa.gov/safewater/contaminants.

3.9 WATER QUALITY PROBLEM AREAS BASED ON EXISTING CONDITIONS

The Anne Arundel County Department of Health has identified three (3) potential groundwater problem areas within the County. These problem areas are due to saltwater intrusion, elevated radium and elevated nitrate levels. The County Department of Health will monitor these areas and, if petitions are submitted for service within the areas, action will be taken accordingly and in conjunction with the Office of Planning and Zoning. The three groundwater problem areas are as follows:

- a. Annapolis Neck
- b. Gambrills Area
- c. Northern Anne Arundel County (generally, all areas north of MD 50)

3.9.1 Annapolis Neck - Salt Water Intrusion

New wells in this area are required to be drilled and grouted (sealed) into a confined aquifer, which is screened at a depth of no less than 270 feet and grouted to a depth of no less than 200 feet to avoid saltwater intrusion problems. The area of concern is shown in Figure 3-4.

3.9.2 Gambrills Area - Elevated Nitrate Levels

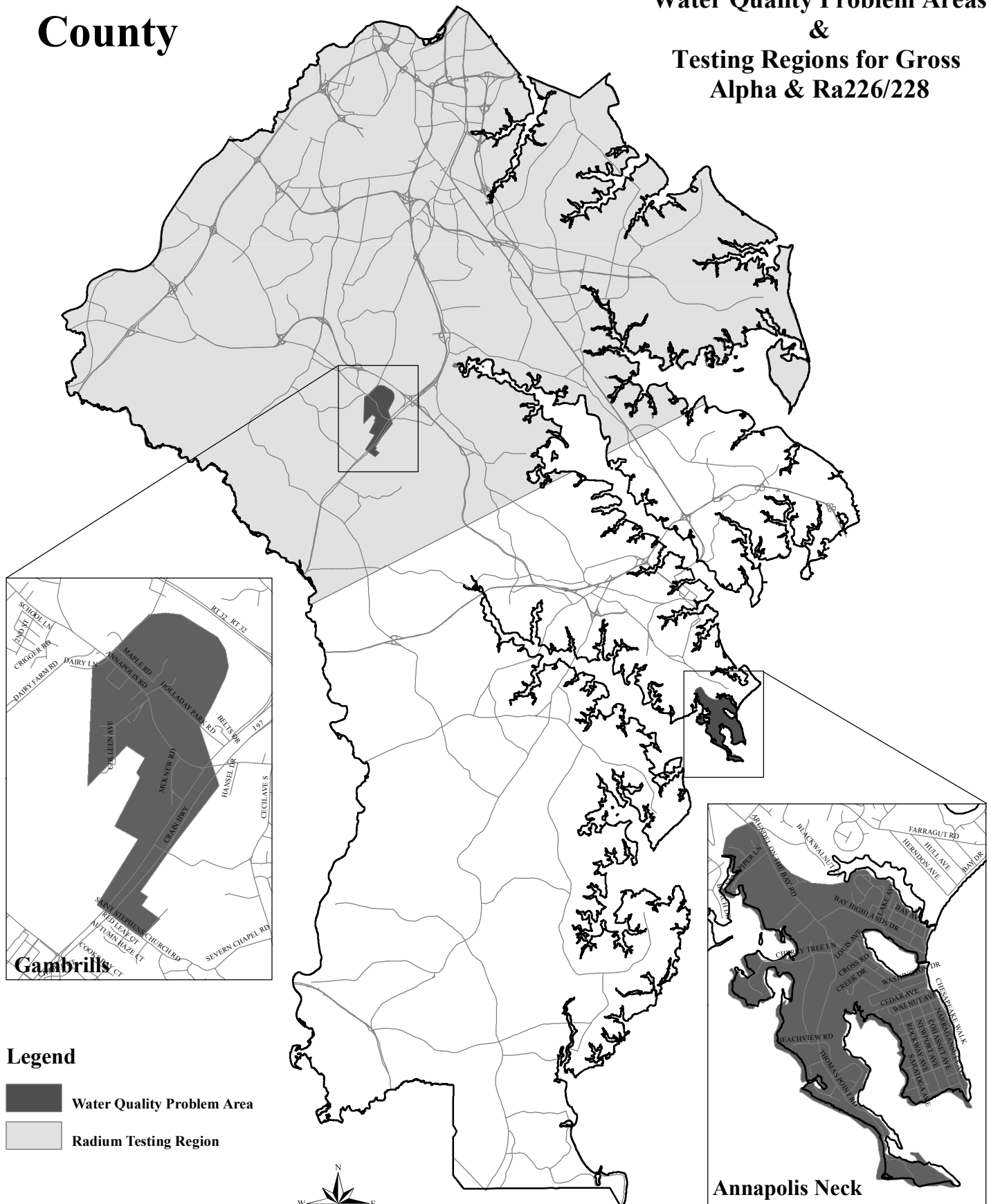
Elevated nitrate levels have been detected in some private wells in the Gambrills area near the intersection of Annapolis Road (MD 175) and Crain Highway (MD 3), just east of the Horizons Farm (the recent U.S. Naval Academy Dairy Farm). The area of concern is shown in Figure 3-4. New wells in this area are required to be drilled and sealed into a confined aquifer below 140 feet in depth to avoid nitrate problems.

3.9.3 Northern Anne Arundel County - Elevated Radium

New and replacement wells in Northern Anne Arundel County are required to be installed to a minimum well depth and meet gross alpha and Radium 226 / 228 drinking water standards. The region within which wells are tested by the County for these parameters is shown in Figure 3-4.

Anne Arundel County

Figure 3-4
Water Quality Problem Areas
&
Testing Regions for Gross
Alpha & Ra226/228



A minimum well depth is determined by the Department of Health and is based on an aquifer with acceptable radionuclide concentrations. A computer model showing the distribution of radionuclide data, well depths, property elevations, and deep test wells is used to determine the minimum well depth requirements. Owners of existing private wells are encouraged to test for gross alpha particles. Where levels are found above the drinking water standards, a water treatment unit or a replacement well in a deeper aquifer is recommended. See Section 3.5.3.1.11 for more details on ongoing capital projects to reduce elevated radium in three self-contained wells in the Glen Burnie area.

3.10 FINANCIAL

3.10.1 General

The Sanitary District of the County encompasses the whole County except for that portion that lies within the corporate limits of the City of Annapolis. The Anne Arundel County Charter assigns the responsibility for the construction and operation of the wastewater facilities in Anne Arundel County to the Department of Public Works. The Charter requires that all water facilities operated by the County be completely self-supporting. Furthermore, the Anne Arundel County Code, Article 4, Title 10 limits the outstanding debt of the County for water facilities to 5.6 percent of the County's assessable basis of real property, 14 percent of the County's assessable basis of personal property and 14 percent of the operating real property described in the Tax-Property Article 8-109 of COMAR, computed as of the first day of the then current fiscal year.

3.10.2 Charges and Assessments

In accordance with the requirements set forth in the Charter, Anne Arundel County has established charges and assessments for connections to the system that are used to pay all operating costs and debt service for the water utilities. Four principal charges have been established as described below. Table 3-13 lists the rates for the water charges.

a. Connection Charges

- i. The User Connection Charge - This charge recovers the cost of constructing the service line between the property line and main pipeline including the cost of the meter. It is charged at the time of the permit application and is payable in full on new homes while existing homes have the option to pay in full or to use a 5 year installment plan.
- ii. Capital Facility Connection Charge - This charge recovers the cost of constructing the water treatment plants, the pumping stations and the conveyance facilities other than the lateral lines. The charge is collected at the time of building permit or connection permit issuance. New homes must pay in full while existing homes have the option to pay 1/3 using a 5-year installment plan and 2/3 over 30 years as a capital facility assessment.
- iii. Inspection Fee - This charge covers the cost of inspecting the service connection and is paid at the time of the permit application.

- iv. Administrative Fee - This charge covers the cost of processing the connection permit.

Front Foot Benefit Assessments

This charge is used to recover the cost of constructing the water lateral lines and is paid annually from the inception of service for a period of 30 years.

User Charge

This bi-monthly or quarterly charge recovers the cost of operating and maintaining the water treatment plants and other major infrastructure.

Environmental Fee

This charge covers the cost for upgrading and rehabilitating water capital facilities and is paid quarterly with the user charge.

TABLE 3-13
Residential Water Charges

Type		Fee
User Connection (existing connection)		\$2,100.00
User Connection (new connection)		\$2,650.00
Capital Facilities Connection Charge		\$6,300.00
Inspection Fee		\$ 30.00
Permit Fee		\$ 25.00
Front Foot Benefit Assessment	Minimum	\$ 2.37 per foot
	Maximum	\$ 7.79 per foot
Quarterly Usage Charges (8-01-12)		\$ 2.68 per 1,000 gal.
Environmental Protection Fee (8-01-12)		25% of the water usage charge

Tables 3-14 and 3-15 provide financial management statistics for the Anne Arundel County Water System. Table 3-14 furnishes the status of the Debt Service Fund and Table 3-15 provides financial information for the Operating Debt Fund. Table 3-16 provides the financial statistics for the city of Annapolis.

TABLE 3-14
Debt Service Fund - Water

Revenues	Fiscal Year 2010	Fiscal Year 2011
Investments	\$1,483,364	\$737,067
Front Foot Assessment fees	1,019,237	1,136,957
Capital Facility Connection fees	7,995,859	20,456,293
EPF fees	5,133,493	5,498,009
Miscellaneous	464,169	417,684
Total Revenues	\$16,096,122	\$28,246,010
Expenses	Fiscal Year 2010	Fiscal Year 2011
Principal	7,808,789	8,382,098
Interest	6,146,643	7,536,896
Pro-rata	252,000	252,000
Miscellaneous	- 0 -	- 0 -
Total Expenses	14,207,432	16,170,994
Revenue over (under) expenses	\$1,888,690	\$12,075,016

TABLE 3-15
Water Operating Fund - Financial Management Statistics

	Fiscal Year 2010		Fiscal Year 2011
Water Charge Revenue	\$30,018,222	Water Charge Revenue	\$30,990,822
Other Revenue - Water (See Schedule D Below)	2,661,087	Other Revenue - Water (See Schedule D Below)	2,886,681
Total Revenue	32,679,309	Total Revenue	33,877,503
Water Operation Expense	21,115,025	Water Operation Expense	20,878,860
Water Maintenance Expense	3,532,326	Water Maintenance Expense	3,961,031
Fees paid to Other Jurisdictions - Water	3,219,278	Fees paid to Other Jurisdictions - Water	2,413,859
Total O&M	27,866,629	Total O&M	26,653,750
Depreciation	13,042,044	Depreciation	10,832,773
Total Expense	40,908,673	Total Expense	37,486,523
Operating income or (loss)	-\$8,229,364	Operating income or (loss)	-\$3,609,020
Total Flow Volume in thousand gallons	12,336,912	Total Flow Volume in thousand gallons	11,378,052

Schedule D - Detail of Other Revenue on Table 3-15

Revenue	Fiscal Year 2010	Fiscal Year 2011
Penalty Charges	\$659,429	\$649,090
Rental Income	1,384,442	\$1,719,119
Reimbursement - Damages	19,661	\$29,876
Pro rata	270,000	270,000
Miscellaneous Recoveries	327,555	\$218,596
	\$2,661,087	\$2,886,681

TABLE 3-16
City of Annapolis
Financial Management Statistics - Water

Category	Fiscal Year 2010	Fiscal Year 2011
Water Charges	\$ 3,170,330	\$3,888,613
Water Rental Income	95,380	104,194
Capital Facility Charges	334,500	356,258
Transfers In	1,350,000	634,660
Interest Income	2,050	918
Other		5,377
TOTAL REVENUE	4,952,260	4,990,020
Personnel Expenses	2,028,680	2,041,035
Other Operating Expense	1,224,170	1,008,757
TOTAL OM&R	3,252,850	3,049,792
Depreciation	595,960	596,051
Non-Operating Expenses	\$1,453,080	1,320,933
TOTAL EXPENSES	5,301,890	4,966,776
Increase(Decrease) in Net Assets	(349,630)	23,244
Debt Principal	\$ 876,794	\$533,607

3.10.3 Capital Improvement Program

Anne Arundel County utilizes a six-year Capital Improvement Program for planning the necessary expansions to the water and wastewater system. All plans for major water and sewer projects financed by Anne Arundel County must be reviewed and approved by the Office of Planning and Zoning, the Planning Advisory Board, the County Council, and finally approved by the County Executive. Table 3-17 lists the current water capital improvement projects within Anne Arundel County. The City of Annapolis also utilizes a six-year Capital Improvement Program. Table 3-18 lists the current water capital improvement projects within the City of Annapolis.

TABLE 3-17
Water Capital Improvement Projects, Anne Arundel County

Contract Title	Contract Number	Description
12" WM St. Marg/Old Mill Bttm	W801201	This project is for design, right of way acquisition and construction of approximately 7,000 (reduced from 11,500) linear feet of 12-inch water main within the 220 Broadneck Service Area. The main will extend along St. Margarets Road from the Amberly WTP to the existing distribution system located east of Mill Creek and along Old Mill Bottom Road to MD Rte 50. The project will improve the pressure within the existing distribution system.
16" Water Main Riedel To Rt 3	W801301	This contract is for the design, right-of-way acquisition and construction of approximately 3,300 LF of 16" water main within the 290 pressure zone in the Crofton Service Area. The main will connect the existing 16" main in Riedel Road to the existing 16" main in MD Route 3.
2" WM Repl - Severna Park	X733789	Replacement of approximately 6,700 lf of existing 2 in water main with new 8in (500lf), 6in (6,000lf), and 4in (200lf) lines in the Severna Park area of Anne Arundel County. Duration is 300 calendar days. Construction inspection services to be provided under X733790.
24" TM Crain Hwy EWT/Oakwood	W803602	This contract is for the design, right of way acquisition of 6,500 feet of 24-inch water transmission main from Crain Highway Elevated Tank to Oakwood Road and of a control valve and booster pump station. This contract also includes installation of a control valve at Severn-Danza Park and a control valve and booster pump station at Dorsey Road.
24" TM Winterson Rd/Ferndale	W803601	This contract includes the design, right of way acquisition and construction of 14,000 feet of 24-inch water transmission main that will transfer water between Winterson Road and the Ferndale Stand Pipe and of a control valve in the vicinity of the Lindale-Brooklyn Park Elementary School.
36" Blue Water Blvd-Reece Rd	W778406	Construction of 6,400 feet of 36" transmission main from Blue Water Blvd to Reece Rd via Odenton Town Center Blvd.
36" Reece Rd - 1615 Disney	W778407	Construction of 5,200 LF of 36" Transmission Main from intersection of Reece Rd and Jacobs Rd to the Fort Meade Booster Pump Station at 1615 Disney Rd.
36" TM Piney O - Odenton Rd	W778404	Construction of 5,300 LF of 36" Transmission Main between Piney Orchard Pkwy and Odenton Rd, via Patuxent Rd North.
Aquifer Storage Recovery	W797608	This contract includes the investigation and evaluation of the use of Aquifer Storage Recovery in the County.
Arnold Prod. Well # 11	W801803	This contract includes the planning, right of way acquisition, design and construction of test well, production well # 11, and transmission main.
Arnold Raw Water Trans. Main	W801805	This contract includes the design and construction of a raw water line from wells #8, #9 and #10 to Arnold WTP (approx 3,300 LF)
Arnold Well # 7	W801802	This contract includes design and construction of Arnold Well # 7.
Arnold Wells # 8, # 9 & #10	W801804	This contract includes design and construction of Arnold Wells # 8, #9 and #10.
Arnold WTP Catwalk	W803318	This contract includes the design and construction of a catwalk between the filters and clarifiers at Arnold Water Treatment Plant. This contract is being managed by Susanne Lockhart.
Arnold WTP Expansion	W801801	This project is to design and construct the expansion of the Arnold Water Treatment Plant. Project includes the expansion of both the water treatment facility and well fields from 8 to 16 MGD.
Balt City - Fullerton WTP	W8046-01	Baltimore City is planning the subject water treatment plant. This project is cover AACounty's proportional share of the water treatment plant project.
Bartgis Manor Water Extension	Y514260	Provide water service to the petitioned area, which includes 6 lots located on Russell Road. Design services to perform a feasibility study and develop a cost estimate. According to Leslie Campbell, Lots 5A and 6R will not be included in the petition
Broad Creek #5 Emerg. Redev.	W744460	Broad Creek #5 redevelopment, pump and motor reconditioning, and column pipe replacement. Contract is to be completed on an emergency basis.

Contract Title	Contract Number	Description
Broad Creek Production Wells	W804003	This contract includes the planning, right of way acquisition, design, and construction to provide 3 new raw water production wells to serve the planned Broad Creek WTP expansion, and installing one well house at each well site, including all power, communications, and piping necessary for completely operational wells. See Contract # W804002 for selected well sites.
Broad Creek Test Wells	W804002	This contract consists of conducting siting studies and siting evaluations leading to the purchase of 2 raw water production well sites and constructing 3 test wells at the two sites. One site to have a test well in Patuxent aquifer and test well in Lower Patapsco aquifer. Other site to have one test well in Patuxent aquifer. Three test wells total. CM preparing resolving change order.
Broad Creek Trans. Mains	W804004	This contract consists of designing and constructing a raw water transmission main from each of the selected well sites to Broad Creek II WTP. See Contract W804002 for selected well sites. A total of two transmission mains to be constructed.
Broad Creek WTP Expansion	W804001	This contract consists of increasing the treatment capacity of the Broad Creek WTP from 4 million gallons per day to 8 million gallons per day. Includes increasing current capacity of several water treatment unit processes including sludge holding, transfer sump, clearwell, filters, clarifiers and rapid mixer, as well as miscellaneous enhancements.
Cape St Claire Rd TM	W783001	Extension Of A 12-Inch Diameter Water Main Along Cape St. Claire Road From Forest Terrace To The Intersection With Hilltop Drive. Design And Construction Is Being Done In Conjunction With A Roadway Improvement Project For Cape St. Claire Road (H461001).
Chg Against WTR Clsd Projects	W741401	Charges Against Closed Projects In The Water Class.
Cm Ii Exp Ph 2 – Wells	W801402	This Contract Will Provide Four New Water Production Wells, Increasing The Total Well Field Capacity From 15 To 21.5 MGD.
Cm Ii Exp Ph 2 - WTR TM Lines	W801403	This Contract Will Provide Raw Water Transmission Lines From Each Of The Two Planned Water Production Well Sites.
Crain Hwy EWT Rehab	X787031	This Contract Is For The Rehabilitation Of Crain Highway EWT.
Crofton Meadow II WTP 12 & 13	W778603	This Contract Includes The Acquisition Of A Well Site And Installing 2 Raw Water Production Wells And A Well House On The Site. Test Wells 12t And 13t Are Under Contract W778606.
Crofton Meadow II WTP Upg - Wells 12/13 Raw Water Line	W778604	This Contract Includes The Installation Of A Large Diameter Raw Water Line From The Wellhouse For Wells 12/13 To The Crofton Meadows II WTP.
Crofton Meadows II Exp Ph 2	W801401	This Contract Will Increase The Capacity Of The Crofton Meadows Ii WTP From 15 To 25 MGD By Adding Additional Sedimentation Basins, Filters And Raw Water Wells. Well Field Will Be Increased From 15 To 21.5 MGD.
Crofton Meadows WTP Program.	W778607	This Contract Includes Expanding And Upgrading The Process Control System At CMII WTP.
Crofton Mead-Test Wells 12T & 13T	W778606	This Contract Includes The Installation Of Test Wells 12t & 13t, And The Associated Testing.
Crofton Water Service Improv.	Y514241	This Work Involves Extending A Water Main Located In Crofton To Close Gaps And Improve The Efficiency Of The Water System (Farnborn St.). Also See Y514248.
Crofton WTR-Hyman/Duke Of Kent	Y514248	This Contract Involves Extending A Water Main In Crofton Approximately 200 Feet Long To Close An Existing Gap. This Contract Was Previously Included With Contract Y514241.
Disney Road Booster Station	W793401	The Project Consists Of Design And Construction Of A Water Booster Pump Station At 1615 Disney Rd. The Pump Station Will Boost 330 Ft Pressure Water From Crofton Water Plant To 350 Ft And 400 Ft Pressure Zones.
Disney Road Water TM	W801002	Design And Construction Of 5,000 Lf Of 30" Main Along Disney Road From Proposed Disney Rd Bps (1615 Disney Rd) To Proposed 30" Transmission Main At MD 175; Design And Construction Of 3,700 Lf Of 12" Main From Disney Estates To Citadel Rd.
Dorsey Road WTP Clearwell	W803314	This Contract Is For The Design And Implementation Of Necessary Repairs To The Dorsey WTP Clearwell . Repairs Include Concrete Crack Repair By Epoxy Injection, Polyurethane Grout, Spall Repair, Joint Repair And Replacement/Waterproofing Of Clearwell Top Slap Topping.
East/West North Cnty Modeling	W803603	Design Contract To Update The County Water Model And Produce A Study To Verify Planned Design Projects Needed To Transmit, Store And Convey Water Across The Northern Part Of The County
EWST-Bacontown	W799602	Design & Construction Of A 2 Million Gallon Elevated Water Storage Tank At Bacontown.
EWST - Crofton/Waugh Chapel	W799605	Design And Construction Of Crofton Water Storage Tank. The Name Of This Tank Will Be Crofton/Waugh Chapel.

Contract Title	Contract Number	Description
EWST - Ft. Smallwood	W799601	Study, Design And Construction Of Elevated Water Storage Tank On Ft. Smallwood Rd. In Tar Cove Park. (Access Road Constructed Under This Contract Number. Tower Will Be Constructed Under Contract Number W799608, While Transmission Main Work (Design & Construction) Will Occur Via W799607.
EWST - Meade Village/Disney Rd.	W799606	Design And Construction Of A 2-Million Gallon Composite Tank At 1615 Disney Road.
EWST - Public Relations	W799612	This Contract Is For The Necessary Public Outreach For Site Selection, Feasibility And Construction Of Tanks Under This Program.
EWST - Selby Grove/Jumpers Hole	W799604	Design And Construction Of A 2 Million Gallon Elevated Water Storage Tank In Selby Grove (Elvaton EWST) Near Jumper's Hole Road And Old Jumper's Hole Road. Transmission Main Will Be Constructed Under W799609, Called "Waterford Rd T.M."
EWST Antenna Inspection	X787038	Professional engineering and inspection on-call services in support of antenna installations on county- owned elevated water storage tanks. There are no construction services involved in this contract.
EWST Sites-BC/Heritage Zones	W799614	Siting Study for 1 - 2 MG tank in the Broad Creek Service Zone and 1 - 1 MG tank in the Heritage Harbor Zone.
EWST-Evergreen Interconnect	W799613	This contract is for the installation of approx. 4,700 lf of transmission main to connect the Waugh Chapel EWST to the 330 and 290 zones
EWST-Ft Smallwood Construct	W799608	Construction and CM/Inspection services for a new 2MG Elevated Water Storage Tank in Ft Smallwood. The tank is being designed by CET Engineering Services under a separate contract (W799601).
EWST-Lincoln Heights Phase 2	W799610	Design & Construction of a 2 million gallon Elevated Water Storage Tank. This tank is also known as the New Broadcreek Tank. This contract should be used instead of W799603.
EWST-Waterford Road Tr. Main	W799609	Construction of 2,050 linear feet (LF) of 20-inch water transmission main from the Elvaton Elevated Water Storage Tank along Old Jumpers Hole Road to Waterford Road and connecting at Ritchie Highway/Rt 2. Other water main improvements include 600 LF of 12-inch water main, 170 LF of 8-inch water main, 7 fire hydrants, and water meter vaults. Design services under W799604.
Fire Hydrant Rehab Ph 16	W787816	This contract will allow for blasting and painting of fire hydrants located throughout the County. Contract will use FHR-OE-2009 manual produced under W787815. Contractor & CM/I Inspector obtained from W787815 contract.
Fire Hydrant Rehab Phase 15	W787815	This contract will create the standard construction open-end under which POs for future phase will be written. The first PO for 550 will be written under this contract number.
Fire Hydrant Rehab Phase 17	W787817	This contract is to paint 1100 fire hydrants.
Fire Hydrant Rehab Phase 18	W787818	This contract is to remove lead paint and repaint 485 fire hydrants to complete grids in which hydrants have not been rehabilitated.
Fire Hydrant Rehab Phase 19	W787819	This contract is to rehab 800 fire hydrants. This contract restarts the rehabilitation program in the northwest corner of the county.
Fire Hydrant Rehab Phase 20	W787820	This contract is for the rehabilitation of 1000 fire hydrants. Contract will use FHR-OE-2009 manual produced under W787815
Ft. Smallwood Interconnect.	W803316	Upgrades to two PCCP water lines (Nursery Road and Fort Smallwood Road) to improve redundancy for service and accessibility for inspection.
GB High Zone-Evelyn Avenue	W801705	This contract provides for the design, right of way acquisition, and construction of 1,860 linear feet of 8" water main along Evelyn Avenue.
GB High Zone-Hammonds Ferry Water Main	W801702	This contract provides for the design, right of way acquisition, and construction of 3,170 linear feet of 12" water main along Hammonds Ferry Road from Oregon Avenue to Hammonds Business Park.
GB High Zone-Nursery Rd	W801704	This contract provides for the design, right of way acquisition, and construction of 2,700 linear feet of 12" water main along Nursery Road.
GB High Zone-Oregon & Raynor	W801703	This contract provides for the design, right of way acquisition, and construction of 2,800 linear feet of 8" water main along Oregon Avenue and Raynor Avenue.
Gibson Is WTP-Ground Storage	W777604	This contract is for the necessary construction of the replacement of the Ground Storage Tank located at Gibson Island. This contract includes all services required in order to construct the new tank, including planning, siting, design documents, permitting, ROW purchase, inspection services and the construction contract.
Gibson Island WTP Upgr Phs 2	W777602	This contract is for the necessary upgrades to the existing Gibson Island Water Treatment Plant (WTP). Upgrades include new high pressure pumps; nre pressure filter tanks, new pressure filter valves and piping; new mixing channel baffle and grating; replacement of the chemical feed building and equipment; electrical improvements; new process control equipment; painting; and structural improvements.
Hammonds Lane GST	X787040	This contract will address the deficiencies identified in previous evaluation studies.

Contract Title	Contract Number	Description
Herald Harbor EWST Rehab	X787041	This contract is for the rehabilitation of Herald Harbor EWST. It includes OSHA, AWWA, structural and coatings upgrades.
Hospital Drive Water TM	W803501	Funds are requested for the design and construction of approximately 1,800 linear feet of 12-inch water main extension from the existing main at the end of Hospital Drive to Elvaton Road. The water main will be constructed within the Hospital Drive Extension right-of-way. See Contract H387902.
HVAC Upgrade At CWF & CM II	W803317	This contract includes the design and construction necessary to upgrade the HVAC systems at the Central Water Facility (CWF) and CM II. Scope includes SD Report only for Millersville CWF HVAC Upgrade and bid documents for CM II HVAC (air dryer) upgrade. This contract is being managed by Victor Kibec.
Jumpers Hole Rehabilitation	X787035	This contract is for the rehabilitation of Jumper's Hole. Rehabilitation will be assessed on WIT's report completed under X764323.
Kings Heights EWT Rehab	X787032	This contract is for the rehabilitation of King's Heights EWT.
Millersville EWST Rehab	X787042	This contract is for the rehabilitation of Millersville EWST. It includes OSHA, AWWA, structural and coatings upgrade.
New Cut WTP	W804301	This contract includes the planning and right of way acquisition of a water treatment plant to serve the Glen Burnie High Zone. The New Cut WTP will serve the area water needs and the water demands created when the Dorsey Road WTP is decommissioned.
Old Mill EWT Rehab	X787033	Rehabilitation of the Old Mill water storage tank. Work to include repainting of the interior and exterior surfaces, repair/replacement of the cathodic protection system, and miscellaneous site work.
Pasadena EWT Demo	W753407	This contract includes the preparation of contract documents for bidding and demolition of the Pasadena Elevated Water Tank.
PCCP Inspct-Ft Smllwd/Nursery	X764325	Inspect PCCP water mains on Nursery Road between Nursery Road Booster PS and Winterson Road (approx. 9,500 feet) and Fort Smallwood Road between the Baltimore Line and the Fort Smallwood Booster PS (approx. 5,200 feet).
Petition-Cape St. Claire WTR	Y514259	Provide water service to petition area in Cape St. Claire Block AZ which involves 11 lots. Design services to perform a feasibility study and develop a cost estimate.
Petition-Elvaton Road Water	Y514255	This petition contract will evaluate the feasibility of providing water service to 9 properties at the west end of Elvaton Road.
Ph 1 WM – Linthicum, Ferndale	W804501	This project includes the design and construction management services for 5,755 linear feet of water main in Edgewood Rd (B&A BLVD to Sycamore/Benton, W Ordnance Rd (RT2 to Sheckells Rd), Camp Meade Rd (Valve #4220B to 4220A), Andover Rd forestdale to Broadview), and Chalmers Rd to B&A Blvd.
Ph 2 WM-Phirne, Brooklyn Park	W804502	This project includes the design and construction management/inspection services for various water system improvements in various locations in the Brooklyn Park and Glen Burnie areas. Improvements are broken down into two separate construction contracts as outlined below a) W8045-06 - 1,700' of 12" DIP to connect water mains on Phirne Road and Patriot Lane b) W8045-07 - 3,500' of 12" DIP at various points along Hammonds Lane in the Brooklyn Park Area.
Piney Orchard EWT Painting	X787023	Blasting and repainting of Piney Orchard Elevated Water Tank. Work addresses interior/exterior of tank, interior fluted column, valve vault interior and exterior piping, Miscellaneous metalwork upgrades, Electrical upgrades, and Cathodic protection upgrades/repairs. Tank can be out of service Sept 15th to May 1st.
Redev. Broad Creek Well # 1	W744459	Assessment, design and redevelopment/reconstruction of Broad Creek #1.
Ritchie Hwy Water Extension	Y514252	This project was combined with W801102.
Rose Haven Rehabilitation	X787037	This contract is for the rehab of Rose Haven.
Rose Haven Site Development	X787039	This project consists of correction of site grading / drainage deficiencies at, Rose Haven Elevated Water Storage Tank.
SER Water Material Stock	X733797	This contract is for the purchase of water roadway valve boxes, meter vaults, meter yokes, curb stop valves, etc. to replace depleted SER inventory. Materials are used by the County Maintenance Department and the County Roads Division for FY12.
Severndale Well # 9	W744457	This well has never been in use due to its excessive iron content. The well will be purged and packer testing (isolating sections of the well so samples can be taken) will be performed. Iron content of the water will be monitored and samples taken to determine if the iron inflow is localized or permeates throughout the well. After these samples are taken and assessed, options will be identified to achieve maximum flow within acceptable iron levels. This contract includes construction of the recommended modification option (i.e. redevelopment, closing off part of the well screen, or drilling a new well). The design, CMI and any additional assessment needed will be included under W744450.

Contract Title	Contract Number	Description
Severndale WTP Chem. Sys. Up.	W799402	Design and construction of sodium hypochlorite and lime chemical handling systems. Sodium hypochlorite will permanently replace a gaseous chlorine system and new lime system will be provided to supplement and eventually replace the aging equipment.
Shipley Rehabilitation	X787036	This contract is for the rehabilitation of Shipley EWST.
Sylvan Shores Water	W803701	Design and construction of a water system at Sylvan Shores to serve approximately 262 properties.
TM Meade To Jessup – SHA	W793203	Design and construct 2,250 feet of water main from Rockenbach Rd to Disney Rd. under SHA contract # AA5805370.
TM Odenton Rd-Blue Water Blvd	W778405	Construction of approx. 4500 feet of 36" transmission main from Hale Street to Blue Water Blvd via Odenton Town Center Blvd.
Tm Odenton/GBH-Chapelgate Ph2	W778403	Design services for Transmission Main from Waugh Chapel-Chapelgate Rd to new Ft. Meade Booster Pump Station. Includes design and construction of approximately 24,000 linear feet of 36-inch diameter water transmission main from Piney Orchard at Patuxent Road, through Odenton Town Center to proposed Booster Pump Station at Disney Road (W793401). Phase split into 4 segments - See contracts W778404 - W778407 for segment status.
TM-MD Rt 32 @ Meade Phase 2	W801602	This contract consists of the design, environmental assessment, ROW acquisition, and construction of approximately 22,000LF of 24" water main from MD 175, along MD Route 32 towards MD City (MD Route 198). Environmental Assessment will be required due to location on Ft. Meade or Department of Interior Property.
Transmission Main Across Rt.2	W801102	Construct a 600 LF 12" water transmission main from its present terminus across Route 2 and bring into the 8" main near Fish Paws store.
Water Clean & Line FY 12	X733798	Cleaning and Lining of Water Mains in the Ft Smallwood area of Anne Arundel County. Previous contract was X733782.
Water Clean & Line FY09	X733782	Water Clean & Line of 6" and 8" water mains throughout Anne Arundel County. This is the first renewal based on the original competitively bid contract number X733780. Inspection Services Under Contract No. X738894. Duration is 365 CD.
Water Main Repl Cm Serv FY10	X733790	Provide ongoing Construction Management and Inspection Services support for the water main repair and replacement program. Contract will include a base year plus 2 option years. Estimates based on initial 12 month performance period.
Water Main Repl Cm Serv Ph 2	X7337100	Provide ongoing Construction Management and Inspection Services support for the water main repair and replacement program. Contract will be renewable.
Water Meter Replacement FY 13	X7337103	Replacement and upgrade of water meters throughout the County for FY13.
Water Model Calibration FY11	X733794	Purchase of water model calibration software licenses.
Water Model Calibration FY13	X7337101	Purchase of water model calibration software licenses from Bentley Systems, Inc. Previous contract number was X733794.
Water Project Management	W803401	This contract includes services for project management of the water class projects during the design, right of way acquisition, construction and performance phases. Funding for this project will be reimbursed by the individual capital projects to be managed.
Water Serv Replacements-Ph13	X7337102	Replace 270 residential water services in Arnold, Severna Park and Glen Burnie. Previous contract was X733795. Inspection will be done by SER.
Water Serv./Lats Renewal FY12	X733795	Replace 248 residential water services in the Laurel, Baltimore and Pasadena areas of Anne Arundel County. Previous contract was X733788. CMI provided under X733790.
Water Service Conn. Repl FY10	X733788	Replacement of 425 3/4" water service connections throughout Anne Arundel County. This is a contract renewal (see original contract X733767) with Strohecker Inc. for 365 days.
Water Strategic Plan Future Work	W7788-02	This contract work involves comprehensive water strategic planning based on current and future water demands throughout the County.
Water Strategic Plan Present Work	W7788-01	Contract involves investigation/study associated with a detailed Water Strategic Plan.
Water System Security Video	W800202	Construct a security video system for water facilities. Schematic design completed under W800201.
Well Production Eng. Services	W744450	Assessment, design, construction management and emergency support from water well redevelopment consultant.
Withernsea WTP	W804201	This contract includes the planning, right of way acquisition, design, and construction of a 5 million gallon per day water treatment plant to serve the Broad Creek 210 pressure zone.
Wm R/R-Ft Smallwood & Nursery	X733791	This contract includes the emergency repair of the PCCP Water Transmission Mains along Ft. Smallwood Road and West Nursery Road.

Contract Title	Contract Number	Description
WSS Central Fencing	W800212	Design and Construction of fencing around Crofton Meadows WTP. Other sites are put on hold due to community outreach issues.; Crofton Meadows I - Well 1 & 2, Crofton Meadows II - Well 8 & 9, Crofton Meadows II - Well 10 & 11, Shipley's WBS.
WSS CM/I Services	W800210	This contract is to provide on call CM/I services for the Water System Security. This also is for permitting assistance.
WSS Quality Monitor Install	W800207	Planning, design and installation of ten water quality monitors in the distribution system. Belvedere SP will be removed from project due to its expected continued non use.
WSS South Fencing	W800211	This contract will utilize Blanket Order IFB No. 11-003 with Longfence Design and Construction of fencing around Arnold Well #2, Broad Creek Wells 1 and 3 and Arnold EWST. This is being done to reduce vulnerability and improve water system security.
WTR Fill Station-Siting Study	W800213	This contract is to conduct 5 siting studies for water fill stations throughout the northern portion of the County. Once the sites are chosen, designs will be completed and permits acquired so that construction may be completed under another contract. Construction inspection will be handled under another contract.

Table 3-18
Water Capital Improvement Projects, City of Annapolis

Project Title	Project Number	Description
Water Treatment Plant	71001	The water treatment plant is at the end of its useful life and in need of replacement. It has significant operational and structural constraints. The existing facility has regulatory and safety issues. Hydraulic issues limit the production capacity of the plant to below its design capacity. A facility plan report (2009) showed that operational and structural constraints result in less than efficient and economical production of drinking water. Replacement parts for most of the mechanical equipment are difficult to find; some parts are no longer made. Refurbishing the existing plant would be difficult, and operational and structural constraints would remain. The results of life-cycle cost and quantitative analyses show that a new City-owned and operated treatment plant is the best alternative.
Water Distribution Rehab	71003	The existing water distribution grid is aging as evidenced by frequent failures. Based on a useful service life of 80 years, the City's financial consultant calculated the water distribution system rehabilitation capital needs for the next twenty years to address pipes, valves and hydrants that have exceeded or will exceed their useful service life. Addressing the capital needs will minimize the potential for a major failure and ongoing operations and maintenance costs. The water distribution infrastructure replacement plan was developed based on priorities identified by DPW Operations in areas where multiple failures have occurred in the last several years.
SCADA / Radio Upgrade*	To Be Determined*	This project continues the replacement of the obsolete controls and communications equipment of Supervisory Controls And Data Acquisition (SCADA) system from the City's sewage pump stations to the central system at 935 Spa Road and from the water tanks to the WTP chart recorders. The new wastewater collection SCADA system project is underway. The new water tank SCADA system will include LC3000 master telemetry system at the Water Treatment Plant and LC2000 remote telemetry units at each tank site. Communication will be via VHF radio (licensed through FCC), which, after the original licensing process, has only a small annual re-licensing fee (which may be waived for local governments), allowing the City to eliminate the costly monthly telephone lease lines.

* Note: Project Title & Description includes both Wastewater & Water Infrastructure, but project has been split into WW & W projects with project numbers 72010 & 71010, respectively.

CHAPTER 4 SEWERAGE SYSTEMS

4.1 GENERAL INFORMATION

Unlike the County's water system that contains interconnections between pressure zones; eleven separate and distinct sewer service areas have been established for purposes of providing sewerage facilities to serve Anne Arundel County. The remaining land is designated as Rural. The boundaries of these service areas are shown on adopted Master Plan Maps of the Sewer System S-1 through S-12 and also on Figure 4-1. These service areas are based on topography and natural drainage areas. There are no combined sewers carrying both sewage and storm water within the public sewer service areas.

Information in this chapter includes: detailed descriptions, projected sewer demands and capacity requirements for each sewer service area; Capital Projects programmed for Wastewater; Sludge Management Strategy; and Wastewater Management Problem Areas designated by the Department of Health.

4.2 FUTURE FLOW PROJECTIONS

The County currently has approximately 116,000 sewer connections and treats approximately 34.2 million gallons per day (MGD) of wastewater. Table 4-1 provides the population and housing unit forecasts through the year 2035. Table 4-2 provides a summary of the anticipated wastewater flows for each service area based upon flow projections developed with the use of the Wastewater Flow Projection System (WWFPS) Tool. For more information regarding the WWFPS, see Appendix H.

4.3 WATER RECLAMATION FACILITIES (WRF)

Of the eleven sewer service areas, eight are served by public facilities operated and maintained by the Anne Arundel County, Department of Public Works. These include: Cox Creek, Maryland City, Patuxent, Mayo, Broadneck, Annapolis, Broadwater, and Bodkin Point (two public operated septic systems and one mound system). Two of the remaining service areas have conveyance systems that are operated and maintained by the County but the treatment facilities are located in neighboring municipalities. These service areas include: Baltimore City (served by Patapsco Sewage Treatment Plant in Baltimore City) and Rose Haven/Holland Point (served by the Chesapeake Beach Wastewater Treatment Plant in Calvert County). Permission to transport wastewater to these facilities for treatment is governed by intra-jurisdictional agreements. Special agreements are discussed in Section 4.4 and in more detail within each appropriate sewer service area description. The final service area, Piney Orchard, is served by a privately owned and operated treatment facility. However, Piney Orchard's collection system is owned and maintained by the County. Table 4-3 is a list of public treatment facilities and their rated capacities.

All remaining land is considered Rural and is not planned for service by public sewer facilities.

TABLE 4-1
Population and Household Forecasts, 2010-2035

Population						
Sewer Service Area	2010	2015	2020	2025	2030	2035
Baltimore City	36,263	38,678	40,330	41,491	42,164	42,586
Cox Creek	139,476	141,945	144,412	147,157	149,003	150,779
Maryland City	21,142	21,732	22,225	22,674	23,888	24,137
Patuxent	72,409	75,484	77,557	79,134	81,148	82,305
Broadneck	84,679	85,728	87,010	88,207	89,042	90,206
Annapolis	83,237	83,814	84,415	84,986	85,680	86,618
City of Annapolis	38,394	39,445	40,497	41,548	42,600	42,600
County Portion	44,843	44,369	43,918	43,438	43,080	44,018
Mayo-Glebe Heights	8,356	8,413	8,525	8,611	8,637	8,725
Broadwater	10,945	11,212	11,562	11,918	12,041	12,176
Piney Orchard	12,133	12,587	12,755	12,767	12,969	13,106
Bodkin Point	340	341	341	341	341	345
Rose Haven / Holland Point	765	765	765	765	765	776
Ft. George Meade (Non-County)	9,181	9,588	9,970	10,373	10,751	10,898
Rural	58,730	61,097	61,579	62,037	62,702	63,820
County Total	537,656	551,384	561,445	570,461	579,132	586,475
Households						
Sewer Service Area	2010	2015	2020	2025	2030	2035
Baltimore City	14,279	15,609	16,645	17,390	17,910	18,449
Cox Creek	55,714	57,673	59,581	61,428	62,841	64,289
Maryland City	6,746	7,028	7,274	7,495	8,127	8,508
Patuxent	27,587	29,291	30,547	31,572	32,772	33,697
Broadneck	31,382	32,208	33,111	33,898	34,472	35,092
Annapolis	36,880	37,427	37,942	38,472	38,946	39,367
City of Annapolis	17,845	18,013	18,182	18,351	18,520	18,520
County Portion	19,035	19,414	19,760	20,121	20,426	20,847
Mayo-Glebe Heights	3,417	3,490	3,579	3,654	3,693	3,741
Broadwater	4,880	5,073	5,288	5,509	5,624	5,719
Piney Orchard	5,446	5,667	5,789	5,840	5,935	5,981
Bodkin Point	162	165	167	168	168	168
Rose Haven / Holland Point	426	429	431	433	434	435
Ft. George Meade (Non-County)	2,683	2,840	2,991	3,148	3,301	3,416
Rural	22,960	24,235	24,685	25,065	25,395	25,721
County Total	212,562	221,136	228,030	234,070	239,616	244,583

Sources:

1. Projections based on Census 2010 SF-1 Data, change rate with 2010 Projections provided in the County's Round 7C, February 2010 and applied to the Round 7C data for years 2015-2035.
2. City of Annapolis P&Z

Figure 4-1 Sewer Service Areas and Timing Categories (11 x 17)

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TABLE 4-2
Projected Sewer Flow, 2010 – 2035

Sewer Service Area	2010 Total Flow (MGD)	Capacity (MGD)	% of Capacity	2015 Total Flow (MGD)	Capacity (MGD)	% of Capacity	
Baltimore City	4.18	6.39	65.4	4.82	6.39	75.4	
Cox Creek	11.97	15.00	79.8	12.27	15.00	81.8	
Maryland City	1.10	2.50	44.0	1.51	2.50	60.4	
Patuxent	5.48	7.50	73.1	6.32	8.00 ^a	79.0	
Broadneck	5.31	6.00	88.5	5.61	8.00 ^b	70.1	
Annapolis	8.44	13.00	64.9	8.78	13.00	67.5	
Annapolis City & USNA	5.20	6.7	77.6	5.34	6.70	79.7	
County Portion	3.24	6.3	50.8	3.44	6.30	54.6	
Mayo - Glebe Heights	0.57	0.64	89.1	0.58	0.65 ^d	89.2	
Broadwater	1.23	2.00	61.5	1.40	2.00	70.0	
Piney Orchard	0.58	1.20 ^a	48.6	0.62	0.70 ^a	88.6	
Bodkin Point	^c	0.007		^c	0.007		
Rose Haven/Holland Point	0.10	0.140	71.4	0.10	0.140	71.4	
County Treated Total	34.10			36.47			
Sewer Service Area	2020 Total Flow (MGD)	Capacity (MGD)	% of Capacity	2025 Total Flow (MGD)	Capacity (MGD)	% of Capacity	
Baltimore City	5.53	6.39	86.5	5.99	6.39 ^e	93.7	
Cox Creek	13.40	15.00 ^e	89.5	14.46	15.00 ^e	96.4	
Maryland City	1.97	3.33	59.2	2.29	3.33	68.8	
Patuxent	7.04	10.50 ^f	67.0	7.63	10.50	72.7	
Broadneck	6.01	8.00	75.1	6.19	8.00	77.4	
Annapolis	9.01	13.00	69.3	9.23	13.00	71.0	
Annapolis City & USNA	5.48	6.70	81.8	5.62	6.70	83.9	
County Portion	3.53	6.30	56.0	3.61	6.30	57.3	
Mayo - Glebe Heights	0.64	0.87	73.6	0.69	0.87	79.3	
Broadwater	1.47	2.00	73.5	1.50	2.00	75.0	
Piney Orchard	0.62	0.70	88.6	0.63	0.70	90.0	
Bodkin Point	^c	0.007		^c	0.007		
Rose Haven/Holland Point	0.10	0.140	71.4	0.10	0.140	71.4	
County Treated Total	39.54			41.99			
Sewer Service Area	2030 Total Flow (MGD)	Capacity (MGD)	% of Capacity	2035 Total Flow (MGD)	Capacity (MGD)	% of Capacity	Build-out Flows ^g (MGD)
Baltimore City	6.26	6.39 ^e	98.0	6.42	6.39 ^e	100.5	10.0
Cox Creek	14.99	15.00 ^e	99.9	15.41	15.00 ^e	102.7	22.57
Maryland City	2.34	3.33	70.3	2.35	3.33	70.6	3.70
Patuxent	8.33	10.50	79.3	8.61	10.50	82.0	13.81
Broadneck	6.28	9.00	69.8	6.38	9.00	70.9	13.75
Annapolis	9.40	13.00	72.3	9.49	13.00	73.0	13.96
Annapolis City & USNA	5.76	6.70	86.0	5.76	6.70	86.0	5.76
County Portion	3.64	6.30	57.8	3.73	6.30	59.2	8.20
Mayo - Glebe Heights	0.74	0.87	85.1	0.79	0.87	90.8	1.14
Broadwater	1.53	2.00	76.5	1.56	2.00	78.0	2.58
Piney Orchard	0.63	0.70	90.6	0.64	0.70	91.4	0.93
Bodkin Point	^c	0.007		^c	0.007		0.09
Rose Haven/Holland Point	0.10	0.140	71.4	0.10	0.140	71.4	0.20
County Treated Total:	43.61			44.59			71.51

Source: AACO August 2010 Allocation Report, AACO Wastewater Flow Projection Tool (WWFPS), and the City of Annapolis
See Appendix H for more information.

General Notes:

- Patuxent WRF nutrient load based capacity was increased from 7.5 MGD to 8.0 MGD due to a nutrient load capacity transfer from the Piney Orchard WWTP.
- Broadneck WRF has been proposed to be re-rated from 6.0 MGD to 8.0 MGD. Capital projects are underway to facilitate the re-rating.
- Flow not metered for existing 16 homes. Future demand is not significant.
- The Mayo SSA is currently under a building moratorium. A study is now being conducted to determine the best method for completing an upgrade and expansion of the Mayo WRF. Capacity was increased to 0.65 MGD due to a planned developer expansion of Glebe Heights.
- These SSAs/WRFs are anticipated to require an expansion, a re-rating, or an additional flow allocation to meet future flow predictions.
- Patuxent WRF nutrient load based capacity was increased from 10.0 MGD to 10.5 MGD due to a nutrient load capacity transfer from the Piney Orchard WWTP.
- Build-out flows for the County were computed assuming full development of all property in the SSA at current zoning as described in Appendix A. Build-out for the City of Annapolis is based on the assumption by City of Annapolis P&Z that build-out is reached in 2030.

TABLE 4-3
Treatment Facilities and Rated Capacities

Treatment Facility (Owner / Operator)	Sewer Service Area	Permit Capacity in MGD (County Allotment)
Patapsco Sewerage Treatment Plant (AA Co.'s Baltimore City SSA)	Baltimore City	73.0 (6.39)
Cox Creek WRF	Cox Creek	15.0
Maryland City WRF	Maryland City	2.5
Patuxent WRF	Patuxent	(8.0) ^a 7.5 ^b
Broadneck WRF	Broadneck	6.0
Annapolis WRF – Jointly Owned by Annapolis City and AA County (AA Co.'s Annapolis SSA)	Annapolis	13.0 (6.30)
Mayo Large Communal WRF Glebe Heights Small Communal WRF	Mayo / Glebe	0.615 0.0223
Broadwater WRF	Broadwater	2.0
Piney Orchard WWTP (Piney Orchard Utility Co, LLC / MES)	Piney Orchard	0.70
Bodkin Mound System WRF (subsurface)	Bodkin Point	0.007
Chesapeake Beach Wastewater Treatment Plant (AA Co.'s Allotment - Calvert County)	Rose Haven / Holland Point	1.5 (0.1375)

Notes:

- a. Nutrient Load Capacity
- b. Hydraulic Capacity

4.3.1 Non-County Owned and / or Operated Facilities

There are several wastewater collection and treatment systems within Anne Arundel County that are privately and / or independently owned and / or operated. Descriptions of major facilities that are operated by other public agencies are contained in the following paragraphs. The City of Annapolis is also listed in Table 4-2 and the other facilities are listed in Table 4-4. It should be noted that Anne Arundel County is not responsible for operation or maintenance of any of these collection systems or facilities. These are depicted on the Master Plans Maps S1 through S12 as the “Other” category.

Fort George G. Meade, D. C. Children’s Center and NSA (Maps S-2, S-4)

Located in the western portion of the County, the United States Army installation, D. C. Children’s Center and NSA are served by a wastewater collection system owned and operated by the Army Corps of Engineers. The treatment plant located on MD Route 198 at MD Route 32, has a design capacity of 4.5 MGD. This system discharges treated effluent directly into the Little Patuxent River.

City of Annapolis (Satellite System) (Maps S-7, S-9)

The City of Annapolis owns and operates a collection system within the Annapolis SSA. The system consists of a network of gravity collectors and force mains and includes 25 sewer pumping stations. The existing system serves approximately 98% of the City (with the remaining 2% planned to be served). Flows from the City of Annapolis are treated at the Annapolis WRF.

United States Naval Academy (Satellite System) (Map S-7)

Located on the southwestern shore of the Severn River in the Annapolis Sewer Service Area, the United States Naval Academy (USNA) grounds are served by a wastewater collection system owned and operated by the US Navy. Wastewater from the system is conveyed to the City of Annapolis sewer system and eventually to the Annapolis WRF through the City network of pipes. Agreements existing between the U.S. Navy, the City of Annapolis, and the County govern allocations and payments between the three jurisdictions.

United States Naval Station – Annapolis (Map S-7)

Located in the Annapolis Sewer Service Area on the opposite shore (north shore) of the Severn River from the USNA (within the Other designated area south of Broadneck SSA 5), the Naval Station is served by a collection system that conveys wastewater to a 1.0 MGD treatment facility within the boundaries of the Naval Station. This treatment facility will continue to treat the wastewater from the David Taylor Research Center under contract with the proprietors that locate there. The system discharges treated effluent directly into the Severn River. These collection and treatment systems are owned and operated by the US Navy. An upgrade to the facility to provide ENR treatment is planned.

Baltimore-Washington Airport (Maps S-1, S-2)

Baltimore-Washington Airport (B.W.I.) is located in the Baltimore Sewer Service Area and is served by a wastewater collection system owned and operated by the Federal Aviation Administration (FAA). The collected wastewater is conveyed through Anne Arundel County to Baltimore County for treatment. Neither the collection system within the airport property, the conveyance-piping network to Baltimore County, nor the treatment of the collected wastewater is the responsibility of Anne Arundel County.

Crownsville State Hospital (Maps S-6, Map S-7)

Located within the Rural service area along MD Route 175 in Crownsville, wastewater generated within the boundaries of the Crownsville State Hospital is collected and treated at a subsurface discharge facility on the Hospital Grounds. Maryland Environmental Services (MES) operates and maintains the facility under contract with the State of Maryland who owns the facility.

Maryland House of Correction (Map S-2)

The Maryland House of Correction - Jessup is located in the Maryland City Sewer Service Area and is served by a wastewater collection and treatment system owned by the Maryland Department of Corrections. Wastewater generated from the site is collected and treated in a 2.0 MGD capacity wastewater treatment facility that discharges directly into Dorsey Run. Maryland Environmental Services operates and maintains the facility under contract with the State of Maryland.

United States Army Ordnance Depot (Map S-1)

The Army Ordnance Depot located on East Ordnance Road in the Cox Creek Sewer Service Area has a privately operated and owned wastewater collection and treatment system with a 20,000 gpd capacity.

Smithsonian Environmental Research Center (SERC) (Map S-10)

The SERC site is located at 647 Contees Wharf Road in Edgewater and is located in the Rural Service Area. It is served by a wastewater treatment and disposal system that is Federally owned and operated. The subsurface discharge system has a 30,000 gpd capacity.

Additional Non-County Facilities Greater than 5,000 Gallons Per Day

In addition to the above facilities, other treatment facilities that have discharge to surface waters or subsurface sewage disposal systems greater than 5,000 gallons per day are listed in Table 4-4. These facilities are shown on the Master Plan Maps S-1 through S-12.

TABLE 4-4
Non-County Facilities with Discharges Greater Than 5,000 gpd

Sewer Service Area	Name	Tax Account Number	Master Plan Map Grid	Capacity (gpd)	Type of Discharge	Operator
Baltimore City	Baltimore-Washington Airport	500090221339	J5	-	Subsurface	FAA
	Holiday Mobile Home Estates	400002588350	F8	125,000	Surface Water	MES
Cox Creek	33 Stahl Point LLC	500016508820	O4	20,000	Surface Water	Private
	Solley Elementary	300000477201, 300090084419	Q6	5,000	Subsurface	BOE
	U. S. Army Ordnance Depot	500090034790	O4	20,000	Surface Water	Private
Maryland City	D C Children's Center	400005951790	D11	Part of Fort Meade	Surface	US Govt. (Fort Meade)
	Maryland House of Corrections	400090014121, 40005585793	A13	2,000,000	Surface	MES
	NSA	400001177100, 400000033782 400001318800, 400090065527	D10	Part of Fort Meade	Surface	US Govt. (Fort Meade)
Patuxent	Blob's Park	442090227214	E9	7,200	Subsurface	Private
	Firestone Complex Rt. 3	400090037724, 400090038600	I17	5,000	Subsurface	Private
	Regency Park Assisted Living Facility	400090233217	J15, K15	7,100	Subsurface	Private
	Ridgeview Plaza	400004734900	F9	25,000	Subsurface	Private
Broadneck	Arnold Station	300014813400	T16	5,000	Subsurface	Private
	Atria Manresa Assisted Living Facility	300019308130	T18, U18	9,000	Subsurface	Private
	Cantler's Riverside Inn	344425074500, 344425074600	V18	11,000	Subsurface	Private
	Chartwell Country Club	318004976607	N11, N12	8,000	Subsurface	Private
	Monumental Title Company	374807090309	R13	5,500	Subsurface	Private
	Severn River Inn	300008003800	U19	5,500	Subsurface	Private
	Comfort Inn (Academy Motel)	300090004909	V17	23,000	Subsurface	Private
Annapolis	Windsor Farm Elementary	300090060655	V16	5,000	Subsurface	BOE
	KFC Edgewater	100090038963	P23	6,000	Subsurface	Private
	Evangelical Presbyterian Church & School	200002465983, 285102465985 200002465990, 00002783110, 200002466100	S18	10,365	Subsurface	Private
	Rolling Knolls Elementary	267100214023	Q19	11,000	Subsurface	BOE

Sewer Service Area	Name	Tax Account Number	Master Plan Map Grid	Capacity (gpd)	Type of Discharge	Operator
	St. Andrews United Methodist School	200090040217	Q21	6,000	Subsurface	Private
	United States Naval Academy	600008387650	T20	600,000	Surface	City of Annapolis
	United States Naval Station	300031870030	V19	1,000,000	Surface	US Navy
Piney Orchard	Piney Orchard WWTP	457190073592, 457190073590	G14	1.2MGD Average		MES
Fort George Meade	Fort George Meade	400090042590, 400090080940	G13	133,000	Surface	US Govt.
Rural	Addiction Treatment Center	400005474450	L11	7,000	Subsurface	Private
	Arlington Echo Outdoor Center	200000211413	N13		Subsurface	Private
	Baldwin Memorial Methodist Church	200090000966	M14	5,000	Subsurface	Private
	Bodkin Elementary	300000477221	V10	19,400	Subsurface	BOE
	Boone's Estates	880090003660, 80090003661, 880090003663	J32	87,000	Subsurface	Private
	Chesapeake High School Complex	300000477221	V10	11,000	Holding Tanks	BOE
	Duncan's Family Campground	800090034422	I32	9,000	Subsurface	Private
	Crownsville State Hospital	200011033710	N17	87,000	MES	MES
	Fort Smallwood Park	300090009446	U7	10,000	Subsurface	Private
	Indian Creek Upper School	2000003610600	N17, N18, O17, O18	7,000	Subsurface	Private
	Indian Creek Lower School	200002784630	N14	8,000	Subsurface	Private
	Knollwood Manor Nursing Home	400003330800	L14	5,000	Subsurface	Private
	Lake Shore Elementary	300000477220	T11	14,900	Subsurface	BOE
	Lyons Creek Mobile Home Estates	800090030137	J36	80,000	Surface	Private
	Maryland Manor Mobile Home	100000564402	J29	90,000	Surface	MES
	Millersville Elementary	400000093047	L15	15,800	Subsurface	BOE
	Millersville KOA	400090041828	K13	19,000	Subsurface	Private
	Old South Country Club	858090069333	K32	10,000	Subsurface	Private
	Patuxent Mobile Home Park	800000107125	I32	35,000	Surface	MES
	Pleasure Cove Marina	300004471915	U9	10,000	Subsurface	Private
	Renditions Golf Course	100090009208	J25	6,610	Subsurface	Private
	Rio Vista Plaza Mobile Home Park	800001325500	I32	9,000	Subsurface	Private
	Smithsonian Environmental Research Center (SERC)	100090008428, 00007804505, 100007804000, 100007804410	Q28	30,000	Subsurface	U. S. Govt.
	Southern Middle School	100000194511	N31	17,035	Subsurface	MES

Sewer Service Area	Name	Tax Account Number	Master Plan Map Grid	Capacity (gpd)	Type of Discharge	Operator
	Southern High School	100000194804	M28	40,000	Subsurface	MES
	Southern Hills	100090228985, 100090228986	J24	21,600	Subsurface	MES
	South Shore Elementary	200000214020	N16	6,200	Subsurface	BOE
	Summerhill Mobile Home Park	200011335600	O18	19,000	Surface	Private
	Texas Roadhouse	300009939505, 300009939500 300090005986	T10	11,500	Subsurface	Private
	Traceys Elementary	800000024715	O34, O35	32,000	Holding Tank	MES
	Waysons Mobile Home Park	800001923900, 800001924300	H32	75,000	Surface Water	MES

4.4 SUMMARY OF SEWER AGREEMENTS

The County has entered into inter-jurisdictional agreements with surrounding municipalities as well as agreements with large developments regarding construction of infrastructure and approval of utility allocation credits. Table 4-5 is a list of the major agreements that have been made with the County. More details regarding these agreements are discussed within the appropriate sewer service area descriptions in Section 4.7.

TABLE 4-5
Inter-jurisdictional Agreements and Special Utility Agreements

Number	Agreements	Sewer Service Area	Effective Date	Expiration Date
Liber 0936	Agreement with Howard County to share the cost and equitable interest in a sewerage system in the Deep Run drainage area.	Baltimore City	March 30, 1979	N/A
N/A	Agreement to continue operation of the jointly used sewer system in the Patapsco Drainage area and also to establish methods for computation and reimbursements of costs incurred by Baltimore County (including conveyance and treatment).	Baltimore City	April 21, 1976	N/A
N/A	Agreement with Baltimore City to provide connection and receipt of flows into the City sewerage system, for transmitting, pumping and disposing of the sewage received from the Brooklyn Park sanitary subdivision.	Baltimore City	August 14, 1939 August 28, 1963	N/A
N/A	Patapsco Sewerage System Memorandum of Understanding providing clarification of all agreements between Baltimore City, Baltimore, Howard and Anne Arundel Counties.	Baltimore City	June 4, 1984	N/A
N/A	Agreement with Calvert County to allow discharge of sewerage from Rose Haven/ Holland Point to be treated at the Chesapeake Wastewater Treatment Plant.	Rose Haven/ Holland Point	August 15, 1996	N/A
UA-89085-0	Agreement with Piney Orchard Development for the design and construction of a private treatment facility and reserved allocations.	Piney Orchard	Oct. 3, 1988	N/A
N/A	Agreement with Two Rivers Development Company, LLC; Koch-Two Rivers, Inc.; Two Rivers Investors, LLC; and Piney Orchard Utility Company, LLC to settle its arrearages by effectuating the transfer of 500,000 gpd of equivalent nutrient load capacity from the Piney Orchard Treatment Plant to Anne Arundel County	Piney Orchard	August 19, 2010	N/A
N/A	Agreement to allow private water and sewer facilities for Reedbird Townhouses until County service becomes available.	Patuxent	May 26, 1976	N/A

Number	Agreements	Sewer Service Area	Effective Date	Expiration Date
N/A	Agreement with Annapolis City to set forth obligations with regard to the future operation and joint use of the Annapolis Water Treatment Facility. This supersedes prior agreements.	Annapolis	August 8, 2001	N/A
N/A	Agreement to provide treatment of Sylvan Shores wastewater at 80% of current rates.	Annapolis	March 4, 1982	N/A
N/A	Agreement with the State of Maryland, MAA to describe the way additional water capital facility connection fees will be calculated each year.	Baltimore City	June 22, 2005	June 30, 2010
N/A	Memo of Understanding between Anne Arundel County and the City for the reciprocal use of Sewer Collection systems.	City of Annapolis	October 15, 2010	N/A
N/A	Effluent Supply Agreement between Anne Arundel County and Constellation Power Source Generation INC.	Cox Creek	February 7, 2008	N/A
N/A	Developers Rights and Responsibilities Agreement which provides for the County to build certain water and wastewater Infrastructure and the developer to build certain infrastructure within time limits within the Odenton Town Center.	Patuxent	October 3, 2010	N/A
RW-3531-12-001	Construction and Right-of Way Permit from the National Park Service for Anne Arundel County to allow a water main and a sewer main and related appurtenances to be built and maintained under the Baltimore-Washington Parkway at Maryland Route 198.	Maryland City	September 19, 2012	September 19, 2022
N/A	Odenton Town Center Sanitary Subdistrict. .Legislation was passed (Bill 71-10) that established the Odenton Town Center Sanitary Subdistrict. Newly connecting development after October 3, 2010, except for projects allocated prior to that date, and existing connected properties that expand or change their use and will generate additional wastewater flow, are subject to a sewer service surcharge that will reimburse the County for building the sewer infrastructure necessary to provide adequate service for the Town Center.	Patuxent	October 3, 2010	N/A
N62477-76-C-3317	Contract for the U. S. Government to purchase and receive sewerage service from the City of Annapolis for the U. S. Naval Academy.	City of Annapolis	April 1, 1976	N/A

4.5 NPDES LIMITATIONS

The Federal Clean Water Act (CWA) and NPDES regulations require that no point source, municipal or industrial, may discharge pollutants to Waters of United States without a NPDES permit. Municipal dischargers, also referred to as “Publicly Owned Treatment Works” (POTWs) are required through their NPDES permits to meet at a minimum the secondary treatment standards in accordance with the Secondary Treatment Regulations at 40 CFR Part 133. These limits typically include limits for BOD, TSS, pH, dissolved oxygen, and disinfection requirements. The regulations also require permitted facilities to monitor the quality of their discharge and report data to the permitting authority.

In addition, the CWA requires every State to develop water quality standards (WQS) to protect receiving waters which include designated uses, water quality criteria, and an antidegradation policy. In addition to the secondary treatment standards, NPDES regulations require permit limits to be issued for any pollutant that may cause or contribute to exceeding the State’s WQS requirements.

4.5.1 Total Maximum Daily Loads

Section 303(d) of the CWA amendments requires states to identify and prioritize receiving waters for which effluent limits are not stringent enough to meet the State's WQS. When a receiving water body is listed, the pollutant and the priority of the impairment are identified and placed on the State's "303(d) list".

For each of these water quality-limited segments, the State must determine the maximum level of any impairing pollutant that can be assimilated in the receiving water without causing violations of established water quality standards. This upper limit of pollutant assimilation is called the Total Maximum Daily Load (TMDL). The TMDL establishes and determines the effects of point and non-point sources on receiving water/stream quality.

The Environmental Protection Agency (EPA) and the Maryland Department of Environment (MDE) regulatory agencies have established a process for developing TMDL's in listed waterways. Once the waters to be included on the list have been identified, priority categories (High, Medium and Low) are assigned to each water quality limited segment. These priority rankings, which take into account the severity of the pollution and uses to be made of the waters, are used for purposes of resource allocation and scheduling of identified improvements. Presently the TMDL process includes biennial reporting of the Section 303(d)-listed waterways and identification of waters scheduled for TMDL development in the next two years.

Maryland's current list describes five different categories of water quality, including: Category 1 - waters attaining all standards; Category 2 - waters attaining some standards; Category 3 - waters with insufficient information to determine if water quality standards are attained; Category 4 - impaired or threatened waters that do not need or have already completed a TMDL; Category 5 - impaired waters for which a TMDL is required.

Once the TMDL process is completed for an impaired waterway, future NPDES permits must incorporate the waste load allocations from the approved TMDL by establishing new limits consistent with the approved TMDL.

All of the County's 12 watersheds are listed for at least four water quality impairments in Category 5 of the 303(d) list. Water bodies in Category 5 of the 303(d) list are under evaluation by the State for a TMDL. Impairing substances include nutrients, metals, toxics, bacteria, sediment, and biological. As of August 2012, the County has 12 promulgated TMDL's and 3 draft TMDL's. There is the potential for the County to have approximately 50 TMDL's when the processes have been completed for all listed segments. See Figure 4-2 for the distribution of promulgated, draft, and potential TMDL's by watershed.

Anne Arundel County's Integrated Report of Surface Water Quality and TMDLs 2012

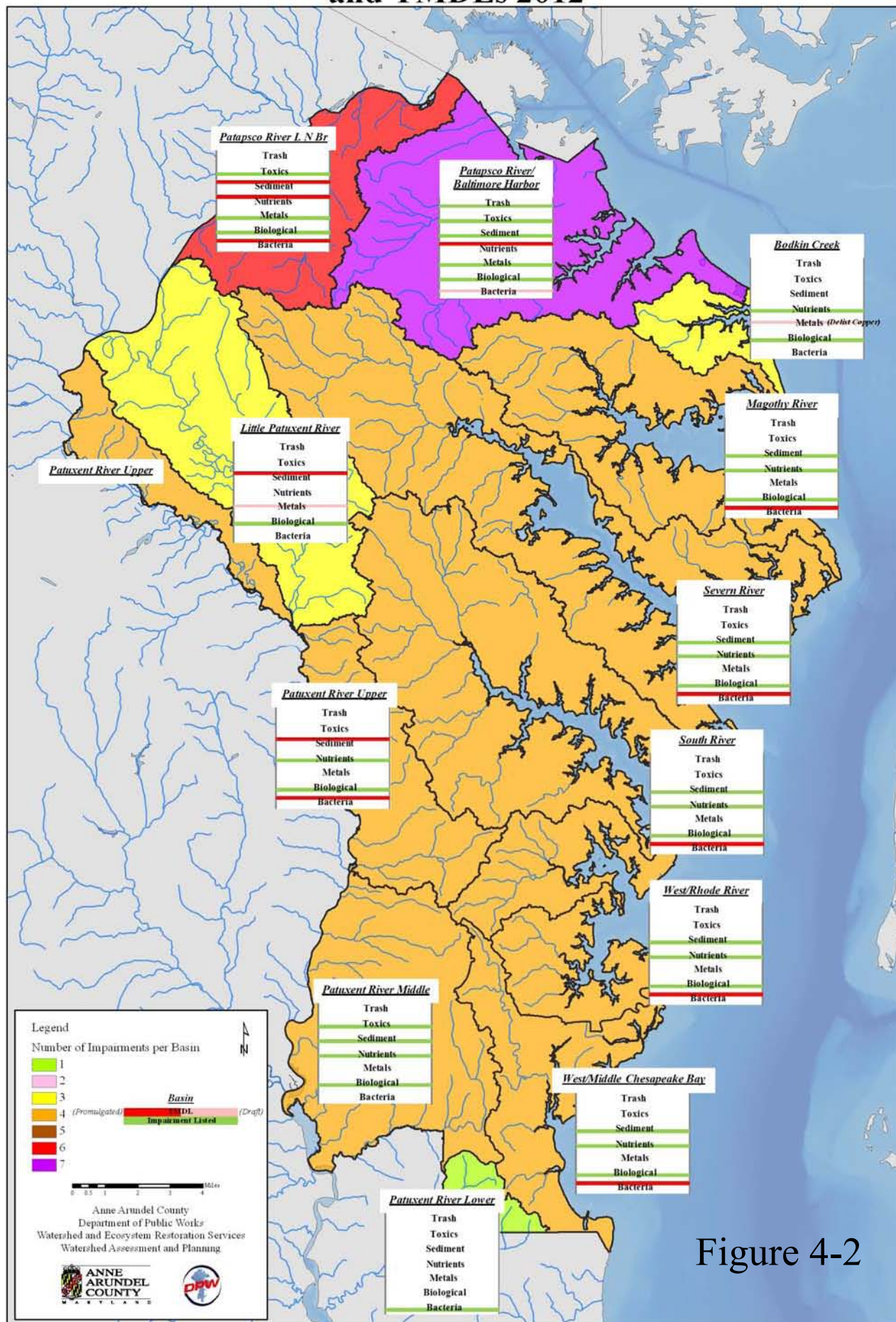


Figure 4-2

4.5.2 Enhanced Nutrient Removal (ENR)

Starting in 2006 with the signing of a Memorandum of Understanding between Anne Arundel County (County) and the Maryland Department of the Environment (MDE), the County initiated a series of procurements to provide design services for the upgrade of each of its wastewater facilities to achieve Enhanced Nutrient Removal (ENR). As defined by the State, ENR is technology capable of achieving 3 mg/L total nitrogen (TN) and 0.3 mg/L total phosphorus (TP) on an annual average basis.

The County owns and operates seven (7) major water reclamation facilities (WRFs). The existing facilities were upgraded in the 1990s to primarily achieve the seasonal Biological Nutrient Removal (BNR) limits of 8 mg/L total nitrogen (TN) and 2.0 mg/L total phosphorus (TP). However, recently issued NPDES permits for the facilities will require ENR treatment levels to be achieved within the next few years. These new NPDES permits have two types of limits.

- a. The first is a concentration-based cap of 4 mg/L TN and 0.3 mg/L TP on an annual average basis. The concentration-based cap is based on the actual flow received at the facility and therefore could apply to flow less than the design flow, i.e., WRF's not at hydraulic capacity.
- b. The second type is a mass loading cap. Generally, the mass loading cap is equal to the design flow of the facility multiplied by the concentration-based cap. At the Annapolis WRF, the mass loading has been increased due to the recent decommissioning of a small private wastewater treatment plant and transfer of the flow and associated load allocation to the County. For the Mayo WRF, the mass loading is to be based on an expanded facility flow of 0.82 MGD.

Under the ENR Upgrade program, each of the facilities is being designed to meet an annual average of 3 mg/L TN and 0.3 mg/L TP at the design flow for the facility. As of June 2012, six projects were under construction and the second phase of the County's largest project is nearing the bid phase. The Mayo WRF ENR project is in the initiation phase while other issues related to the facility are being resolved. The expected completion date for all projects, with the exception of the Mayo WRF, is the end of 2017.

While the facilities will be designed in accordance with the ENR Strategy and the Bay Restoration Fund Act to meet 3mg/l Total Nitrogen (TN) and 0.3 mg/l Total Phosphorous (TP), total pound loadings as reported in the discharge permit, will be calculated based on 4 mg/l TN and 0.3 mg/l TP at the current design rated capacity as recognized in the 2003 Water and Sewer Master Plan. This additional pound loading will allow the County to expand to the hydraulic capacity another 33%, as noted in Table 4-6, while maintaining nutrient loads constant. Once upgraded, the County shall operate each of the enhanced nutrient removal facilities in a manner that optimizes the nutrient removal capability of each facility. This may achieve better performance than the loading limits of the watershed nutrient discharge permits towards meeting a goal of 3 mg/l TN and 0.3 mg/l TP. Table 4-6 shows the current anticipated pollutant load for each WRF and the future anticipated pollutant load once ENR is completed. Essentially, this shows that TN load will be reduced by 33% (848,000 lbs/year to 570,000 lbs/year) while processing capacity is increased 33% (47.1 MGD to 62.7 MGD).

Under applicable federal and state law, the County may expand the capacity of the WRF's in the future as long as the expanded capacities are in accordance with the County's most recent Water and Sewer Master Plan and the watershed-based nutrient discharge limits, or any more stringent local water quality based limitations are not exceeded by the expansion.

Consent Agreements have been executed with MDE that include completion dates and modified effluent conditions recognizing the possible disruptions to normal plant operations at: Annapolis, Broadwater, Maryland City, and Patuxent. Similar Consent Agreements are under consideration for Cox Creek and Broadneck. The current completion dates as stipulated by MDE are:

- a. Annapolis WRF - June 2015
- b. Broadneck WRF - December 2013
- c. Broadwater WRF - June 2015
- d. Cox Creek WRF - November 2016
- e. Maryland City WRF - August 2015
- f. Patuxent WRF - September 2015

TABLE 4-6
Current and Future Operational Characteristics

Historical Permit Goals (BNR) – A							
Facility	Current Recognized Design Capacity (MGD)	Current TN (mg/L) ^a	TN (lbs/Year)	Current TP (mg/L)	TP (lbs/Year)		
Cox Creek	15.0	8.0	365,292	2.0	91,323		
Annapolis	13.0	8.0	316,586	2.0	79,147		
Broadneck	6.0	8.0	146,117	2.0	36,529		
Broadwater	2.0	8.0	48,706	2.0	12,176		
Mayo\Glebe	0.64	N/A ^e	-	2.0	3,896		
Patuxent ^b	8.0 ^c (7.5) ^d	8.0	194,822	1.0	24,353		
Maryland City ^b	2.5	8.0	60,882	1.0	7,610		
Totals:	47.14		1,132,405		255,035		
Current Operational Characteristics (BNR) – B							
Facility	Current Recognized Design Capacity (MGD)	Current TN (mg/L)	TN (lbs/Year)	Current TP (mg/L)	TP (lbs/Year)		
Cox Creek	15.0	8.8	401,821	1.6	73,058		
Annapolis	13.0	6.0	237,440	0.46	18,204		
Broadneck	6.0	2.2	40,182	0.45	8,219		
Broadwater	2.0	6.0	36,529	0.3	1,826		
Mayo\Glebe	0.64	19	37,016	0.2	1,364		
Patuxent	8.0 ^c (7.5) ^d	2.5	60,882	0.2	4,871		
Maryland City	2.5	4.5	34,246	0.2	1,522		
Totals:	47.14		848,117		109,064		
Future Operational Characteristics (ENR) – C							
Facility	Maximum Capacity Based on Nutrient Cap (MGD)	TN (mg/L)	TN (lbs/Year)	TP (mg/L)	TP (lbs/Year)	TN Reduced (lbs/Year) (from B)	TP Reduced (lbs/Year) (from B)
Cox Creek	20.0	3.0	182,646	0.23	14,003	219,175	59,056
Annapolis	17.3	3.0	157,989	0.23	12,112	79,419	6,091
Broadneck	8.0	3.0	73,058	0.23	5,601	-32,876	2,618
Broadwater	2.67	3.0	24,383	0.23	1,869	12,146	-43
Mayo\Glebe	0.85	3.0	7,762	0.23	595	29,254	769
Patuxent	10.5	3.0	95,889	0.23	7,352	-35,007	-2,481
Maryland City	3.33	3.0	30,411	0.23	2,331	3,836	-809
Totals:	62.65		572,139		43,864	275,978	65,200

Notes:

- a. TN Limits are assumed to be 8 mg/L, the default assumption prior to the Interim Nutrient Cap Strategy.
- b. Discharges directly to the Patuxent River.
- c. Nutrient Load Capacity
- d. Hydraulic Capacity
- e. Mayo\Glebe does not have a TN goal.

Two watershed permits were also established, one for Patuxent/Maryland City and another to cover Broadneck, Broadwater, Mayo, Annapolis, and Cox Creek. These watershed permits contain a permitted annual pollutant loading of TN and TP (in lbs/yr) permitted to be discharged in accordance with the previously described computation.

If Anne Arundel County were to take ownership of or eliminate another existing WRF in one of the watersheds, the nutrient discharge permit for that watershed would be revised, in accordance with a statewide policy recently developed by MDE, to incorporate the additional nutrient load allocation for the new County-owned facility.

Nutrient load for each watershed can be increased through trading consistent with a statewide policy recently developed by MDE. The concept of nutrient trading allows a discharger of nutrients, faced with expensive nutrient reductions to meet water quality standards, to purchase “credits” (e.g., pounds of nitrogen) from a second nutrient discharger that has reduced its discharge below its legal requirement. This process allows dischargers with higher nutrient reduction costs to pay another discharger for equivalent reductions. Trading also enables entities with low clean up costs to reduce discharges below legal requirements and generate revenue. An example of the trading would be if individual residences/businesses currently served by septic tanks were connected to the public sewer system. The amount of additional waste load given to the County for each septic tank taken off-line would be based on MDEs statewide policy. See Section 4.5.3 for more information related to septic systems.

Upon completion of all ENR projects, the County will be in conformance with its Watershed Implementation Plan. The County’s wastewater treatment facilities will meet the assigned TMDL loads.

4.5.3 On-Site Disposal Systems (OSDS)

The On-Site Disposal System Evaluation Study and Strategic Plan, completed in March 2008 evaluated the nutrient loading impact that OSDS have on its receiving waters. A copy of this study is available for download from the Anne Arundel County DPW website at: <http://www.aacounty.org/DPW/Utilities/OSDS.cfm>. The study found that given the high number of septic systems coupled with their proximity to tidal waters and the sandy soils present along the waterways, the resulting nutrient load is significant. The following discussion provides insight on the overall issue of OSDS and their nutrient loads.

The OSDS Evaluation Study estimated that Anne Arundel County has 36,120 septic systems serving residential properties, and 4,564 serving non-residential properties for a total of 40,684 septic systems. The systems are distributed across the County’s sewer service areas, and by service category as shown in Tables 4-7 and 4-8 respectively.

Using Maryland Department of the Environment’s (MDE’s) criteria regarding the delivery ratio of nitrogen to the receiving water (as a function of the septic system’s distance to surface water), it is estimated that septic systems in the County annually contribute approximately 1,000,000 lbs (TN/year) to the Chesapeake Bay Watershed. This estimate, based on MDE’s Maryland Policy for Nutrient Cap Management and Trading in Maryland’s Chesapeake Bay Watershed Policy assumes that septic systems generate 40 mg/l TN, per system, each residential household contains 3.2 people at 9.5 lbs of TN/person and non-residential systems use 1,300 gpd.

TABLE 4-7
Inventory of OSDS by Sewer Service Area
Anne Arundel County Septic Evaluation Study

Sewer Service Area	Number Of Septic Systems	Percent
Annapolis	3,201	7.9%
Baltimore City	1,446	3.6%
Bodkin Pt-Pinehurst	140	0.3%
Broadneck	9,957	24.5%
Broadwater	291	0.7%
Cox Creek	2,513	6.2%
Ft. George Meade	2	0.0%
Maryland City	160	0.4%
Mayo-Glebe Heights	104	0.3%
Patuxent	892	2.2%
Piney Orchard	17	0.0%
Rose Haven	4	0.0%
Rural	21,815	53.6%
(blank)	142	0.3%
Grand Total	40,684	100.0%

Note: "Blank" refers to the number of OSDS that could not have the sewer service area identified.

TABLE 4-8
Inventory of OSDS by Planned Sewer Service Type
Anne Arundel County Septic Evaluation Study

Sewer Service Category	Number Of Septic Systems	Percent
Existing Service	1,881	4.6%
Future Service	8,322	20.5%
No Public Service	23,041	56.6%
Other	18	0.0%
Park	22	0.1%
Planned Service	5,676	14.0%
Resource Conservation Area	1,584	3.9%
(blank)	140	0.3%
Grand Total	40,684	100.0%

Note: "Blank" refers to the number of OSDS that could not have the sewer service area identified. Sewer Service categories were based on the 2003 Official Sewer Maps which included Park and Resource Conservation Area categories.

The study also looked how to most cost effectively reduce the nutrient load whether through connection to public sewer, cluster treatment systems, or individual denitrifying systems. In analyzing these different treatment methods, it was recognized that OSDS equipped with denitrifying systems can reduce the nitrogen load from 40 mg/l to 20 mg/l, while connection to ENR upgraded WRF's reduces the nitrogen load down to 4 mg/l. Given the significant reduction associated with connecting to public sewer systems, the County is evaluating cost/benefit analysis to determine an appropriate strategy. As previously shown in Table 4-8, 15,879 OSDS of the total 40,684 are in either existing, planned or future service categories. Furthermore,

18,708 OSDS are within a sewer service area. Given these relationships, a very likely strategy for reducing nitrogen loads to the receiving waters will include extensions of public service.

As part of the Watershed Implementation Plan Phase II, the County has been tasked to reduce the load from OSDS. DPW is currently developing a strategy to connect approximately 20,000 of these septic systems to public sewer or cluster treatment systems. This strategy will be based on the findings of the OSDS Evaluation Study and augmented with information from the Health Department regarding septic problem areas to provide the County a prioritized approach to solve public and environmental health concerns related to OSDS.

Another aspect the strategy would include is increased pollutant load caps at the WRF's. For instance, Table 4-9 shows maximum hydraulic capacity as limited by the respective nitrogen load caps for each of the WRF's equipped with ENR; however, should existing septic loads be reduced significantly, a correspondingly significant increase in pollutant load cap, and hence hydraulic capacity, should be recognized in the WRF discharge permit limits. This would be in effect considered a nutrient trade between non-point source (septic) and point source (WRF). While any TMDL implementation plan should demonstrate a net decrease in total pollutant, it should be expected that the trade-off exceeds a 1:1 ratio. For further information on the trading aspects of OSDS connections to public sewer see MDE's Maryland Policy for Nutrient Cap Management and Trading in Maryland's Chesapeake Bay Watershed Policy.

TABLE 4-9
Nutrient-Based WRF Capacity Limits

Water Reclamation Facility	Current Design Capacity	Maximum Capacity Based on Nutrient Cap	Projected 2035 Flow	Build Out Flow
Annapolis	13	17.33	9.49	13.96
Broadneck	6	8.00	6.38	13.75
Broadwater	2	2.67	1.56	2.58
Cox Creek	15	20.00	15.41	22.57
Mayo\Glebe	0.64	0.85	0.61	1.14
Total by Watershed	36.64	48.85	33.45	54.00
Maryland City	2.5	3.33	2.35	3.70
Patuxent	8.0 ^a (7.5) ^b	10.50	8.61	13.81
Total by Watershed	10.50	13.83	10.96	17.51

Notes:

- a. Nutrient Load Capacity
- b. Hydraulic Capacity

4.5.4 Water Reuse

Anne Arundel County plans to pursue alternative wastewater strategies that are responsive to the needs of its citizens and the environment. Anne Arundel County has a contract with Constellation Generation for the sale of treated effluent. Other water reuse initiatives may prove to be feasible and desirable. Alternative treatment and/or reuse facilities may relieve existing conveyance and treatment facilities or supplement future expansion plans. In addition, reuse applications would reduce the discharge of nutrients such as nitrogen and phosphorous to the Chesapeake Bay and its tributaries.

4.5.5 County Pre-Treatment Program

The Pretreatment Program is an EPA approved program designed to establish guidelines and limit pollutants discharged to the County sewer system at the source. The program has established its guidelines through industrial and commercial permitting and enforcement.

The pretreatment program is a self-funded program that currently has three major areas of concern: industrial discharges; commercial food handling services and marina pump outs. The industrial permitting program is designed to limit the amount and strength of various chemicals and pollutants from entering the County's sewer system. Through the industrial program the County has been able to enhance the employee's health and safety and help keep the environment clean. This is done through on-site inspections and wastewater sampling and monitoring. The commercial food handling services portion is also a permit oriented program limiting the businesses to the amount of solids being discharged to the collection system by requiring grease traps to be installed and maintained in the line of the kitchen wastewater discharge. This is primarily handled through grease trap inspections. The marina pump out is a permit and inspections program designed to educate boaters and marina owners and to limit the types of pollutants being discharged to the County system. This allows boaters a place to discharge on board wastes instead of discharging wastes overboard to the open waters of the Chesapeake Bay. Currently the pretreatment program maintains approximately 1500 permits.

The State's planned Tributary Strategy currently under development, and possible maximum daily load (TMDL) based limits could significantly impact treatment costs. If required, the County will consider requiring additional pre-treatment or potentially apply use surcharges in order to collect the actual cost of treatment of excessive strength waste.

4.6 OPTIMIZATION OF FACILITIES AND REDUCTION OF O & M COSTS

The Department of Public Works is actively engaged in investigating the existing sewerage service areas and sub-drainage basins to ensure the expansion of infrastructure will efficiently service future planned development. The investigation is focused on ways to optimize operation and maintenance (O&M), reduce cost and consolidate facilities. Every effort will be made to ensure proposed infrastructure will service both existing and future needs. Component standardization, phasing of infrastructure and optimizing site location are key factors towards reduction of future O&M costs. Collection system piping and pump station facilities financed by the development community or the County's Utility Enterprise Fund will continue to be reviewed with optimization and reduction of O & M costs in mind. Facilities will be planned with the potential future service area taken into consideration as well as implementation of project phasing to service the existing, interim and future conditions.

4.6.1 Sewer Strategic Planning – County-Wide Focus

The Systems Evaluation and Rehabilitation (SER) division within the Bureau of Utility Operations is responsible for monitoring sewer flows, identification and investigation of inflow and infiltration sources and management of rehabilitation / repair projects within the existing system. Flow data from SERs metering program is utilized to calibrate the County's sewer computer model. This sewer model is part of the Sewer and Water Allocation, Management and

Planning System (SWAMP) and is further described in Appendix B. The model is utilized to check capacity availability for proposed development while considering existing, allocated and estimated flows from development under the Office of Planning and Zoning subdivision review process within each service area.

The previous non-graphical –based sewer model was replaced with a Windows-based model called SewerCad. This new model allows the County to analyze sewer force mains, conduct extended period simulations, and produce graphical outputs, all functions that were not possible with the previous sewer model.

The Department of Public Works recently completed a Comprehensive Sewer Strategic Plan for the entire County. The Comprehensive Sewer Strategic Plan consisted of a 2-phase approach for planning future modifications and expansion of the County’s existing wastewater collection and treatment system.

The first phase of the program was completed in December 2003. The County’s wastewater treatment plants were evaluated on a number of criteria including the State’s anticipated effluent total nitrogen discharge goals and other future discharge permit requirements, capacity of the receiving water body, constraints imposed by the location of each facility, and re-use options. Based on this information the maximum possible expansion of the treatment plants was determined.

The second phase of the program, completed in March 2007, evaluated ways to expand or modify the existing wastewater conveyance system to route flow toward treatment plants with the most available capacity to accommodate future growth in a cost effective manner. The Strategic Plan provides a strategy for optimizing existing facilities, designates approximate location and size of future pump stations & force mains, and includes recommendations for existing infrastructure upgrades required to meet future service area needs. It also provides the basis for the Capital Improvement Program and direction to the development community regarding infrastructure expansion and sizing.

Major recommendations and findings of the Strategic Plan project have been incorporated into the appropriate sections of this document. Potential infrastructure upgrade projects and future sewer extensions have been reflected on the appropriate Service Area Maps (S-1 through S-12).

4.6.2 Capacity, Management, Operation, Maintenance (CMOM)

Under the provisions of the Clean Water Act, the Environmental Protection Agency has been given oversight of Capacity, Management, Operation, Maintenance (CMOM) programs that are intended to lower the risks to public health or the environment by improving the performance of sewer collection systems and the response to sanitary sewer overflows (SSOs) when they occur.

Anne Arundel County has adopted a CMOM program to document the actions being undertaken to properly manage, operate, and maintain all parts of the sewer collection system at all times. The CMOM program was ultimately approved by MDE in 2005 and has been utilized ever since.

The short-term goals are to focus on utilizing asset management tools (such as geographic information systems, computer information and management system, and hydraulic modeling) that the County already has in place to improve the operation and maintenance of the collection system. Long-term goals will focus on continuing to reduce SSOs resulting from such things as mechanical problems at pumping stations, blockages, power failures, and lack of hydraulic capacity.

The County maintains an Allocation System for water and wastewater capacity. This system is used to monitor subdivision activity vs. available capacity. It provides a “near-term” perspective on project activity, planned growth, and sewer flows as opposed to the “long-term” projections presented in Table 4-2. Sewer Allocation Reports for each SSA are presented in Section 4.7 Sewer Service Area Descriptions. Further information on the County’s Allocation System can be found in Appendix B.

4.6.3 Excellence in Cost Leadership (EXCEL) Program

In 1997, the Anne Arundel County Department of Public Works Bureau of Utility Operations created a joint labor and management program to help the agency become more efficient and cost effective by reorganizing and changing work practices. The program, Excellence in Cost Effective Leadership (EXCEL), has helped the Bureau reduce costs while maintaining environmentally sound water and wastewater services.

The Steering Team, a joint labor and management team, was created to provide leadership and empowerment to employees so the Bureau could become more competitive while increasing the cost-effectiveness of its operations without resorting to layoffs or a reduction in the quality of service.

Through the EXCEL Program employee work teams were created to develop strategies for improvement that could be implemented by the Bureau. Key strategies for increasing effectiveness, productivity and participation of all employees have included implementing a flexible, multi-skilled workforce, providing intensive training to increase the skill level of employees, and moving to a team-based organizational structure while decreasing layers of management. Work teams are focused on reengineering the way they perform tasks, improving maintenance programs to maximize the life cycle of the Bureau’s equipment, and using new technology to improve performance and efficiency while reducing the need for manpower.

The results of the EXCEL Program have been tremendous for the Department of Public Works. Since fiscal year 1999, the EXCEL Program has saved over \$18.03 million by reducing staff through attrition and energy savings. The Bureau is currently saving an additional \$1.38 million annually and that is only the beginning of the potential savings that is expected through the implementation of new strategies to improve the efficiency of the Bureau.

By moving to a team-based organizational structure, the supervisory ratio went from 1 supervisor for 9 employees to 1 supervisor for 14 employees without resorting to layoffs or a reduction in the quality of service.

Employees are undergoing extensive training to develop multiple skills in the fields of mechanical, electrical, instrumentation, safety, laboratory and operations as part of a program that increases efficiency and productivity by creating a more flexible workforce in operations and maintenance.

4.7 SEWER SERVICE AREA DESCRIPTIONS

The following descriptions provide detailed information including: land use; existing conditions; projected future development and the potential impact on the existing sewer systems.

4.7.1 Baltimore City Sewer Service Area No. 1

4.7.1.1 *General Description*

The drainage area of the Patapsco River generally establishes the limits of the Baltimore City Sewer Service Area. The County line is the western and northern boundary. The eastern and southern limits generally follow the watershed boundary of Deep Run and the Patapsco River west of Wagner's Point, including Jessup north of MD Route 175 and the area north of the Baltimore Beltway (Rt. 695) near Cabin Branch Creek. The boundaries are shown on the adopted Master Plan Maps S-1 and S-2.

The sewer service area encompasses approximately 18,719 acres and includes the communities of Brooklyn Park, Linthicum, Hanover, Jessup, and the BWI Airport. According to the County's current Land Use Plan, the service area north of MD 100 is primarily designated for medium density residential and industrial park land uses. South of MD 100, the service area is primarily designated for lower density residential uses, with the exception of a large employment mixed use site and the Arundel Mills Mall. There are roughly 2,121 acres of vacant land within the service area that could be served by public sewer in the future.

There are two non-County systems located within the Baltimore City Sewer Service Area. They are described in Section 4.3.1. listed in Table 4-4 and depicted on the adopted Master Plan Maps S-1 and S-2.

4.7.1.2 *Projected Population Growth and Flows*

Population forecasts in the Baltimore City SSA indicate an increase to 42,478 by 2035. Much of the growth in this area will occur along the BW Parkway corridor and near the BWI Airport. Office park development continues in the area west of the airport and along West Nursery Road to the north. Several residential Planned Unit Developments are under construction or complete near the Arundel Mills Mall and in the Jessup community. Another Planned Unit Development is being planned in Brooklyn Park. Redevelopment along some of the older commercial highway corridors in the service area is also being promoted. The Arundel Preserve mixed use development in Hanover will include a mix of office, retail and multifamily uses.

As shown in Table 4-2, the average daily sewer flows in the service area are projected to increase to 6.42 MGD in 2035. The allowable and unused capacity for the Baltimore City Service Area is listed in Table 4-10.

TABLE 4-10
Sewer Allocation Report For Service Area #1 - Baltimore City
January 2012

	Current	Master Plan						
		2015	2020					
Safe Capacity	6,390,000	6,390,000	6,390,000					
Flow	4,250,000	4,930,000	5,230,000					
Capacity Available for Allotment	2,140,000	1,460,000	1,160,000					
Allotment Category	Allotment 3/10/11	Revised Allotment	Allocated 1/18/12	Available Capacity	Active Projects Under Review	Resulting Capacity	Recommended Allotment	Potential Projects
Public Health	10,000	10,000	0	10,000	0	10,000	10,000	0
Public Service	25,750	25,750	0	25,750	0	25,750	25,750	107,900
Assisted Housing	15,000	15,000	0	15,000	0	15,000	15,000	0
Buildable Lots	26,250	24,750	1,000	23,750	0	23,750	24,750	0
Community Development	75,000	75,000	0	75,000	0	75,000	75,000	0
Minor Subdivision	14,475	14,000	1,250	12,750	0	12,750	14,000	0
Major Subdivision	804,300	749,800	708,350	41,450	69,000	27,550 ^a	777,350	0
Commercial Complex	444,500	401,750	331,800	69,950	500	69,450	401,750	53,750
Industrial Subdivision	247,500	230,000	185,250	44,750	0	44,750	230,000	0
Reserved Capacity	508,225	593,950	0	593,950	0	593,950	566,400	0
TOTALS gpd)	2,171,000	2,140,000	1,227,650	912,350	69,500	842,850	2,140,000	161,650

Recommended allotment changes:

- a. Transfer 27,550 gpd from Reserved Capacity to Major Subdivision Category to cover Active Projects.

4.7.1.3 Water Reclamation Facility

The Patapsco Wastewater Treatment Plant, located on Wagner's Point in Baltimore City, provides treatment for the majority of sewage in the service area. The plant, owned and operated by Baltimore City, has an allowable operating capacity of 73 MGD. Anne Arundel County's existing flows are approximately 4.25 MGD out of a purchased capacity of 6.39 MGD based on the existing allowable operating capacity of the plant.

Anne Arundel County has entered into several agreements with both Howard and Baltimore Counties and Baltimore City regarding jointly utilizing sewerage facilities. These agreements stipulate capacity allocations to Anne Arundel County as well as capital and operating cost allocations. Anne Arundel County's allotted capacity within the conveyance system that is owned and operated by other jurisdictions, as specified in the aforementioned agreements, is schematically summarized in Figure 4-3.

Based on the results of the Comprehensive Sewer Strategic Plan, 2035 average daily flows will be approximately 6.42 MGD. The County currently has an allotment of 6.39 MGD at the Patapsco WWTP. While there is no immediate concern regarding additional capacity requirements in this SSA, the County must have a plan in place by 2035 to either obtain more flow allocation from the City or to divert from this SSA.

ENR is planned at the Patapsco WWTP. Major projects at the facility include Biological Aerated Filters (SC-845), Denitrification Filters (SC-852), and ENR Enhancements to Existing Facilities (SC-855). The City is expected to complete these ENR upgrades by 2015.

Figure 4-3

**Baltimore City
Patapsco WWTP**

**Hague Ave.
Interceptor**

**Cedar Hill
Interceptor**

Baltimore County Interceptor

**Patapsco
Interceptor**

**Linthicum/ShIPLEY
Interceptor**

**Howard County
Deep Run Interceptor**

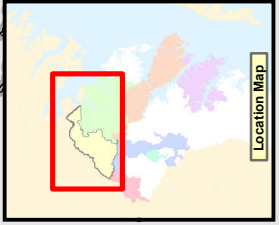
**Howard County
Licking Creek Interceptor**

**Hanover Rd
Interceptor**

**Stoney Run
Interceptor**

**Dorchester
Interceptor**

Interjurisdictional Facilities	Estimated Existing ADF (MGD)	Allowable ADF by Agreement (MGD)	Estimated Existing Peak (MGD)	Allowable Peak Flow by Agreement (MGD)
Licking Creek Int.	0.025	N/A	0.08	3.02
Deep Run Int.	0.61	N/A	2	4.42
Baltimore County Int.	3.2	N/A	7.8	8.5
Baltimore City - Patapsco WWTP	4	6.39	10.5	N/A



Baltimore City SSA Sewer Connection Points

4.7.1.4 *Pumping Station, Collection and Conveyance Systems*

A list of pump stations is provided in Table 4-11 and a schematic of the relationship between pump stations and the connecting infrastructure (pressure and gravity) is provided in Figure 4-4. The inventory of this infrastructure within the SSA includes the following:

- a. 7 sewer pump stations
- b. 137 miles of gravity mains ranging from 6 to 42 inches in diameter
- c. 1.1 miles of pressure collectors (grinder pump systems) ranging from 1.5 to 3 inches in diameter
- d. 1.1 miles of force mains ranging in size from 4 to 12 inches in diameter
- e. Approximately 11,400 connections

The integral backbone of the County's portion of the Baltimore City SSA consists of six major gravity interceptors: Licking Creek, Stoney Run, Callaway Branch, Riverside, Cedar Hill, and the recently completed Piney Run interceptor. The Licking Creek and Piney Run interceptors discharge into Howard County's Deep Run interceptor. The Deep Run, Stoney Run, and Callaway Branch interceptors discharge into the Patapsco interceptor, which is owned and operated by Baltimore County. All wastewater flow that goes to Howard County and Baltimore County must be pumped through Baltimore County's Patapsco Pumping Station. This Baltimore County pumping station (located adjacent to Anne Arundel County's Patapsco Pumping Station) has a peak capacity of 56 MGD and expansion potential to an ultimate 70 MGD. Flow from the Brooklyn Sub-Service Area is conveyed directly to Baltimore City. Approximately half the flow goes through the Baltimore City's Brooklyn Park Pump Station and the remaining flow goes directly into the Baltimore City's gravity system.

TABLE 4-11
Baltimore City Sewer Service Area
Inventory of Pump Stations

Station Name	Owner	Address/Location	Master Plan Map	Operating Map 200/40	A.A. County Station ID Number	Design Capacity (MGD)
Church Circle	County	311 Church Circle	S-1	K04/A1	700034	0.216
Harbor Valley Estates	County	5662 Harbor Valley Rd	S-1	M02/C1	700234	0.252
Linthicum/Shipley	County	834 Hammonds Ferry Rd N	S-1	J02/A2	700245	1.973
Patapsco	County	6816 Baltimore Annapolis Blvd	S-1	L02/C1	700035	3.024
Patapsco Park	County	200 Shenandoah Ave	S-1	L02/C2	700036	0.72
Ridgeway Manor	County	25 Terrace Rd	S-1	K02/B1	700270	0.023
State Highway	County	7530 Old Telegraph Rd	S-2	I07/A2	700313	0.223

4.7.1.5 *Required Infrastructure Capital Improvements* (Table 4-35 in Section 4.10)

The pump stations below have been identified through the Comprehensive Strategic Plan as potentially requiring upgrades to meet sub-drainage flow requirements in the future:

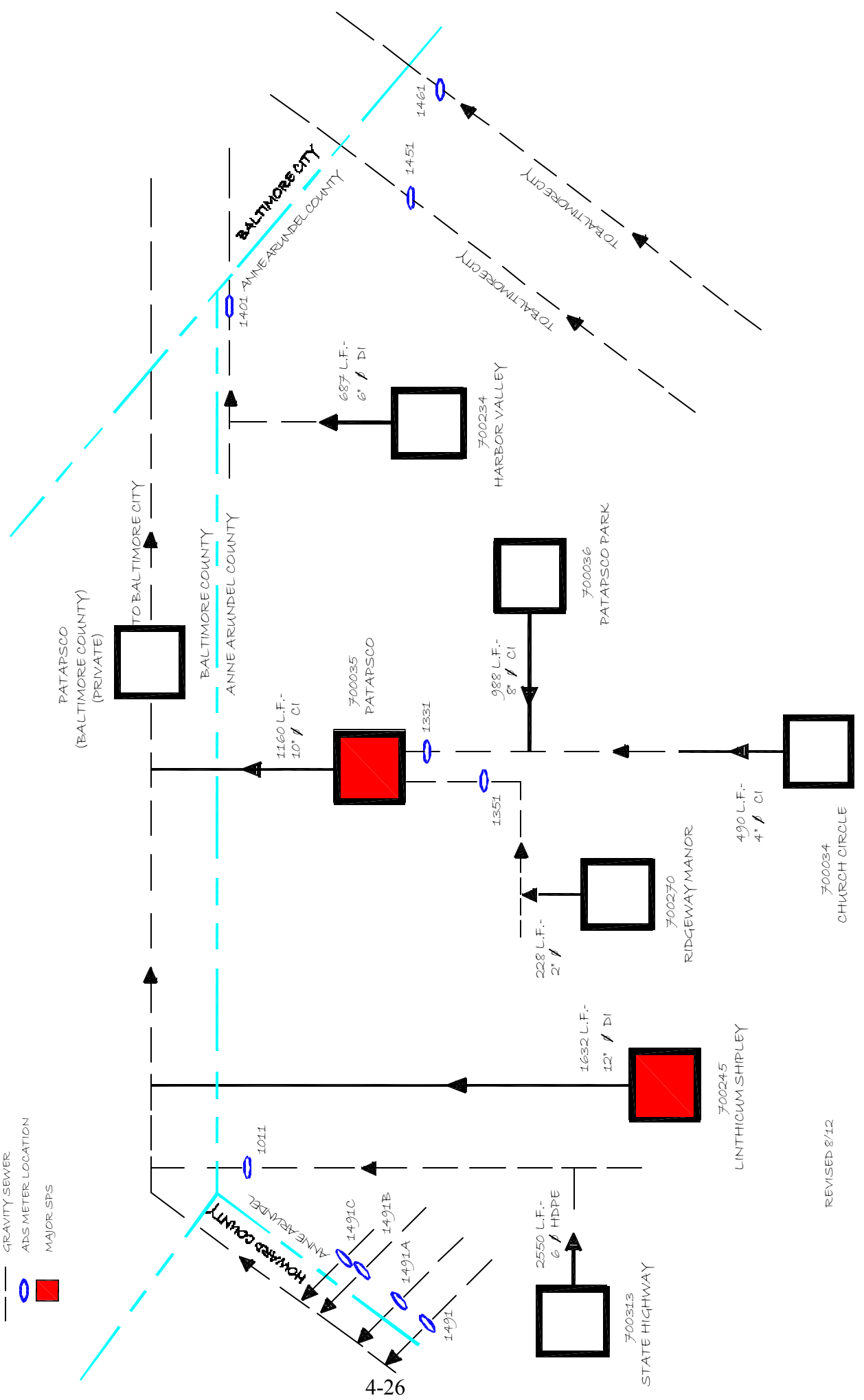
- a. Patapsco
- b. Linthicum/Shipley
- c. Patapsco Park

LEGEND

- 700000 COUNTY SWAMP ID #
- SEWAGE PUMPING STATION (SPS)
- FORCE MAIN
- GRAVITY SEWER
- ADS METER LOCATION
- MAJOR SPS

BALTIMORE CITY SERVICE AREA

Figure 4-4



REVISED 8/12

New pump station facilities designed and constructed as either development projects or through the County's Capital Improvement Program are anticipated in the following locations:

- a. Cedar Hill SPS (Development Project)
- b. Ridge Rd Merritt SPS (Development Project)

A number the capacity deficient gravity mains and force mains were also identified through the Comprehensive Sewer Strategic Plan. On-going investigations will determine specific capacity for infrastructure upgrades (pump stations / piping) and timing of these improvements.

4.7.2 Cox Creek Sewer Service Area No. 2

4.7.2.1 General Description

The Cox Creek service area is located in the northern portion of the County. It is generally bounded by Baltimore City to the North, Rock Creek to the East, Elvaton Road and the Magothy River to the South, and Baltimore-Washington International Airport to the West. The boundaries are shown on the Master Plan Maps S-1 thru S-5.

The Cox Creek sewer service area encompasses approximately 29,435 acres. The service area covers the communities of Ferndale, Glen Burnie, Harundale and Pasadena. The current Land Use Plan designates the majority of Glen Burnie, Ferndale and Harundale for medium density residential land uses, with commercial uses concentrated along the Ritchie Highway and Crain Highway corridors. The Glen Burnie Town Center is developed and planned as a mixed-use activity hub. Much of the Pasadena area is planned for lower density residential uses, with commercial uses along Mountain Road. Existing and planned industrial uses are located on the east side of BWI Airport and on Marley Neck. There are 3,952 acres of vacant land within the service area that could be served by public sewer in the future.

There are three non-County owned and / or operated systems located within the Cox Creek Sewer Service Area. These systems are described in Section 4.3.1, listed in Table 4-4 and depicted on the adopted Master Plan Maps S-1 through S-5.

4.7.2.2 Projected Population Growth and Flows

Population in the Cox Creek service area is projected to increase to 150,398 residents by 2035. Much of the future growth in the service area will occur on the Marley Neck where several large residential developments are underway including Tanyard Springs, Tanyard Cove, Symphony Village at Tanyard Cove, and Osprey Landing. Over 3,200 residential units are planned within these four development projects combined. Additional residential development will likely continue along Solley Road. Commercial redevelopment will be promoted in revitalization districts along Ritchie Highway and Mountain Road, and the area near the Cromwell Light Rail Station is planned for longer-term redevelopment as a mixed-use transit hub.

The average daily sewage flow for Cox Creek WRF is projected to increase to 15.41 MGD by 2035. Table 4-12 presents the allowable and unused capacity in the Cox Creek service area.

TABLE 4-12
Sewer Allocation Report For Service Area #2 – Cox Creek
January 2012

	Master Plan							
	Current	2015	2020					
Safe Capacity	15,000,000	15,000,000	15,000,000					
Flow	11,970,000	13,730,000	14,130,000					
Capacity Available for Allotment	3,030,000	1,270,000	870,000					
Allotment Category	Allotment 3/10/11	Revised Allotment	Allocated 1/18/12	Available Capacity	Active Projects Under Review	Resulting Capacity	Recommended Allotment	Potential Projects
Public Health	194,600	194,600	0	194,600	0	194,600	194,600	0
Public Service	273,050	273,050	13,250	259,800	0	259,800	273,050	0
Assisted Housing	15,000	15,000	0	15,000	0	15,000	15,000	0
Buildable Lots	106,250	105,750	3,500	102,250	0	102,250	105,750	0
Community Development	112,000	112,000	0	112,000	0	112,000	112,000	0
Minor Subdivision	48,750	47,750	8,570	39,180	0	39,180	47,750	0
Major Subdivision	1,121,500	1,035,900	971,400	64,500	41,000	23,500	1,035,900	118,250
Commercial Complex	308,000	284,800	181,350	103,450	40,750	62,700	284,800	69,500
Industrial Subdivision	639,775	639,275	52,250	587,025	0	587,025	639,275	0
Reserved Capacity	211,075	321,875	0	321,875	0	321,875	321,875	0
TOTALS (gpd)	3,030,000	3,030,000	1,230,320	1,799,880	81,750	1,717,930	3,030,000	187,750

Notes: No allotment changes recommended

4.7.2.3 Water Reclamation Facility

The Cox Creek Water Reclamation Facility is located off Wagner Road. The 15 MGD rated facility provides activated sludge secondary treatment and phosphorus reduction facilities with an annual average daily flow of approximately 11.97 MGD. The treated effluent is discharged to the Patapsco River. The facility has achieved good performance since the BNR upgrade with a seasonal (May through September) average effluent TN of 8.8 mg/L in 2012, which is higher than the design seasonal TN goal of 8.0 mg/L. The Cox Creek WRF, as currently designed, will have great difficulty meeting Maryland's Interim Nutrient Cap Strategy at its current flow rate and at its design flow of 15 MGD. The facility will require significant capital improvements to achieve an annual average effluent TN of 3.0 mg/l (limit of technology). The Cox Creek WRF ENR upgrade is to be completed under Capital Project S802200. Interim effluent limits will remain in effect until the ENR facilities are constructed. The site (acreage) housing the Cox Creek WRF is fully used and it will be costly to support additional capacity expansion. The selected design approach for ENR is to fully retrofit the process with a membrane bioreactor (MBR). The MBR process will require expansion and re-configuration of the current reactors, construction of a membrane facility, and abandonment of the existing secondary clarifiers. This process will provide ENR level treatment on a smaller footprint. Conventional means would require significant expansion of the secondary clarifiers and corresponding encroachment into critical area and wetlands. The MBR facility will accommodate future expansion to provide for the planned growth and development in the SSA.

As seen in Table 4-2, average daily flow at the Cox Creek WRF will be nearing its current rated capacity of 15 MGD by 2030. Previous efforts to address this future shortfall included the construction of the Cayuga Farms Pump Station (S792900). The drainage area served by that pump station currently represents approximately 0.130 MGD average daily flow (ultimate flows of approximately 0.8 MGD) that now discharges into the Broadneck SSA. This drainage basin was previously part of the Cox Creek SSA.

Three diversion alternatives were considered in the Strategic Plan that involved transfer of flows to the Broadneck SSA and/or the Baltimore SSA. Diversion 2, the selected alternative for cost projection purposes, proposes a pump station near MH 2964 on the Marley Creek Interceptor. Flows from the new station can be conveyed to the Broadneck SSA by manifolding a new force main into the Cayuga Farms SPS force main. Existing average daily flows of 0.76 MGD and 2030 flows of 0.98 MGD could be diverted from the Cox Creek SSA to the Broadneck SSA with this project. It was also acknowledged that the “Base Case” (no flow diversions from Cox Creek SAA) was a viable option; however a costly expansion of the Cox Creek WRF will be required prior to 2030 under this scenario.

The above alternatives have been reflected on the appropriate Service Area Maps (S-1 through S-12) to recognize planned or potential changes to the Sewer Service Areas impacted if any one or all of the alternatives are implemented.

4.7.2.4 *Pumping Station, Collection and Conveyance Systems*

A list of pump stations is provided in Table 4-13 and a schematic of the relationship between pump stations and the connecting infrastructure (pressure and gravity) is provided in Figure 4-5. The inventory of this infrastructure within the SSA includes the following:

- a. 58 sewer pump stations
- b. 370 miles of gravity mains ranging from 4 to 48 inches in diameter
- c. 7.5 miles of pressure collectors (grinder pump systems) ranging from 1.5 to 3 inches in diameter
- d. 38 miles of force mains ranging in size from 4 to 54 inches in diameter
- e. Approximately 40,400 connections

The integral backbone of the Cox Creek conveyance system is the Cross County Force Main (CCFM) that conveys wastewater from 19 pump stations to the treatment facility. This common force main is made up of two parallel lines: a predominately 42-inch diameter North CCFM and a 36-inch diameter South CCFM. Manifold force mains such as this add complexity to the system as head conditions are affected by the discharge rates of the various connected pump stations.

The highest elevation points on the CCFM are located at Air Release Valve #24 on the North section and Air Release Valve #415 on the South section near the intersection of Solley Road and Nabb's Creek Road. The Brandon Woods Business Park pump station discharges its flow downstream of this high point within the gravity portion of the force main.

TABLE 4-13
Cox Creek Sewer Service Area
Inventory of Pump Stations

Station Name	Owner	Address/Location	Master Plan Map	Operating Map 200/40	A.A. County Station ID Number	Design Capacity (MGD)
7th Ave	County	995 7th St	S-3	O05/C3	700232	0.115
Arundel Road	County	232 Arundel Rd	S-3	S07/A1	700064	0.569
Aspen Park	County	7601 Appalachian Dr	S-3	Q08/C3	700219	1.642
Bar Harbor I	County	119F Bar Harbor Rd	S-3	S07/B1	700050	0.858
Bar Harbor II	County	16 Johnson Rd	S-3	S07/C1	700048	0.979
Bay Dr	County	206F Harlem Rd	S-3	S06/C2	700066	0.115
Bell Ave	County	1069 Bell Ave	S-3	O06/D1	700198	0.288
Brandon Woods Business Park	County	7635 Gambrills Cove Rd	S-3	Q06/A2	700290	0.432
Cabin Branch	County	1071 Cedar Ave	S-1	L04/B1	700038	2.88
Carvel Beach	County	424 Carvel Beach Rd	S-3	R07/D1	700069	0.232
Chestnut Hill Cove	County	1298 Hollow Glen Ct	S-3	Q06/B2	700229	0.481
Cinder Cove	County	90 Hammerlee Rd	S-2	N05/C2	700096	12.24
Country Club Estates	County	7829 Leymar Rd	S-2	O06/C3	700110	1.152
Country Club Manor	County	1038 Dumbarton Rd	S-2	N06/A2	700060	0.806
Creek Rd	County	8596 Creek Rd	S-3	T07/D3	700084	0.164
Elizabeth Landing	County	1021 Elizabeths Landing Way	S-3	R07/B2	700179	0.576
Freetown	County	8068 Solley Rd	S-3	P08/C1	700099	1.728
Glen Ave	County	7749 Glen Ave	S-3	Q08/A2	700156	0.022
Greenhaven II	County	835 205th St	S-3	Q08/B1	700217	0.266
Harbor Dr S.E.	County	7797 Harbor Dr	S-3	R06/A2	700062	0.072
Harris Heights	County	681 Cedar Ave	S-1	M04/D1	700051	1.008
Holly Rd North	County	8205 Holly Rd	S-3	R06/B2	700070	0.144
Lombardee Beach	County	7610 Beaver Rd	S-3	R07/D2	700216	0.317
Margate	County	917 Sunnybrook Dr	S-2	N06/A3	700063	0.677
Marley	County	521 Norman Ave	S-2	N07/B3	700097	14.76
Marley Ave	County	1722 Marley Ave	S-1	O05/B4	700231	0.259
Marley Neck	County	730 Pittman Rd	S-1	Q04/C3	700252	1.872
Meadow Lane	County	8468 Meadow Ln	S-3	S06/B1	700065	0.468
Morris Hills	County	205 Arundel Corporation Rd	S-1	N04/D1	700075	0.792
Mount Pleasant Beach	County	1073 Locust Dr	S-3	R08/D1	700049	0.418
Old Mill Rd	County	290 Chalet Dr	S-2	N10/D4	700040	0.403
Ordinance Rd	County	6769 Waterview Ct	S-1	N05/B1	700041	1.44
Park Rd	County	127 Park Rd	S-3	S07/D4	700067	0.163
Park West	County	7845R Parke West Dr	S-2	L08/C3	700079	1.040
Pinehaven	County	7680 Briar Ln	S-3	R08/D4	700101	0.958
Price Club	County	600 Ordinance Rd	S-1	O04/C4	700253	0.467
Quarterfield Crossing	County	577 Jones Rd	S-2	K07/B3	700311	0.481
Quarterfield School	County	7907 Meyers Dr	S-2	K09/A3	700059	0.461
Riviera Beach	County	107 Carroll Rd	S-3	S07/D2	700102	10.944
Rock Creek	County	1263 Pekin Rd	S-3	R08/B2	700205	3.842
Sandy Beach	County	136R Sandy Beach Dr	S-3	S07/C2	700068	0.461
Schrams Crossing	County	8110 Bell Tower Crossing	S-3	Q09/C3	700296	0.446
Sea Breeze	County	8005 Shore Rd	S-3	R06/B1	700100	0.242
Sharon Dr	County	4400 Sharon Dr	S-3	S09/B2	700191	0.144
Shoreland Dr	County	968 Shoreland Dr	S-2	N06/A1	700197	0.684
Silver Sands	County	869 North Shore Rd	S-3	Q08/D1	700279	0.374
Stone Haven	County	8113 Beach Dr	S-3	Q08/D3	700225	0.396
Stoney Beach I	County	1931 Hilltop Rd	S-3	S06/D3	700223	0.482
Stoney Beach II	County	1351 Triwater Ct	S-3	S06/D3	700224	0.125
Stoney Creek	County	8250 Fort Smallwood Rd	S-3	R07/A1	700072	0.157
Sunset Beach	County	8450 Byrd Rd	S-3	R07/B1	700058	0.524
Tanyard Springs	County	7460 Marley Neck Blvd	S-3	P05/B3	700310	2.988
Tick Neck Rd	County	8030 Mayfield Rd	S-3	R09/C4	700194	2.009
Valley Rd	County	1240 Rock Hill Rd	S-3	S08/C4	700085	0.644
Waterview	County	700 Waterview Dr	S-3	R06/B4	700071	2.016
Festival at Pasadena	Private	8139 Ritchie Hwy	S-3	O9/B3		
Glen Burnie Elks	Private	878 Stevenson Rd	S-2	K09/D2	700182	
Humble Oil (Ames)	Private	8101R Ritchie Hwy	S-3	O09/C2	700098	0.338
Jumpers Mall	Private	8064 Ritchie Hwy	S-3	O09/C4	700111	0.163
Lake Shore	Private	31R Magothy Beach Rd	S-3	S10/D1	700297	
Scotts (Franks Nursery)	Private	8120F Ritchie Hwy	S-3	O09/C1	700193	0.035
Southdale	Private	8049F Jumpers Hole Rd	S-3	O09/C4	700230	0.049
The Horizons	Private	8030R Ritchie Hwy	S-2	O09/C4	700206	0.288
Wendys	Private	8142 Ritchie Hwy	S-3	O09/C2	700031	0.4

COX CREEK SERVICE AREA

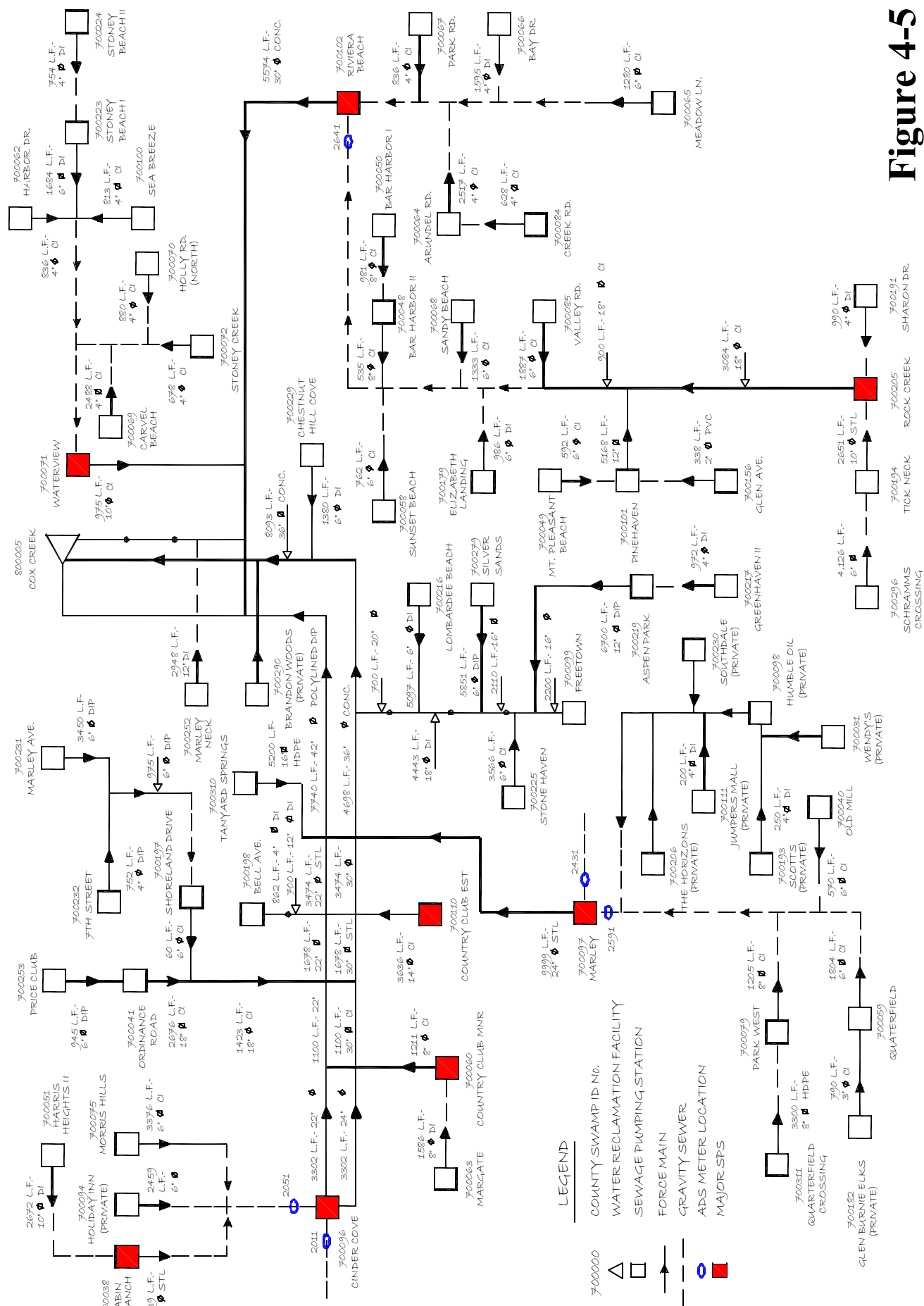


Figure 4-5

4.7.2.5 Required Infrastructure Capital Improvements (Table 4-35 in Section 4.10)

Infrastructure CIP projects in the Cox Creek SSA include:

- a. Furnace Branch Sewer Replacement (CIP S797800)
- b. Marley-Jumpers Sewer Rehabilitation (CIP S783700)
- c. Woodholme Circle Sewer (CIP Petition Project S803600)
- d. Cinder Cove Force Main Replacement (CIP S806700)
- e. Valley Rd Force Main Replacement (CIP X7388142)

These pump stations are being upgraded by either development projects or through the County's Capital Improvement Program, or have been identified through the Comprehensive Strategic Plan as potentially requiring upgrades to meet sub-drainage flow requirements in the future:

- | | |
|-------------------------------------|--|
| a. Marley (CIP S791862) | l. Quarterfield School (Scheduled for Abandonment) |
| b. Cinder Cove (CIP S791800) | m. Price Club |
| c. Stonehaven (Development Project) | n. Chestnut Hill Cove |
| d. Pinehaven | o. Creek Rd (CIP S791855) |
| e. Marley Avenue (CIP S791857) | p. Riviera Beach (CIP 805200) |
| f. Cabin Branch | q. Harbor Dr E (CIP S791855) |
| g. Ordnance Road | r. Waterview (CIP S791832) |
| h. Farmington Village | s. 7 th Ave (CIP S791857) |
| i. Aspen Park | t. Park West (CIP S791833) |
| j. Glen Avenue | |
| k. Harris Heights | |

New pump station facilities designed and constructed as either development projects or through the County's Capital Improvement Program are anticipated in the following locations:

- a. Stonehouse Run (Development Project)

A number the capacity deficient gravity mains and force mains were also identified through the Comprehensive Sewer Strategic Plan. On-going investigations will determine specific capacity for infrastructure upgrades (pump stations / piping) and timing of these improvements.

4.7.3 Maryland City Sewer Service Area No. 3

4.7.3.1 General Description

The Maryland City sewer service area encompasses approximately 6,784 acres and includes the portion of the Patuxent River drainage basin west of Fort Meade. It covers the area south of MD 175 and extends from the western boundary of the County eastward and southward to the limits of Fort Meade. The service area includes the community of Maryland City, the Russett PUD, and portions of Jessup and extends east of the Baltimore Washington Parkway to include a large tract of federally owned property leased by the District of Columbia. The boundaries are shown on the Master Plan Maps S-2 and S-4.

According to the County's current Land Use Plan, the service area is planned primarily for medium and high-density residential uses in Maryland City and office park uses in Jessup, Annapolis Junction, and along MD 198. A large tract of land in Jessup south of MD 175 is also

planned for residential mixed-use development. There is a considerable amount of open space in the service area including the Little Patuxent River floodplains and the Oxbow Natural Area. There are roughly 1,173 acres of vacant land within the service area that could be served by public sewer in the future.

There are three non-County owned and / or operated treatment facilities located within the Maryland City SSA. These are described in Section 4.3.1, listed in Table 4-4 and shown on Master Plan Map S-4.

4.7.3.2 Projected Population Growth and Flows

Population within the Maryland City sewer service area is projected to increase to approximately 24,001 residents by the year 2035. Anticipated development over the planning horizon includes the continued build out of the National Business Park, continued development on the Konterra property in Annapolis Junction, redevelopment on the Laurel Race Track site, some commercial revitalization along MD 198, a planned mixed use development on the Clarks 100 site in Jessup, and development of several large tracts of land south of MD 198 adjacent to the Patuxent Wildlife Refuge which are planned for industrial park use on the current Land Use Plan.

As shown in Table 4-2, the average daily sewer flows in the service area are projected to increase to 2.35 MGD in 2035. The allowable and unused capacity for the Maryland City Service Area is listed in Table 4-14.

TABLE 4-14
Sewer Allocation Report For Service Area #3 - Maryland City
October 2012

	Current	Master Plan						
		2015	2020					
Safe Capacity	2,500,000	2,500,000	2,500,000					
Flow	1,102,000	1,680,000	1,860,000					
Capacity Available for Allotment	1,398,000	820,000	640,000					
Allotment Category	Allotment 1/23/12	Revised Allotment	Allocated 10/8/12	Available Capacity	Active Projects Under Review	Resulting Capacity	Recommended Allotment	Potential Projects
Public Health	10,000	10,000	0	10,000	0	10,000	2,500 ^a	0
Public Service	1,170	1,170	0	1,170	0	1,170	1,170	2,000
Assisted Housing	5,000	5,000	0	5,000	0	5,000	0 ^b	0
Buildable Lots	23,000	23,000	0	23,000	0	23,000	5,000 ^c	0
Community Development	0	0	0	0	0	0	0	0
Minor Subdivision	2,000	2,000	0	2,000	0	2,000	0 ^d	0
Major Subdivision	332,050	325,050	68,100	256,950	404,250	(147,300)	448,680 ^f	250,000
Commercial Complex	214,050	207,600	157,150	50,450	72,500	(22,050)	229,650 ^f	73,750
Industrial Subdivision	686,000	686,000	665,250	20,750	0	20,750	686,000	0
Reserved Capacity	124,730	138,180	0	138,780	0	138,180	25,000 ^e	0
TOTALS (gpd)	1,398,000	1,398,000	890,500	507,500	476,750	30,750	1,398,000	325,750

Notes: Active projects includes 70% of Arundel Gateway and Liberty Valley

Recommended allotment changes:

- a. Reduce the allotment for Public Health by 7,500 gpd
- b. Reduce the allotment for Assisted Housing by 5,000 gpd
- c. Reduce the allotment for Buildable Lots by 18,000 gpd
- d. Reduce the allotment for Minor Subdivision by 2,000 gpd
- e. Reduce the Reserved Capacity to 1% of Safe Capacity
- f. The allotment made available by the adjustments above is 23,670 gpd less than the amount needed to cover the Active Projects.

4.7.3.3 Water Reclamation Facility

The Maryland City Water Reclamation Facility, located adjacent to and west of Maryland City, utilizes the Schreiber activated sludge process. This WRF was constructed in 1990 by the Russett Developer and was designed to serve the capacity requirements of the Russett Development as well as estimated flows for the existing and planned service categories within the service area. The plant has a capacity of 2.50 MGD and discharges to the Patuxent River. An existing average daily flow of 1.10 MGD is received at the plant. The facility has achieved very good performance with a 5-year average effluent TN of 4.5 mg/L and a 5-year average effluent TP of < 0.2 mg/L, both well below the NPDES requirements. Some capital improvements are under construction to enable the facility to achieve annual average effluent TN concentrations of 3.0 mg/l or less, the “limit of technology”. The Maryland City WRF ENR upgrade is to be completed under Capital Project S803000. As shown in Table 4-14, although Maryland City WRF is at only 40 percent of its design capacity based on flow received, it is nearly at capacity based on sold allocations. Therefore it is critical that expansion occur soon.

An expansion of the Maryland City WRF is planned under Capital Project (CIP S8066) to 3.7 MGD. Anne Arundel County has requested that MDE reissue the State Discharge Permit for the Maryland City WRF (which expires July 31, 2013) with three (3) tiers of effluent limits. The first set of effluent limits would be the same as the existing permit and would be based on the current design average daily flow rate of 2.5 MGD. These limits would be in effect from the time the permit is issued (with allowances for phased implementation of ENR limits consistent with the Consent Agreement between Anne Arundel County and MDE) until the plant expansion is completed (projected January 2016).

The second set of effluent limits would be based on an average daily flow rate of 3.33 MGD. These limits would go into effect when the expansion project is completed and would be based on achievement of an annual average effluent TN concentration of 3.0 mg/L from the facility.

The third set of effluent limits would be based on an average daily flow rate of 3.7 MGD. These limits would go into effect after Anne Arundel County is able to demonstrate that the effluent quality from the Maryland City WRF is able to achieve an effluent TN of 2.7 mg/L or less or that the combined effluent quality from the Maryland City WRF and the Patuxent WRF is able to meet the requirements of the watershed permit at the combined rated capacity of the two facilities.

Pumping Station, Collection and Conveyance Systems

A list of pump stations is provided in Table 4-15 and a schematic of the relationship between pump stations and the connecting infrastructure (pressure and gravity) is provided in Figure 4-6. The inventory of this infrastructure within the SSA includes the following:

- a. 7 sewer pump stations
- b. 37.9 miles of gravity mains ranging from 4 to 24 inches in diameter
- c. 10.4 miles of force mains ranging in size from 4 to 20 inches in diameter
- d. Approximately 4,312 connections

There are large developable tracts of land within the planned service category in this sewer service area. Development of these areas will require extensive comprehensive planning of conveyance and pumping infrastructure due to the impact on infrastructure within the service area.

TABLE 4-15
Maryland City Sewer Service Area
Inventory of Pump Stations

Station Name	Owner	Address/Location	Master Plan Map	Operating Map 200/40	A.A. County Station ID Number	Design Capacity (MGD)
Annapolis Junction	County	8207 Dorsey Run Rd	S-2	D10/C4	700306	2.16
Barbers Trailer Park	County	413 Kokomo Ct	S-4	A12/B3	700073	0.576
Little Patuxent	County	2401 Russett Green West	S-4	C11/D1	700271	3.74
Maryland City	County	3533 Tejon Rd	S-4	A12/A1	700273	4.205
National Business Park	County	116 National Business Pkwy	S-2	D10/A4	700289	1.195
Russett Phase II	County	3000 Lost Creek Blvd	S-2	C10/C4	700293	0.576
Russett Phase III	County	8061 Pennington Dr	S-2	C10/B2	700295	0.9

4.7.3.4 Required Infrastructure Capacity Improvements (Table 4-35 in Section 4.10)

Russett Phase II has been identified through the Comprehensive Strategic Plan as potentially requiring an upgrade to meet sub-drainage flow requirements in the future.

Arundel Gateway is planning to construct a new sewer pumping station and force main that will convey sewer flow from their site and other properties in the vicinity of MD 198 east of the Baltimore-Washington Parkway to the Maryland City WRF.

National Business Park North plans to construct a gravity interceptor sewer from their site to the Annapolis Junction SPS. This will divert sewer flows from their site and other projects in the northern areas of the Maryland City SSA away from the National Business Park SPS which is nearing capacity.

A number of capacity-deficient gravity mains and force mains were also identified through the Comprehensive Sewer Strategic Plan. On-going investigations will determine specific capacity for infrastructure upgrades (pump stations / piping) and timing of these improvements.

4.7.4 Patuxent Sewer Service Area No. 4

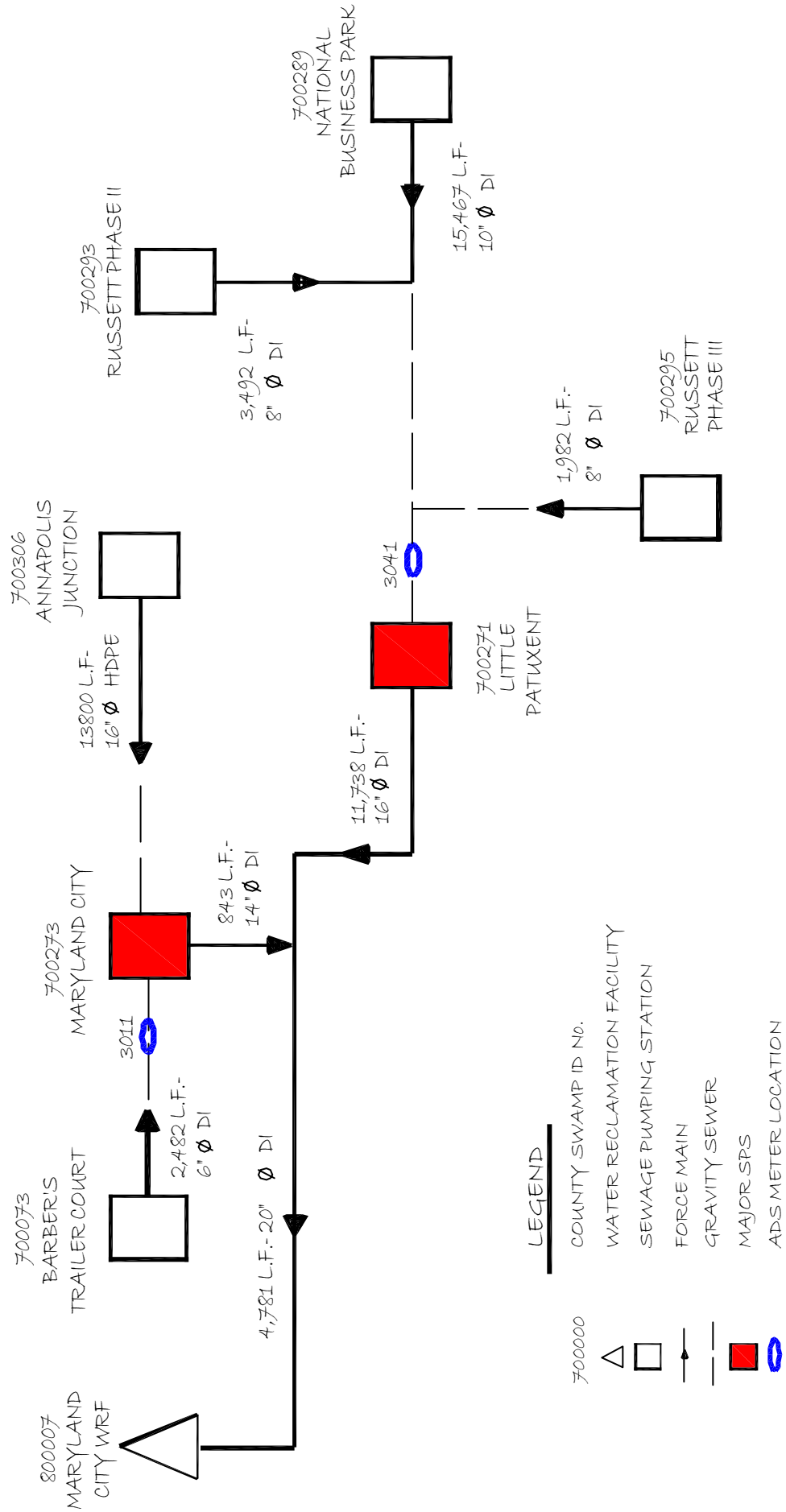
4.7.4.1 General Description

The Patuxent sewer service area includes the portion of the Patuxent River drainage basin east of Fort Meade. It covers portions of Severn, Jessup, Odenton and Crofton and includes the communities of The Provinces, Seven Oaks, and the Odenton Town Center. The service area encompasses approximately 14,709 acres. According to the current Land Use Plan, this service area is designated predominantly for a mix of low and medium density residential use, with smaller pockets of high-density residential uses. The Odenton Town Center is planned as a transit-oriented mixed-use development, and property at MD 175 and the BW Parkway is planned for residential mixed use. Commercial land uses are concentrated primarily along MD 3 in Crofton and Gambrills. There are approximately 2,086 acres of vacant land within the service area that could be served by public sewer in the future.

There are four non-County owned and / or operated treatment facilities located within the Patuxent SSA. These systems are listed in Table 4-4 and shown on Master Plan Maps S-2, S-4, and S-6.

MARYLAND CITY SERVICE AREA

Figure 4-6



4.7.4.2 Projected Population Growth and Flows

Population within the Patuxent sewer service area is forecast to reach 82,539 by 2035. Future growth in the area will include a mix of residential, office and retail development in the Odenton Town Center. Major projects being planned in the Odenton Town Center include the Village at Odenton Station and Town Center Commons. Future growth in the service area will also include the Parkside mixed use development that will be predominantly residential with some office and retail uses, and the Two Rivers Planned Unit Development that will contain over 2000 age-restricted single family and townhouse units.

Table 4-2 indicates that average daily sewage flows are projected to increase to 8.61 MGD by 2035. Table 4-16 presents the allowable and unused capacity in the Patuxent service area.

TABLE 4-16
Sewer Allocation Report For Service Area #4 – Patuxent
January 2012

	Master Plan							
	Current	2015	2020					
Safe Capacity	7,500,000	10,500,000	10,500,000					
Flow	5,537,000	7,270,000	8,160,000					
Capacity Available for Allotment	1,963,000	3,230,000	2,340,000					
Allotment Category	Allotment 3/10/11	Revised Allotment	Allocated 1/18/12	Available Capacity	Active Projects Under Review	Resulting Capacity	Recommended Allotment	Potential Projects
Public Health	5,500	5,500	0	5,500	0	5,500	5,500	0
Public Service	15,000	15,000	0	15,000	0	15,000	15,000	2,500
Assisted Housing	0	0	0	0	0	0	0	0
Buildable Lots	9,750	8,000	1,750	6,250	2,000	4,250	8,000	0
Community Development	20,000	20,000	0	20,000	0	20,000	20,000	0
Minor Subdivision	7,750	7,750	3,500	4,250	0	4,250	7,750	0
Major Subdivision	1,198,350	1,170,500	1,041,550	128,950	0	128,950	1,198,350	431,500
Commercial Complex	537,250	537,250	342,800	194,450	53,250	141,200	537,250	423,250
Industrial Subdivision	124,000	123,750	93,200	30,550	250	30,550	123,750	0
Reserved Capacity	84,400	75,250	0	75,250	0	75,250	47,400	0
TOTALS (gpd)	2,002,000	1,963,000	1,482,800	480,200	55,250	424,950	1,963,000	857,250

Notes: No allotment changes recommended. The Halle Property is not included in Active Projects because it cannot be allocated until the interceptor is constructed. 362,250 gpd (1,449 EDUs). It's included in Potential Projects at this time.

4.7.4.3 Water Reclamation Facility

Sewage from the service area is collected and conveyed to the Patuxent Water Reclamation Facility (WRF) located west of Maryland Rt. 3 just north of Crofton. The plant has a rated capacity, based on nutrient load limitations, of 8.0 MGD and discharges to the Little Patuxent River. The existing average daily flow at the plant was 5.54 MGD. The facility utilizes an oxidation ditch activated sludge process designed for nitrification/de-nitrification and phosphorus removal. The Patuxent WRF is currently achieving excellent performance with a 5-year effluent average of 2.5 mg/L TN and < 0.2 mg/L TP. Under Capital Project S804100 (Patuxent WRF ENR) improvements are under construction to ensure the facility is capable of achieving an annual average effluent TN concentration of 3.0 mg/l or less under all design conditions. These improvements include supplemental carbon storage and feed system and new denitrifying filters.

An agreement between the Two Rivers Development Company and partners, the Piney Orchard Utility Company, and the County has been adopted to transfer 500,000 gpd of equivalent nutrient load capacity (6,091 lbs/yr nitrogen and 457 lbs/yr phosphorus) from the Piney Orchard Treatment Plant to Anne Arundel County. The County intends to apply the transferred nutrient load capacity to the Patuxent WRF, increasing its maximum capacity based on the nutrient cap from 10 MGD to 10.5 MGD.

An expansion of the Patuxent WRF is planned under Capital Project (CIP S8065) to 11.6 MGD. Similar to the Maryland City WRF, Anne Arundel County has requested that MDE reissue the State Discharge Permit for the Patuxent WRF (which expires July 31, 2013) with three (3) tiers of effluent limits.

The first set of effluent limits would be the same as the existing permit and would be based on the current design average daily flow rate of 7.5 MGD and equivalent nutrient load capacity of 8 MGD reflecting the transfer from Piney Orchard WWTP. These limits would be in effect from the time the permit is issued (with allowances for phased implementation of ENR limits consistent with the Consent Agreement between Anne Arundel County and MDE) until the plant expansion is completed (projected July 2015).

The second set of effluent limits would be based on an average daily flow rate of 10.5 MGD. These limits would go into effect when the expansion project is completed and would be based on achievement of an annual average effluent TN concentration of 3.0 mg/L from the facility.

The third set of effluent limits would be based on an average daily flow rate of 11.6 MGD. These limits would go into effect after Anne Arundel County is able to demonstrate that the effluent quality from the Patuxent WRF is able to achieve an effluent TN of 2.7 mg/L or less or that the combined effluent quality from the Maryland City WRF and the Patuxent WRF is able to meet the requirements of the watershed permit at the combined rated capacity of the two facilities.

4.7.4.4 *Pumping Station Collection, and Conveyance Systems*

A list of pump stations is provided in Table 4-17 and a schematic of the relationship between pump stations and the connecting infrastructure (pressure and gravity) is provided in Figure 4-7. The inventory of this infrastructure within the SSA includes the following:

- a. 7 sewer pump stations
- b. 191.4 miles of gravity mains ranging from 4 to 48 inches in diameter
- c. 2.7 miles of pressure collectors (grinder pump systems) ranging from 1.5 to 3 inches in diameter
- d. 4.2 miles of force mains ranging in size from 4 to 24 inches in diameter
- e. Approximately 22,600 connections

The integral backbone of the Patuxent conveyance system consists of three major gravity interceptors: Severn Run Interceptor, Patuxent Interceptor, and the Odenton Interceptor. Of these three interceptors, the Odenton Interceptor is nearing capacity when considering those projects that have been approved for service. In response, the County established a Sanitary District that incorporates the Odenton Town Center. The District provides for assessment of sewer surcharges to new development to allow for recovery of costs incurred by the County toward the cost of expanding the interceptor (CIP S805900).

There are large developable tracts of land within the planned service category. Development of these areas will require extensive comprehensive planning of conveyance and pumping infrastructure due to the potential impact on infrastructure within the service area. Additionally, development of portions of the Odenton Town Center has accelerated the necessity for upgrades to the Odenton Interceptor.

TABLE 4-17
Patuxent Sewer Service Area
Inventory of Pump Stations

Station Name	Owner	Address/Location	Master Plan Map	Operating Map 200/40	A.A. County Station ID Number	Design Capacity(MGD)
Crofton (Walk-in)	County	1451 Crain Hwy N	S-6	I18/C3	700004	5.76
Pigeon House	County	1655 Crain Hwy	S-6	H19/B1	700001	0.144
Ridgeview Plaza	County	2661 Annapolis Rd	S-2	F09/D2	700314	1.309
Ridgeway	County	21 Burns Crossing Rd	S-2	J10/C3	700002	3.456
Severn Run	County	1501 Old Mill Rd	S-4	I11/B1	700003	10.8
Storch Property	County	1035 Crain Hwy	S-6	I16/B2	700107	2.16
Walden	County	1500 Underwood Rd	S-6	K17/C1	700291	0.403

4.7.4.5 Required Infrastructure Capital Improvements (Table 4-35 in Section 4.10)

These pump stations are being upgraded by either development projects or through the County's Capital Improvement Program, or have been identified through the Comprehensive Strategic Plan as potentially requiring upgrades to meet sub-drainage flow requirements in the future:

- a. Storch Property
- b. Pigeon House
- c. Severn Run (CIP S805905)

New pump station facilities designed and constructed as either development projects or through the County's Capital Improvement Program are anticipated in the following locations:

- a. Ridgeview SPS and Force Main (CIP S-799000)
- b. Parkside SPS (Development Project)
- c. Wilsons Grove SPS (Development Project)
- d. Two Rivers 1, 2, and 3 SPS's (Development Project)
- e. Route 3 Corridor SPS (Development Project)

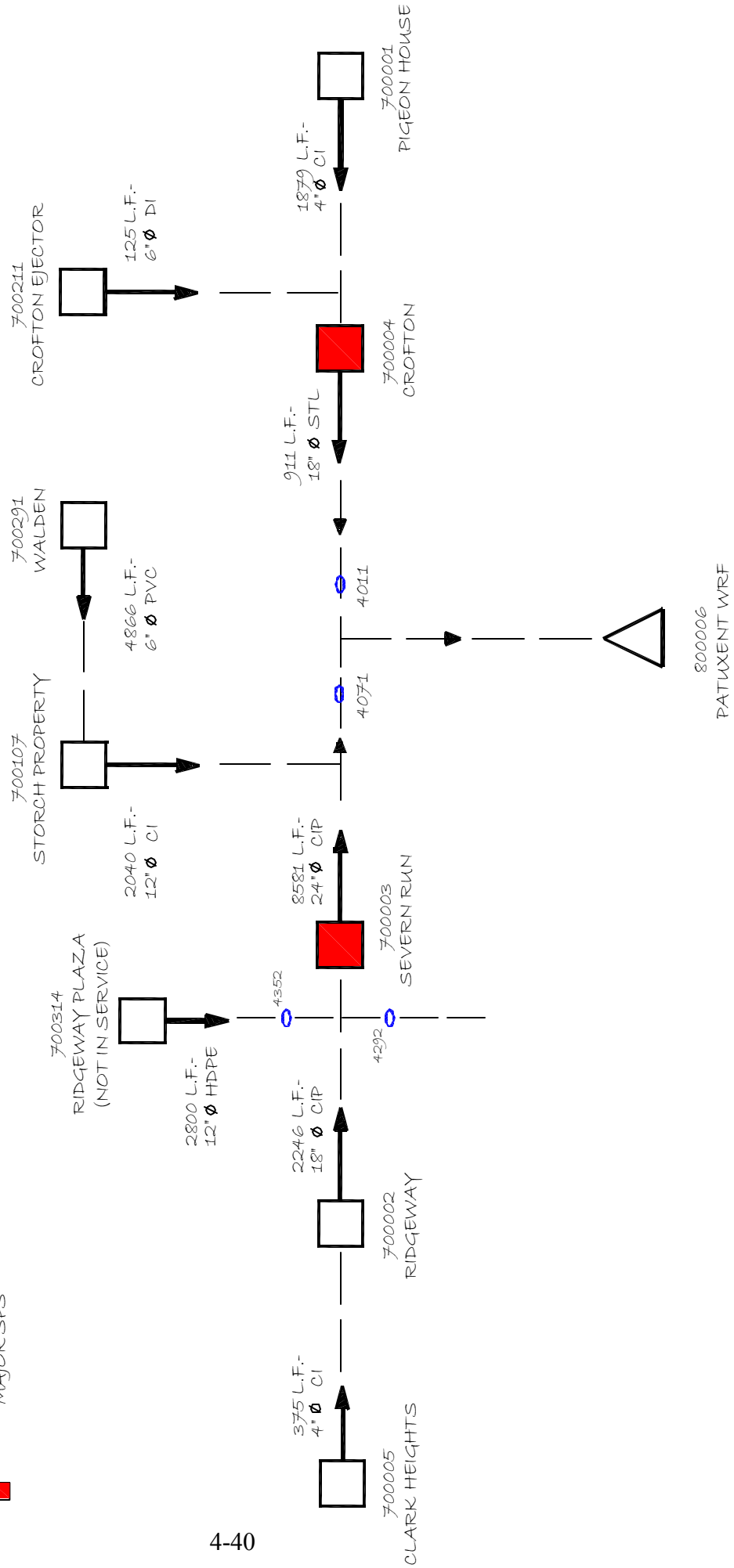
A number the capacity deficient gravity mains and force mains were also identified through the Comprehensive Sewer Strategic Plan. Further defined infrastructure planning is also underway to facilitate the full development of the Odenton Town Center. On-going investigations will determine specific capacity for infrastructure upgrades (pump stations / piping) and timing of these improvements.

Figure 4-7

PATUXENT SERVICE AREA

LEGEND

- COUNTY SWAMP ID NO.
- WATER RECLAMATION FACILITY
- SEWAGE PUMPING STATION
- FORCE MAIN
- GRAVITY SEWER
- ADS LOCATION
- MAJOR SPS



REVISED 8/12

4.7.5 Broadneck Sewer Service Area No. 5

4.7.5.1 General Description

The Broadneck service area is located in the east-central portion of the County. The Magothy and Severn Rivers, including a portion of the headwater of the Severn River along Benfield Road and MD Route 3, generally bound it.

The sewer service area encompasses approximately 28,022 acres. The major land uses in the service area are low and low-medium residential and rural/agricultural, with localized areas of commercial development. The most densely populated areas include Severna Park, Pasadena and Cape St. Claire. This area also includes the U.S. Naval Station Reservation which will remain served by the existing private WRF within the Reservation. There are about 2,549 acres of vacant land within the service area that could be served by public sewer in the future.

There are eight non-County owned and / or operated treatment facilities located within the Broadneck SSA. These systems are listed in Table 4-4 and depicted on the adopted Master Plan Maps S-2 through S-5 and S-7.

4.7.5.2 Projected Population Growth and Flows

Population within the Broadneck sewer service area is projected to increase to 90,687 by the year 2035. Future growth within the service area will be primarily new residential development or infill. Commercial development or redevelopment will occur at hubs along Ritchie Highway and along Veterans Highway in Severna Park. The Severna Park Mall and surrounding area is targeted for redevelopment as a village center with a mix of uses.

Table 4-2 indicates that average daily sewage flows are projected to increase to 6.38 MGD by 2035. Table 4-18 presents the allowable and unused capacity in the Broadneck service area.

TABLE 4-18
Sewer Allocation Report For Service Area #5 – Broadneck
January 2012

	Master Plan							
	Current	2015	2020					
Safe Capacity	6,000,000	8,000,000	8,000,000					
Flow	5,308,000	6,810,000	7,520,000					
Capacity Available for Allotment	692,000	1,190,000	480,000					
Allotment Category	Allotment 3/10/11	Revised Allotment	Allocated 1/18/12	Available Capacity	Active Projects Under Review	Resulting Capacity	Recommended Allotment	Potential Projects
Public Health	46,650	46,650	0	46,650	0	46,650	46,650	0
Public Service	50,000	50,000	9,500	40,500	8,000	32,500	50,000	0
Assisted Housing	15,000	15,000	0	15,000	0	15,000	15,000	0
Buildable Lots	97,250	96,500	4,250	92,250	0	92,250	96,500	0
Community Development	0	0	0	0	0	0	0	0
Minor Subdivision	18,500	18,000	7,500	10,500	0	10,500	18,000	1,250
Major Subdivision	317,700	258,650	221,750	36,900	21,250	15,650	258,650	12,750
Commercial Complex	72,750	65,250	17,250	48,000	22,000	26,000	65,250	423,250
Industrial Subdivision	13,500	13,500	10,750	2,750	0	2,750	13,500	0
Reserved Capacity	60,650	128,450	0	128,450	0	128,450	128,450	0
TOTALS (gpd)	692,000	692,000	271,000	421,000	51,250	369,750	692,000	14,000

Notes: No allotment changes recommended. Broadneck WRF has applied to be re-rated from 6.0 MGD to 8.0 MGD.

4.7.5.3 Water Reclamation Facility

The Broadneck Water Reclamation Facility is located off Log Inn Road. The facility is rated at 6.0 MGD with the annual average daily flow of 5.31 MGD. The treated effluent is discharged into the Chesapeake Bay. Full-scale biological nutrient reduction (BNR) facilities have been completed. The plant discharges through an outfall to the Chesapeake Bay, approximately 4,000 feet from the shoreline.

The Broadneck WRF is achieving very good performance with a 5-year average effluent TN of 2.23 mg/L and an average effluent TP of 0.45 mg/l, both well below the NPDES requirements. The facility will require significant capital improvements to meet the “limit of technology” level of 3.0 mg/L TN at the proposed re-rated plant capacity of 8.0 MGD. Broadneck WRF ENR is to be completed under Capital Project S803100. Sufficient space is available on the existing site for the facility to be increased to 12 MGD if necessary, however the nutrient cap limits hydraulic capacity to 8 MGD at ENR treatment levels.

Based on the results of the Comprehensive Sewer Strategic Plan, 2035 average daily flows will be approximately 6.38 MGD. Flow projections indicate that the Broadneck WRF will exceed its rated design capacity of 6.0 MGD in approximately 2020. The County is currently pursuing a re-rating of this facility to 8.0 MGD.

4.7.5.4 Pumping Station, Collection and Conveyance Systems

A list of pump stations is provided in Table 4-19 and a schematic of the relationship between pump stations and the connecting infrastructure (pressure and gravity) is provided in Figure 4-8. The inventory of this infrastructure within the SSA includes the following:

- a. 60 sewer pump stations
- b. 213.6 miles of gravity mains ranging from 6 to 60 inches in diameter
- c. 12.6 miles of pressure collectors (grinder pump systems) ranging from 1.5 to 3 inches in diameter
- d. 34.1 miles of force mains ranging in size from 4 to 36 inches in diameter
- e. Approximately 20,700 connections

TABLE 4-19
Broadneck Sewer Service Area
Inventory of Pump Stations

Station Name	Owner	Address/Location	Master Plan Map	Operating Map 200/40	A.A. County Station ID Number	Design Capacity (MGD)
Arnold WTP	County	1336 Jones Station Rd	S-7	T16/A2	700299	0.288
Ashberry Court	County	507F Ashberry Ln	S-5	P13/B2	700006	0.429
Atlantis	County	919 Barracuda Cove Ct	S-5	V15/A2	700162	0.448
Bay Hills	County	571 Bay Green Dr	S-5	V15/C3	700026	1.44
Belvedere Yacht Club	County	415 Alameda Pkwy	S-5	T14/B1	700023	0.374
Ben Oaks	County	461 Severnside Dr	S-4	M12/B2	700192	2.304
Berrywood	County	205R Berrywood Dr	S-5	R12/C4	700149	0.206
Big Cypress Creek	County	3 McKinsey Rd	S-5	Q13/B1	700010	14.976
Boones Trail	County	25 Evergreen Trl	S-5	P14/A1	700007	0.464
Brittingham	County	261 Finnegan Dr	S-5	P11/C1	700259	0.317
Busch	County	341 Buschs Frontage Rd	S-7	W16/C3	700028	0.518
Cape Arthur II	County	4F Giddings Rd	S-5	S13/D3	700057	0.429

Station Name	Owner	Address/Location	Master Plan Map	Operating Map 200/40	A.A. County Station ID Number	Design Capacity (MGD)
Cape Arthur III	County	208F McKinsey Rd	S-5	R13/A3	700014	0.759
Cape Arthur V	County	133 McKinsey Rd	S-5	R13/D2	700016	1.98
Cape St. Claire I	County	964 Woodland Cir	S-7	W16/B1	700143	3.11
Cape St. Claire II	County	1084 Little Magothy View	S-5	X15/C4	700145	0.749
Cape St. Claire III	County	1260 Swan Dr	S-7	X16/D4	700144	0.516
Cape St. Claire IV	County	1133 River Bay Rd	S-5	W15/A1	700185	0.372
Cape St. Claire V	County	1379R Greenway Dr	S-5	V15/B3	700199	0.432
Cape St. Claire VIII	County	1007 Lakeview Ln	S-5	W15/D2	700236	0.190
Cape St. Claire X	County	1008F Lake Claire Dr	S-5	W15/D3	700237	0.023
Carrollton Manor I	County	638 Jumpers Hole Rd	S-5	O13/C1	700187	0.184
Carrollton Manor II	County	658 Shore Rd	S-5	O13/C1	700188	0.203
Carrollton Manor III	County	726 Shore Rd	S-5	O13/B4	700189	0.176
Carrollton Manor IV	County	581 Park Rd	S-5	O13/A3	700190	0.927
Cattail Creek	County	91 Robinson Landing Rd	S-5	Q12/B2	700009	10.138
Cayuga Farms	County	428 University Dr	S-2	L10/C4	700304	1.209
Cedar Point Rd	County	9F Cedar Point Rd	S-5	P14/A3	700008	0.115
Cedar Rd	County	4 Cedar Rd	S-5	Q13/C4	700011	0.118
Colchester I	County	506 Lymington Rd	S-5	P13/C3	700150	0.347
Dill Rd	County	683 Dill Rd	S-5	R13/C2	700167	0.209
Divinity Cove	County	210 Mill Church Rd	S-5	S14/A3	700183	0.161
Doris Dr	County	859 Doris Dr	S-5	T14/A3	700022	0.648
East-West Boulevard	County	8373 Veterans Hwy	S-4	M11/D3	700292	0.428
Evergreen Commons (Temporary)	County	800 Janet Dale Ln	S-2	K09/D3	700316	0.21
Fair Oaks	County	303 Fairtree Dr	S-5	R12/C1	700125	0.228
Forked Creek	County	1160 Greenhill Rd	S-5	T15/A1	700163	2.760
Haskell Rd	County	423 Haskell Rd	S-5	S14/B1	700018	1.08
Lakeland	County	531 Lakeland Rd	S-4	O13/D4	700166	0.564
Lakeview	County	775 Lakeview Dr	S-5	T14/D1	700021	1.008
Little Cypress Creek	County	271 Cypress Creek Rd	S-5	R13/B1	700015	0.209
Long Meadow	County	613 Cypress Rd	S-5	R13/B4	700171	0.157
Manhattan Beach I	County	755R Dividing Creek Rd	S-5	S14/D3	700122	1.08
Manhattan Beach II	County	351 Magothy Rd	S-5	S13/C2	700123	0.72
Manhattan Beach III	County	807 Natures Run	S-5	R14/A1	700124	0.259
Mill Creek	County	198 Campus Green Dr	S-5	S15/A1	700020	10.8
Old Jones Station	County	53 Jones Station Rd	S-5	S14/C3	700181	0.749
Pasadena Elementary School	County	509 Pasadena Rd	S-5	P10/B3	700317	0.173
Round Bay I	County	6F Ridout Rd	S-5	Q14/A2	700012	0.230
Round Bay II	County	106 Severn River Rd	S-5	Q14/B1	700013	0.121
Round Bay III	County	821 McKinsey Rd	S-5	R14/D1	700017	1.318
Shipleys Choice	County	316R Sourwood Ct	S-4	N11/C1	700207	0.425
Twin Harbors I	County	181 Baybourne Dr	S-5	S14/A4	700146	0.173
Twin Harbors II	County	124F Shore Rd	S-5	S14/C1	700147	0.144
Twin Harbors IV	County	226 Peninsula Farm Rd	S-5	S14/C1	700019	0.648
Twin Harbors V	County	241R Peninsula Farm Rd	S-5	S14/B4	700148	0.173
Ulmstead Estates	County	725 White Swann Dr	S-5	U14/D1	700024	0.353
Whispering Woods I	County	401 Blossom Tree Dr	S-7	V16/C3	700027	0.216
Whispering Woods II	County	1435 Shot Town Rd	S-7	U17/D1	700025	0.835
Whitehurst	County	480 White Cedar Ln	S-5	R12/B2	700126	0.328
Westinghouse	Private	896 Oceanic Dr	S-7	Y18/A3	700029	0.396

BROADNECK SERVICE AREA

LEGEND

- 700000 COUNTY SWAMP ID NO.
- △ WATER RECLAMATION FACILITY
- SEWAGE PUMPING STATION
- FORCE MAIN
- GRAVITY SEWER
- ADS METER LOCATION
- MAJOR SPS

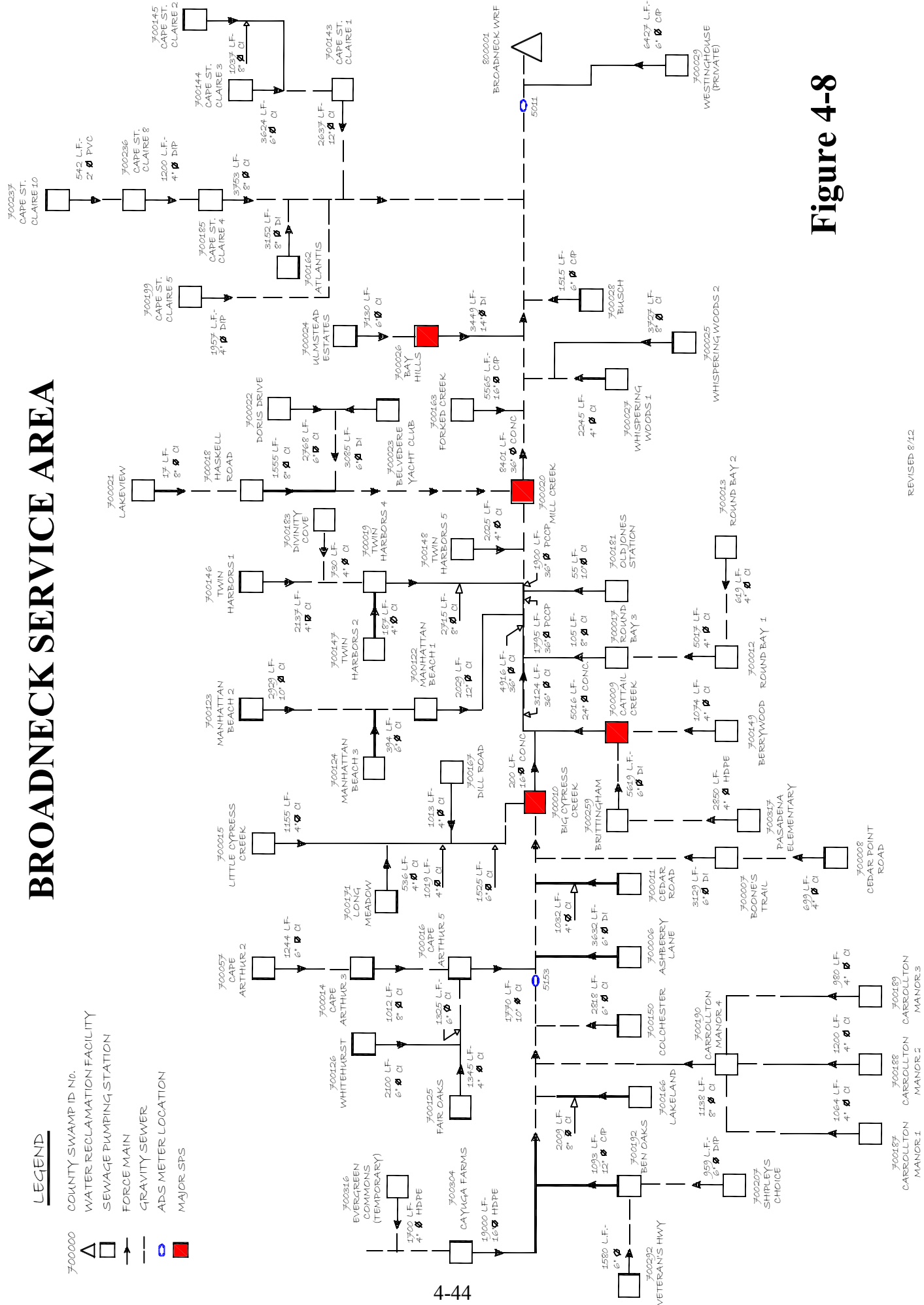


Figure 4-8

4.7.5.5 Required Infrastructure Capital (Table 4-35 in Section 4.10)

The integral backbone of the County's conveyance system is a series of pumping facilities that convey wastewater south along Ritchie Highway by the Big Cypress Creek pumping station to the Mill Creek pump station near Anne Arundel Community College. Wastewater from the Mill Creek facility is pumped along College Parkway to where it flows by gravity to MD Route 50 and ultimately to the Broadneck WRF. These major components were re-evaluated as a part of the strategic planning effort, regarding their ability to convey the future flow requirements of the service area as well as the potential future flows from the Broadneck SSA.

Infrastructure CIP projects in the Broadneck SSA include:

The Cayuga Farms Interceptor Phase II (CIP S792905) is under construction. When completed, both Quarterfield School SPS (Public) and Glen Burnie Elks (Private) will be abandoned and the sewer flow from that area will be re-routed from the Cox Creek SSA to the Broadneck SSA. A sewer service boundary change will be required at that time.

Force Main Replacements are planned for at the following pumping stations:

- | | |
|------------------------------|------------------------------------|
| a. Doris Dr (CIP X7388141) | f. Belvedere Yacht Club (CIP |
| b. Haskell Rd (CIP X7388141) | X7388142) |
| c. Dill Rd (CIP X7388141) | g. Cape Arthur V (CIP X7388142) |
| d. Whispering Woods II (CIP | h. Valley Rd (CIP X7388142) |
| X7388142) | i. Manhattan Beach I (CIP 7388145) |
| e. Whitehurst (CIP X7388142) | |

These pump stations are being upgraded by either development projects or through the County's Capital Improvement Program, or have been identified through the Comprehensive Strategic Plan as potentially requiring upgrades to meet sub-drainage flow requirements in the future:

- | | |
|-----------------------------|------------------------------------|
| a. Cape St. Claire IV | l. Fair Oaks |
| b. Cape St. Claire VIII | m. Shipley's Choice |
| c. Cape St. Claire V | n. Whispering Woods II |
| d. Cape St. Claire X | o. Ulmstead Estates |
| e. Cape St. Claire II | p. Round Bay I, II, and III |
| f. Cape St. Claire III | q. Whitehurst |
| g. Doris Dr (CIP S7918131) | r. Cayuga |
| h. Brittingham | s. Cape Arthur V (CIP S791889) |
| i. Bay Hills (CIP S7918118) | t. Big Cypress Creek (CIP S806300) |
| j. Mill Creek (CIP S804700) | u. Haskell Road (CIP_S7918116) |
| k. Whispering Woods I | v. Divinity Cove (CIP S7918130) |

New pump station facilities designed and constructed as either development projects or through the County's Capital Improvement Program are anticipated in the following locations:

- a. Route 50 Crossing SPS (X7388135)
- b. Bay Head Farms SPS (Development Project)
- c. Park Retreat SPS (Development Project)

A number the capacity deficient gravity mains and force mains were also identified through the Comprehensive Sewer Strategic Plan. On-going investigations will determine specific capacity for infrastructure upgrades (pump stations\ piping) and timing of these improvements.

4.7.6 Annapolis Sewer Service Area No. 6

4.7.6.1 General Description

The Annapolis sewer service area includes the City of Annapolis and the surrounding area. It is generally bounded by the Severn River, the Chesapeake Bay, South River and MD 50. The southern boundary extends beyond the South River to include the Woodland Beach, South River Colony, and Sylvan Shores drainage areas. The northwestern boundary extends north of Route 50 to include the Bacon Ridge Branch Watershed. The boundaries are shown on Master Plan Maps S-6 through S-9.

The service area encompasses 19,570 acres, of which 4,892 acres fall within the City of Annapolis. The Annapolis area is heavily oriented to water-related recreation and commercial ventures. Other than the City itself, other urbanized areas include the Parole Growth Management Area and the MD Route 2 corridor in Edgewater. There are approximately 854 acres of vacant land within the service area that could be served by public sewer in the future.

According to the County's current Land Use Plan, the majority of land in the County portion of the service area (excluding the City of Annapolis) is planned for low-density residential use. Densities are higher in the Heritage Harbor and Riva Trace communities and in the Woodland Beach community in Edgewater. Commercial and office uses are planned primarily in the Parole Town Center and along MD 2 in Edgewater. The Parole Town Center is an existing mixed-use activity center that includes retail and office uses, regional commercial services and residential uses.

The City of Annapolis is primarily developed. However, redevelopment of property and several annexations from the County have occurred in recent years. Future development will be primarily from infill of single-family homes and redevelopment of commercial properties. West Street (MD 450) has been targeted as a revitalization corridor.

There are six privately or independently owned and / or operated systems located within the Annapolis SSA. These systems are described in Section 4.3.1, listed in Table 4- 4 and depicted on the adopted Master Plan Maps.

4.7.6.2 Projected Population Growth and Flows

Population within the Annapolis sewer service area is projected to increase to 86,173 by the year 2035. The County portion of the population increase is 43,573 and the City portion is 42,600. Future County residential growth will primarily be concentrated in the Parole Town Center with lower density infill development occurring in other areas on the Annapolis Neck. County commercial and office uses will continue to be concentrated in the Parole Town Center and along MD 2 and Mayo Road in Edgewater. The new Annapolis Town Center at Parole mixed use development is near completion and will include a hotel, multifamily condominium units, retail and office uses.

For the City, almost all of the growth potential could be accommodated within four areas labeled "Opportunity Areas" in the City's Comprehensive Plan. Combined, the four areas could accommodate up to 95% of residential growth projections, or 1,770 new residential units. The Outer West Street corridor represents 78% of growth projections; Forest Drive represents 8%; West Annapolis represents 6%; and the Bay Ridge Opportunity Area represents 4%. Another 5% of growth projections may come from infill and vacant land development. This land-use based projection assumes a maximum build-out scenario and expansion of the City boundary by 106 acres in two annexation areas, as defined in the Comprehensive Plan.

Table 4-2 indicates that average daily sewage flows are projected to increase to 9.49 MGD by 2035. Table 4-20 presents the allowable and unused capacity in the Annapolis service area and Table 4-21 shows the City of Annapolis Flow Projections.

TABLE 4-20
Sewer Allocation Report For Service Area #6 – Annapolis
January 2012

	Current			Master Plan				
	City of Annapolis	County	Total	2015	2020			
Safe Capacity	6,700,000	6,300,000	13,000,000	13,000,000	13,000,000			
Flow	5,033,000	3,469,000	8,502,000	9,970,000	10,240,000			
Capacity Available for Allotment	1,667,000	2,831,000	4,498,000	3,030,000	2,760,000			
Allotment Category	Allotment 3/10/11	Revised Allotment	Allocated 1/18/12	Available Capacity	Active Projects Under Review	Resulting Capacity	Recommended Allotment	Potential Projects
Public Health	32,500	32,500	0	32,500	0	32,500	32,500	0
Public Service	191,500	191,500	50,250	141,250	0	141,250	191,500	51,250
Assisted Housing	0	0	0	0	0	0	0	0
Buildable Lots	4,500	4,250	1,250	3,000	0	3,000	4,250	0
Community Development	285,000	285,000	0	285,000	0	285,000	285,000	0
Minor Subdivision	22,000	22,000	6,000	16,000		16,000	22,000	150,000
Major Subdivision	540,460	539,460	80,100	459,360	0	459,360	539,460	0
Commercial Complex	303,750	285,250	182,950	102,300	0	102,300	285,250	0
Industrial Subdivision	56,750	56,750	250	56,500	0	56,500	56,750	73,500
Reserved Capacity	2,537,200	2,556,950	0	2,556,950	0	2,556,350	2,556,950	0
City of Annapolis	524,340	524,340	0	524,340	0	524,340	524,340	0
TOTALS (gpd)	4,498,000	4,498,000	320,800	4,177,200	0	4,177,200	4,498,000	274,750

Notes: No allotment changes recommended

TABLE 4-21
City of Annapolis Sewer Flow Projections

Year	Average Daily Flow (MGD)
2010	5.20
2015	5.34
2020	5.48
2025	5.62
2030	5.76
2035	5.76

4.7.6.3 Water Reclamation Facility

Sewage from the service area is collected and conveyed to the Annapolis Water Reclamation Facility (WRF) located off Edgewood Road in the City of Annapolis. This facility utilizes an activated sludge process providing nitrification/de-nitrification. The WRF was recently expanded to 13 MGD (under Capital Project S792400). The facility has been able to meet its permit requirements with an average TN concentration of 6.0 mg/l and a TP concentration of 0.46 mg/l. To meet the effluent TN "limit of technology" goal of 3.0 mg/L at the expanded capacity of 13 MGD, significant capital improvements are required. The Annapolis WRF ENR upgrade (Capital Project S802900) is under construction and has an anticipated completion of May 2013. The Wastewater Flow Projection Tool indicated that the 2035 average daily flow would be approximately 9.49 MGD. At the current rated capacity there is no immediate concern regarding additional capacity requirements in this SSA.

There is sufficient space on site to increase the total capacity of the facility to as much as 17.5 MGD if necessary in the future. By Agreement, the treatment facility is jointly owned by the City of Annapolis and Anne Arundel County. However, Anne Arundel County is responsible for operation and maintenance of the plant. An average daily flow of 8.50 MGD was recorded at the plant in January 2012. Of that, approximately 5.00 MGD was received from the City of Annapolis and 3.50 MGD from the County. Both jurisdictions have their own collections systems and incoming connections to the facility, which are metered. The effluent from the facility is discharged to the Severn River. The plant contains a 13 million gallon emergency storage basin on-site. An agreement has been executed to address capacity requirements for each jurisdiction. Under this agreement, the flow split at the Annapolis WRF is 6.3 MGD for Anne Arundel County and 6.7 MGD for the City of Annapolis at the 13 MGD total rated capacity.

4.7.6.4 Pumping Station, Collection, and Conveyance Systems

The inventory of the City of Annapolis owned and operated pump stations is included in Table 4-22 and a schematic of the relationship between pump stations and the connecting infrastructure (pressure and gravity) is provided in Figure 4-9. The City owned and operated collection system within the SSA consists of a network of gravity collectors and force mains and includes 22 sewer pumping stations. The system serves approximately 98% of the City. Flows from the Naval Academy pass through the City collection system before reaching the Annapolis WRF.

A list of County pump stations is also included in Table 4-22 and a schematic of the relationship between pump stations and the connecting infrastructure (pressure and gravity) is provided in Figure 4-10. The inventory of this infrastructure within the SSA includes the following:

- a. 60 sewer pump stations
- b. 135.3 miles of gravity mains ranging from 4 to 24 inches in diameter
- c. 9.4 miles of pressure collectors (grinder pump systems) ranging from 1.5 to 3 inches in diameter
- d. 36.0 miles of force mains ranging in size from 4 to 30 inches in diameter
- e. Approximately 14,200 connections

The integral backbone of the County's portion of the Annapolis service area conveyance system is a 30-inch diameter manifold force main that conveys sewage from the Parole sewer pump station to the Annapolis WRF. Manifold force mains add complexity to the system as head conditions are affected by the discharge rates of the other connected pump stations.

The highest elevation point on this force main is located on Forest Drive between Martha Court and Thorn Drive. Hunt Meadows SPS (owned by City of Annapolis) discharges its flow upstream of this high point. A large area designated as planned service lies along Forest Drive south of Bywater Road. Development in this area would require comprehensive planning to designate drainage areas that could be served by pump stations designed and constructed to discharge against the head conditions of Parole and Hunt Meadows pump stations.

TABLE 4-22
Annapolis Sewer Service Area
Inventory of Pump Stations

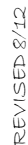
Station Name	Owner	Address/Location	Master Plan Map	Operating Map 200/40	A.A. County Station ID Number	Design Capacity (MGD)
Admiral Drive	City of Annapolis	Admiral Dr	S-7	N/A	N/A	0.500
Annapolis Roads Apts.	City of Annapolis	Lake Heron Dr	S-7	N/A	N/A	0.040
Awald Road	City of Annapolis	Awald Rd	S-9	N/A	N/A	0.090
Bay Front Drive	City of Annapolis	Bay Front Dr	S-9	N/A	N/A	0.060
Baywoods	City of Annapolis	Private	S-9	N/A	N/A	0.050
Belmont	City of Annapolis	Edgewood Rd	S-9	N/A	N/A	2.200
Boucher Avenue	City of Annapolis	Boucher Ave	S-9	N/A	N/A	0.100
Bristol Drive	City of Annapolis	Bristol Dr	S-7	N/A	N/A	0.140
Bywater Estates	City of Annapolis	Bywater Rd	S-9	N/A	N/A	0.150
Fairfax Road (Parole)	City of Annapolis	Fairfax Rd	S-7	N/A	N/A	0.150
Hanover Street	City of Annapolis	Hanover St	S-7	N/A	N/A	0.040
Harness Creek	City of Annapolis	Harness Creek Rd	S-9	N/A	N/A	0.050
Hunt Meadows	City of Annapolis	Harness Ct	S-9	S22/A3	800020	0.220
Kingsport	City of Annapolis	Greenbriar Ln	S-9	N/A	N/A	0.075
Monterey (W. Annap.)	City of Annapolis	Shiley St	S-7	N/A	N/A	0.050
Newtown	City of Annapolis	Newtown Rd	S-9	N/A	N/A	0.160
Porter Road	City of Annapolis	Porter Rd	S-7	N/A	N/A	0.050
President Point #1	City of Annapolis	President Point Dr	S-7	N/A	N/A	0.040
President Point #2	City of Annapolis	President Point Dr	S-7	N/A	N/A	0.040
Second Street	City of Annapolis	Second St	S-7	N/A	N/A	5.000
Shearwater Drive	City of Annapolis	Shearwater Dr	S-7	N/A	N/A	0.010
Smith Avenue	City of Annapolis	Smith Ave	S-7	N/A	N/A	0.600
Sumner Road	City of Annapolis	Sumner Rd	S-7	N/A	N/A	0.110
Truxtun Park	City of Annapolis	Truxtun Park Rd	S-9	N/A	N/A	0.250
Wardour	City of Annapolis	Wardour Dr	S-7	N/A	N/A	0.040
Whiton Court	City of Annapolis	Whiton Ct	S-9	N/A	N/A	0.080
Anchorage I	County	22 Dale Dr	S-9	U23/A2	700120	0.432
Anchorage II	County	1152 Mainsail	S-9	U22/B2	700121	0.115
Annapolis Landing	County	3124 Stonehenge	S-9	O23/A4	700176	0.562
Annapolis Roads	County	1050 Old Bay Ridge Rd	S-9	U22/B3	700215	0.312
Arundel on the Bay I	County	1337 Magnolia Ave	S-9	V25/A4	700132	0.756
Arundel on the Bay II	County	3500R Rockway Ave	S-9	V24/C2	700131	0.158
Arundel on the Bay III	County	3313 Shore Dr	S-9	V24/D2	700130	0.230
Arundel on the Bay IV	County	1319 Fishing Creek Rd	S-9	V24/C4	700129	0.252
Arundel on the Bay V	County	1256 Washington Dr	S-9	V24/D3&4	700128	1.354
Arundel on the Bay VI	County	3331 Thomas Point Rd	S-9	U24/A1	700127	1.872
Bay Ridge I	County	36 Bay Dr	S-9	V23/B1	700055	1.224
Bay Ridge II	County	226 Lake Dr	S-9	V22/C2	700053	0.086
Bay Ridge IX	County	17 River Dr	S-9	W23/D4	700165	0.353

Station Name	Owner	Address/Location	Master Plan Map	Operating Map 200/40	A.A. County Station ID Number	Design Capacity (MGD)
Bay Ridge V	County	69 Bay Dr	S-9	V23/A2	700052	0.418
Bay Ridge VI	County	2 Bay Dr	S-9	V23/B3	700056	0.491
Bay Ridge VII	County	148 Lake Dr	S-9	V23/A3	700054	0.183
Bay Ridge VIII	County	42R E Lake Dr	S-9	V22/B2	700164	0.527
Bay View	County	1850 Shore Dr	S-9	Q24/A4	700092	1.656
Bentley Rd	County	1018 Shore Dr	S-9	Q23/B2	700046	0.259
Berkshire	County	3095 Newington Dr	S-9	O22/B2	700151	0.121
Broadcreek	County	1 Harry S Truman Pkwy	S-7	P20/A3	700226	0.144
Cape St. John I	County	2999 Boyds Cove Dr	S-9	P21/B3	700136	0.864
Cape St. John II	County	3001 Friends Rd	S-9	P22/A4	700137	0.144
Cape St. John III	County	3033 Friends Rd	S-9	P22/A3	700138	0.144
Cape St. John IV	County	2989F Poplar Trl	S-9	P22/A4	700139	0.230
Cape St. John V	County	2998A Dogwood Trl	S-9	P22/A1	700140	0.144
Cape St. John VI	County	210 Cape Saint John Rd	S-9	Q22/D4	700141	0.144
Cape St. John VII	County	123 Island View Rd	S-9	Q22/D4	700142	0.144
Chesapeake Harbor I	County	2111 Chesapeake Harbour Dr E	S-9	U22/A1	700200	0.347
Chesapeake Harbor II	County	7008R Channel Village Ct	S-9	U21/B2	700222	0.374
Dreams Landing	County	550 Dreams Landing Way	S-7	S18/B4	700312	0.144
Edgewater Village	County	50 Central Ave W	S-9	P24/D2	700308	0.223
Generals Hwy	County	2110F Generals Hwy	S-7	Q19/B2	700086	1.8
Ginger Park	County	149 Bausum Rd	S-7	Q20/C3	700305	0.062
Heritage Harbor I	County	998 Mastline Dr	S-6	O20/C4	700081	1.274
Heritage Harbor II	County	516 Coover Rd	S-7	O20/B1	700080	1.613
Highland Beach I	County	1455 Chesapeake Ave	S-9	V24/D1	700210	0.403
Highland Beach II	County	3273 Washington Ave	S-9	V23/D3	700209	0.144
Hillsmere I	County	509 Beach Dr	S-9	U23/C4	700045	1.296
Hillsmere II	County	107 Green Spring Dr	S-9	T24/A4	700157	0.144
Hillsmere III	County	133F East Bay View Dr	S-9	U24/D4	700158	0.432
Hillsmere IV	County	126 Bay View Dr W	S-9	T24/D2	700159	0.377
Hillsmere V	County	623F Demyan Dr	S-9	T24/D1	700160	0.255
Hillsmere VI	County	616 Harbor Dr	S-9	T24/A4	700161	1.0152
Hillsmere VII	County	129 Kueth Dr	S-9	U23/C3	700083	0.478
Holly Rd South	County	257 Riverside Rd	S-9	Q23/D1	700091	0.089
Hoot Owl	County	513 Hoot Owl Rd	S-9	O22/B1	700082	0.691
Jennifer Rd	County	110 Jennifer Rd	S-7	R19/B1	700258	2.052
Krapish	County	3030F Old Riva Rd	S-9	P22/D3	700076	0.274
Loretta Heights	County	36 Defense St	S-7	R20/D4	700093	0.36
Monticello	County	1930 Lizzio Ln	S-7	R19/D4	700309	0.144
Parole	County	2446 Solomons Island Rd	S-7	R20/C4	700212	10.1
Riva II	County	171 Harry S Truman Pkwy	S-7	Q20/D3	700089	1.296
Riva Woods	County	2741 Lury Ln	S-9	P21/A2	700172	0.288
Riverview	County	3085R Riverview Rd	S-9	P22/C4	700078	0.101
South River Colony	County	3440 Monarch Dr	S-9	Q25/D4	700294	0.128
Sylvan Shores	County	201 Poplar Rd	S-9	O22/A3	700233	0.662
Thomas Point I	County	1536 Gordon Cove Dr	S-9	U25/A1	700133	0.396
Webster Place	County	532 Shore Dr	S-9	Q23/B1	700077	1.382
Woodland Beach	County	34 Mayo Rd	S-9	P23/A2	700235	5.148
Londontown Publik House	Private	837R Londontown Rd	S-9	R23/D4	700272	

Figure 4-9



Figure 4-10



4.7.6.5 Required Infrastructure Capital Improvements (Table 4-35 in Section 4.10)

Force Main Replacements are planned for at the following pumping stations:

- a. Jennifer Rd Force Main Replacement (CIP 804302)
- b. Bay Ridge VIII (CIP X7388141)
- c. Heritage Harbor I (CIP X7388141)
- d. Hillsmere VI (CIP X7388141)

These pump stations are being upgraded by either development projects or through the County's Capital Improvement Program, or have been identified through the Comprehensive Strategic Plan as potentially requiring upgrades to meet sub-drainage flow requirements in the future:

- | | |
|----------------------------------|-------------------------------------|
| a. Broadcreek (CIP S7918126) | k. Hillsmere III (CIP S7918123) |
| b. Sylvan Shores (CIP S804000) | l. Hillsmere IV (CIP S7918123) |
| c. Anchorage I | m. Hillsmere V (CIP S7918123) |
| d. Riva Woods (CIP S804200) | n. Hillsmere VII (CIP S7918123) |
| e. Hillsmere I | o. Holly Rd South (CIP S7918126) |
| f. Annapolis Roads | p. Parole (CIP S804900) |
| g. Jennifer Road (CIP S804301) | q. Highland Beach I (CIP S7918123) |
| h. Cape St. John I (CIP 7918129) | r. Highland Beach II (CIP S7918123) |
| i. Heritage Harbor II | s. Bay View |
| j. Hillsmere II (CIP S7918123) | |

New pump station facilities designed and constructed as either development projects or through the County's Capital Improvement Program are anticipated in the following locations:

- a. Edgewater Beach SPS (Potential CIP Petition Project)

A number the capacity deficient gravity mains and force mains were also identified through the Comprehensive Sewer Strategic Plan. On-going investigations will determine specific capacity for infrastructure upgrades (pump stations\ piping) and timing of these improvements.

4.7.7 Mayo Sewer Service Area No. 7

4.7.7.1 General Description

The Mayo sewer service area is located on the Mayo peninsula east of Glebe Bay and is bordered by the South and Rhode Rivers. The area encompasses approximately 3,851 acres of land and includes the Glebe Heights sub-service area. The boundaries are shown on Master Plan Maps S-9 and S-10.

The majority of this service area is low-density residential with a few small community commercial centers. There are also a number of marinas and marine related activities as well. This SSA also contains one of the County's largest parks, the Beverly-Triton Beach Park. There are approximately 451 acres of vacant land within the service area that could be served by public sewer in the future.

There are no independently operated treatment facilities located within the Mayo SSA.

4.7.7.2 Projected Population Growth and Flows

Population in the sewer service area is projected to increase to approximately 8,727 by the year 2035. Future development in the Mayo service area will be from building single-family homes on existing vacant residential lots and redevelopment of commercial and marina properties.

The allowable and unused capacity for the Mayo Service Area is listed in Tables 4-23 and 4-24.

TABLE 4-23
Sewer Allocation Report For Service Area #7a – Mayo
January 2012

	Master Plan							
	Current	2015	2020 ^a					
Safe Capacity	615,000	870,000	870,000					
Flow	556,000	670,000	700,000					
Capacity Available for Allotment	59,000	200,000	170,000					
Allotment Category	Allotment 3/10/11	Revised Allotment	Allocated 1/18/12	Available Capacity	Active Projects Under Review ^b	Resulting Capacity	Recommended Allotment	Potential Projects
Public Health	0	0	0	0	0	0	0	0
Public Service	0	0	0	0	0	0	0	0
Assisted Housing	0	0	0	0	0	0	0	0
Buildable Lots	1,575	1,350	1,350	0	0	0	1,350	0
Community Development	10,575	10,575	10,575	0	0	0	10,575	0
Minor Subdivision	2,250	2,250	2,250	0	0	0	2,250	0
Major Subdivision	10,575	8,550	8,550	0	0	0	8,550	0
Commercial Complex	0	0	0	0	0	0	0	0
Industrial Subdivision	0	0	0	0	0	0	0	0
Reserved Capacity	34,025	36,275	0	36,275	0	36,275 ^a	36,275	0
TOTALS (gpd)	59,000	59,000	22,725	36,275	0	36,275	59,000	0

Recommended allotment changes:

- a. Initially, 12,300 gpd was approved as Reserved Capacity at the time of the moratorium. The Allotment Committee has agreed that the Reserved Capacity should increase due to the variability of the flows at the Mayo WRF during wet weather conditions.
- b. Active projects totaling 11,250 gpd (50 EDUs) exist for this service area, but due to the moratorium, no allotment will be made to them; therefore, active projects are not listed.

TABLE 4-24
Sewer Allocation Report For Service Area #7b – Glebe Heights
January 2012

	Master Plan							
	Current	2015	2020 ^a					
Safe Capacity	23,000	33,500	0					
Flow	18,000	26,550	0					
Capacity Available for Allotment	5,000	6,950	0					
Allotment Category	Allotment 3/10/11	Revised Allotment	Allocated 1/18/12	Available Capacity	Active Projects Under Review ^b	Resulting Capacity	Recommended Allotment	Potential Projects
Public Health	0	0	0	0	0	0	0	0
Public Service	0	0	0	0	0	0	0	0
Assisted Housing	0	0	0	0	0	0	0	0
Buildable Lots	675	675	0	675	0	675	675	0
Community Development	0	0	0	0	0	0	0	0
Minor Subdivision	0	0	0	0	0	0	0	0
Major Subdivision	2,700	2,700	2,700	0	0	0	2,700	0
Commercial Complex	0	0	0	0	0	0	0	0
Industrial Subdivision	0	0	0	0	0	0	0	0
Reserved Capacity	1,625	1,625	0	1,625	0	1,625	1,625	0
TOTALS (gpd)	5,000	5,000	2,700	2,300	0	2,300	5,000	0

Notes:

- a. Glebe Heights small cluster system is to be abandoned and flow transferred to the Mayo WRF.
- b. Three active projects for 41 EDUs exist for this service area, but no allotment will be made to them until the facility is expanded; therefore, active projects are not listed.

4.7.7.3 Water Reclamation Facilities

The Mayo Large Communal is located off Pure Water Way and currently serves the Mayo peninsula communities. The 0.615 MGD large communal treatment system servicing the larger community is made up of two acres of recirculating sand filters, four acres of man-made bulrush/cattail wetlands, and four acres of man-made peat wetlands. The effluent is discharged through the offshore pier at the mouth of the Rhode River after disinfection by ultra-violet light. The existing average daily flow is approximately 0.556 MGD.

A lot-by-lot analysis of the development potential of each parcel within the service area was completed that considered zoning; lot size, and some generalized environmental constraints. This resulted in an estimated design flow within the SSA of 1.14 MGD. However, nutrient load caps limit the hydraulic processing capacity to 0.82 MGD at 4 mg/l or 1.09 MGD at 3 mg/l.

The Glebe Heights sub-drainage area is served by a small cluster system that includes a 26.6-acre site with an 8-acre leaching field. The design capacity is 22,300 gpd and the average daily flow is approximately 18,000 gpd.

The Mayo service area has been subject to a building moratorium since August 2008 due to insufficient capacity at the Mayo WRF. An upgrade and expansion of the Mayo Water Reclamation Facility was originally planned that would change the WRF to a conventional activated sludge biological process and an interim increase in capacity from 0.615 to 0.87 MGD. This project has been delayed due to MDE concerns regarding use of the existing WRF outfall under a different treatment process.

A study is now being conducted to determine the preferred method for completing the Mayo WRF Upgrade and Expansion. Seven alternatives have been evaluated and since reduced to a short list of 3 alternatives considered most viable that were selected for further consideration:

- a. Implement ENR Upgrade\Expansion at the Mayo WRF and Discharge Treated Effluent to New Outfall extended into the Bay beyond shellfish beds.
- b. Pump Septic Tank Effluent from Mayo to the Annapolis WRF for Treatment and Discharge
- c. Implement ENR Upgrade\Expansion at the Mayo WRF and Pump Treated Effluent to Annapolis WRF Outfall for Discharge

If it is determined that the Mayo WRF will remain in service, it will be converted to a conventional activated sludge biological process and expanded to 0.87 MGD under CIP 769700. Funds have also been appropriated for the Mayo WRF ENR upgrade under CIP S803200. The Expansion and ENR projects are likely to be completed simultaneously. The ultimate expansion to 1.14 MGD would occur in the future.

The developer of the Southpointe subdivision plans to complete ENR and an expansion of the Glebe Heights Small Cluster System from its current design capacity of 22,300 gpd to 33,500 gpd. Looking forward, an engineering study has been completed that recommends abandonment of the Glebe Heights Small Communal Facility and consolidation of flows at an expanded Large Communal System.

4.7.7.3.1 Mayo Wastewater Management Plan

The Mayo Wastewater Management Plan outlines the vision for control of service to the area. In 1984-1987, the public sewer system was designed and later constructed to eliminate serious wastewater and public health problems on the Mayo peninsula that had plagued the area residents for many years. The Mayo Wastewater Management Plan was developed to eliminate these environmental health problems and, at the same time, address important citizen concerns, including growth management and environmental protection. Construction of the Mayo sewerage system began in the summer of 1986 and was completed in 1991. Nothing in this Master Plan alters the original ultimate projected capacity of the system required to serve the Mayo Sewer Service Area.

4.7.7.3.2 Strategic Plan for Infrastructure Expansion

A Comprehensive Strategic Plan was completed for the Mayo SSA in 2003. Major recommendations from this plan included:

- a. Upgrades to Selby I SPS
- b. Upgrades to Carr's Ridge II, III, IV, and V-5 SPS's
- c. Upgrades to Shoreham Beach I and II SPS's
- d. Further investigation of the Central Avenue Interceptor
- e. Further investigation of new type of STEP pump for house tanks
- f. Improved flow metering equipment at pumping stations

4.7.7.4 Pumping Station, Collection, and Conveyance Systems

Each property within the sub-drainage areas served by the Large Communal facility has a septic tank. The effluent from these septic tanks is conveyed away from the individual properties through either a small diameter gravity sewer pipe or pumped from the property using a fractional horsepower effluent pump. The effluent is then collected in local community pump stations and pumped to the Large Communal facility through a manifold force main.

The Glebe Heights system has a similar configuration except the collected septic tank effluent from the community is pumped to the Glebe Heights Small Communal Treatment System.

A list of pump stations is provided in Table 4-25 and a schematic of the relationship between pump stations and the connecting infrastructure (pressure and gravity) is provided in Figure 4-11.

**TABLE 4-25
Mayo Sewer Service Area
Inventory of Pump Stations**

Station Name	Owner	Address/Location	Master Plan Map	Operating Map 200/40	A.A. County Station ID Number	Design Capacity (MGD)
Beverly Beach I	County	510 Cedar Ave	S-10	T27/C4	700284	0.662
Beverly Beach II	County	115 Grande View Rd	S-10	T27/C30	700285	0.151
Beverly Beach III	County	1693 Cliff Dr	S-10	S27/B2	700286	0.060
Beverly Beach IV	County	326 Linden Ave	S-10	S27/B1	700287	0.053
Camp Letts	County	Camp Letts Rd	S-9	R26/D2	700315	0.864
Carrs Ridge I	County	1168 Carrs Wharf Rd	S-10	S26/B4	700274	0.245
Carrs Ridge II	County	3901R Rhode Harbor Rd	S-10	S26/C1	700275	0.029
Carrs Ridge III	County	4189 Carrs Ridge Rd	S-10	S27/A4	700277	0.072

Station Name	Owner	Address/Location	Master Plan Map	Operating Map 200/40	A.A. County Station ID Number	Design Capacity (MGD)
Carrs Ridge IV	County	3968 Germantown Rd	S-10	S26/C3	700276	0.033
Carrs Ridge V	County	4045 Cadle Creek Rd	S-10	S27/D1	700278	0.039
Glebe Heights I	County	3429 Glebe Dr	S-9	R24/C1	700247	0.058
Glebe Heights II	County	402 Beach Dr	S-9	R24/D3	700248	0.047
Glebe Heights III	County	418 Beach Dr	S-9	R24/D3	700249	0.046
Glebe Heights IV	County	3306 Leritz Ln	S-9	R24/D4	700250	0.039
Glebe Heights V	County	3306F Kenney Ct	S-9	R24/D2	700251	0.029
Holly Hill I	County	3824 Twin Oak Dr	S-9	S26/D1	700257	0.173
Holly Hill II	County	216 Holly Rd	S-9	R26/A1	700256	0.036
Loch Haven I	County	3451 Shady Dr	S-9	S24/C2	700280	0.288
Loch Haven II	County	3495 Cedar Dr	S-9	S24/D2	700281	0.072
Mayo WWTP Facility	County	551 Pure Water Way	S-9	R25/B1	700288	
River Club Estates	County	3940 West Shore Dr	S-9	R26/A1	700246	0.029
Selby On The Bay I	County	3696 7th Ave	S-9	S25/C2	700266	0.432
Selby On The Bay II	County	865 Holly Ave	S-9	S25/C1	700267	0.048
Selby On The Bay III	County	3672 8th Ave	S-9	S25/C4	700268	0.112
Selby On The Bay IV	County	924 Holly Ave	S-9	S25/B4	700269	0.194
Shoreham Beach I	County	3906 Dogwood Trl	S-9	T26/A3	700282	0.046
Shoreham Beach II	County	4262 Carvel Ln	S-10	T27/A1	700283	0.173
Triton Beach	County	4221 Shoreham Beach Rd	S-10	S26/B2	700260	0.396
Turkey Point I	County	900 Old Turkey Point Rd	S-9	S26/A3	700263	0.130
Turkey Point II	County	1147 Turkey Point Rd	S-9	T26/D4	700264	0.115
Turkey Point III	County	1267 Turkey Point Rd	S-9	T25/B4	700265	0.040
West Shore I	County	4101 Waterview Dr	S-10	T26/C4	700261	0.060
West Shore II	County	1281 Mayo Ridge Rd	S-10	S26/B1	700262	0.055

The inventory of this infrastructure within the SSA includes the following:

- 33 sewer pump stations
- 16.5 miles of gravity mains ranging from 4 to 10 inches in diameter
- 27.2 miles of pressure collectors (step pump systems) ranging from 1.5 to 3 inches in diameter
- 18.8 miles of force mains ranging in size from 3.5 to 10 inches in diameter
- Approximately 3,260 connections

4.7.7.4.1 Operational Difficulties with Existing Infrastructure

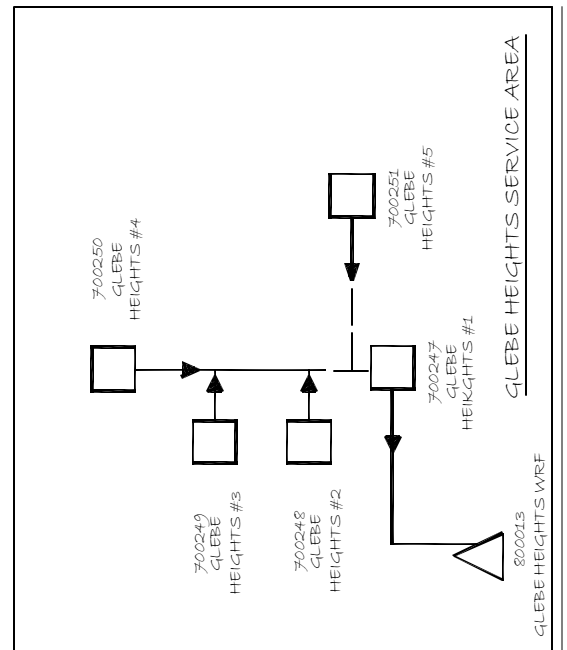
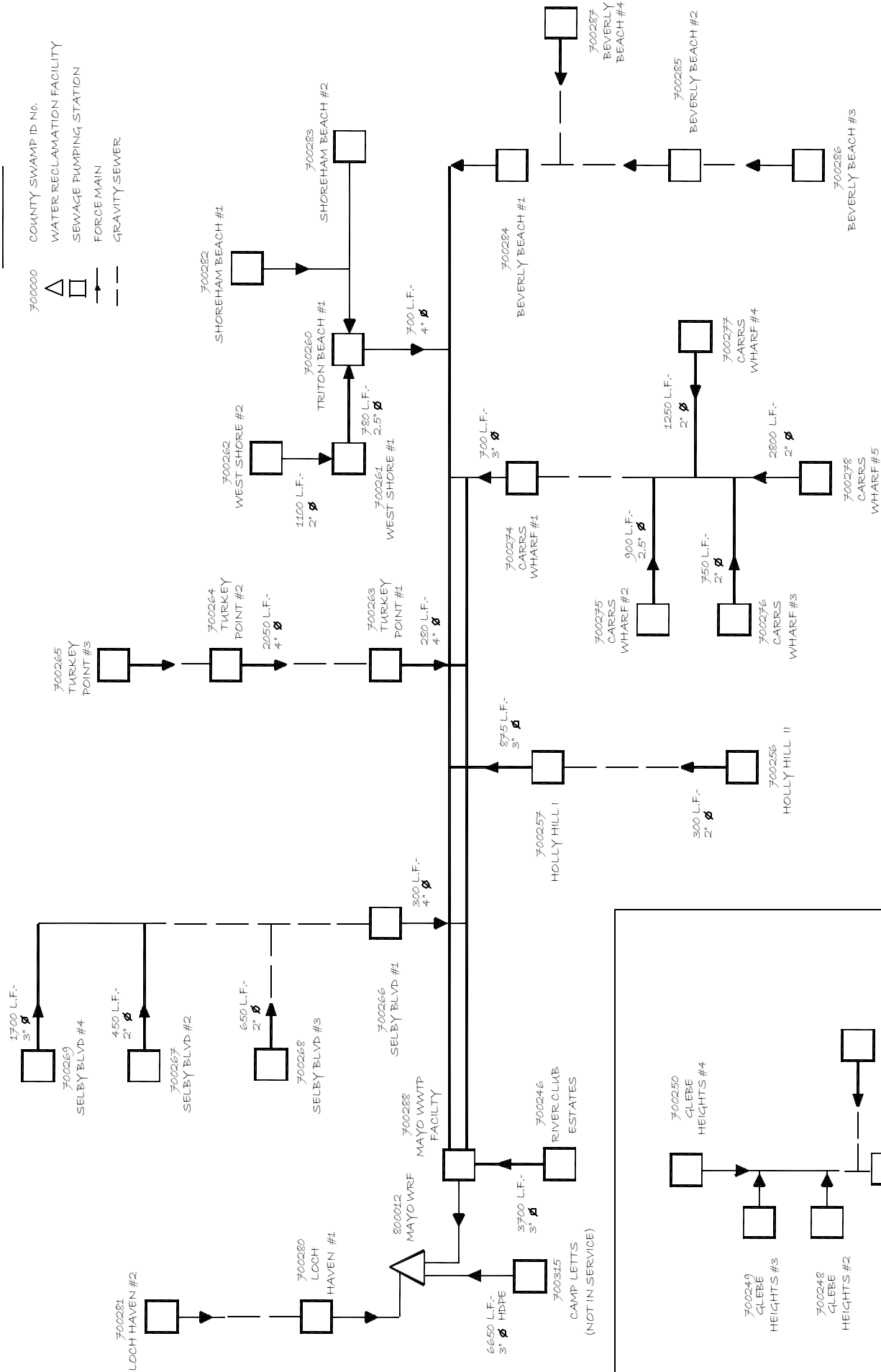
As described in the previous section, the wastewater collection facilities on the Mayo Peninsula consist of a series of small diameter gravity sewers (SDGS) and low-pressure septic tank effluent pumping systems (STEP). Each property has its own septic tank and only the effluent from these tanks is collected. The systems were designed with very low allowances for infiltration and inflow. In turn, the treatment facilities at Glebe Heights and the Large Communal Facility were sized accordingly. Since start-up in 1990, peak flows at the Large Communal Facility have been higher than anticipated. Several pumping stations within the Service Area have repeatedly required emergency pump out, particularly during intense precipitation events. Pumping stations that have been severely impacted include Beverly Beach II, III, and IV, Shoreham Beach I and II, Carr's Ridge, IV, and V, Holly Hill I, and Loch Haven I. The Large Communal Treatment Facility treatment efficiencies have on occasion been reduced due to the unanticipated and highly fluctuating flows received at the plant.

MAYO SERVICE AREA

Figure 4-11

LEGEND

- 700000 COUNTY SWAMP ID No.
- △ WATER RECLAMATION FACILITY
- SEWAGE PUMPING STATION
- FORCE MAIN
- GRAVITY SEWER



4.7.7.5 *Required Infrastructure Capital Improvements (Table 4-35 in Section 4.10)*

Upgrade of pump capacities to the several of the No. 1 pump stations within the Mayo service area were completed under capital project S-776500. The purpose of the project was to increase these pump station's discharge rates, enabling the stations to handle the peak flows experienced during intense rain events. This project, along with the parallel influent interceptor installation, and the Beverly Beach I Force Main Upgrade, has greatly reduced the need for emergency responses at the No. 1 pump stations.

These pump stations are being upgraded through the County's Capital Improvement Program, or have been identified as potentially requiring upgrades to meet sub-drainage flow requirements in the future:

- a. Carr's Ridge II, III, IV, and V (CIP S799202)
- b. Shoreham Beach I and II (CIP S799209).
- c. Beverly Beach II, III, and VI (CIP S799207)
- d. River Club Estates
- e. Loch Haven I
- f. Triton Beach (CIP S799204)
- g. West Shore I and II (CIP S799205)
- h. Selby on the Bay I and II (CIP S799210)
- i. Holly Hill I (CIP S799208)
- j. Glebe Heights I (Development Project)

4.7.8 Broadwater Sewer Service Area No. 8

4.7.8.1 *General Description*

The Broadwater sewer service area lies on the Broadwater peninsula in the southeastern portion of the County and is generally bounded by the West River to the north and the Chesapeake Bay to the east. It includes the developed areas of Shady Side, Deale, and Churchton. The boundaries are shown on Master Plan Maps S-10 and S-11.

The Broadwater sewer service area covers approximately 6,477 acres. The County's Land Use Plan designates the majority of the land area for low and low-medium density residential use with small commercial hubs in Shady Side, Churchton, and Deale. The area also includes several marina uses and related commercial development along Rockhold and Tracy's Creeks. There are approximately 1,805 acres of vacant land in the service area that could be served by public sewer in the future.

There are no independently operated treatment facilities located within the Broadwater SSA.

4.7.8.2 *Projected Population Growth and Flows*

Population in the Broadwater area is projected to increase to approximately 12,171 residents by the year 2035. Future development will primarily be from building single-family homes on existing vacant residential lots and redevelopment of commercial and marina properties.

The allowable and unused capacity for the Broadwater Service Area is listed in Table 4-26.

TABLE 4-26
Sewer Allocation Report For Service Area #8 – Broadwater
January 2012

	Current	Master Plan						
		2015	2020					
Safe Capacity	2,000,000	2,000,000	2,000,000					
Flow	1,243,000	1,560,000	1,600,000					
Capacity Available for Allotment	757,000	440,000	400,000					
Allotment Category	Allotment 3/10/11	Revised Allotment	Allocated 1/18/12	Available Capacity	Active Projects Under Review	Resulting Capacity	Recommended Allotment	Potential Projects
Public Health	70,000	70,000	0	70,000	0	70,000	70,000	0
Public Service	100,000	100,000	0		1,250	98,750	100,000	3,750
Assisted Housing	15,000	15,000	0	15,000	0	15,000	15,000	0
Buildable Lots	431,000	430,750	1,250	429,500	0	429,500	430,750	0
Community Development	0	0	0	0	0	0	0	0
Minor Subdivision	18,462	18,500	8,000	10,500	250	10,250	18,500	0
Major Subdivision	85,500	85,500	13,250	72,250	10,000	62,250	85,500	8,500
Commercial Complex	34,500	28,250	3,000	25,250	250	25,000	28,250	0
Industrial Subdivision	500	500	250	250	0	250	500	0
Reserved Capacity	11,038	8,500	0	8,500	0	8,500	8,500	0
TOTALS (gpd)	766,000	757,000	25,750	731,250	11,750	719,500	757,000	12,250

Notes: No allotment changes recommended

4.7.8.3 Water Reclamation Facility

The Broadwater Water Reclamation Facility is located off Deep Cove Road and serves the Broadwater peninsula communities. It has a capacity of 2.0 MGD and serves households in Deale, Franklin Manor, Cape Anne, Avalon Shores, Idlewilde-Snug Harbor, Galesville and Chalk Point. The Broadwater facility is an activated sludge BNR secondary treatment plant with an average daily flow of 1.24 MGD. The Broadwater WRF ENR upgrade is to be completed under Capital Project S803700.

Based on the results of the Comprehensive Sewer Strategic Plan, 2035 average daily flows will be approximately 1.56 MGD. At the current rated capacity there is no immediate concern regarding additional capacity requirements in this SSA. The Broadwater facility is considered to be adequately sized to service development within the existing and planned service categories with the current land use and zoning.

4.7.8.4 Pumping Station, Collection and Conveyance Systems

A list of pump stations is provided in Table 4-27 and a schematic of the relationship between pump stations and the connecting infrastructure (pressure and gravity) is provided in Figure 4-12. The inventory of this infrastructure within the SSA includes the following:

- a. 24 sewer pump stations
- b. 57.4 miles of gravity mains ranging from 8 to 48 inches in diameter
- c. 11.3 miles of pressure collectors (grinder pump systems) ranging from 1.5 to 3 inches in diameter
- d. 5.1 miles of force mains ranging in size from 4 to 16 inches in diameter
- e. Approximately 4,600 connections

The major infrastructure components of the Broadwater collection and conveyance system are currently sized to handle the anticipated flows within the current planning period.

TABLE 4-27
Broadwater Sewer Service Area
Inventory of Pump Stations

Station Name	Owner	Address/Location	Master Plan Map	Operating Map 300/40	A.A. County Station ID Number	Design Capacity (MGD)
Avalon Shores I	County	6202 Shady Side Rd	S-10	S31/A4	700208	2.16
Avalon Shores II	County	1517 Snug Harbor Rd	S-10	T30/C4	700227	0.396
Bay Breeze	County	1575 Columbia Beach Rd	S-11	T31/C2	700152	2.88
Broadwater	County	830 Broadwater Rd	S-11	R33/C3	700168	6.48
Cape Anne	County	5636 Battee Dr	S-11	R33/B1	700074	0.216
Cedarhurst	County	1187F Holly Ave	S-10	T31/D1	700170	0.36
Chalk Point	County	5118 Chalk Point Rd	S-10	R31/C4	700238	1.03
Columbia Beach	County	1680 Columbia Beach Rd	S-11	T32/D1	700153	0.288
Dartmouth	County	5614 Dartmouth St	S-11	S33/D2	700042	1.152
Drum Point	County	6087 Drum Point Rd	S-11	Q35/D3	700202	0.432
Ford Rd	County	1409 Ford Rd	S-10	S30/A4	700255	0.177
Franklin Manor I	County	1280 Ellicott Ave	S-11	S33/A3	700043	0.648
Franklin Manor II	County	5626 Carvel St	S-11	S33/C1	700155	0.022
Idlewilde	County	4739 Idlewilde Rd	S-10	T29/B3	700196	0.54
Johnson Dr	County	1223 Johnson Dr	S-10	S30/C4	700240	0.331
Lerch Dr	County	5100 Lerch Dr	S-10	S30/C2	700239	0.187
Main Street	County	936 Main St	S-11	R34/C1	700243	0.158
North Deale	County	5920 Deale Churchton Rd	S-11	Q34/C1	700180	0.432
Owing Beach	County	6042 Melbourne Ave	S-11	Q35/B4	700203	0.432
Parkers Creek	County	759 Mason Beach Rd	S-11	Q35/A4	700204	0.936
Resthaven	County	858 Cedar Dr	S-11	R34/C2	700242	0.131
Snug Harbor	County	1703 Cedar Ave	S-10	T30/B3	700195	0.432
Tyler Rd	County	5929 Tyler Rd	S-11	Q34/B4	700241	0.562
West Shady Side	County	6530 Shady Side Rd	S-10	S30/D4	700254	0.158

4.7.8.5 Required Infrastructure Capital Improvements (Table 4-35 in Section 4.10)

Infrastructure CIP projects in the Broadwater SSA include several pump station upgrades. These pump stations are being upgraded through the County's Capital Improvement Program, or have been identified through the Comprehensive Strategic Plan as potentially requiring upgrades to meet sub-drainage flow requirements in the future:

- a. Lerch Dr.
- b. Cape Anne (CIP S7918127)
- c. Dartmouth (CIP S7918127)
- d. Columbia Beach (CIP S7918127)
- e. Avalon Shores II (CIP S791875)

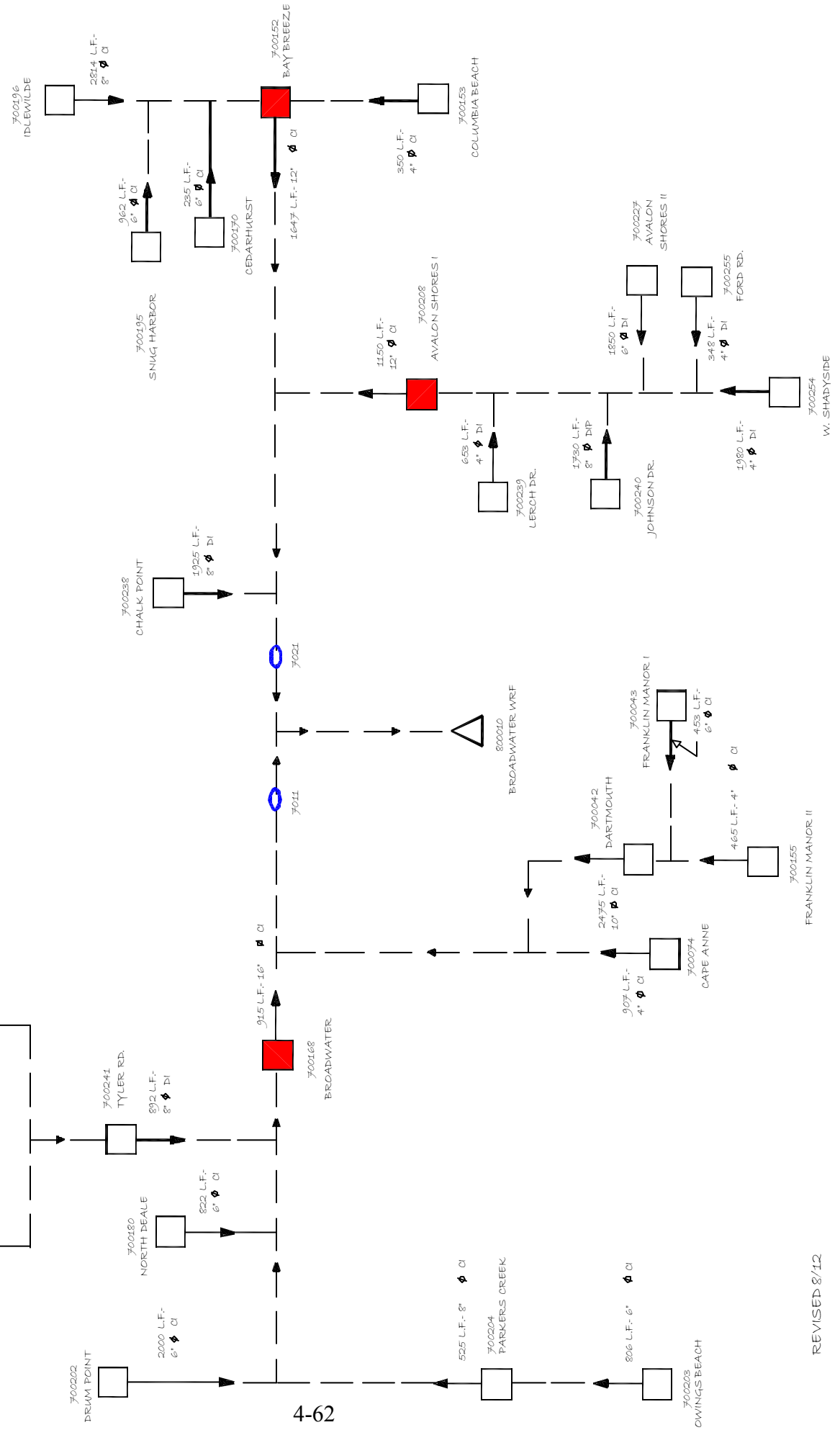
No pipes or force mains were identified as being capacity deficient through the Comprehensive Sewer Strategic Plan.

Figure 4-12

BROADWATER SERVICE AREA

LEGEND

- 700000 COUNTY SWAMP ID NO.
- △ WATER RECLAMATION FACILITY
- SEWAGE PUMPING STATION
- FORCE MAIN
- - - GRAVITY SEWER
- ADS METER LOCATION
- MAJOR SPS



4.7.9 Piney Orchard Sewer Service Area No. 9

4.7.9.1 General Description

The Piney Orchard sewer service area is located in the mid-western portion of the County and encompasses approximately 1,974 acres of land. It is bordered by the Patuxent Research Refuge to the west and the Odenton Town Center to the north. The service area consists of an approved Planned Unit Development (PUD) known as Piney Orchard. Construction of the development began in 1987, and upon completion it will consist of approximately 4,100 dwelling units. The planned land uses include medium density residential and mixed commercial uses. The remainder of the service area is primarily open space.

The wastewater collection system is owned, operated and maintained by the County Department of Public Works. The sewer collection system in the service area contains only gravity sewer mains. The service area is considered one large drainage area with no sub-drainage areas. The area is depicted on the adopted Master Plan maps S-4 and S-6.

4.7.9.2 Projected Population and Growth Flows

Population within the service area is projected to increase to approximately 13,299 residents by the year 2035. Development will occur primarily in the Piney Orchard PUD, where planned housing and commercial uses will be built.

4.7.9.3 Water Reclamation Facility

The wastewater treatment facility at Piney Orchard is privately owned by the Piney Orchard Utility Company, LLC and is operated by Maryland Environmental Services (MES). The existing average daily flow is approximately 0.58 MGD. The Piney Orchard WWTP utilizes the Bardenpho process for biological nutrient removal.

The facility is currently permitted at 0.7 MGD, based on nutrient load limitations, with an annual load allocation under the Chesapeake Bay TMDL of 8,523 pounds per year of total nitrogen and 639 pounds per year of total phosphorus. Recently, 6,091 pounds per year of total nitrogen and 457 pounds per year of total phosphorous of its annual load allocation under the Chesapeake Bay TMDL were transferred to Anne Arundel County. See Section 4.7.4.3 for further information.

4.7.9.3.1 Strategic Plan for Infrastructure Expansion

The Piney Orchard WWTP is currently sized to service the existing and planned service categories of the service area with the current land use and zoning. Ownership of the facility was recently transferred from Ribera Development Corporation to the Piney Orchard Utility Company, LLC.

4.7.9.4 Pumping Station Collection and Conveyance Systems

The inventory of this infrastructure within the SSA includes the following:

- a. 29.5 miles of gravity mains ranging from 8 to 20 inches in diameter
- b. 0.25 miles of pressure collectors (grinder pump systems) ranging from 1.5 to 2.5 inches in diameter
- c. Approximately 4,450 connections

The major infrastructure components are currently sized to handle the anticipated flows within the current planning period.

4.7.9.5 *Required Infrastructure Capital Improvements*

No major projects are planned for this area.

4.7.10 *Bodkin Peninsula Sewer Service Area No. 10*

4.7.10.1 *General Service Area Description*

The Bodkin Peninsula is located in the northeast section of Anne Arundel County on the peninsula extending northward from Downs Memorial Park between Bodkin Creek and the Chesapeake Bay. The service area is approximately 317 acres. The service area boundary is shown on Map S-3.

There are no independently operated treatment facilities located within the Bodkin Peninsula SSA.

4.7.10.2 *Projected Population and Growth Flows*

Population within the service area is projected to increase to approximately 379 residents by the year 2035.

4.7.10.3 *Wastewater Management System*

The existing treatment facility was constructed privately; however, the County assumed responsibility for ownership and maintenance of the system in November 1986. The overall wastewater management system is based on communal on-site septic systems (leach field systems) to serve the Pinehurst Communities, of which there are currently 14 connections. The communal septic system, which serves the area, is divided into three sub-systems with separate disposal fields. The communal septic system was designed to serve only the existing development. Therefore no extensions or upgrades to the system are anticipated.

4.7.11 *Rose Haven / Holland Point Sewer Service Area No. 11*

4.7.11.1 *General Service Area Description*

This service area is located in South County on the southeastern tip on the Chesapeake Bay at the Calvert County boundary line. Encompassing approximately 387 acres, Rose Haven and Holland Point were previously within the Rural Service Area. County takeover of the Rose Haven private system and provision of service to Holland Point was requested and approved as a result of petitions by the citizens of the two communities. The service area consists of a total of approximately 400 dwelling units and commercial developments including a marina, commercial strip center, restaurant and motel. The boundaries are shown on Master Plan Map S-12.

Construction of a capital project commenced in 1998 to construct low-pressure sewers, gravity and pumping facilities to serve both Rose Haven and Holland Point and was completed in 2001. A special \$6 million federal grant from the Environmental Protection Agency as well as local citizens' front foot assessment over the next 30 years provided the funding for the design and construction of the infrastructure. The project's scope included the expansion of the Chesapeake Beach Wastewater Treatment Plant located in Calvert County and the necessary collection and pumping infrastructure to transport the wastewater from the two communities to the Calvert County facility. Through an intra-jurisdictional agreement, executed between Anne Arundel County and the owners of the Chesapeake Beach Wastewater Treatment Plant, permission was

obtained for transport and treatment up to 0.1375 MGD at the Calvert County facility. Anne Arundel County currently has an existing average daily flow of approximately 0.10 MGD to this facility.

There are no independently operated treatment facilities located within the Rose Haven SSA.

4.7.11.2 *Projected Population and Growth Flows*

Population in the sewer service area is projected to increase to approximately 977 people by the year 2035. Future development in the Rose Haven / Holland Point Service Area will be from building single family homes on existing vacant residential lots and redevelopment of commercial and marina properties.

The allowable and unused capacity for the Rose Haven / Holland Point Service Area is listed in Table 4-28.

TABLE 4-28
Sewer Allocation Report For Service Area #11 – Rosehaven
January 2012

	Current	Master Plan						
		2015	2020					
Safe Capacity	137,500	137,500	137,500					
Flow	100,000	85,000	87,000					
Capacity Available for Allotment	37,500	52,500	50,500					
Allotment Category	Allotment 3/10/11	Revised Allotment	Allocated 1/18/12	Available Capacity	Active Projects Under Review	Resulting Capacity	Recommended Allotment	Potential Projects
Public Health	0	0	0	0	0	0	0	0
Public Service	0	0	0	0	0	0	0	0
Assisted Housing	0	0	0	0	0	0	0	0
Buildable Lots	13,250	13,000	8,250	4,750	3,250	1,500	13,000 ^a	0
Community Development	0	0	0	0	0	0	0	0
Minor Subdivision	0	0	0	0	0	0	0	0
Major Subdivision	5,250	5,250	5,000	250	0	250	5,250	0
Commercial Complex	13,750	13,750	13,750	0	0	0	13,750	0
Industrial Subdivision	0	0	0	0	0	0	0	0
Reserved Capacity	5,250	5,500	0	5,500	0	5,500	5,500 ^b	0
TOTALS (gpd)	37,500	37,500	27,000	10,500	3,250	7,250	37,500	0

Notes: The availability of remaining capacity is limited by flow or a maximum of 550 EDUs, whichever is reached first. The reserved capacity based on allotment by flow is not available for allocation because of the limitation on the number of EDUs per our agreement with Calvert County. The availability of remaining capacity is limited by flow or a maximum of 550 EDUs, whichever is reached first, as shown in the chart below.

	Gallons	EDUs
Total Capacity (550 EDUs * 250 gpd)	137,500	550
Current Flow	100,000	
Connected - Rose Haven Residential		185
Connected - Rose Haven Commercial		25
Connected - Holland Pt. Residential		177
Connected - Holland Pt. Commercial		0
Allocated to approved project	5,000	20
Reserved by Agreement-Rose Haven Utilities	13,750	55
Active projects under review	0	0
Pending permits	3,250	13
Building Permits Issued but not connected	250	1
Building Permits issued to date		42
Allocated to remaining buildable lots	8,000	32
Available Capacity	7,250	0

4.7.11.3 Pumping Station Collection and Conveyance Systems

Pumping station information is provided in Table 4-29. The inventory of this infrastructure within the SSA includes the following:

- a. 1 sewer pump station
- b. 2.7 miles of 8 inch diameter gravity mains
- c. 3.8 miles of pressure collectors (grinder pump systems) ranging from 1.5 to 4 inches in diameter
- d. 2.5 miles of 8 inch diameter force main
- e. Approximately 400 connections

The major infrastructure components are currently sized to handle the anticipated flows within the current planning period.

TABLE 4-29
Rose Haven / Holland Point Sewer Service Area
Inventory of Pump Stations

Station Name	Owner	Address/Location	Master Plan Map	Operating Map 200/40	A.A. County Station ID Number	Design Capacity (MGD)
Rose Haven	County	7034 Sycamore Ave	S-12	R38/C2	700303	0.579

4.7.11.4 Required Infrastructure Capital Improvements

No major projects are planned for this area.

4.7.12 Rural Service Area

The Rural Service Area encompasses nearly 129,808 acres and consists of the remaining County land outside of the aforementioned designated sewer service areas. This includes land west of the Broadwater SSA to the County boundary and south of Crofton to the Calvert County boundary line. In addition, the area north of Annapolis along the southern shore of the Severn River north of Rt. 50; the area between Gibson Island, Rock Creek, and the Magothy River; and the area south of Fort Meade between the Little Patuxent and Patuxent Rivers are also designated as part of the Rural Service Area.

The Rural Service Area lies outside of the County's planned growth areas. Population is projected to increase to approximately 63,842 residents by 2035. Properties in the Rural Area are generally planned for very low-density development and are typically served by individual septic and well systems or private community systems. There are no plans to extend public utilities into the Rural Service Area in the foreseeable future. See Section 4.5.4 for further information regarding onsite disposal systems serving the rural and other SSA's.

There are 31 independently operated wastewater treatment facilities within the Rural Service Area. These systems are described in Section 4.3.1, listed in Table 4-4 and depicted on the adopted Master Plan Maps S-2 thru S-12.

4.8 SLUDGE MANAGEMENT

The Department of Public Works, through the Bureau of Utility Operations, is responsible for the treatment of domestic sewage received at its Water Reclamation Facilities. The treatment generates Bio-Solids (sewage sludge), which is further treated and reused by a private contractor as described in Appendix C. The Bureau of Utility Operations is also responsible for the management of the County's Septage Management Program. The program governs the disposal of domestic septage that is discharged into the County's system, by private entities at one of the County's three septage-receiving points (See Appendix E). The County is currently evaluating its Bio-Solids management program in response to recent regulations imposed by the Department of Agriculture regarding Fall/Winter land application.

4.9 ON-SITE WASTEWATER MANAGEMENT PROBLEM AREAS

The Anne Arundel County Health Department has identified 33 on-site wastewater management areas within Anne Arundel County that show indication of operational problems. These areas have problems such as high water table, small lot size, impermeable soil or excessive slope. The Department of Health will monitor these areas and if petitions are submitted for service within the areas, action will be taken accordingly. Figure 4-13 shows the location of the problem areas in the County. Table 4-30 is a list of wastewater management problem areas in order of priority.

TABLE 4-30
On-Site Wastewater Management Problem Areas

Location	Master Plan Map / Grid Number	Problem Description				
		High Water Table	Impermeable Soils	Small Lot Size	Steep Slopes	Well Setbacks
1. Brockbridge Road	S-2 / C10	X	X	X		X
2. Champion Forest	S-2 / E8			X	X	
3. Communities off Nabbs Creek Road	S-3 / Q7	X	X	X	X	X
4. Green Gables	S-3 / W10	X		X	X	X
5. Pinehurst	S-3 / W10	X	X	X	X	X
6. Venice on the Bay (Lower End)	S-3 / U7	X	X	X		X
7. Bayside Beach	S-3 / W8	X	X	X	X	X
8. Rock Creek Park	S-3 / T8	X	X	X	X	X
9. Freetown	S-3 / O8	X				
10. Bahama Beach	S-3 / V9	X		X		X
11. Poplar Ridge	S-3 / V9	X		X		X
12. Belhaven Beach	S-3 U9	X		X	X	X
13. Kurtz Beach	S-3 / V8	X		X		X
14. Clearview Village	S-3 / R9	X	X	X		
15. Shore Acres Around Lake Placid	S-5 / V14	X	X			X
16. Long Point on Magothy (Lower End)	S-5 / W11	X		X		X
17. Laurel Acres	S-5 / S12	X	X	X		X
18. Herald Harbor (Lower Area)	S-5 / P15		X	X		
19. Huntshire, Pasadena	S-5 / P11	X		X		
20. Maple Road	S-5 / S12	X				
21. Chelsea Beach	S-3, S-5 / S10, S11	X		X		X
22. Log Inn Estates	S-7 / Y16	X	X			X
23. Whitehall Manor	S-7 / X18	X				
24. Amberly	S-7 / W17	X	X	X		
25. Palisades on Severn	S-5 / P15	X		X	X	X
26. Wild Rose Shores	S-9 / R22		X	X	X	X
27. Gingerville Manor	S-7, S-9 / Q21		X	X		X
28. Edgewater Beach	S-9 / P22	X	X	X	X	X
29. Southdown Shores	S-9 / P23		X	X		X
30. Broadwater Point Road	S-11 / R34	X	X	X		X
31. Highview on the Bay	S-11 / P35		X	X		X
32. Arkhaven	S-11 / P36	X	X	X		X
33. Fairhaven	S-12 / Q37		X	X	X	X

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Figure 4-13 (11 x 17) Wastewater Management Problem Areas

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4.10 FINANCIAL

4.10.1 General

The Sanitary District of the County encompasses the whole County except for that portion that lies within the corporate limits of the City of Annapolis. The Anne Arundel County Charter assigns the responsibility for the construction and operation of the wastewater facilities in Anne Arundel County to the Department of Public Works. The Charter requires that all wastewater facilities operated by the County be completely self-supporting. Furthermore, the Anne Arundel County Code, Article 4, Title 10 limits the outstanding debt of the County for wastewater facilities to 5.6 percent of the County's assessable basis of real property, 14 percent of the County's assessable basis of personal property and 14 percent of the operating real property described in the Tax-Property Article 8-109 of COMAR, computed as of the first day of the then current fiscal year.

4.10.2 Charges And Assessments

In accordance with the requirements set forth in the Charter, Anne Arundel County has established charges and assessments for connections to the system that are used to pay all operating costs and debt service for the sewer utilities. Four principal charges have been established as described below. Table 4-31 lists the rates for the sewer charges.

a. Connection Charges

- i. The User Connection Charge - This charge recovers the cost of constructing the service line between the property line and main pipeline including the cost of the meter. It is charged at the time of the permit application and is payable in full on new homes while existing homes have the option to pay in full or to use a 5 year installment plan.
- ii. Capital Facility Connection Charge - This charge recovers the cost of constructing the sewage treatment plants, the pumping stations and the conveyance facilities other than the lateral lines. The charge is collected at the time of building permit or connection permit issuance. New homes must pay in full while existing homes have the option to pay 1/3 using a 5-year installment plan and 2/3 over 30 years as a capital facility assessment.
- iii. Inspection Fee - This charge covers the cost of inspecting the service connection and is paid at the time of the permit application.
- iv. Administrative Fee - This charge covers the cost of processing the connection permit.

b. Front Foot Benefit Assessments

This charge is used to recover the cost of constructing the sewer lateral lines and is paid annually from the inception of service for a period of 30 years.

c. User Charge

This bi-monthly or quarterly charge recovers the cost of operating and maintaining the sewage treatment plants and other major infrastructure.

d. Environmental Fee

This charge covers the cost for upgrading and rehabilitating wastewater capital facilities and is paid quarterly with the user charge.

TABLE 4-31
Residential Sewer Charges

Type		Fee
User Connection (under County Capital Project)		\$3,400.00
User Connection (Under a private contract)		\$4,270.00
Capital Facilities Connection Charge		\$7,600.00
Inspection Fee		\$ 30.00
Permit Fee		\$ 25.00
Front Foot Benefit Assessment	Minimum	\$ 4.76 per foot
	Maximum	\$ 11.69 per foot
Mayo Connection Charge		\$8,130.00 per EDU
Mayo Service Availability Charge (Unimproved Properties)		\$2,630.00 per EDU
Quarterly Usage Charges (1-01-12)		\$ 4.71 per 1,000 gal.
Environmental Protection Fee (Except Mayo Service Area) _ Effective 8-01-12		25% of the sewer usage charge
Sewer Only - based on 24,000 gallons (Also applies to Mayo Service Area)		\$ 113.04

Tables 4-32 and 4-33 provide financial management statistics for the Anne Arundel County Sewer System. Table 4-32 furnishes the status of the Debt Service Fund and Table 4-33 provides financial information for the Operating Debt Fund. The City of Annapolis sewer fund fiscal information follows in Table 4-34.

TABLE 4-32
Debt Service Fund - Sewer

Revenues	Fiscal Year 2010	Fiscal Year 2011
Investments	\$1,559,168	\$826,870
Front Foot Assessment fees	4,638,319	4,020,956
Capital Facility Connection fees (includes Mayo)	8,073,983	16,620,589
EPF fees	8,911,208	9,123,657
Miscellaneous	464,169	551,672
Total Revenues	23,646,847	31,143,744
Expenses	Fiscal Year 2010	Fiscal Year 2011
Principal	11,570,456	11,185,448
Interest	6,944,793	7,244,342
Pro-rata	253,000	253,000
Miscellaneous	- 0 -	- 0 -
Total Expenses	18,768,249	18,682,790
Revenue over (under) expenses	\$4,878,598	\$12,460,954

TABLE 4-33
Sewer Operating Fund, Financial Management Statistics

	Fiscal Year 2010		Fiscal Year 2011
Sewer Charge Revenue	\$48,977,100	Sewer Charge Revenue	\$50,563,972
Other Revenue – Sewer (See schedule D below)	2,151,682	Other Revenue - Sewer (See schedule D below)	2,009,399
Total Revenue	51,128,782	Total Revenue	52,573,371
Sewer Operation Expense	30,603,009	Sewer Operation Expense	34,442,065
Sewer Maintenance Expense	8,694,198	Sewer Maintenance Expense	8,253,663
Fees paid to Other Jurisdictions - Sewer	2,833,955	Fees paid to Other Jurisdictions - Sewer	2,252,122
Total O&M	44,131,162	Total O&M	44,947,850
Depreciation	20,424,476	Depreciation	22,061,602
Total Expense	64,555,638	Total Expense	67,009,452
Operating income or (loss)	-\$13,426,856	Operating income or (loss)	-\$14,436,081
Total Flow Volume	12,336,912	Total Flow Volume	11,378,052

Schedule D - Detail of Other Revenue on Table 4-33

Revenue	Fiscal Year 2010	Fiscal Year 2011
Penalty Charges	\$1,119,575	\$1,107,399
Pretreatment	209,300	216,309
Haulers	2,000	2,450
Pro rata	270,000	270,000
Reimbursement for Lake Shore	66,992	63,771
Reimbursement -Damages	5,974	- 0-
Leachate	74,820	40,461
Developer Services Fees (Inspections)	75,465	71,270
Reimbursement – Capital projects (sewer)	- 0 -	19,144
Miscellaneous Recoveries	327,556	218,595
	\$2,151,682	\$2,009,399

TABLE 4-34
City of Annapolis
Financial Management Statistics - Sewer

Category	Fiscal Year 2010	Fiscal Year 2011
Sewer Charges	\$4,551,061	\$ 4,139,603
Connection Charges	19,650	62,850
Capital Facility Charges	347,792	456,585
Interest Income	535	1,584
Other	93,244	192,070
TOTAL REVENUE	5,012,282	4,852,691
Operating Expenses	1,812,991	1,551,354
Maintenance Expense	444,942	284,945
AA County Contract	3,031,072	3,090,670
TOTAL OM&R	5,289,005	4,926,969
Depreciation	631,969	632,921
Non-Operating Expenses	2,558,218	\$1,771,087
TOTAL EXPENSES	8,479,192	7,330,977
Increase(Decrease) in Net Assets	(3,466,910)	(2,478,285)
Debt Principal	\$763,573	\$ 511,536
TOTAL FLOW-CITY (MG)	2035.41 (63%)	1888.58 (61%)
TOTAL FLOW-COUNTY (MG)	1216.97 (37%)	1199.08 (39%)

4.10.3 Capital Improvement Program

Anne Arundel County utilizes a six-year Capital Improvement Program for planning the necessary expansions to the water and wastewater system. All plans for major water and sewer projects financed by Anne Arundel County must be reviewed and approved by the Office of Planning and Zoning, the Planning Advisory Board, the County Council, and finally approved by the County Executive. Table 4-35 lists the current wastewater capital improvement projects within Anne Arundel County. The City of Annapolis also uses a six-year Capital Improvement Program. Table 4-36 lists the current capital wastewater projects within the City of Annapolis.

TABLE 4-35
Wastewater Capital Improvement Projects, Anne Arundel County

Contract Title	Contract Number	Description
305 Coll. Pkwy Stream Rest.	S7918121	This project is to complete the property line and topographic surveys, geotechnical investigation, design preparation, construction documents, grading permit, bid documents, bidding phase services, construction phase services, and as built drawings for the nursing home outfall retrofit. The Site is located at 305 College Parkway in Arnold.
6"-12" CIPP Lining-Phase III	X7388166	Relining of approximately 9,394 lf of 8", 110 lf of 10", 333 lf of 12" and 157 lf of 15" pipe by CIPP (Cured in Place Pipe) method in the Baltimore, Gambrills, Glen Burnie, Hanover, Harmans, Laurel, Linthicum Heights, and Pasadena areas of Anne Arundel County. Included is the reinstatement of 188 sewer laterals. All lines will be CCTV'ed prior to contract document design to verify need for lining. Inspection services to be provided under X7388139.
8"-12" CIPP Lining-Phase II (6"-12")	X7388159	Relining of approximately 8,189 lf of 6 inch to 12 inch pipe by CIPP (Cured In Place Pipe) method in the Glen Burnie, Millersville, and Severn areas of Anne Arundel County. The majority of the pipe to be relined will be 8" in diameter. Included is the reinstatement of 103 sewer laterals. Inspection services to be provided under X7388139.
8"-16" CIPP Lining-Phase 1 (6"-12")	X7388158	Relining of approximately 13,630 lf of 8 inch, 10 inch and 16 inch pipe by CIPP (Cured In Place Pipe) method in the Severna Park area of Anne Arundel County. The majority of the pipe to be relined will be 8" in diameter. Included is the reinstatement of 223 sewer laterals. Inspection services provided under X7388139.
Anchorage I Valve Replacement	S7918122	This contract includes replacing 3 inoperable valves at Anchorage I SPS.
Annap SSA Chck Valve Vaults 1	S7918134	Repairs and Upgrades to Annapolis Check Valve Vaults for Bay Ridge 2,5,6,7,8,9
Annap SSA Chck Valve Vaults 2	S7918135	Repair and upgrades to Annapolis SSA Check Valve Vaults for Arundel on the Bay 2,3,4, and Thomas Point
Annap WRF Sptg Rcv Stn Screen	S802345	This contract consists of furnishing and installing a complete packaged spiral screen and washing/compactor system in the Septage Receiving Station channel at the Annapolis WRF.
Annap. Influent Odor Control	S802314	Study, design, and construction of the influent pump station odor control system at Annapolis WRF.
Annap. WRF Hoist Upgrade	S802327	Monorail and Hoist System at influent pump station to be modified to allow safe installation and removal of pumps from drywell. Low clearance hoist to be installed and monorail beam to be extended outside doorway.
Annap /Cox Creek Barscreen Rehab	S802344	This contract includes the furnishing of parts and labor to rehabilitate the bar screens at Annapolis WRF (2) and Cox Creek WRF (2).
Annapolis ENR Grant Mgmt	S802902	Oversee and coordinate the efforts to obtain from MDE grant funding for the ENR upgrade.
Annapolis Bypass I	S7918139	Repairs and upgrades to Annapolis SSA Bypass for Krapish and Loretta Heights SPS. Upgrades include bypass installation, control panel modifications, wet well ladder installation, and addition of a wet well vent, painting exterior equipment and bringing water service to the SPS's.
Annapolis Bypass II	S7918140	Repair and upgrades to Annapolis SSA By-pass for Heritage Harbor 1. Upgrades include bypass installation, control panel modifications, and exterior painting.
Annapolis Communitors II	S7918143	Funds are requested for design and construction to upgrade existing sewage pumping stations to meet current control and operational standards for Riva 2 and Anchorage 1 SPS's. Upgrades include communitor installation, wet well vent installation, installation of a junction box, and bringing water service to the SPS's.
Annapolis Sewer Extensions	X764235	This contract includes developing preliminary layouts, sizing and cost estimates for extending public sewer to allow decommissioning of existing septic systems in the Annapolis Service area.
Annapolis WRF ENR	S802901	This contract is to upgrade the Annapolis WRF to meet enhanced nutrient removal regulatory requirements. The contract includes design and construction to meet an effluent requirement of 3.0 mg/l TN and 0.3 mg/l TP.

Contract Title	Contract Number	Description
Annapolis WRF GST Replacement	S802341	Replace existing gravity thickener equipment located in Annapolis WRF including Gravity Thickener #1, 2, and 3. This contract is being managed by Jai Liu.
Avalon Shores 2 / Cedarhurst	S7918138	Funds are requested for design and construction to upgrade existing sewage pumping stations to meet current control and operational standards. Specific upgrades include a new check valve vault, bubbler, and comminutor for Avalon Shores 2, and a new by-pass pump around facility, wet well ventilation, and comminutor for Cedarhurst.
Bartgis Manor Sewer Extension	Z533263	Provide sewer service to the petitioned area which includes 7 lots located on Russell Road. Design services to perform feasibility study and develop a cost estimate. Per Leslie Campbell, Lots 5A and 6R will not be included in the petition
Bay Hills SPS Retrofit	S7918118	Design and construction of Bay Hills SPS improvements to include: drywell abandonment and installation of wet well mounted suction lift station with prefab building; generator, bypass, surge relief, ventilation, BGE/Service cabinet, and access road replacement; water to station; Emergency Storage; SWM; and relocation of wet well access hatch (to be external to prefab building).
Ben Oaks Diesel Pump	S7918128	Funds are requested for design and construction to upgrade existing sewage pumping stations to meet current control and operational standards. New diesel driven pumps will be installed to provide automated emergency pumping capacity to the station. This work is likely to include building and site modifications as well as some electrical work.
Ben Oaks SPS Generator Repl.	S7918111	Replacement of existing emergency generator at the Ben Oaks Sewage Pumping Station and including ancillary work such as automatic transfer switch, modifications to fuel line/storage systems, etc
Big Cypress SPS Retro	S806301	This project provides funding for construction of major improvements to the Big Cypress Creek Sewage Pumping Station.
Bodkin Pt. Septic Conversions	X764233	This contract will include evaluating collection and treatment options for the existing cluster septic systems in the Bodkin Point area to provide increased nitrogen removal.
Broad Creek WWTP Abandonment	S792704	Demolition of unneeded structures remaining at the Broad Creek WWTP site.
Broadneck ENR Grant Mgmt	S803102	Oversee and coordinate the efforts to obtain from MDE grant funding for the ENR upgrade.
Broadneck WRF ENR	S803101	This contract includes all upgrades to the Broadneck WRF necessary to meet annual effluent total nitrogen of 3.0 mg/l and effluent total phosphorus of 0.3 mg/l. Work will include all new unit processes and any modifications needed to the existing systems to support the new treatment requirements and a new ultraviolet disinfection system.
Broadneck WRF ENR Programming	S803103	The work in this contract includes programming and system integration services for the Broadneck WRF ENR upgrade.
Broadneck WRF Infl. Screens	S797905	This contract includes the replacement of the two bar screens at Broadneck WRF and installation of a bar screen bypass.
Broadneck WRF UV System	S797904	Work in this contract includes the construction of a new ultraviolet disinfection system and related plant modifications.
Broadwater ENR Grant Mgmt	S803702	Oversee and coordinate the efforts to obtain from MDE grant funding for the ENR upgrade.
Broadwater ENR Phase 2 Upgrd	S803704	This contract includes design, construction and construction management for the construction of a new secondary clarifier and sludge pumping station.
Broadwater ENR Programming	S803703	The work in this contract includes programming and integration services for the Broadwater WRF ENR upgrade.
Broadwater WRF - New Gates	S802347	This Project supports required upgrades and retrofits of WRF structures, equipment and infrastructure. This Contract will replace sliding gates and sluice gates in the reactor tanks that have been determined to be deteriorated and at the end of their service life.
Broadwater WRF Barscreen / Odor	X764236	The existing mechanical bar screen and stationary bar rack in Broadwater WRF Pumping Station have been incurring high maintenance/repair costs in order to maintain functionality. The underground portions of the structure have also flooded numerous times, creating unsafe conditions. Odor from the pumping station is also an issue. This contract investigates design options to replace the existing mechanical bar screen and stationary bar rack and install a new odor control system.
Broadwater WRF ENR	S803701	This contract includes all upgrades to the Broadwater WRF necessary to meet annual effluent total nitrogen of 3.0 mg/l and effluent total phosphorus of 0.3 mg/l. Work will include all new unit processes and any modifications needed to existing systems to support the new treatment requirements. Addition of new secondary clarifier and sludge pump station being done under separate contract (S803704)
Broadwtr Clarifier Drive Repl	S802342	This contract includes the replacement of two primary clarifier drive units, including concrete repairs of units 1 & 2 at Broadwater WRF.
CAD Topobase Implementation	X7388140	Consultant services to convert CAD data into Oracle Spatial database and implement Topobase software.
Cape St. John 1 SPS Retro	S7918129	Cape St. John 1 SPS retrofit scope includes a by-pass pump around facility; new odor control; comminutor and vault; and cathodic protection.
Cattail Creek FM Inspection	X764232	Study to determine feasible inspection methods for sewer force mains and recommend method for Cattail Creek FM.
Cayuga Farms Interceptor Ph 2	S792905	Design, right-of-way acquisition, and construction of approximately 7,000 linear feet of gravity sewer interceptor in Severn between Upton Rd and the existing Garren's Choice subdivision off Quarterfield Rd. The portion of gravity sewer through Garren's Choice is built by others.

Contract Title	Contract Number	Description
Chesapeake Bch WWTP ENR	S806001	To cover Anne Arundel County's share of ENR costs for upgrade at Chesapeake Beach Wastewater Treatment Plant, in accordance with the inter-jurisdictional agreement with the Town of Chesapeake Beach.
Cinder Cove FM Rehab	S806701	Funds are requested for the design, right of way acquisition, and construction of approximately 5,000 linear feet of 30" force main from Hammarlee Drive to Marley Creek.
Cinder Cove Force Main	X7388122	This contract includes an evaluation of the Cinder Cove SPS 22" Force Main.
Cinder Cove Overflow Mods	S805301	This project includes the planning, right of way acquisition, design, and construction of modifications (new MCC, new back-up generator, portable bypass pumps, new pumps, ventilation improvements, screen, and bypass vault) necessary to mitigate discharge of sewage from the Cinder Cove Sewage Pump Station.
Cox Creek / SPS Surge Control	S7918136	Cox Creek SPS Surge Control
Cox Creek SPS Bypass I	S7918141	Repairs and upgrades for Cox Creek SPS, Margate SPS and Valley Road SPS. Upgrades include by-pass installation, wet well entry modifications, bringing water service to the SPS, and installation of fall protection.
Cox Creek SPS Bypass II	S7918142	Repairs and upgrades for Cox Creek SPS By-pass for Stoney Creek and Old Mill. Upgrades include by-pass installation, wet well entry modifications, wet well ladder installation, and fall protection installation.
Cox Creek WRF ENR	S802201	This contract includes planning, right-of-way acquisition, design, design services during construction and CM/I services for the Cox Creek ENR Project. Construction will occur in two phases under S802202 and S802203.
Cox Creek WRF ENR Const Ph 1	S802202	This project consists of the construction of the phase 1 portion of the ENR upgrade. This will include the construction of a new Electrical Room, influent flow meter and primary clarifier. (Note: Design and CM/I services provided under S802201).
Cox Creek WRF ENR Const Ph 2	S802203	This contract consists of the phase 2 portion of the ENR upgrade. This will include modifications to the preliminary treatment systems and chemical feed systems, construction of a membrane and high flow treatment system. (Note: Design & CM/I services provided under S802201. Also, contract does not include construction of non-ENR items which will be funded under S802326 & non-ENR Project S806100.)
Cox Creek WRF Non-ENR	S806101	This is a parallel project to S802200 and covers facilities and equipment that are not eligible for MDE grant funding. Work under both this project and S802200 is essential to assuring continuous and reliable plant operations within stringent environmental permit limits. Upgrades will also include grit chamber modifications, post aeration modifications, chemical feed systems, gravity thickener improvements, and new grit classifiers. Project to also include construction of odor control facilities originally proposed under project S802200.
Creek Road & Harbor Drive SPS P/G/CV	S791855	Replacement of pumps, guiderails, installation of connection vault, dual bubbler, cathodic protection, fall protection and aluminum handrails, providing water to station, control panel modifications and electrical upgrades. Design Only. Construction being done under S791856.
CSF Phase 1 Construction	S777203	Design and construction of Central Sanitation Facility at Millersville Central Utilities Complex. This includes site work, grading, bulk material storage, Administration Building, Warehouse, Vector Building, covered parking for mobile generators, and modifications to the existing Central Water Facilities buildings. Site work integrates storm water management features such as infiltration trenches, restores a wetland area on-site, and restores one-half mile of stream tributary to Bear Branch and the Severn River.
CSF UOC 2-Ton Bridge Crane	S777205	This contract provides a 2-ton bridge crane in the shop area of the existing Central Water Facility, Building C in the Millersville Utility Operations Complex. Design services under contract S777203. Construction management and inspections services for contract S777206 are included.
CSF UOC Bldg C Renovations	S777206	This contract renovates the shop areas in existing Building C, Central Water Facilities, 435 Maxwell Frye Road in the Millersville Utility Operations Complex. Design services under contract S777203. Construction management and inspection under contract S777205.
Cox Creek WRF Slide/Sluice Gates	S802346	This contract consists of demolishing and installing six (6) slide gates and two (2) sluice gates in the post aeration tanks and chlorine contact effluent channel at the Cox Creek WRF. PM is Kay Liu.
Dewatering Facilities-Design	S800601	Planning and design of dewatering improvements at Maryland City WRF, Broadneck WRF, Annapolis WRF and Patuxent WRF. Belt Filter Presses and separate construction contracts for each facility. Construction services under contracts S800603, S800604, S800605 and S800606.
Divinity Cove SPS Retrofit	S7918130	This contract is for design and construction upgrades to Divinity Cove SPS. Major improvements include replacement of pumps and guardrails, installation of force main bypass vault, improvements to fall protection and painting.
Doris Road SPS Retrofit	S7918131	The contract also includes design and construction upgrades to Doris Road SPS. Major improvements includes replacement of pumps and handrails, installation of force main bypass vault, rehabilitation and/or replacement of wet well, improvements to wet well ladder and painting.
Emergent Wetland #2 & 4 Imprv	S769714	This contract includes: 1) The removal and disposal of the existing foliage, media, baffle walls, piping and liner and installation of new foliage, media, baffle walls, and liner at EWL's 2 & 4. 2) Upgrade of piping at EWL's 2 & 4.
Furnace Branch Sewer Replacement	S797801	Design and construct a replacement for approximately 500 LF of gravity sewer across Furnace Branch Creek along Gov. Ritchie Hwy in Glen Burnie.
Grease/Grit Facility	S802501	This contract includes the planning, sighting, and preliminary design of a facility to process grease and grit removed from sewage pumping stations.

Contract Title	Contract Number	Description
Haskell Road Outfall Retrofit	S7918119	This contract is to complete the property line and topographic surveys, geotechnical investigation, design preparation, construction documents, grading permit, bid documents, bidding phase services, construction phase services, and as built drawings for the Haskell Road Outfall Retrofit. The Site is located at the headwaters of Mill Creek in Arnold.
Jennifer Road FM Replacement	S804302	The Jennifer Road pumping station effluent force main will be replaced to increase the capacity for the new pumping station.
Jennifer Road PS Upgrade	S804301	Design & construction a new Jennifer Road SPS and replace the effluent force main to Rte 2.
Large Diam. Sewer Relining 3	X7388168	Relining of approximately 580 lf of 18" sewer main (MH 10660 to MH 10662) and 1,480 lf of 24" sewer main (MH 10662 to MH 10673, MH 10677 to MH 10678, MH 10673 to MH 10674, MH 28384 to MH 10676, and MH 10676 to MH 10677) in the Broadwater area of Anne Arundel County, near the Drum Point Road Interceptor. CMI services to be provided under X7388165. In House design. Traffic, permits, and bypass plans by WBCM under PO from X7388130. See X7388130 and X7388131 for Large Diameter Sewer Relining 1 and 2, respectively.
Large Diam. Sewer Relining 4	X7388169	Relining of approximately 2,980 lf of 30" sewer main (MH 11530 to MH 11531 and MH 11532 to MH 11535), 730 lf of 36" sewer main (MH 11536 to MH 11537), and 5,150 lf of 42" sewer main (MH 11489 to MH 28934, MH 11496 to MH 11528 and MH 11531 to MH 11532) in the Broadneck area of Anne Arundel County, near the College Parkway Interceptor. CMI services to be provided under X7388165. In House design. Traffic, permits, and bypass plans by WBCM under PO from X7388130.
Large Diam. Sewer Relining I	X7388130	Relining of approx. 12,747 LF of large (18 to 30 in) diameter sewer main piping: Benfield Road : 4575 lf total (24in, 650 lf & 30in, 3,925 lf); Chalk Point Road: 18in, 5,647 lf ; Franklin Manor Road: 18in, 2,525 lf
Large Diam. Sewer Relining II	X7388131	Relining of approximately 4,317 LF of 42in, 15in and 12in diameter sewer main in the vicinity of: Bay Dale Dr. (42in - 2,520 lf) and Tick Neck Rd (12in & 15in - 1,797 lf).
Lions Gate/Science Dr. Repair	X7388154	Emergency stabilization of the sewer main near stream by Lion's Gate Lane and on Science Drive.
Lower Broadneck Ext. Phase 2	X764238	This contract includes developing preliminary layouts, sizing and cost estimates for extending public sewer to allow decommission of existing septic systems in the Lower Broadneck Area.
Lower Broadneck Sewer Ext.	X764234	This contract includes developing preliminary layouts, sizing and cost estimates for extending public sewer to allow decommissioning of existing septic systems in the lower Broadneck peninsula.
Manhole Frame & Cover FY12	X7388163	This contract is to replace approximately 125 manhole frames and covers, plus 100 covers only, in the Crofton and Severna Park areas of Anne Arundel County. CMI will be provided under X7388139.
Marley SPS Upgrade	S805401	The work in this contract includes construction and construction management services associated with the installation of four new pumps at the Marley SPS. Work also includes construction of a new electrical building.
Marley-Jumpers Sewer Phase 2	S783702	Design and Construct a 15-inch diameter sewer from Hammock Lane to Jumpers Hole Road.
Maryland City UV System Upgd	S803005	This contract includes the design and construction of a new ultraviolet disinfection system at the Maryland City WRF.
Maryland City WRF ENR	S803001	This contract includes all necessary work to upgrade the facility to meet an average effluent total nitrogen of 3.0 mg/L, and an average effluent total phosphorus of 0.3 mg/L.
Maryland City WRF Expansion	S806601	This contract will include design, construction and construction management for the expansion of the MD City WRF to a capacity of 3.7 MGD average daily flow, by January 2016.
Mayo - Triton Beach Upgrade	S799204	This contract is to upgrade Triton Beach Sewer Pump Station in order to mitigate existing capacity issues. The contract will involve data analysis, sewer modeling, developing alternative solutions, and ultimately upgrade the impacted sewer pump station based on the most feasible recommended alternative. - The proposed upgrades will include two new pumps, a new generator, pump around and a valve vault, additional storage capacity, and other incidental mechanical and electrical upgrades.)
Mayo Coll Sys Up-Carr's Ridge	S799202	Upgrade Carr's Ridge Pump Station in order to mitigate the existing capacity issues. The contract will initially include study and design. Later, it will lead to the construction based on the approved design in order to upgrade capacity.
Mayo Coll Sys-West Shore 1&2	S799205	This contract includes study, design and construction (upgrade) of West Shore Sewer Pump Stations 1 & 2.
Mayo RSF 2a & 2b Rehab	S769715	Effluent quality of the RSFs has shown deterioration. In-plant investigations to determine the cause(s) of the lower RSF effluent quality have been unsuccessful. A consultant is being retained to investigate the RSF effluent quality issues and to provide recommendations to correct the problem.
Mayo WRF ENR	S803201	This contract includes the design and construction of Enhanced Nutrient Removal (ENR) treatment facilities for the Mayo WRF to meet Maryland Department of the Environment guidelines (3.0 mg/l TN and 0.3 mg/l TN).
Mayo WRF Expansion	S769702	This contract consists of design and construction of an expanded Mayo water reclamation facility and abandonment of the existing treatment facility. Formerly contract 5452S.
Mayo WRF Phs 1 Facility Imprv	S769712	This contract includes the design and construct of Phase 1 improvements that include replacing the main pump station, replacing the UV disinfection system, constructing two flow equalization basins, upgrading the power distribution system, and upgrading the SCADA and remote monitoring systems.
Mayo-Bb SPS 2, 3 & 4 Upgd	S799207	This contract includes the design and construction of upgrades of Beverly Beach Sewage Pumping Stations II, III and IV.

Contract Title	Contract Number	Description
Mayo-Holly Hill SPS I Upgd	S799208	This contract includes the design and construction of upgrades at Holly Hill I SPS.
Mayo-Selby SPS I & II Upgds	S799210	This contract includes the design and construction of upgrades at Selby on the Bay I and II SPSs. Consultant Selection via shortlist
Mayo-Shoreham Bch SPS I & II	S799209	This contract includes the design and construction of upgrades at Shoreham Beach I and II SPS.
MD City WRF ENR Programming	S803002	The work in this contract includes programming and integration services for the Maryland City WRF ENR project.
MD City WRF Improvements	S803004	This contract includes improvements to the facility identified during the ENR design, but not directly required by the ENR project. Engineering & CM to be provided under ENR contract.
Mill Creek Hw Rest WQ Mntng	S7918120	This contract involves field and office activities needed to perform water quality monitoring at the Mill Creek Headwaters for a period of six years (2011-2016). Mill Creek is located in Arnold.
Mill Creek SPS Environ. Rest.	S7918108	This project is to remove 5254 CY of material from the headwaters (deposited in the creek as a result of the December 17, 2005 Sewage spill), and the previously dredged portion of Mill Creek.
Mill Creek SPS Upgrade	S804701	This contract includes the design and construction of various upgrades at the Mill Creek Sewage Pump Station. The purpose of the contract is to replace and update mechanical and electrical equipment, controls, etc., to improve the station's operation and reliability.
Mini System Rehab Ph 11	X7388149	Mini System Rehab of sewer lines including video pipe services & relining of small diameter sewer system infrastructure. Year long contract for cleaning of sewer lines, restoration of manholes, television inspection of sewer lines & service connections throughout the County. Cured-in-place lining for 2000 lf also included. Purpose of this contract is to reduce the amount of I/I entering the sewer system and to minimize maintenance problems. Work includes water jet cleaning, root removal, tv-ing, remote pipe joint/lateral chemical grouting & manhole grouting.
New Cut Farm SPS Abandonment	S792705	New Cut Farms SPS was abandoned in place 3 years ago. The above ground structures need to be demolished. This contract is to restore the abandoned SPS station site back to its natural state.
Odenton Town Center Sewer	S805901	This contract includes right of way acquisition, design, and reconstruction of the existing sewer serving the Odenton Town Center area to increase flow capacity and includes Severn Run SPS upgrades.
Ohio Avenue Sewer Extension	Z533265	Provide sewer service to petition area 7203 Ohio Avenue. In-house design services to investigate feasibility and develop preliminary cost estimate.
Ohio Avenue Sewer Extension	X7388175	Install 150 LF of sewer main from manhole # 35812 located on 7201 Ohio to property line of 7203 Ohio Avenue. Installation of sewer main on 7203 Ohio Avenue is under petition project.
OTC Interceptor-Leg 2, 3, 5	S805903	This contract is for the construction and inspection of approx. 4,087 feet of 24-inch sewer interceptor along Leg 2 and Leg 3 (between Crossroads Drive and South Railroad Crossing) and approx. 1,526 feet of 12-inch sewer interceptor along Leg 5 (between North Railroad Crossing and rear of Liberty Bldg), as part of OTC Interceptor.
OTC Interceptor-Leg 4, 6, 7	S805904	This contract is for the construction and inspection of 2,917 feet of 18-inch sewer interceptor along Leg 4 (between Crossroads Drive and former Nevamar and Formica properties) and approx. 1,341 feet of 12-inch sewer interceptor along Legs 6 and 7 (between Formica property and Breitwart Ave.).
OTC Sewer Interceptor-Leg 1	S805902	This contract is for the construction and inspection of 4,173 feet of 30-inch sewer interceptor along Leg 1 (between Severn Run Pump Station and Crossroads Drive), as part of Odenton Town Center Sewer Interceptor.
OTC Sewer-Severn Run SPS Upg.	S805905	This contract is for construction and inspection of Severn Run SPS upgrades, including expansion of wet well, provisions for storage, wet well cleaning and access.
Park West SPS Retrofit	S7918133	Design and construction to upgrade existing sewage pumping station to meet current control & operational standards.
Parole SPS Odor Control Rehab	S804902	This contract includes replacement of existing odor scrubber control panel, Sodium Hydroxide tank, Sodium Hypochlorite tank, chemical feed pump, level probe for sump pump monitor, PH probe, ORP probe and probe controller at Parole SPS.
Parole SPS Upgrade	S804901	This project includes the design and construction of Parole Sewage Pumping Station upgrade needed to improve its operation and reliability. Improvements include: replacement of pumps #1 and #3; replacement of influent screens with grinders; VFD and control upgrades; backup generator; odor control upgrade; valve and piping replacement; and others
Pasadena ES Sewer	S804501	Design, ROW acquisition and construction of a sewage pump station, 8" gravity sewer and 4" force main to serve the new Pasadena Elementary School.
Pasadena SPS Completion	S804502	This contract is for the emergency sole source completion of the construction of a sewage pumping station, and force main to serve the Pasadena Elementary School and a portion of the adjacent drainage area.
Patuxent ENR Grant Manager	S804102	The work in this contract includes grant management and negotiations with MDE.
Patuxent ENR Programming	S804103	This contract will provide PCS programming for the new aeration control system, blowers, and identification filters to be installed as part of the ENR project.
Patuxent WRF ENR	S804101	This contract includes all necessary work to upgrade the facility to meet an average effluent total nitrogen of 3.0 mg/L, and an average effluent total phosphorus of 0.3 mg/L.
Patuxent WRF Expansion	S806501	This contract includes design, construction and construction management for the expansion of the Patuxent WRF to a capacity of 11.60 MGD and will include addition of new process train, new process units, and modifications to existing units as needed.

Contract Title	Contract Number	Description
Petition-Parkway Ind. Pk Sewer	Z533262	This contract consists of Parkway Industrial sewer upgrades necessary for County take-over.
Regional Sludge Facility Study	S800701	Study will reevaluate the County's biosolids management strategy and develop biosolids management options that may include a regional biosolids processing facility. The study will consider current regulations, permitting requirements, rights-of-way, industry trends, MDE's stated preference for on-site WRF dewatered biosolids storage, class A biosolids disposal, renewable energy options and other markets for biosolids derived products. The objective is to define a flexible, sustainable, and cost-effective biosolids management strategy. Specific alternative sites for selected management options will be evaluated in later phases of the study as appropriate.
Replace BW WRF Blower Drives	S802343	This contract includes the purchase of 4 blower drives to be installed at Broadwater WRF.
Resurf. Adjust By Roads Div.	X7388162	This contract is to reimburse the County Roads Division for FY 12 water and sewer utility adjustments performed by their crews that were necessary during their road resurfacing contracts under their paving blanket orders. Includes adjusting structure heights and replacing structure covers to meet current County specifications. This cost was previously included in contract X7388120 for Road Material Purchases.
Ridgeview FM - SHA	S799004	Design/construct approx. 2000 linear feet of discharge force main and interceptor sewer from Rockenbach Rd. to Disney Rd under SHA contract # AA5805370.
Ridgeview Plaza Fm And Interceptor	S799002	Design/construct approx. 8,500 LF of discharge force main from the new Ridgeview SPS to the existing interceptor sewer along Ridge Rd. and Stone Castle Dr. SHA to complete remaining approx. 2,000 LF of force main and interceptor from Rockenbach Rd. to Disney Rd.
Ritchie Hwy Sewer Extension	Z533260	Complete a schematic design report to provide sewer service to three properties located on Ritchie Highway 1/4 north of College Parkway.
Riva Road CSJ Parallel FM	S800103	Design and construction of approximately 4890 LF of new 16" (18" HDPE) force main and 1135 LF of new 12" (14" HDPE) force main to convey wastewater from the South River Bridge along Riva Road to connect with the existing force main near Speicher Drive.
Riva Town Ctr 18"/24" Sewer Reln	X7388155	Relining of 18" and 24" gravity wastewater main behind Riva Town Center and intersecting Riva Road near Aris T. Allen Blvd beginning at manhole #33948 and ending at the Parole Pump Station. Included is the rehabilitation of 12 manholes. Continuation of X7388123. CMI services under X7388139.
Riva Woods SPS Upgrades	S804201	Design and Construction of improvements to the Riva Woods Sewage Pumping Station. Improvements include new pumps and motors; a new grinder; additional wet well capacity to meet MDE requirements for shellfish protection; new valves and pipe fittings in the dry well; a new emergency generator with enclosure, new electrical controls and panels; gas detection; dual bubbler level control system; wet and dry well ventilation; corrosion protection; a new water service; and site work.
Riviera Beach SPS Mods	S805201	This contract includes the planning, design, and construction of modifications (new MCC, portable bypass pump, bypass vault modifications, NFPA 820 compliance and new electrical utility service necessary to mitigate discharge of sewage from the Riviera Beach Sewage Pump Station.
ROW Cl G Tree/Old Mill/Solley	X7388153	Right of way clearing in three areas of Anne Arundel County: (1) 5,650 lf x 20 ft wide crossing Phirne Road from MH #2974 northeast to MH2815 (only 4,000 lf needs to be cleared), (2) 4,000 lf x 20 ft wide along the Old Mill Interceptor from MH #2830 north to MH #2818, and (3) 2,300 lf x 15 ft wide along Solley Road from MH #7888 to MH #15713. Clearing of a total of approximately 10,300 lf of sewer interceptor in wooded area in order to maintain vehicular access to manholes in case of emergency, repair and maintenance. CMI to be provided under X7388165.
ROW Cl Glen Burn/MD Cty/Arnld	X7388174	Right of way clearing in three areas of Anne Arundel County: [1] Glen Burnie (a) 1,500 lf x 10 ft wide over the Lorimer Road sewer line from MH #2078 to MH #2068, (b) 10,400 lf x 15 ft wide along the Hospital Drive sewer line from MH #11473 to MH #2109, and (c) 3,954 lf x 20 ft wide along the Bay Meadows sewer line from MH #16419 to MH #16406, [2] Maryland City (a) 2,800 lf x 30 ft wide along the Russett Green sewer line from MH #25594 to MH #25560-A and (b) 2,800 lf x 20 ft wide along the Maryland City sewer line from MH #2755 to MH #2763, and [3] Arnold 1,300 lf x 25 ft wide along the Shore Acres sewer line from MH #11485 to MH #11486. Clearing of a total of approximately 22,754 lf of sewer line in wooded area in order to maintain vehicular access to manholes in case of emergency, repair and maintenance. CMI to be provided under X7388165.
ROW Clearing - Deale Area	X7388125	Right-of-Way Clearing in the Deale Area for approximately 10,500 LF along a sewer interceptor. Duration is 60 CD.
Rte 50 Sewer Crossing	X7388135	This contract includes the investigation, design and construction necessary to rehabilitate or replace the Route 50 sewer crossing at MH19247.
Rust Removal/Cathodic Protect. Phase 2	S791896	Design, blasting & painting at 14 SPS: Fair Oaks, Cape Arthur 2, 3 & 5, Little Cypress Creek, Colchester, Boone Trail, Cedar Rd, Lakeland, Ben Oaks, Dill Rd., Long Meadow Cape St. Claire #4 & Round Bay #3. Note: Cathodic protection work will be completed in a separate contract TBD.
Sea Breeze SPS Retaining Wall	S791856	Design and construction replacement of retaining wall, installation of fall protection, and regrading at Sea Breeze SPS. This contract will also cover construction of S791855 and S791857 improvements (at Harbor Drive, Creek Rd, 7th Ave, Marley Ave SPSs).
Seventh Ave. & Marley Ave. Pump/Rail Replacement	S791857	Seventh Ave. SPS and Marley Ave SPS - Replacement of pumps, guiderails, (installation of comminutor was deleted during schematic design), fall protection, dual bubbler system, control panel modifications and electrical upgrades. To be bid and awarded with S791855 and S791856. See S791856 for contacts.

Contract Title	Contract Number	Description
Severn / Hanover Row Clearing	X7388176	Clearing ROWs over sewer lines through out the County. This contract will include design and construction of ROW clearings in Severn (Seven Oaks - 13,400 LF X 20 FT wide) and Hanover (Stoney Run Ext. 1 - 8,600 LF X 15 FT wide, Stoney Run Ext. 2 - 10,800 LF X 15 FT wide, and Old Coaling Tree Farm- 8,200 LF X 10 FT wide). Construction Management Inspection will be provided under X7388165.
Sewer Lateral Repl. FY11	X7388148	Replacement of two hundred (200) standard sewer lateral house connections of depths less than 12 feet throughout Anne Arundel County. CM services under contract X7388139. Duration is 365 calendar days. Previous contract X7388118. Construction management and inspection services to be provided by SER.
Sewer Main Repl Cm Serv Ph 2	X7388165	Renewable year long contract for Construction Management and Inspection services in support of the sewer main repair and replacement contracts.
Sewer Model Calibration FY11	X7388151	Sewer modeling and associated consulting services and software.
Sewer Model Calibration FY13	X7388173	Sewer modeling and associated consulting services and software thru Bentley Systems, Inc. Previous contract number was X7388151.
Sewer Program Mgmt	S802802	This contract includes project management services for wastewater class projects during the design, right of way acquisition, construction and performance phases. Funding for this contract will be reimbursed by the individual capital projects to be managed.
Sewer Project Mgmt	S802801	This contract includes project management services for wastewater class projects during the design, right of way acquisition, construction and performance phases. Funding for this contract will be reimbursed by the individual capital projects to be managed...
Sewer Recn/Repl CM Serv 08/09	X7388116	CM/Inspection services for multiple SER (System Evaluation & Rehabilitation) waste water projects to replace and reline sewer mains, laterals, manhole frame and cover adjustments, and more. This is a renewal based on the prior year's contract number X738894 for the same services.
SMR/R Belvedere	X7388171	Replace the existing 6-inch ductile iron force main from the Belvedere SPS to the 6-inch force main located in Broadwater Road. The new force main will be approximately 3100 LF in length and 6-inch HDPE pipe. The new force main will be installed along Alameda Branch, Sherman Ave, and Harmony Ave.
SMR/R Cape Arthur V	X7388170	Contact includes the construction of one of the sites in contract 142 SM DIA FMII: Cape Arthur V: 1,770 LF of 10" DIP on McKinsey Road from the pump station to manhole #2172,
SMR/R Manhattan Beach Fm Repl	X7388145	Replacement of approximately 2000 lf of 12 sewer force main from Manhattan Beach 1 pump station, along right-of-way to Dividing Creek Road, to existing sewer manhole 500035 at Rt. 2 by trenchless methods. Contract Duration 190 calendar days.
SMR/R Pine Drift Dr. Emerg.	X7388167	Work includes the emergency repairs of an existing sewer lateral located at 734 Pine Drift Drive, Odenton in the Piney Orchard Community. The pipeline failure is along the portion of the sewer lateral that connects the residential unit to the sewer main.
SMR/R Small Diamtr Replace 2	X7388142	This is a one year, small diameter sewer force main replacement contract utilizing trenchless methods for Cape Arthur V (1,770 lf), Whispering Woods II (3,727 lf), Belvedere Yacht Club (3,085 lf), Whitehurst (3,425 lf) and Valley Road (1,887 lf).
SMR/R Small Diamtr Replace 1	X7388141	This is a one year, small diameter sewer force main replacement design contract utilizing trenchless methods for Bay Ridge VIII (2,290 lf), Heritage Harbor I (1,125 lf), Hillsmere VI (3,838 lf), Doris Drive (2,768 lf), Haskell Road (1,600 lf) and Dill Road (1,013 lf).
SMR/R.-Valley Rd	X7388172	Contact includes the construction of two of the sites in contract 142 SM DIA FMII: Valley Road: 1,887 LF of 6" DIP along Valley Road from the pump station to Rock Hill Road, along Rock Hill Road to Farmview Road, along Farmview Road to manhole #4484 at Fort Smallwood Road.
Special Sewer Lateral Repl Fy10	X7388134	Replacement of 50 special sewer lateral service connections throughout Anne Arundel County. Duration 295 CD.
Special Sewer Lateral Repl Fy11	X7388146	Replacement of 50 special sewer lateral service connections throughout Anne Arundel County. Duration 295 CD. Construction inspection to be provided under X7388139.
SPS - Standby Power Phase 3	S791867	This contract provides funding for the replacement of generators, ATs, and fuel tanks at the following sewage pump stations; Boones Tr., Cape St. Claire #1, Dill Rd., Haskell Rd, Lakeland, Lakeview, Longmeadow, Margate, Morris Hills, Jones Station, and Twin Harbors 1,2,4,5.
SPS - WW Entry, Ladders, Landings, Venting	S791875	Design and construction of wet well entries, ladders, landings and ventilation. This work is split into 3 groups of SPS. All three groups will be designed consecutively but will be bid separately. This contract number will cover: Arundel on the Bay 2, 3, Hillsmere 7, Avalon Shores 2, Chalk Point, Main St., Rest Haven, West Shadyside. S791884 and S791885 cover several other stations.
SPS Big Cypress Retrofit	S791863	Big Cypress Creek SPS retrofit. Scope includes replacing all pumps, MCC, valves, moving all electrical controls to an aboveground enclosure, modification for NFPA 820 compliance, and generator replacement. This contract to cover design and design services during construction. Construction to be done under separate project, S806300.
SPS Boones Trail Improvement	S7918137	Funds are requested for design and construction to upgrade Boones Trail sewage pumping station to meet current control and operational standards. Upgrades shall consist of replacement of discharge isolation and check valves, installation of emergency bypass connection, NFPA upgrades to the ventilation system and control panels, new PLC based controls, painting, and fence replacement.
SPS Brandon Woods Up/Retro	S791893	Repair of pavement settlements that have developed in the vicinity of the existing soil odor filter in the Brandon Woods Sewer Pump Station yard. Injection grouting will be used to stabilize the soil that remains after excavation.

Contract Title	Contract Number	Description
SPS Broadcreek/Holly Road	S7918126	Funds are requested for design and construction to upgrade existing sewage pumping stations to meet current control and operational standards. Proposed upgrades to the individual station are: Broadcreek a pump and its guide rail system will be replaced. The control panel will undergo modifications. A new check valve vault and stand by power will be installed. Holly Road South a pump and its guide rail system will be replaced. The wet well entry will be modified. A new check valve vault and wet well ventilation will be installed.
SPS Cape Arthur 5 Pump Repl.	S791889	Design & replacement of existing pumps & motors; design & construction of pump station bypass, rust removal and painting, cathodic protection, wet well rehab and all associated electrical upgrades. Pump evaluation to examine shorter pump and motor assemblies such as vertical built-together pump. Scope expanded to include design and construction of suction/discharge valves.
SPS Cape Arthur Odor Control	S7918110	This contract will consist of design and installation of an odor control system to reduce and minimize odors at Cape Arthur 5 Sewer Pump Station.
SPS Cathodic Protection Rpr	S7918124	Investigation and evaluation of existing cathodic protection systems at 37 pumping stations in the Annapolis, Broadneck, and Mayo/Broadwater sewer service areas. A final report will document existing conditions, recommend replacement/repairs, and provide associated cost estimates.
SPS Cattail Odor Control	S7918107	This contract includes the evaluation of odor sources at the Cattail Sewer Pump Station, and any health impact the odors may have. Odor control modifications or replacement maybe necessary based on the results of the noted evaluation.
SPS Dartmth/Cape Anne/Col Bch	S7918127	Funds are requested for design and construction to upgrade existing sewage pumping stations to meet current control and operational standards. The upgrades to each individual station are listed below: Dartmouth a new bypass vault and wet well ladder will be installed. The station will also be repainted. Cape Anne a new bypass vault and wet well ladder will be installed. Columbia Beach a new bypass vault, wet well ladder, wet well vent, and a junction box will be installed.
SPS Fac Gen Replace Phase 4	S806201	This contract provides funding for construction of replacement generators, ATSS and fuel tanks at the following sewage pumping stations; Broadwater SPS, Cape Anne, Cape St. John 1, Columbia Beach, Dartmouth, Forked Creek, Franklin Manor 1, Heritage Harbor 1, Heritage Harbor 2, Krapish, Maryland City, Storch Property, Whispering Woods, #2.
SPS Fac Gen Replace Phase 5	S806202	This contract provides funding for construction of replacement generators, ATSS and fuel tanks at the following sewage pumping stations; Cabin Branch, Cattail Creek, Hillsmere I, Manhattan Beach I, Manhattan Beach II, and Manhattan Beach III.
SPS Fac Gen Replace Phase 6	S806203	This contract provides funding for construction of replacement generators, ATSS and fuel tanks at 5-10 sewage pumping stations. This contract is for construction only.
SPS Fac Gen Replace Phase 7	S806204	This contract provides funding for construction of replacement generators, ATSS and fuel tanks at 5-10 sewage pumping stations. This contract is for construction only.
SPS Gen Replace Design 1	S806205	This multi-year contract provides funding for design of the replacement and installation of generators at sewage pumping stations throughout Anne Arundel County.
SPS Gen Replace Design 2	S806206	This multi-year contract provides funding for design of the replacement and installation of generators at sewage pumping stations throughout Anne Arundel County.
SPS Marley Retrofit	S791862	This contract is for the design and design services during construction of the Marley SPS upgrades (S805401).
SPS Up/Retro Bay Ridge Area	S7918123	Design and construction of various improvements to: Hillsmere 2-5, 7 and Highland Beach 1, 2. Improvements include: new valves, pumps, emergency bypasses, guiderails, controls, fall protection, junction boxes, and hatches.
SPS WW Entry/Ladders/Land. 2	S791884	Design and construction of SPS wet well entry ways, ladders, landings and ventilation systems for the following pump stations: Chesapeake 1-2, Cape St. John 1, Ashberry Court (this site deleted), Belvedere Yacht Club (moved to phase 3) and Carrollton Manor 3 (this site deleted).
SPS WW Entry/Ladders/Land. 3	S791885	Design and construction of SPS wet well entry ways, ladders, landings and ventilation systems for the following pump stations: Forked Creek (entry mod only), Round Bay 1-2 (entry mods only) (Round Bay III deleted), Elizabeth Landing (landing & ventilation), Old Mill (landing), Ordinance Rd (entry mods & ventilation), Shoreland Dr. (ventilation).
State Hwy Relocation FY 04	X800005	This project is programmed for replacement and/or relocation of existing County Wastewater Infrastructure and Water Infrastructure which are required because of state highway construction.
State Hwy Relocation FY 05 06	X800006	This project is programmed for replacement and/or relocation of existing County Wastewater Infrastructure and Water Infrastructure which are required because of state highway construction.
Sylvan Shores Ps Upg	S804001	Design, construction of new 1.6MGD Sylvan Shores Sewage Pumping Station including a wet well, dry well, emergency storage vault, emergency overflow vault, modifications to the existing pumping station building including replacement of the existing generator, modifications to the generator building, installation of 300 LF of 8" diameter gravity sewer and manholes, installation of 100 LF of 10" diameter FM, a new ferrous sulfide odor control system, demolition of the existing sewage pumping station, soil odor control filter, ferrous sulfide odor control system and demolition/abandonment of the existing gravity sewer and manholes.
Sylvan Shores Sewer	S803801	Construct a sanitary sewer system to serve approximately 262 properties within the Sylvan Shores community.
Tanglewood WW Syst. Take Over	Z533264	County take over of Tanglewood development sewer system. System will be inspected and repaired as necessary. All work to be coordinated by DPW Operations.

Contract Title	Contract Number	Description
Up/Retro-Forked Creek Odor	S7918115	Contract consists of installing a new Odophos odor control system at the Forked Creek Sewage Pumping Station.
Waterview SPS Retrofit	S7918132	Design and construction to upgrade existing sewage pumping station to meet current control and operational standards.
WRF Effluent Wells	S802701	Design and construction of effluent stilling wells at the Broadwater WRF and Maryland City WRF. The wells are required to allow calibration of flow meters.
WRF Up/Retro-Brdnk Chem Tank	S802337	Replacement of caustic storage tank. Current tank is fiberglass, 11,000 gallons and heated.
WRF Up/Retro-Broadwtr Clarif.	S802335	This contract includes design, construction and inspection services needed to provide two new isolation valves upstream of the primary clarifiers and new bar screens on the septage receiving station.
WW Service Conn FY13	X741216	Wastewater service connections FY13.
WWPP Mid-Size Swr Extensions	X764237	This contract includes developing preliminary layouts, sizing and cost estimates for extending public sewer to allow decommissioning of existing septic systems in Severn areas.
WWPP-Millersville Lab Upgrade	X764231	This contract includes conducting a feasibility study of expanding the Millersville Testing Laboratory.
WWSS CM/I Services	S804603	This contract is to provide on call CM/I services for the Wastewater System Security. This also is for permitting assistance.
WWSS Fencing Mayo	S804604	Design & construction of fencing around SPS: Phase 1: Carrs Ridge 1-5, Selby 3-4, Glebe Heights 2-5, Holly Hill 2, River Club, Turkey Point 3 Phase 2: Beverly Beach 3-4, Loch Haven 2, Selby 2, West Shore 1-2, Franklin Manor 2, Shoreham 1-2, Turkey Point 2 Ops Team Manager: Mike Matthews
WWSU Software / Dispatch Area	S798107	This contract includes upgrading the SCADA software and renovating the dispatch area

TABLE 4-36
Wastewater Capital Improvement Projects, City of Annapolis

Project Title	Project Number	Description
Sewer Pump Station Rehab	72002	Replacement of sewage pumping stations, pumping station components and/or pumps. There are 25 pump stations in the City and most have aging pumps and other components that pose a significant potential of failure, and thus a threat to the health and safety of the citizens. Several pumps have failed, requiring immediate dispatch of emergency pumps to prevent sewage spill, causing an adverse impact on the cost of operation. Some of the pumps are so old that parts have to be specially made for them. Pump Station generator failures have also occurred, resulting in no back-up power in the event of a power failure. One of the pump stations, Whitton Ct., requires complete replacement. This prefabricated "Tin Can" pumping station consists of an underground steel shell containing the pumps and controls. This station is in excess of 30 years old and the steel containment vessel is at the end of its design life. In all cases, new high efficiency or variable speed drive pumps result in longer pump life, reduced energy consumption, and more constant flow in down stream pipes
SCADA / Radio Upgrade	To Be Determined*	This project will replace the obsolete controls and communications system of Supervisory Controls And Data Acquisition (SCADA) information from the City's sewage pump stations to the central system at 935 Spa Road and from the water tanks to the WTP chart recorders. The new wastewater collection SCADA system project is underway. The new water tank SCADA system will include LC3000 master telemetry system at the Water Treatment Plant and LC2000 remote telemetry units at each tank site. Communication will be using VHF radio (licensed through FCC), which after the original licensing process, has only a small annual relicensing fee (which may be waived for local governments), allowing the City to eliminate the costly monthly telephone lease lines.
Sewer Rehabilitation & Upgrades	72004	Over half of the City's sewers are greater than 50 years old, and many are over 80 years old and require repair. Based on a useful life of 80 years, our financial consultant has calculated the required sewer rehabilitation capital needs for the next 20 years to address the sewers that have exceeded or will reach the end of their useful life. Most of the pipes needing rehabilitation can be lined using trenchless methods. Others will need replacement. The decision is made based on site investigation. This project is expected to be multi-year and focused on the oldest pipes, including those in the Eastport and Historic District areas. The majority of the pipes are either vitrified clay (terracotta) pipes, which often have joint failures, or concrete pipes, which deteriorate due to the sewer gases. Pipe joint failures and other leaks due to deterioration typically cause increased infiltration, pumping, and treatment needs and costs. In addition, the environmental impact of pipe failure is of concern.

* FY13 SCADA CIP project number is 72010

Appendices

APPENDIX A
WATER AND SEWERAGE SYSTEMS DESIGN CRITERIA

1. WATER SYSTEM DESIGN CRITERIA

A. Water Demand and Peaking Factors by Zoning Classification (Residential Districts)

Zoning	Projected Population per Acre	Projected Dwelling Units per Acre	Projected Avg. Flow per Acre @ 100 gpd	Maximum Day Peaking Factor	Maximum Day Demand gpd/DU	Maximum Hr. Peaking Factor
RA	0.54	0.1	54	2.7	-	3.8
RLD	0.54	0.2	54	2.7	-	3.8
R-1	2.59	1	259	2.7	699	3.8
R-2	4.71	2.5	471	2.7	509	3.8
R-5	8.96	3.5	896	2.4	614	3.5
R-10	18.81	10	1,881	2.4	451	3.5
R-15	25.88	15	2,588	1.9	410	3.3
TC	21.66	12	2,166	1.9	343	3.3
R-22	30.68	22	3,068	1.6	223	3.1

B. Water Demand and Peaking Factors by Zoning Classification (Non-Residential and Mixed Use Districts)

Zoning	Projected Avg. Flow per Acre	Maximum Day Peaking Factor	Maximum Day Demand GPD/DU	Maximum Hour Peaking Factor
C1	1,300	1.4	1,820	2.0
C2	500	1.3	650	1.6
C3	1,300	1.4	1,820	2.0
C4	1,300	1.4	1,820	2.0
MA1	1,300	1.4	1,820	2.0
MA2	1,300	1.4	1,820	2.0
MA3	1,300	1.4	1,820	2.0
MB	1,300	1.4	1,820	2.0
MC	1,300	1.4	1,820	2.0
MXD-R	3,000	1.4	4,200	2.0
MXD-C	3,000	1.4	4,200	2.0
MXD-E	3,000	1.4	4,200	2.0
MXD-T	3,000	1.4	4,200	2.0
OTC districts	3,000	1.4	4,200	2.0
SB	1,300	1.4	4,200	2.0
W1	500	1.3	650	1.6
W2	500	1.3	650	1.6
W3	1,000	1.1	1,100	1.4

C. Fire Flows

Use	Fire Flow
Residential ¹ :	
Single Family ²	1,000 gpm at 20 psi residual
Townhouses (R-5)	1,500 gpm at 20 psi residual
Garden Type Apts. (R-15)	2,000 gpm at 20 psi residual
High-Rise Apts. (R-22)	2,500 gpm at 20 psi residual
Commercial:	
Regional Shopping Centers (C-3)	3,000 gpm at 20 psi residual
Office Buildings	3,000 gpm at 20 psi residual
Institutions:	
Hospitals	2,500 gpm at 20 psi residual
Schools	2,500 gpm at 20 psi residual
Industrial:	3,000 gpm at 20 psi residual

D. Sizing of Facilities

Facility	Criteria
Wells supplying a single treatment facility	Operating: Must provide maximum daily demand with all wells operating (except standby) for a 24-hour period of operation; or Standby: In addition to the operating wells required above, provide extra well capacity in each well field equal to at least 25% of the required operating capacity (i.e., a minimum of 20% of the total well field capacity) for use as standby. Standby wells shall be at least equal in capacity to the largest operating well in a well field or group of independent wells.
Treatment Plants	Maximum day demand
Pumping Stations discharging into system and Transmission Mains	Maximum day demand
Storage Facilities	Operating or Equalizing Capacity for each pressure zone; 20% of maximum day demand, plus <u>Fire Reserve:</u> (all residential) 1,000gpm for 2 hours = 12,000 gal., or (residential and commercial) 3,000gpm for 3 hours = 540,000 gal, plus <u>Emergency Reserve:</u> 50% of average day demand
Minimum Tank Size	2,000,000 gal. ³
Distribution System	Peak hourly demand while maintaining a minimum 30 psi residual pressure at curb Maximum daily demand while maintaining a minimum of 40 psi at the curb

2. SEWERAGE DESIGN CRITERIA FOR MASTER PLAN

- A. The annual average daily flows are calculated by summing the domestic contribution and infiltration component, plus the industrial contribution. Flow criteria will be in accordance with approved County's *Design Guidance for Wastewater and Waterworks Facilities, Part A, Appendix D*. See page A- 4.

¹ Above fire flows to be used in the absence of site specific data from fire underwriters or construction plans, which would permit a determination of fire, flow requirements using insurance industry standards (Insurance Services Office - ISO). Consideration will be given to reducing the requirement where proposed construction includes sprinkler systems; refer to current ISO recommendations.

² Consideration will be given to reducing the requirement to 750 gpm where it can be demonstrated the 1,000 gpm is technically unfeasible.

³ General criteria; may be some instances requiring smaller tanks.

Peak Design Flow = Peak Flow + Peak Commercial Flow + Peak Industrial Flow + Infiltration and Inflow Allowance⁴

Peak flows are equal to the annual average flow multiplied by the peaking factor obtained from the Maryland Department of Environment empirical curve shown under Anne Arundel County, Department of Public Works, *Design Guidance for Wastewater and Waterworks Facilities, Part A, Appendix G, Peak Flow Curve*. See page A- 5.

Infiltration flows are considered to be constant flow rates and are not included when determining peak flow rates.

- B.** Pumping stations, force mains and interceptors are sized for peak design flows as defined in item A. above.
- C.** The nominal capacity (based on the annual average daily flow) of the treatment plant is the rated size. The required sizes of certain treatment units within the plan are determined based on the average daily flow expected to occur during the maximum month, since effluent limitations contained in the NPDES Permit must be satisfied under this condition. The maximum month average daily flow (i.e. plants design flow) will be equal to 120% of the annual average flow. However, hydraulically, the treatment components should be designed for the peak design flows, as defined in item A. above.
- D.** The determination of the time schedule for providing additional treatment plant capacity is based on having the expanded facilities operational at the time the projected average daily flow occurring during the maximum month equals the nominal or rated capacity of the existing plant. For purposes of developing cost estimation totals, the projected costs have been tabulated as being funded during the year preceding the date required.

BASIS FOR WASTEWATER FLOW PROJECTIONS BY ZONING FOR UNDEVELOPED OR PARTIALLY DEVELOPED AREAS

Zoning	Projected Population per Acre	Projected Dwelling Units per Acre	Projected Avg. Flow (250 gpd per EDU^{5, 6})	I / I per Acre @100 gpd/acre
RA	0.54	0.1	---	---
RLD	0.54	0.2	---	---
R-1	2.59	1.0	250	100
R-2	4.71	2.5	625	100
R-5	8.96	3.5	875	100
R-10	18.81	10	2,500	100
R-15	25.88	15	3,750	100
TC	21.66	12	3,000	100
R-22	30.68	22	4,400	100

⁴ Peak factors for Commercial and Industrial flows are determined on a case by case basis.

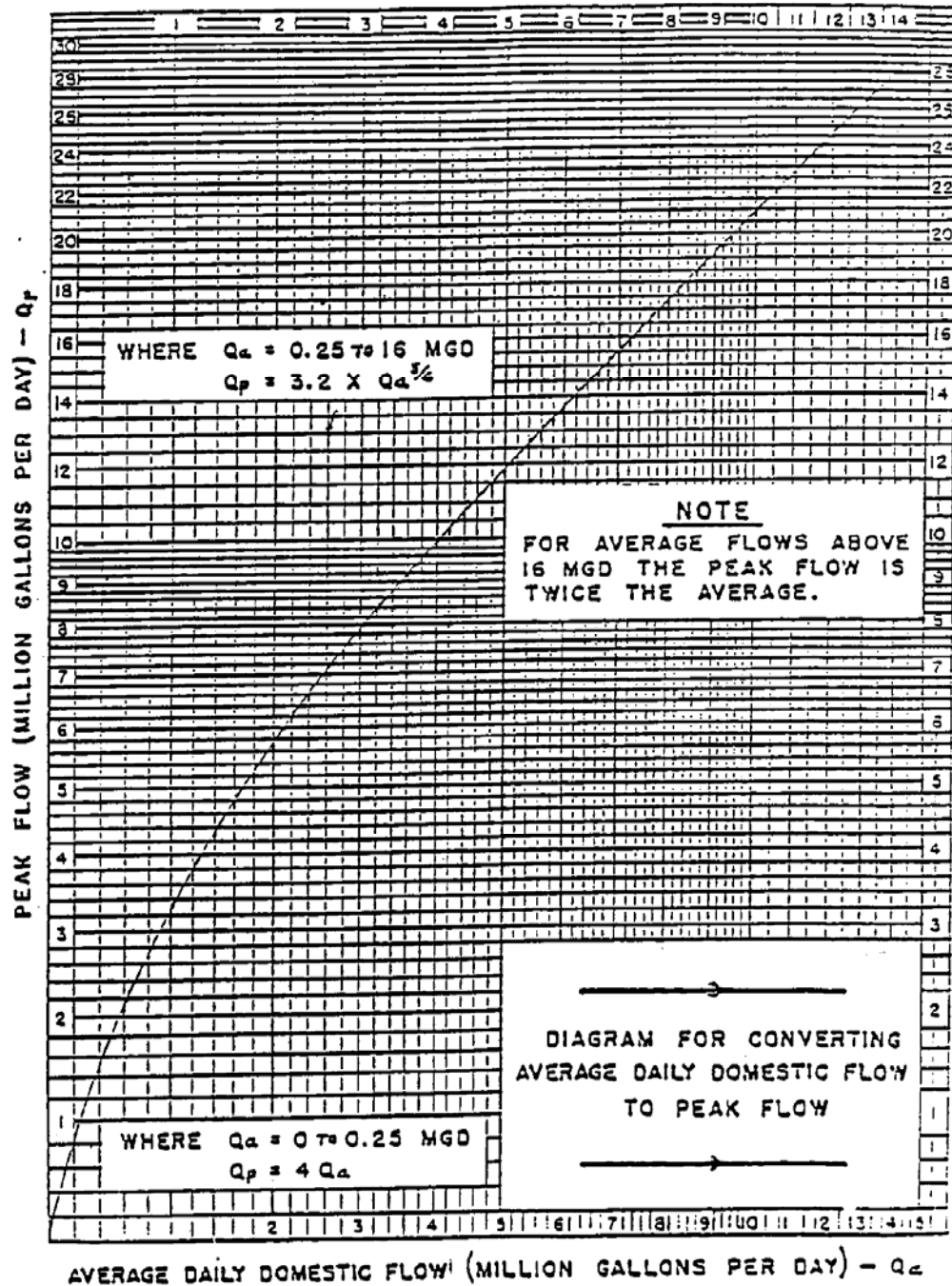
⁵ EDU = Equivalent Dwelling Unit. This unit could be a townhouse or single-family unit. An apartment unit is estimated at 200 gpd per unit.

⁶ 250 GPD/EDU has been adopted by the County for wastewater for all service areas. Using 250 GPD/EDU provides much better basis for allocating capacity on a county-wide basis than varying rates from sewer service area to sewer service area and majority of development in the County may be considered to fall in the medium density R5 zoned areas.

Zoning	Average Flow per Acre (gal)	I / I per Acre @ 100 gpd/acre
C1, C3, C4, SB, MA1, MA2, MA3, MB, MC	1,300	100
W1, W2, C2	500	100
W3	1,000	100
MXD-R, MXD-C, MXD-E, MXD-T	3,000	100
OTC districts	3,000	100

PEAK FLOW CURVE

(from State of Maryland "Design Guidelines for Sewerage Facilities")



APPENDIX B

SEWER / WATER ALLOCATION MANAGEMENT SYSTEM

The Sewer/Water Allocation, Management and Planning System (SWAMP) is a computerized system providing the County with rapid and accurate means of tracking water and sewer system capacity. Its purpose is to assess current development plans, to ensure water and sewer capacity is available for the development, and to provide an engineering planning tool useful in conducting strategic planning, recommending capital improvements, and preparing updates to the Master Plan for Water Supply and Sewerage Systems.

Operation and maintenance of the SWAMP system involves input from the Departments of Public Works, Inspections and Permits and the Office of Planning and Zoning. Data input requirements from the four County departments include: engineering data on each new segment of the water and sewer systems, water consumption, the status of properties including location, utility service, land use, acreage, and priority level for service. The input is inventoried and cross-referenced to operating maps on file at the Department of Public Works so that any portion of the system can be identified and analyzed.

The SWAMP system has the capabilities to:

- A. Determine the annual average water consumption for each serviced property.
- B. Determine the total daily water consumption by water and sewer system segments.
- C. Determine the adequacy of the hydraulic capacity for any gravity sewer segment under existing flows or simulated future flows and reports any inadequate segment(s) and the magnitude of the inadequacy.
- D. Perform hydraulic calculations for the water distribution system to determine residual pressure and flow conditions at all points in the system under any simulated condition.
- E. Perform hydraulic calculations for sewer pump station\force main systems to determine operational parameters under simulated conditions.

The County's hydraulic models have the ability to perform gravity and pressure analyses as well as extended period simulations. The results can be displayed in either graphical or tabular formats. This has greatly increased the County's ability to analyze the systems and conduct strategic planning.

ALLOCATION OF WASTEWATER AND WATER CAPACITY

In order to comply with Title 9, Subtitle S, Water and Sewer Planning of the Health and Environmental Article of the State Code, the County Council enacted Bill 72-88 as Article 27, Title 3 of the County Code. This allows an Allocation Committee, comprised of the Planning and Zoning Officer, Director of Public Works, and the Core Group Leader and/or their designees, to allocate public water or wastewater service to a subdivision prior to final

subdivision approval, if adequate capacity exists. For industrial subdivisions, a tentative allocation may be assigned at the sketch plan approval stage.

Allotment of Capacity

The Allocation Committee may establish allotments on a service area basis as set forth in the most current version of the Anne Arundel County Master Plan for Water Supply and Sewerage for the following uses:

- a. Public health needs
- b. Public service needs, including County Capital Projects
- c. Assisted housing
- d. Buildable approved lots
- e. County-assisted economic and community development projects
- f. Minor subdivisions, family conveyance subdivisions, and administrative plats
- g. Major subdivisions and planned unit developments
- h. Planned commercial complexes and industrial subdivisions
- i. Reserve capacity

The Allocation Committee may at any time redistribute allotments in order to reflect changes in market demands, development inactivity, or needs of the community and County; and establish sub-uses to the uses listed.

Uncommitted water and wastewater capacity is determined on a regular basis. The Allocation Committee regularly issues a public report of changes in the proportion of allocations available to uses and the availability of unallocated capacity. A copy of the latest report is available by request from the Department of Inspections and Permits.

Water and wastewater capacity is contingent on the availability of Federal, State, or County funds to finance water and wastewater Capital Projects. The County is not responsible for providing water or wastewater service and is not liable for monetary damage for the failure to provide service if the County is unable to acquire rights-of-way necessary for the construction of water or wastewater Capital Projects. The County is not responsible for any Federal or State action, including operational moratoria, that temporarily suspends, delays, or otherwise affects an allocation, or if a contractor defaults on a County water or wastewater project in the service area in which an allocation has been made, or any other contingency that affects the timing or ability to connect that is beyond the control of the County.

Private Financing for Additional Capacity

If a subdivider agrees to provide or finance, at no cost to the County, the cost of all or part of the construction of or addition to a Capital Facility that the County will not immediately provide, the County may allocate water or wastewater capacity for the subdivider's project in an amount up to the capacity provided or financed by the subdivider.

Effect of Zoning Action

The grant of a reclassification, special exception, or other zoning action does not entitle any person to an allocation of water or wastewater capacity for that property.

If a building permit is revoked or for any reason becomes void, the allocation, 20% of the Capital Facility connection charge, and any other fees paid as a part of the building are forfeited.

APPENDIX C

BIOSOLIDS (SLUDGE) MANAGEMENT

In this section, the current biosolids (sludge) handling and utilization/disposal practices are discussed. This includes sludge management activities, sludge production rates and methods of utilization/disposal.

1. Background

There are seven operating wastewater treatment plants owned and operated by Anne Arundel County and one groundwater facility. These plants range in capacity from 0.615 MGD to 15 MGD at the largest water reclamation facility. All plants are similar in that they provide secondary treatment with activated sludge processes. The seven wastewater plants have been or are in the process of being modified to accomplish Enhanced Nutrient Removal (ENR) with various types of activated sludge processes. The groundwater facility was designed to remove solids and accommodate a flow of 0.446 MGD.

In April 1984, the Anne Arundel County Department of Utilities entered into an agreement with Wheelabrator Water Technologies, Inc. (WWT, Inc.), Bio Gro Division, to manage the processing and utilization/disposal of all generated wastewater biosolids. The contract included the installation and operation of on-site dewatering and biosolids stabilization facilities. The County has closely monitored the contract and is satisfied that the contractor has insured its integrity. The land application contract was re-bid in July 2005 and was awarded to Synagro Technologies Inc., who purchased WWT, Inc., Bio Gro Division. The contract runs for a ten-year period ending June 30, 2015.

2. Current Situation

Synagro Technologies Inc. is currently contracted to provide the following services at the Annapolis, Broadneck, Broadwater, Cox Creek, Maryland City, and Patuxent Water Reclamation Facilities:

- A. Receiving, dewatering and lime stabilizing processed biosolids.
- B. Removal and disposal of biosolids through land application at permitted sites within the state of Maryland.
- C. Providing off-site storage for biosolids when land application is restricted due to atmospheric conditions.
- D. Ensuring that their operation:
 - a. Allows biosolids to be removed in a timely manner so as not to interfere with the operation and process of the supported facility that may create a condition that would cause deterioration of plant effluent and increased operating costs caused by the accumulation of excessive biosolids by-products.

- b. Does not create any condition that would cause objectionable odors to be emitted from the supported facility.
- c. Has a contingency that would prevent the storage of biosolids in excess of its permitted storage capacity.
- d. Maintains sufficient permitted land application acreage that would provide for the disposal of one year's biosolids production.

Table C-1 summarizes the type of biosolids handling systems currently in use at the County's treatment plants, bio-solid generations, and process data for the County facilities.

TABLE C-1
Biosolids Management Matrix

WRF	2008 Biosolids Generated		2009 Biosolids Generated		2010 Biosolids Generated		2011 Biosolids Generated	
	DRY TONS	WET TONS	DRY TONS	WET TONS	DRY TONS	WET TONS	DRY TONS	WET TONS
Annapolis	5,029	33,254	3,972	30,760	3,931	24,261	3,718	15,820
Broadneck	1,789	13,539	1,559	12,479	1,576	8,998	1,682	9,142
Broadwater	473	1,575	498	1,705	421	1,421	475	18,097
Cox Creek	5,394	22,108	5,136	20,675	5,308	19,367	5,140	18,097
Maryland City	677	4,791	533	3,888	519	3,712	616	2,970
Patuxent	2,975	21,439	2,297	18,172	1,950	15,275	1,992	9,918
Mayo	N/A							
TOTAL	16,338	96,707	13,995	87,679	13,704	73,034	13,624	74,044

3. Sludge Stabilization

At six of the County-owned treatment plants - Annapolis, Broadneck, Broadwater, Cox Creek, Maryland City, and Patuxent - stabilization is accomplished by the addition of lime in sufficient quantity to raise the pH to 12 or higher. The high pH creates an environment that is not conducive to the survival of pathogenic organisms. Consequently, the biosolids should not putrefy, create odors, or pose a health hazard.

The Mayo facility is a land treatment facility and minimal biosolids are generated. However, some generated liquid waste is transported to a County-owned WRF where the material is disposed of through their de-watering system.

4. Dewatering

At the present time, dewatering is accomplished with belt filter presses at all facilities.

5. Utilization/Disposal

The primary method of biosolids disposal in the County is through land application. This has been, and continues to be, performed on both agricultural and marginal sites. (Note: by State of Maryland definition, “marginal” sites are those that exhibit poor quality of topsoils resulting from surface mining or grading. Such sites are typically permitted at biosolids utilization/disposal rates higher than agronomic applications to replenish nutrients and organic matter to the soils).

6. Site Permitting Program

Under present State regulations, an operating permit must be obtained from Maryland Department of the Environment (MDE) to transport and dispose of biosolids. The County's land application site permitting program is presently administered, operated and managed by WWT, Inc., Bio Gro Division.

7. Future Situation

As part of the current sludge handling contract, Synagro upgraded dewatering equipment at one of the Water Reclamation Facilities (WRFs). A capital project is currently underway to upgrade dewatering equipment at the four other WRFs. The upgrades will provide redundancy, increase reliability, improve efficiency, and optimize the biosolids handling operations. In addition, Anne Arundel County is undergoing a Regional Biosolids Facility Study that will examine biosolids sustainability and evaluate alternatives for recycling biosolids in future operations.

A recent change to the Maryland Department of Agriculture (MDA) regulations limits fall application of nutrients beginning October 2012 and prohibits winter land application in 2016. As a result, upcoming capital projects could include developing storage facilities and strategies, as well as developing pilot projects with public and/or private entities.

APPENDIX D

GROUNDWATER PROTECTION PLAN

The Groundwater Protection Plan documents and summarizes County Department of Health policies and programs regarding on-site sewage disposal systems (septic systems) and the protection of groundwater quality where public sewer is not available.

1. On-site Sewage Disposal Systems Serving New Construction
(New structure on previously unimproved lot)

It is County policy to permit on-site sewage disposal systems for new construction only where an unsaturated soil treatment zone of four feet or greater can be maintained. Sand mound systems may be utilized to obtain the four-foot treatment zone.

Variances may be granted by the Department of Health where nitrogen-reducing advanced pretreatment technologies are utilized for the development of existing lots of record. The on-site sewage disposal system be reduced to meet the minimum requirements of COMAR 26.04.02.

2. Repair of Failing On-site Sewage Disposal Systems

2.1 Repairs or replacements of existing failed on-site sewage disposal systems shall maintain a four foot treatment zone of unsaturated soil whenever available.

2.2 When a failed on-site sewage disposal system cannot be repaired by a conventional system design, non-conventional system designs may be considered. Selection of a non-conventional system design will give first consideration to maximizing the soil treatment zone but may include any or all of the following.

2.2.1 Installation of a system with less than the minimum design size or horizontal setbacks as required by County regulation due to area limitations created by separation requirements from water supply wells, property lines, streams, etc. Future increases in the finished square footage of the existing dwelling are not permitted unless the limited home addition requirements are met. Water conserving plumbing fixtures may be required.

2.2.2 Installation of a non-conventional system utilizing advanced pretreatment technologies to improve effluent quality prior to discharge to an on-site sewage disposal system with less than a four-foot soil treatment zone. Every effort will be made to maximize the unsaturated soil treatment zone.

2.3 When a repair to a failing on-site sewage disposal system cannot be achieved utilizing any of the above options, a holding tank will be recommended.

3. On-site Sewage Disposal Systems Serving Existing Residential Structures for Which New Construction (Additions) is Proposed.

The Code of Maryland Regulations 26.04.02.02D states that the County may not issue a building permit to alter any residence served by an on-site sewage disposal system until the Approving Authority (Department of Health) has certified the existing on-site sewage disposal system as capable of handling the existing sewage flows and any reasonable foreseeable increase in sewage flows. The Anne Arundel County Department of Health conducts a review of the existing on-site sewage disposal system whenever an increase in the finished square footage of a house is proposed or where the building addition may adversely affect the on-site sewage disposal system, designated future replacement areas or water supply wells. The Department of Health may recommend County approval of building permits for proposed home additions under the following conditions:

- 3.1 If a review of records indicates that the existing sewage disposal system and proposed building addition meet all current State and County requirements, including a four foot unsaturated soil treatment zone and sufficient system replacement areas, building permit approval may be recommended.
- 3.2 If records of the existing sewage disposal system are insufficient, the existing system is evaluated on site. Percolation tests, auger borings, and partial excavation of the existing sewage disposal system may be performed. If the evaluation indicates that the sewage disposal system and proposed building addition meet all current State and County requirements, including a four foot unsaturated soil treatment zone and sufficient system replacement areas, building permit approval may be recommended.
- 3.3 If records and/or on-site data indicate that the existing sewage disposal system has insufficient capacity or will not provide adequate treatment for the proposed construction, building permit approval is recommended only if the necessary modifications are made to the sewage disposal system to meet all current State and County requirements, including a four foot unsaturated soil treatment zone and sufficient system replacement areas.
- 3.4 If records and/or on-site data indicate that the existing sewage disposal system has insufficient capacity or will not provide adequate treatment for the proposed construction and the site is not suitable for the installation of a system that meets current State and County requirements or there are not sufficient system replacement areas, disposal system certification and building permit approval for a limited home addition may be recommended if the existing disposal system is improved to handle the existing sewage flows by the installation of advanced pretreatment technology and a design which maximizes soil treatment and protection of water supplies and groundwater.

Measures to protect existing water supplies and groundwater include installation of water tight septic and pump tanks, increased horizontal and/or vertical separations between on-site sewage disposal systems and existing water supply wells, and replacement of existing water supply wells into confined aquifers.

Special conditions may be added to well construction permits for the protection of groundwater.

Limited home additions are restricted to a maximum increase in the finished square footage of the house of no more than 50% and no more than 1000 square feet with no increase in the number of bedrooms. This limited home addition standard allows an existing house to be razed and replaced by a new house sized within the above criteria.

Limited home additions are allowed only when all of the following conditions are met:

- 3.4.1 The existing house has a bathroom and an on-site sewage disposal system that is functioning hydraulically or has a repairable failure.
- 3.4.2 The existing house is physically occupied and has not been vacated or abandoned within three (3) years prior to the date of application.
- 3.4.3 The proposed building addition does not increase the finished square footage of the house by more than 50% and no more than 1000 square feet where nitrogen-reducing technologies are utilized.
- 3.4.4 The limited home addition does not increase the number of bedrooms of the existing dwelling.
- 3.4.5 Construction plans are required showing the existing structure and proposed building addition.
- 3.4.6 The footprint of the proposed limited home addition does not adversely impact the on-site sewage disposal system, designated future replacement areas, or water supply wells. Existing water supply wells are not jeopardized by the sewage disposal system modifications.
- 3.4.7 The on-site sewage disposal system will utilize an unsaturated soil treatment zone in preference to a saturated soil treatment zone and allow no surfacing of effluent.
- 3.4.8 The advanced on-site wastewater treatment system is approved and installed before the building permit for the building addition is issued except where hardships can be demonstrated, a property owner may request a building permit be issued where 125% of the construction costs of the sewage disposal system modifications are placed in an escrow account with the Department of Health.

APPENDIX E

SEPTAGE MANAGEMENT PLAN

1. References

- a. COMAR 26.04.02 “Sewage Disposal and Certain Water Systems for Homes, and Other Establishments in the Counties of Maryland Where a Public Sewage System is Not Available.”
- b. COMAR 26.04.06 “Sewage Sludge Management.”

2. General

This Septage Management Plan details how Anne Arundel County is in compliance with the aforementioned regulations.

3. Septage Quantity Forecast

- a. A recent study conducted by the County’s Health Department determined that there were approximately 41,000 septic systems in the County. The County’s Water and Sewerage Master Plan reports there will always be “No Public Service Areas.” This will require homes built in those areas to utilize septic systems.
- b. Each household with a properly functioning septic system generates approximately 250 gallons of septage annually. Using this factor, annual generation of septage in the County is estimated at 10.2 million gallons.
- c. Through normal usage, a properly functioning septic system requires maintenance (solids removal) every 3 to 5 years. If the septic system is failing or used as a holding tank, more frequent removal of septage is necessary, substantially increasing the total volume of septage generated in the County that must be removed. (See par. 4(c)(4)).
- d. Septic haulers reported transporting Anne Arundel County produced septage to other jurisdictions for disposal starting in 2006. The continuation of this practice and the amount cannot be assured. Political concerns, environmental regulations and public perception may change or influence this practice, requiring the County to provide the necessary facilities to accommodate the added volumes.

4. Responsibilities

This plan is administered jointly by three agencies of Anne Arundel County: the Department of Health, the Department of Inspections and Permits, and the Department of Public Works, Bureau of Utility Operation.

- a. The Department of Health:

- (1) Inspects vehicles used to pump and transport sewage within Anne Arundel County and ensures compliance with federal, state and local regulations.
 - (2) Inspects grease interceptors of commercial facilities (restaurants, hotel kitchens, bars, factory cafeterias or restaurants, clubs or other establishments engaged in the preparation of food) that discharge to a septic system and ensures the interceptor is operated and maintained in accordance with the Anne Arundel County Plumbing Code. (Grease generated by the aforementioned cannot be allowed to enter the County's wastewater treatment system, for its slug loading will have a deleterious impact on the system's biological process, making the resulting sludge unfit for agricultural application). The requirement for conducting this inspection is found in COMAR 10.15.13.
 - (3) Inspects septic systems of applicants seeking a reduced disposal rate under the Department of Public Works Holding Tank Program. The Health Department determines whether the system qualifies as a Holding Tank under COMAR 26.04.02.03B, or whether a repair to the septic system can be made. The Health Department recommends to the DPW a 2-year permit for approved holding tank systems, or a 90-day temporary permit where septic system repairs are possible.
 - (4) Reviews requests from marinas to discharge marine-generated septage into the County's wastewater system (coordinated by DPW).
- b. The Department of Inspections and Permits issues licenses to operate within Anne Arundel County to septic haulers, in accordance with the Anne Arundel County Code and other existing regulatory parameters. Inspections and Permits also reviews requests from marinas to discharge marine-generated septage into the County's wastewater system (coordinated by DPW).
- c. The Department of Public Works, Bureau of Utility Operations:
- (1) Issues Hauled Waste Discharge Permits to properly licensed and inspected liquid waste haulers desiring to discharge into the County system.
 - (2) Accepts septage at the County's three septage receiving points (SRP) during normal business hours:
 - (a) Annapolis WRF, 7228 Edgewood Road, Annapolis, MD,
 - (b) Broadwater WRF, 1161 Deep Cove Road, Churchton, MD,
 - (c) Cox Creek WRF, 8833 Wagner Station Road, Curtis Bay, MD (near Riviera Beach).
 - (3) Manages the County's Marine Sanitation Pumpout Systems program by reviewing requests from those marinas located within the County that are

installing pumpout systems in accordance with Maryland State regulations, and who require permission to discharge the generated wastewater into the County's wastewater system either through a direct connection into the sewer pipes, or by having a septic hauler transport same to a septage receiving station. Requests are routed through a committee chaired by DPW and composed of representatives from the Department of Health, and Inspections and Permits. Comments from the reviewers are compiled and sent to the applicant for action. Once all parameters are met, DPW issues a Special Agreement. The Special Agreement is forwarded to the Maryland Department of the Environment, the Department of Natural Resources, and the septic hauler (if applicable). DPW monitors the discharge through periodic inspection of the facility.

- (4) Manages the County's Holding Tank program that offers a reduced septage disposal rate to those qualifying for same. The DPW issues the permit based on Health Department recommendations and their final review. A two-year permit fee is charged and holding tank disposal tickets are sold to the permittee, which eliminates the need to charge the hauler when their septage is brought to a receiving facility. For those receiving a temporary permit, a permit fee is not charged; however, they must pay for the holding tank disposal tickets that they receive.

(a) As of September 2012:

1. There were 30 customers participating in the two (2) year program.
2. Gallons received by fiscal year were:

	FY 06	FY 11
Gallons of holding tank waste received	2,520,000	2,593,180
Gallons of septic tank waste received	1,528,300	3,309,280

5. Conclusion

- a. Anne Arundel County is currently in compliance with the disposal parameters of the regulation.
- b. Septage received is discharged into the facilities headworks or holding tank of the treatment process with other sewage where it is biologically treated, dewatered and lime stabilized prior to disposal through the department's bio-solids management program.

- c. The aforementioned facilities have the capacity to accept the septage forecasted and generated within Anne Arundel County, excluding that septage which is grease-laden and generated by commercial facilities. NOTE: It is the generator's responsibility for disposing of grease-laden septage through an outlet such as a rendering plant. If subject septage can be pre-treated, disposal at a County facility would be approved.
- d. The County does not accept any septage generated outside of Anne Arundel County.
- e. The County has four additional water reclamation facilities (wastewater treatment plants) – Broadneck, Maryland City, Mayo and Patuxent – that are not designed to accept septage. Since septage systems and processing demands are expected to decline over the next ten years, their upgrading to accept septage is not considered cost-effective.
- f. The County:
 - (1) Monitors septage receiving to determine if the increased volume impacts the process at the three SRP's, which could result in an NPDES violation.
 - (2) Under the Bureau of Utility Operations, had convened a committee composed of representatives from its bureau, the County Department of Health, the City of Annapolis, and the Liquid Waste Haulers Association, to address both grease and septage disposal concerns and how best to meet the future needs of both the public and private sectors, as the issue of local jurisdictions accommodating that which they generate within their own boundaries receives more political attention. The committee was not able to arrive at a formidable solution to this concern.

APPENDIX F

SUMMARY OF TEXT CHANGES

Appendix F and G are records of those changes and revisions presented as a result of the work performed by the Office of Planning and Zoning, the Department of Public Works, and the Department of Health, as required by the State of Maryland, for the triennial update.

General

- All tables and text updates as applicable to existing information and nomenclature.

Chapter 1 – Goals, Policies, and Procedures

- Revised format of the chapter to be more user-friendly
- Revised goals and policies based on the adopted 2009 General Development Plan
- Revised text to add reference to the State’s Sustainable Growth and Agricultural Preservation Act of 2012 and Growth Tiers
- Added a policy regarding use of Bay Restoration (Septic) Funds (1.2.2.G)
- Removed the interim amendment application from the Water and Sewer Master as it will be available online and in the Office of Planning and Zoning
- Clarified definitions for Planned Service, Future Service and No Public Service

Chapter 2 – Background Information

- Updated information regarding land cover, land use and zoning acreages
- Updated population and housing information

Chapter 3 – Water Supply

- Water Pressure Zone (WPZ) text and tables have been revised to reflect current conditions
- Data for non-County facilities, financial statistics and Capital Improvement Program items has been updated
- Data for water demand, population and housing has been updated
- Information regarding historical studies has been removed

Chapter 4 – Sewerage Systems

- Updated information on the County’s on-site disposal systems and strategies for reducing nutrients loads from these systems based on the OSDS Evaluation Study
- Updated information regarding NPDES limitations, TMDLs and Enhanced Nutrient Removal
- Data and projections for waste water demand, population and housing have been updated
- Data for non-County facilities, financial statistics and Capital Improvement Program items has been updated

APPENDIX G

WATER AND SEWER MASTER PLAN MAP CHANGES

A. Overall Map Changes:

1. All parcels that have been developed or are assessed with the extension of public water or sewer are appropriately updated to reflect Existing Service.
2. Water and sewer service timing category boundaries have been aligned with subdivision or parcel boundaries.
3. Sewer Service Areas and Water Pressure Zones boundaries have been adjusted to match parcel and subdivision boundaries where possible.
4. Water and Sewer Service timing category boundaries have been aligned with Sewer Service Areas and Water Pressure Zones boundaries where possible.

B. Individual Sewer Map Changes

S-1

1. Change private property from Other Service to Planned Service in the Andover Road / Camp Meade Road area. The property is not currently served by a non-County system. (Grid K4)

S-2

2. Change from Future Service to Planned Service in the Wigley Avenue area within the Baltimore City SSA. Connection to public sewer is now feasible. This addresses OSDS Area 8 and Problem Septic Area P2. (Grids D7, D8, E7, E8)
3. Change from Future Service to Planned Service and move the boundary to include parcels in the Obrecht Drive / Brightview Drive area in the Cox Creek SSA. These parcels are better served by the Cox Creek SSA and there is capacity available to serve the site. (Grids M10, N10); Also Map S-4 (Grids M10, N10)
4. Change from Planned Service to No Public Service within the Maryland City SSA for property that is preserved as part of the Oxbow Natural Area. (Grid B10); Also Map S-4 (Grids B10, B11)

S-3

5. Change from Future Service to Planned Service in the Nabbs Creek area within Cox Creek SSA. Connection to public sewer is now feasible. This also addresses Problem Septic Area P3. (Grids P6, P7, Q6, Q7, Q8)
6. Change from Future Service to Planned Service in the Long Hill Road area within Cox Creek SSA. This property was rezoned from R1 to R15. (Grid O9)
7. Change from No Public Service to Future Service and move boundary from the Rural Area to include parcels to the Cox Creek SSA in the Magothy Beach Road, Woods Road, and Lake Shore Drive area. This addresses Problem Septic Areas P17 and P21 and portions of OSDS Area 2. Implements GDP recommendation that properties in septic problem areas should be placed in a public sewer service category where feasible to extend public sewer. (Grid S10); Also Map S-5 (Grids R11, R12, S10, S11, S12)

S-4

8. Change from Planned Service to No Public Service within the Maryland City SSA for a property that is zoned OS and is conservation land that is not planned for development. (Grid A12)
9. Change from Planned Service to No Public Service within the Patuxent SSA for two parcels owned by Anne Arundel County and used as conservation land. (Grids I13, I14, J14))
10. Change from No Public Service to Planned Service and move boundary from the Rural Area to include the parcel in the Patuxent SSA west of Crain Highway, south of Millersville Road at Hansel Drive. This parcel has been rezoned from RLD to C2 and public sewer is appropriate to serve commercial office development. GDP Land Use Plan will be revised to reflect the new zoning during the next comprehensive plan update. (Grid K14)

S-5

11. Change from Planned Service to Capital Facilities for the new Eastern District Police Station. (Grid P10)
12. Change from Future to Planned Service for area around new Pasadena Elementary School and Eastern District Police Station. Connection to public sewer is now feasible. (Grids P10)
13. Change Ritchie Highway Sewer Petition area to Capital Facilities. (Grids R14, R15, S14, S15)
14. Change from Future Service to Planned Service west of Bayhead Road in the Broadneck SSA. Connection to public sewer is now feasible. This addresses a portion of OSDS Area 3. (Grids X15, X16, Y15)

S-6

15. Change from No Public Service to Planned Service and move boundary from the Rural Area to the Patuxent SSA, south of Defense Highway, east side of Davidsonville Road. This area has been rezoned from RA to SB and public sewer is appropriate to serve commercial business uses. GDP Land Use Plan will be revised to reflect the new zoning during the next comprehensive plan update. (Grid J19)

S-7

16. Change from Future service to Planned Service on Ritchie Highway in the Broadneck SSA. Connection to public sewer is feasible and the owner of a planned commercial development wishes to extend public sewer to the site. (Grids S16, T16)
17. Change from No Public Service to Future Service South of Route 50 in the Broadneck SSA. These properties are not planned for Rural development densities and should not be located in the No Public Service area category within the Broadneck SSA. In addition, the change addresses portions of OSDS Area 3 and Problem Septic Area P24. Implements GDP recommendation that properties in septic problem areas should be placed in a public sewer service category where feasible to extend public sewer. (Grids T18, U17, U18, U19, V16, V17, V18, V19, W16, W17, W18, X17, X18)
18. Change from No Public Service to Existing Service in the Broadneck SSA. The property was rezoned from RA to C2 and lies within a greater Existing Service area. Public sewer is appropriate to serve commercial office uses. GDP Land Use Plan will be revised to reflect the new zoning during the next comprehensive plan update. (Grid X17)

19. Change from No Public Service to Planned Service and move boundary from the Rural Area to include a portion of the City of Annapolis Water Treatment Plant site in the Annapolis SSA. The City plans to construct a new Water Treatment Plant with offices and a laboratory on the same site and wishes to connect the new facilities to the nearby public sewer system. (Grid P19)
20. Change from No Public Service to Planned Service and move the boundary from the Rural Area to the Annapolis SSA at the Defense Highway / Crownsville Road intersection for a parcel that was rezoned from RA to R2. The parcel is bordered on 3 sides by Existing and Planned Service areas of similar development densities and there is sufficient capacity in the system to include this property in the SSA. GDP Land Use Plan will be revised to reflect the new zoning during the next comprehensive plan update. (Grid O19)
21. Change from Future Service to Existing Service on Bestgate Road in the Annapolis SSA for a portion of a parcel that has been rezoned to C2. The front portion of the property is developed with a commercial use that is currently connected to public sewer. (Grid R19)
22. Change from Future Service to Planned Service for St. John Neumann property on Bestgate Road. Connection to public sewer is feasible and the property owner has requested to extend sewer to the site to serve new facilities being planned. (Grids R19, S19)
23. Change from Future Service to Planned Service west of Riva Road in the Annapolis SSA. Connection to public sewer is now feasible. (Grids P20, P21).

S-8

24. Change from No Public Service to Future Service and move boundary from the Rural Area to include parcels in the Annapolis SSA in the Glen Isle and Hambleton Road areas. This addresses a portion of OSDS Area 4. Implements GDP recommendation that properties in septic problem areas should be placed in a public sewer service category where feasible to extend public sewer. (Grids N21, N22); Also on Map S-9 (Grids O21, O22)

S-9

25. Change from No Public Service to Future Service within the Annapolis SSA. The area should be served in the future by public sewer when feasible. This addresses Problem Septic Area P26. Implements GDP recommendation that properties in septic problem areas should be placed in a public sewer service category where feasible to extend public sewer. (Grids R21, R22, R23, S21, S22, S23, T22, T23)
26. Change from Future Service and No Public Service to Planned Service on the west side of MD 2 in the Annapolis SSA. This addresses a portion of OSDS Area 4, Problem Septic Area P28 and a portion of Problem Septic Area P29. Implements GDP recommendation that properties in septic problem areas should be placed in a public sewer service category where feasible to extend public sewer. (Grids P22, P23, P24, Q22, Q23)

27. Change from No Public Service to Existing and Planned service and move the boundary from Rural to the Annapolis SSA on the south side of Central Avenue for parcels that are zoned C4. Public sewer is appropriate to serve highway commercial uses and sewer lines are in place along this section of MD 214. Two of the properties have previously connected to the public sewer. (Grid P24)

S-10

28. Change from Existing and Planned Service to No Public Service for Franklin Point Park. The park currently is not served by public sewer and is a preservation area. There are currently no long range plans to extend public sewer to the park. (Grids S31, T31); Also on Map S10 (Grids S31, S32, S33, T31, T32, T33)

S-11

29. Change from Existing Service to Planned Service in the Broadwater SSA for the commercially zoned portion of the parcels. These areas are undeveloped and are not yet connected to public sewer service. In addition, change a portion of the parcels that have been rezoned to C3 from No Public Service to Planned Service and move the boundary of the Rural Area to include these portions in the Broadwater SSA. (Grid R32)

S-12

No Changes

C. Individual Water Map Changes

W-1

1. Identify Marley Neck Sub-Water Pressure Zone. (Grids Q4, Q5)

W-2

2. Identify Ridge Forest Sub-Water Pressure Zone. (Grids G8, H8)

W-3

3. Change from Future Service to Planned Service in the Long Hill Road area within Glen Burnie Low WPZ. This property was rezoned from R1 to R15. (Grid O9)

W-4

4. Change from Planned Service to No Public Service within the Maryland City WPZ for property that is preserved as part of the Oxbow Natural Area and change from No Public Service to Planned service within the Maryland City WPZ privately owned properties that are not part of this natural area. (Grid B10)
5. Change from No Public Service to Planned Service and move the boundary from the Rural Area to include a portion of the Tipton Airport, which is currently served by the privately operated Fort Meade system, in the Maryland City WPZ. (Grids D12, E12)
6. Identify Millersville Sub-Water Pressure Zone. Change the Severn Forest Subdivision from Existing to Planned Service within the Millersville WPZ as it is not connected at this time to public water. (Grids I11, I12, J11, J12, J13)

7. Change from Planned Service to Future Service at MD 32 and Redmiles Lane within the Kings Heights/Odenton WPZ. The properties cannot be served at this time. (Grid I11)
8. Change from No Public Service to Planned Service and move boundary from the Rural Area to include the parcel in the Kings Heights/Odenton WPZ west of Crain Highway, south of Millersville Road at Hansel Drive. This parcel has been rezoned from RLD to C2 and is adjacent to the Patuxent SSA. Public water is appropriate to serve commercial office development. GDP Land Use Plan will be revised to reflect the new zoning during the next comprehensive plan update. (Grid K14)

W-5

9. Split the Broadneck/Glen Burnie Low WPZ into the Broadneck WPZ and the Glen Burnie WPZ. (Grids O10-O13, P10-P14, Q10-Q14, R10-R15, S10-S15, T13-T15, U14-U15, V14-V15, W14-W15, X15, Y15); Also on Map W1 (Grids O3-O5, P4-P5, Q4-Q5, R3-R5), Map 2, (Grids L6-L10, M5-M10, N5-N10, O5-O10), Map W3 (Grids O5-O10, P5-P10, Q5-Q10, R5-R10, S6-S10, T6-T10, U8-U10), Map W4 (Grids M11-M13, N11-N13, O11-O13), Map W7 (Grids R16, S16-18, T16-18, U16-U20, V16-V20, W16-W20, X16-X19, Y16-Y19, Z16-Z18)

W-6

10. Change from No Public Service to Planned Service and move boundary from the Rural Area to the Patuxent SSA, south of Defense Highway, east side of Davidsonville Road. This area has been rezoned from RA to SB and is adjacent to the Crofton WPZ. Public water is appropriate to serve commercial business uses. GDP Land Use Plan will be revised to reflect the new zoning during the next comprehensive plan update. (Grid J19)

W-7

11. Change from No Public Service to Future Service south of Route 50 in the Broad Creek WPZ. These properties are not planned for rural development densities and should not be located in the No Public Service area category within the Broadneck WPZ. (Grids V17, V18, W17, X17, X18)
12. Change from No Public Service to Planned Service in the Broad Creek WPZ. The property was rezoned from RA to C2 and is adjacent to an area planned for public water service. GDP Land Use Plan will be revised to reflect the new zoning during the next comprehensive plan update. (Grid X17)
13. Change from No Public Service to Planned Service and move the boundary from the Rural Area to the Broad Creek WPZ at the Defense Highway / Crownsville Road intersection for a parcel that was rezoned from RA to R2. The parcel is bordered on 3 sides by Existing and Planned Service areas of similar development densities and there is sufficient capacity in the system to include this property in the WPZ. GDP Land Use Plan will be revised to reflect the new zoning during the next comprehensive plan update. (Grid O19)

W-8

14. Identify Heritage Harbor Sub-Water Pressure Zone. (Grids N19, N20, N21, O19, O20, O21, P19, P20, P21)

W-9

15. Change from No Public Service to Existing and Planned service and move the boundary from Rural to the Broad Creek WPZ on the south side of Central Avenue for parcels that are zoned C4. Public water is appropriate to serve highway commercial uses and water lines are in place along this section of MD 214. Two of the properties have previously connected to the public water. (Grid P24)

W-10

No Changes

W-11

No Changes

W-12

No Changes

D. Sewer Facility Changes

Map	Grid	Description Of Changes
S-1	H4	Added planned service Ridge Road Merritt SPS.
S-1	H4	Added planned service force main to service planned Ridge Road Merritt SPS.
S-1	H4	Added planned service gravity sewer for planned Ridge Road Merritt.
S-1	H4, I4	Added planned service gravity sewer.
S-1	J3	Changed some future service pipe sizes upgrades to existing gravity sewer per developer completion.
S-1	N3	Changed future service Cedar Hill SPS to planned service, and updated force main alignment.
S-1	N3	Changed future service Cedar Hill force main to planned service, and updated alignment.
S-1	N3, O2	Added planned service gravity sewer for Cedar Hill subdivision.
S-1	O5	Changed future service expansion of Marley Avenue SPS to capital facilities service.
S-1, S-3	P5, P6	Changed alignment of planned service gravity sewer for Tanyard Cove North per updated 2010 plans.
S-2	D9, D10	Changed from planned service gravity to existing service.
S-2	E8	Changed from planned service gravity to existing service.
S-2	E9	Changed from planned service gravity to existing service.
S-2	E9, F9	Changed planned service force main alignment per revised plans.
S-2	G6, G7, H7	Changed alignment of planned service gravity sewer for Preston Commons per revised drawings, (Formerly Ridge Road Hotels).
S-2	I7	Changed from planned service force main to existing service for the existing SHA SPS.
S-2	I7, J7	Added existing service gravity sewer that services SHA property.
S-2	J9	Changed planned service gravity sewer to existing for Garrens Choice subdivision.
S-2	J9, K9	Changed planned service force main to existing service for Garrens Choice SPS.
S-2	K7, K8	Changed planned service force main to existing for Quarterfield Crossing.
S-2	K7, K8, L8	Added existing service gravity sewers for Quarterfield Crossing.
S-2	K8	Changed from planned service gravity sewer to existing service for Quarterfield Crossing.
S-2	K9	Changed planned Evergreen Commons Temp. SPS to existing service.
S-2	K9	Changed future service Cayuga Farms Interceptor alignment per revised drawings.

Map	Grid	Description Of Changes
S-2	K9	Added planned service gravity sewers for Handschuh-Happel property subdivision
S-2	K9, K10	Changed future service Cayuga Farms interceptor to capital facilities service.
S-2	L8	Added capital facilities service upgrades to Park West SPS.
S-2	N5	Added capital facilities expansion of Cinder Cove SPS.
S-2	N7	Changed future service Marley SPS upgrades to capital facilities service.
S-2	O5	Added capital facilities upgrades to 7th Avenue SPS.
S-2, S-3	N5, N6, O6	Added capital facilities force main rehab for Cinder Cove.
S-2, S-3	N10, O10	Changed alignment of future service gravity main per OSDS Study results.
S-3	O10, P10	Changed location of future service gravity sewer per OSDS Study results.
S-3	O6, P6	Changed planned service gravity sewer alignment for Tanyard Cove South subdivision per revised drawings.
S-3	O7	Added planned service Stonehouse Run SPS.
S-3	O7	Added planned service force main for Stonehouse Run subdivision.
S-3	P10	Changed location of future service SPS per OSDS Study results.
S-3	P10	Changed location of future service gravity sewer per OSDS Study results.
S-3	P6	Added planned service gravity sewer for Creekside Village.
S-3	P6	Added existing service Tanyard Springs gravity sewers.
S-3	Q10	Changed location of future service SPS per OSDS Study results.
S-3	Q10	Changed location of future service SPS per OSDS Study results.
S-3	Q10	Changed location of future service SPS per OSDS Study results.
S-3	Q10, R10	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-3	R6	Added capital facilities service upgrades to Waterview SPS.
S-3	R6	Added capital facilities service upgrades to Harbor Drive SE SPS.
S-3	S-7	Added capital facilities service upgrades to Riviera Beach SPS.
S-3	T7	Added capital facilities service upgrades to Creek Road SPS.
S-3, S-5	P10, P11	Changed location of future service gravity sewer per OSDS Study results.
S-3, S-5	P10, Q10	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-3, S-5	Q9, Q10, R9	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-4	A12	Added capital facilities service upgrades to Md City SPS.
S-4	A13	Changed MD City WRF capital facilities service expansion to 1.2 MGD, and total plant capacity to 3.7 MGD.
S-4	A13, B11, B12, C11, C12, D12	Changed future service force main to planned service and updated alignment.
S-4	D12	Changed future Arundel Gateway SPS to planned service.
S-4	G14	Reduced Piney Orchard WRF (Private) capacity from 1.2 MGD to 0.7 MGD.
S-4	H11	Added planned service gravity sewers for Odenton Town Center at Seven Oaks Subdivision.
S-4	H12	Added capital facilities service Odenton Town Center 12 inch gravity sewer
S-4	H12	Added existing service gravity sewer.
S-4	H12	Added planned service gravity sewer for Jefferson at Odenton Town Center.
S-4	H12	Added planned service gravity sewer for Odenton Town Center Commons.
S-4	H12, I12	Changed planned pipe size upgrade per Odenton Town Center Sewer Study to remove some pipes as they have been upgraded.
S-4	H12, I12	Added capital facilities service Odenton Town Center 24 inch gravity sewer.
S-4	I11	Changed future service expansion of Severn Run SPS to capital facilities service.
S-4	I11	Changed future service pipe size upgrade to capital facilities gravity sewer.
S-4	I11	Changed future service pipe size upgrade to capital facilities gravity sewer.
S-4	I11	Changed future service pipe size upgrade to capital facilities gravity sewer.
S-4	I11, I12	Changed future service pipe size upgrade to capital facilities gravity sewer.

Map	Grid	Description Of Changes
S-4	I11, I12	Added capital facilities service Odenton Town Center 30 inch gravity sewer.
S-4	I12	Changed future service pipe size upgrade to capital facilities gravity sewer.
S-4	I12	Changed future service pipe size upgrade to capital facilities gravity sewer.
S-4	I12	Changed future service pipe size upgrade to capital facilities gravity sewer.
S-4	I12	Changed future service pipe size upgrade to capital facilities gravity sewer.
S-4	I12	Changed future service pipe size upgrade to capital facilities gravity sewer.
S-4	I12	Changed future service pipe size upgrade to capital facilities gravity sewer.
S-4	I12	Added planned service Odenton Town Center 10 inch gravity sewer.
S-4	I15, J15	Added future service gravity main for future Route 3 SPS and force main.
S-4	K15	Changed location of future service SPS per revised information.
S-4	N10	Added planned service force main for planned Solomons Choice SPS.
S-4	N10, N11	Added planned service gravity mains for planned Solomons Choice subdivision.
S-4	N11	Added planned service Solomons Choice SPS
S-4	N11	Added future service SPS per OSDS study results.
S-4	N11	Added future service SPS per OSDS study results.
S-4	N11	Added future service force main to service future SPS per OSDS Study results.
S-4	N11, N12, O12	Added future service force main to service future SPS per OSDS Study results.
S-4	N12	Changed location of future service SPS per OSDS Study results.
S-4	N12	Changed alignment of future service gravity main per OSDS Study results.
S-4	N12, O12	Changed alignment of future service gravity main per OSDS Study results.
S-4, S-6	J15, J16, K15	Changed alignment of future force main to service future SPS per revised information.
S-4, S-5	N12, O12	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-5	O10	Added planned service (Temporary) Park Retreat SPS.
S-5	O10, P11	Added planned service force main for (Temporary) Park Retreat SPS.
S-5	P10	Changed capital facilities Pasadena Elementary SPS to existing service.
S-5	P10	Added capital facilities gravity sewer for new Eastern District Police Station.
S-5	P10, P11	Changed capital facilities force main to existing service for Pasadena Elementary SPS.
S-5	P11	Changed capital facilities gravity sewer to existing service for Pasadena Elementary SPS.
S-5	Q10, Q11, Q12	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-5	Q11	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-5	Q11, R11	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-5	Q12	Added future service SPS per OSDS Study results.
S-5	Q12	Added future service force main to service future SPS per OSDS Study results.
S-5	Q13	Added capital facilities upgrades to Big Cypress Creek SPS.
S-5	R10, R11	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-5	R11	Changed location of future service SPS per OSDS Study results.
S-5	R11	Changed location of future service SPS per OSDS Study results.
S-5	R13	Added capital facilities upgrades to Cape Arthur V SPS.
S-5	R9, S10, S11	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-5	S11	Added future service SPS per OSDS study results.
S-5	S11	Added future service force main to service future SPS per OSDS study results.
S-5	S11	Added future service gravity main per OSDS Study results.
S-5	S11, S12	Added future service force main to service future SPS per OSDS study results.
S-5	S12	Added future service SPS per OSDS study results.
S-5	S12	Added future service SPS per OSDS study results.

Map	Grid	Description Of Changes
S-5	S12	Added future service force main to service future SPS per OSDS study results.
S-5	S12, T12	Added future service force main to service future SPS per OSDS study results.
S-5	S14	Added capital facilities upgrades to Haskell Road SPS.
S-5	S14	Added capital facilities upgrades to Divinity Cove SPS.
S-5	S15	Changed location of future service SPS per OSDS Study results.
S-5	S15	Added capital facilities upgrades to Mill Creek SPS
S-5	S15	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-5	T12	Added future service SPS per OSDS study results.
S-5	T14	Changed future service expansion of Doris Drive SPS to capital facilities service.
S-5	U14	Changed location of future service SPS per OSDS Study results.
S-5	U14, V14, U15	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-5	U15, V14, V15	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-5	V14	Changed location of future service SPS per OSDS Study results.
S-5	V14	Added future service SPS per OSDS Study results.
S-5	V14	Added future service force main to service future SPS per OSDS Study results.
S-5	V15	Changed location of future service SPS per OSDS Study results.
S-5	V15	Changed future service expansion of Bay Hills SPS to capital facilities service.
S-5	V15	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-5	X15	Changed location of future service Beacon View SPS per OSDS Study results.
S-5, S-7	R15, R16, S15	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-5, S-7	S15, S16	Added future service gravity main per OSDS Study results.
S-5, S-7	S15, S16, S17	Changed alignment of future service force main to service future CSSP SPS per OSDS Study results.
S-5, S-7	X15, X16	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-6	H17	Changed Patuxent WRF planned service expansion to capital facilities service adding 4.1 MGD, and total plant capacity to 11.6 MGD.
S-6	I16	Added existing service gravity mains for the Village at Waugh Chapel South.
S-7	P20	Changed future expansion of Broadcreek (DPW & Library) SPS to capital facilities.
S-7	R16	Changed location of future service SPS per OSDS Study results.
S-7	R18	Added future service SPS per OSDS study results.
S-7	R18	Added future service force main to service future SPS per OSDS Study results.
S-7	R18, R19	Changed alignment of future service gravity main per OSDS Study results.
S-7	R19, R20	Added capital facilities service force main replacement for Jennifer Road SPS.
S-7	R20	Added capital facilities upgrades to Parole SPS.
S-7	S15	Changed location of future service SPS per OSDS Study results.
S-7	S16	Changed location of future service SPS per OSDS Study results.
S-7	S16	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-7	S17	Changed location of future service SPS per OSDS Study results.
S-7	S18	Changed location of future service SPS per OSDS Study results.
S-7	S18	Changed location of future service SPS per OSDS Study results.
S-7	S18	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-7	S18, S19	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-7	T17	Changed location of future service SPS per OSDS Study results.

Map	Grid	Description Of Changes
S-7	T17	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-7	U16, U17	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-7	U17	Changed location of future service SPS per OSDS Study results.
S-7	U17	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-7	U17	Added future service gravity main per OSDS Study results.
S-7	V19	Added Annapolis Naval Station WRF (Private) ENR upgrades.
S-7	W17	Added capital facilities Route 50 SPS.
S-7	W17	Added capital facilities force main for planned Route 50 SPS.
S-7	X15, X16	Changed future service Bay Head Farms force main to planned service.
S-7	X16	Changed from future service to planned service.
S-7	X16, X17	Changed future service gravity sewer to planned service.
S-7, S-9	O20, O21	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-9	O21	Changed location of future service SPS per OSDS Study results.
S-9	O22	Added capital facilities expansion of Sylvan Shores SPS
S-9	O22	Added future service SPS per OSDS Study results.
S-9	O22	Added future service force main to service future SPS per OSDS Study results.
S-9	O22	Added future service gravity main per OSDS Study results.
S-9	P21	Added capital facilities upgrade of Riva Woods SPS.
S-9	P21	Changed future service expansion of Cape St. John I SPS to capital facilities service.
S-9	P22, P23	Added existing service gravity sewer for Villages at Lee Airport commercial subdivision.
S-9	P24	Added existing service gravity sewers for Edgewater Village Shopping Center.
S-9	P24	Added existing service gravity sewers for Central Avenue Sewer Extension.
S-9	Q21	Changed location of future service SPS per OSDS Study results.
S-9	Q21	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-9	Q22	Changed location of future service SPS per OSDS Study results.
S-9	Q22	Changed alignment of future service force main to service future SPS per OSDS Study results.
S-9	Q23	Added capital facilities upgrades to Holly Road South SPS.
S-9	R24	Changed capital facilities service Glebe Heights I SPS upgrades to planned service.
S-9	R25	Added planned service expansion of Glebe Heights WRF to 0.010, and total plant capacity to 0.033.
S-9	R25	Added planned service Glebe Heights WRF upgrade to ENR.
S-9	R25	Changed capital facilities expansion for Mayo WRF to future service expansion and total plant capacity to 1.14 MGD.
S-9	R26	Changed from planned to future upgrade to River Club Estates SPS.
S-9	S25	Added capital facilities upgrades to Selby On The Bay II SPS.
S-9	S25	Added capital facilities upgrades to Selby On The Bay I SPS.
S-9	S26	Added capital facilities upgrades to Holly Hill I SPS.
S-9	T24	Added capital facilities upgrades to Hillsmere II SPS.
S-9	T24	Added capital facilities upgrades to Hillsmere IV SPS.
S-9	T24	Added capital facilities upgrades to Hillsmere V SPS.
S-9	T26	Added capital facilities upgrade to Shoreham Beach I SPS.
S-9	U23	Added capital facilities upgrades to Hillsmere VII SPS.
S-9	U24	Added capital facilities upgrades to Hillsmere III SPS.
S-9	V23	Added capital facilities upgrades to Highland Beach 2 SPS.
S-9	V24	Added capital facilities upgrades to Highland Beach 1 SPS.
S-10	S26	Added capital facilities upgrade to Carrs Ridge II SPS.

Map	Grid	Description Of Changes
S-10	S26	Added capital facilities upgrade to Carrs Ridge IV SPS.
S-10	S26	Added capital facilities upgrades to West Shore II SPS.
S-10	S26	Added capital facilities upgrades to Triton Beach SPS.
S-10	S27	Added capital facilities upgrade to Carrs Ridge III SPS.
S-10	S27	Added capital facilities upgrade to Beverly Beach IV SPS.
S-10	S31	Changed planned Holder Farm SPS to future service.
S-10	S31	Changed planned service Holder Farm subdivision force main to future service.
S-10	T26	Added capital facilities upgrades to West Shore I SPS.
S-10	T27	Added capital facilities upgrade to Shoreham Beach II SPS.
S-10	T27	Added capital facilities upgrade to Beverly Beach II SPS.
S-10	T27	Added capital facilities upgrade to Beverly Beach III SPS.
S-10	T30	Added capital facilities upgrades to Avalon Shores II SPS.
S-10, S11	S31	Changed planned service gravity sewer to future service for Holder Farm subdivision.
S-11	P35, Q34, Q35	Changed capital facilities service low pressure sewer to existing service for Deale Road Sewer Petition.
S-11	R33	Changed future service expansion of Cape Anne SPS to capital facilities service.
S-11	S33	Added capital facilities upgrades to Dartmouth SPS.
S-11	T32	Added capital facilities upgrades to Columbia Beach SPS.

E. Water Facility Changes

Map	Grid	Description Of Changes
W-1	J2, J3	No change to capital facilities service water main for EWTM Study.
W-1	J2, J3, K3	Added capital facility Service water main.
W-1	J4, K4, L4	Added capital facility Service water main for EWTM.
W-1	K4	Added planned service water main for Pitometer Phase II Calibration Study.
W-1	K4,L4, L6, M4,	Added capital facility Service water main.
W-1	L3, M3	No change to future service water main for the 2003 Comprehensive Water Strategic Plan.
W-1	M3, N3	Added planned service water main for Cedar Hill.
W-1, W-2	G5, H4, H5	Added planned service water main for Preston Gateway North.
W-1, W-2	H4, H5	No change to future service water main for MDOT Headquarters.
W-1, W-2	H5, H6	No change to planned service water main for Preston Gateway North.
W-1, W-2	M3, M4, M5, M6	No change to future service water main for the 2003 Comprehensive Water Strategic Plan.
W-1, W-3	P5	No change to planned service water main for Tanyard Cove North subdivision. Spatially adjusted to reflect changes in latest set of plans.
W-2	D10	Added future service water main for Guilford Road.
W-2	E8, F8, F9	Changed to existing services water main.
W-2	F7, F8	Change to existing service water main for Arundel Preserve Phase 2 subdivision.
W-2	F8	Added planned service water main for Arundel Preserve.
W-2	F8	Added planned service water main for Arundel Preserve Phase 2 Parcel 10.
W-2	F8	Added planned service water main for the Enclave at Arundel Preserve Phase 2.
W-2	F8, G8	No change to planned service water main for Arundel Mills Water Study.
W-2	F9	No change to planned service water main for Parkside Mixed Use Development- phase 1.
W-2	F9	Modified alignment of capital facilities service water main.
W-2	F9	No change to planned service water main for Parkside mixed use development.

Map	Grid	Description Of Changes
W-2	F9	No change to capital facilities Disney (Ft. Meade) BPS. Spatial adjustment based on change in plans.
W-2	F9	No change to future service expansion of Disney (Ft. Meade) BPS. Spatial adjustment based on change in plans.
W-2	F9, G8, G9	Added planned service water main for Arundel Mills Water Study.
W-2	F9, G9	Changed to capital facility 8/07; Changed from 16" to 30" 9/08 since Disney (Ft. Meade) BPS moved.
W-2	G8	No change to planned service water main to connect Ridge Forest BPS to 400 pressure zone.
W-2	G9	Added planned/capital facility service water main for Zebron Property.
W-2	G9, H9	Added capital facilities service water main for Disney Road EWT.
W-2	G9, H9	Added capital facilities service water main for Disney Road BPS.
W-2	H10	No change to planned service water main for Jennifer Meadows subdivision.
W-2	H10	Added Reecewood 12" planned service water main.
W-2	H10	Added Dellospidale 8" planned service water main to show connection.
W-2	H6	No change to future service water main for MDOT Headquarters.
W-2	H6	No change to future service water main for Preston Gateway @ Piney Run Business Park. Spatial adjustment to reflect plans.
W-2	H7, H8	No change to future service water main for the 2003 Comprehensive Water Strategic Plan.
W-2	H9	Changed capital facilities service Meade Village ET name to Disney ET and status to existing.
W-2	H9, H10	Added planned service water main for Loving property.
W-2	H9, H10, I10	No change to planned service water main for Crossland Farm (Arend Cora Property) subdivision.
W-2	H9, I9	No change to future service water main per CWSP recommendation.
W-2	H9, I9	Changed from capital facilities to future service water main. Spatial adjustment to remove areas that are now existing.
W-2	I5	Added planned service water main for MDOT Headquarters.
W-2	I7	No change to planned service water main for Buckingham Mixed Use Development.
W-2	I7, I8	No change to planned service water main south of Dorsey Road along Telegraph Road.
W-2	I8, I9, J9, K9, L9, L8, M8	No change to capital facilities service water main.
W-2	I9	No change to planned service water main for Reece Road Property subdivision.
W-2	J9, K9	No change to capital facilities water main.
W-2	L10	No change to future service New Cut GST.
W-2	L10	No change to future service New Cut WTP.
W-2	L10, M10	Added capital facilities service water main. Project no.
W-2	L7	No change to planned service expansion of Dorsey Roads WTP and well fields.
W-2	L9	Changed Crain Hwy SCW to existing service.
W-2	L9	Added capital facility Crain Hwy SCW ASR.
W-2	L9, L10	No change to future service water main for the 2003 Comprehensive Water Strategic Plan.
W-2	M10	Added planned service water main for Shipleys Crossing North.
W-2	M9	Changed Elvaton Road Water Petition capital facilities service to existing water main.
W-2	M9, N9	Changed part of project from future service to capital facility. Spatially modified alignment of future service water main that connects future Old Mill WTP to system.

Map	Grid	Description Of Changes
W-2	N10	No change to future service Old Mill WTP, BPS, and well fields.
W-2	N9	No change to capital facilities service water main.
W-2		Added Reecewood 8" planned service water main to show connection.
W-2, W-4	H10	Modified alignment of planned service water main for Dellospidale Property subdivision.
W-2, W-4	I10, J10	No change to planned service water main for Sulin Property subdivision.
W-2, W-4	M10, N10, O10, O11, N11	No change to planned service water main for connection to 295 pressure zone.
W-2, W-4	N10, N11	No change to planned service water main for Solomon's Choice.
W-3	O10	Added planned service water main for Dynasplint.
W-3	O10	Existing water main added for Elvaton EWT.
W-3	O7	Added planned service water main for Holly Ridge.
W-3	O7	Added planned service water main for Woodvale Resubdivision.
W-3	O9, O10	Added planned service water main for Cromwell Property.
W-3	P10	Changed name of project to Elvaton ET from Selby Grove ET and status to existing.
W-3	P5, P6	No change to planned service water main for Tanyard Cove South subdivision. One section is now existing.
W-3	P5, P6	Sections of planned service water main for Tanyard Springs subdivision are now existing. No change to remaining planned service water main.
W-3	P6	Added planned service water main for Symphony Village at Tanyard Cove.
W-3	P6	Added Tanyard Springs 8" planned service water main to show connection.
W-3	P6	No change to future service build out of WTP.
W-3	P6	No change to future service Marley Creek GST.
W-3	P6, P7, Q6	Added future service water main per CWSP recommendation.
W-3	Q9	No change to future service water main for the 2003 Comprehensive Water Strategic Plan.
W-3	Q9	No change to future service Brookfield GST.
W-3	Q9	No change to future service Brookfield WTP.
W-3	S9	No change to capital facilities service water main.
W-3	T8	No change to capital facilities service Fort Smallwood ET.
W-4	A10, A11, B10	No change to planned service water main for Fieldstone subdivision.
W-4	A11	No change to planned service water main for Laurel Race Track.
W-4	B11	No change to planned service water main for Brockbridge subdivision.
W-4	B11	No change to planned service water main for Bacontown ET connection. Spatial adjustment to reflect change in plans.
W-4	B11	No change to capital facilities service Bacontown ET. Adjusted spatially to reflect change in plans.
W-4	C11, C12, D12	Changed 16" TM for Laurel Heights BPS to 20" and revised alignment per the Arundel Gateway planned development.
W-4	D12	No change to planned service Laurel Heights BPS.
W-4	D12, E12	Modified alignment of planned service water main from 2003 Master Plan.
W-4	D12, E12	Modified alignment of planned service water main from 2003 Master Plan.
W-4	E12, F12, G12, H12	No change to capital facilities service water main.
W-4	G11	No change to capital facilities service water main at Charter Oaks Blvd.
W-4	G11, G12, H12	Added planned service water main for Berger Square.
W-4	G9, G10, H10, H11, H12, H13	Changed location of alignment to reflect new plans due to change of (Ft. Meade) BPS location.
W-4	G9, G10, H10, H11, H12, H13	Changed to existing service and the location of alignment to reflect new plans due to change of Ft. Meade BPS location.
W-4	H11	Added capital facilities service water main.
W-4	H11	Added planned service water main for Odenton Town Center at Seven .

Map	Grid	Description Of Changes
W-4	H12	No change to planned service water main for The Village at Odenton Station subdivision.
W-4	H12	No change to planned service water main for Odenton Town Center subdivision.
W-4	H12	Added capital facilities service water main.
W-4	H12	Added planned service water main for Broadstone At Odenton.
W-4	I11	No change to future service Mayfield Indus. Park ET.
W-4	I11, I12, I13	No change to future service water main for the 2003 Comprehensive Water Strategic Plan.
W-4	I13	No change to future service Kings Heights WTP and well fields.
W-4	I13	No change to future service Kings Heights GST.
W-4	M11	No change to planned expansion of Shipley's Choice BPS.
W-4	N10, N11	No change to planned service water main for Solomons Choice.
W-4, W-6	I15, I16, J16	Added planned service water main for Summfield Village.
W-4, W-6	K14, K15, J15, J16	No change to planned service water main for Route 3 corridor.
W-5	O15	No change to planned service Herald Harbor ET.
W-5	P12, Q12	Added planned service water main for Canterbury Crossing.
W-5	R14, S15	Added recently completed capital facilities service water main. Existing.
W-5	S15	No change to future service AACC ET.
W-5	V15, V16	Added planned service water main for Deep Creek Village.
W-5, W-7	V15, W15, W16	No change to planned service water main for the Cape St. Claire Water Study.
W-6	F16	No change to planned service Two Rivers ET.
W-6	F16, G16, H16, H17, I17	Added 16' planned service water main for Two Rivers subdivision.
W-6	G17	No change to planned service Two Rivers BPS.
W-6	G17, H17, H18	Added 10" planned service water main for Two Rivers Subdivision.
W-6	H17	Added planned service water main for Crofton Commerce Center.
W-6	I16	Changed to existing service water main for Village @ Waugh Chapel South.
W-6	I16	Added capital facility service water main.
W-6	I16	Changed name of project from Crofton ET.
W-6	I16, I17, J16	No change to planned service water main for Two Rivers Planned Development. Spatially adjusted to reflect change in plans.
W-6	I16, I17, J16	No change to planned service water main or Two Rivers Planned Development. Spatially adjusted to reflect change in plans.
W-6	I16, J16	Changed to existing service water main for Village @ Waugh Chapel South.
W-6	I17	Added capital facilities service water main.
W-6	J16	No change to project. Spatial alignment adjusted to reflect latest plans for the 2003 Comprehensive Water Strategic Plan.
W-6	J16, K16	Added planned service water main for the E nclave at Crofton Valley.
W-6	J17	No change to capital facilities service water main from Crofton Meadows WTP to Pearl Ave.
W-6	J17	No change to future service expansions of Crofton Meadows II WTP.
W-6	J17	No Change to planned service Crofton Meadows II WTP.
W-6	J18	Changed to existing from capital facilities service water main.
W-6	M17	No change to planned service Chesterfield well fields and water treatment plant.
W-6	M17	No change to future service expansion of Chesterfield well fields and BPS.
W-6	N17	No change to future service Crownsville well fields.
W-7	O19	No change to capital facilities service Heritage Harbor ET.
W-7	P20	No change to planned service Broad Creek III WTP.
W-7	P20	No change to future service expansion of Broadcreek III WTP.
W-7	Q20	Modified capital facility service water pipe from 12" To 16".

Map	Grid	Description Of Changes
W-7	Q20, R20, R19, S19, S18, T18, T17, T16	No change to planned service water main for the 2003 Comprehensive Water Strategic Plan.
W-7	R20	No change to planned service water main for Annapolis Towne Centre At Parole.
W-7	R20	Added planned service water main for Parole Office Building.
W-7	S19	Spatially adjusted planned service Lincoln Heights ET site location due to change in plans.
W-7	T16, U16, V16, W16	No change to future service water main for the 2003 Comprehensive Water Strategic Plan.
W-7	U17, U18, V17, W17	No change to capital facilities service water main.
W-7	W16	No change to capital facilities water main.
W-7	W16	No change to planned service Cape St. Claire ET.
W-7, W-9	S21, S22, T22	No change to future service water main for the 2003 Comprehensive Water Strategic Plan.
W-8	N22	Changed project name from Central Avenue ET, now existing.
W-9	O22, O23	No change to future service water main for the 2003 Comprehensive Water Strategic Plan.
W-9	P23, P24	No change to planned service water main for the 2003 Comprehensive Water Strategic Plan.
W-9	P23, Q23, Q24	No change to future service water main for the 2003 Comprehensive Water Strategic Plan.
W-9	P24	No change to planned service water main for the 2003 Comprehensive Water Strategic Plan.
W-9	P24	Changed to existing water service for Edgewater Village Center.
W-9	P24	No change to existing service 8-inch, 12-inch water mains for Edgewater Village Center.
W-9	P24	No change to planned service Withernsea WTP.
W-9	P24	No change to future service Withernsea WTP.
W-9	T22	No change to future service Annapolis Neck ET.
W-9	T22, T23, U22, U23	No change to future service water main for the 2003 Comprehensive Water Strategic Plan.

APPENDIX H

METHODOLOGY FOR DETERMINING PROJECTED SEWER FLOW DEMANDS

The anticipated wastewater flows for each sewer service area (presented in Table 4-2) are based upon flow projections developed with the use of the Wastewater Flow Projection System (WWFPS) Tool. The WWSFPS, developed as a key part of the 2007 Comprehensive Sewer Strategic Plan, intersects various layers of data including Water\Sewer Billing, Consolidated Property File (CPF), Zoning, Landuse, and Transportation Analysis Zone (TAZ) data to determine projected sewer flow demands for each sewer service area in the County.

The intent of flow forecasting for the Comprehensive Sewer Strategic Plan is to develop flows for individual sewer service areas (SSAs), at approximately the neighborhood or subdivision scale that may be served by a small pump station. These flow forecasts are then aggregated to the water reclamation facilities (WRF) sewershed level for each of the WRFs. This smaller scale is referred to as subdrainage areas or sub-sewer service areas (sub-SSAs). The intent is to look at a planning horizon of 20 years, with the timing of projects determined on an annual basis for the first 10 years, and in 5-year increments thereafter. In addition, the County is interested in ultimate buildout conditions as a point of reference.

For buildout conditions, wastewater flow forecasting is done for all County land uses within an SSA boundary, whether or not they are actually connected to the sewer system. The areas that have sewer service are determined as part of the modeling of alternative scenarios for extending sewer service. This allows the County to estimate total flows and loads not only for WRFs but also for septic systems, which will assist with compliance with regulatory programs such as TMDLs and the ENR program.

The determination and analysis of wastewater flows proceeds in the following steps:

- A. Determination of current flows, for each existing sub-SSA spatial unit.
- B. Determination of current land uses where zoning will take precedence, such as vacant, agricultural or open space land that will become developed according to zoning densities; or existing land that will be replaced by land of different density (e.g. redevelopment with higher density, or complete redevelopment such as a Town Center redevelopment).
- C. Determination of buildout flows within existing developed areas, that is handling infill in areas shown as developed according to the 2002 land use layer.
- D. Determination of buildout flows in vacant land areas or areas subject to redevelopment, i.e. areas where zoning takes precedence over existing land uses.
- E. Determination of rate of growth within each sub-SSA based on growth in corresponding TAZs.

In conceptual terms, the overall methodology follows the general procedures previously utilized by the County. This involves calculating sewer demands based on flow factors assigned by zoning category for all such categories found spatially within each sub-SSA. This approach is enhanced by allowing flows in existing developed areas to be based on actual flows from billing records. It is further enhanced by accounting for potential infill development in already developed areas, where amount of infill is determined based on zoning.

Current Flows by Sub-Sewer Service Area

This step is carried out in order to allow comparison of aggregated flows from the sub-SSAs to measured flows at pump stations or flow monitoring stations. This exercise allows verification of I/I factors previously used by the County of 100 gpd/acre. Sub-SSAs are overlaid with the County's Consolidated Property File (CPF), and Consumption for those accounts with sewer service code of B or S (both water and sewer, and sewer only) and Commitment Level equal to 1 are totaled.

Areas Where Zoning Takes Precedence over Existing Land Use and Vice Versa

To determine how flows should be calculated for each area it is important to know whether existing development will remain unchanged or whether it will be largely replaced by higher density development reflected in current County zoning. To conduct this analysis, the GIS layer of existing land use is intersected with current zoning (as well as the sub-SSA, CPF, and timing category layers, as explained later). A matrix of zoning and current land use has been developed that shows areas where zoning takes precedence over existing land uses and vice versa. The purpose of this matrix is to account for current land uses where zoning will take precedence in the future, such as vacant land as shown on the land use layer that will become developed as shown on the zoning layer. However, it also shows existing land that will be replaced by land of different density (e.g. redevelopment with higher density, or complete redevelopment such as a Town Center redevelopment). Limits on development density in Resource Conservation Areas (RCA) within the Critical Area overlay district are also taken into account.

Flows for Areas to Be Developed Based on Zoning

In areas where zoning takes precedence, the calculation of wastewater flows are based on application of the lookup tables of flow factors and dwelling units per acre, with factors varying by zoning category.

For residential zoning categories, the calculation is as follows for each zoning area within the sub-SSA:

$$\begin{aligned} & [\text{Area of zoning type (ac)}] \times [\text{dwelling unit density for zoning type (du/ac)}] \\ & \times [\text{flow factor (gpd / du)}] \end{aligned}$$

For non-residential zoning types, the calculation is as follows for each zoning area within the sub-SSA:

$$[\text{Area of zoning type (ac)}] \times [\text{flow factor (gpd / acre)}]$$

Infill Flows for Buildout within Already Developed Areas

Areas that will not undergo changes due to zoning, that is those where land use takes precedence, may nonetheless show potential increases of the number of properties built and/or connected to sewer service due to infill development and/or changes in percent of properties connected.

For each sub-SSA, and only for each land use type where land use takes precedence over zoning:

- A. Determine total actual sewer flows for all accounts within each land use polygon by totaling consumption by land use type from an overlay of the CPF and land use 2002 layer. Sewer flows are given as:

- a. $[\sum (\text{Consumption of all CPF Accounts within Land Use Polygon with Sewer Service (B or S) and with Commitment Level 1})] \times \text{Sewer Return Factor}$
- B. Determine the percent of accounts served for each land use polygon, and check that the total number of accounts reflects the zoning density. Increase the number of accounts to reflect the zoning density, only for the fraction of accounts not served.
- C. For the unserved residential accounts, multiply the number of accounts served by the flow factor (gpd/dwelling unit) appropriate for that land use or zoning type.
- D. For nonresidential accounts, estimate flows for the area based on zoning factors (GPD/acre for underlying zoning). Compare that to the total for existing accounts and take the larger value of the two. This essentially means zoning takes precedence if it results in a higher projected flow than current flows.
- E. Sum existing flows with the projected infill flows for each land use type where land use takes precedence over zoning, by SSA.

Extrapolating Flows over Time

The TAZs contain population and employment data for TAZ polygons throughout the County. Data are available in 5-year increments for a planning horizon of 20 years. The procedure for extrapolating rates of growth in flow is to use the rates of growth in population for each 5-year increment. To assign these growth rates to individual sub-SSAs, the area-weighted average rate of growth of overlapping TAZ layers are computed. The process computes flows in any year based on projected growth rates for the 20 year planning horizon, after which growth rates are assumed to continue at the rate of the last 5-year period. The computation checks when growth reaches the build-out flow projection for each sub-SSA thereby allowing a determination to be made of the approximate year of build-out for each sub-SSA.

Data Requirements

GIS Layers

The following categories of GIS data layers are needed:

- A. Current Sewer Service Areas (at the sub-SSA level)
- B. Current Land Use
- C. Timing Categories
- D. Zoning
- E. Consolidated Property File (CPF)
- F. Traffic Analysis Zones (TAZ)

Lookup Tables

Data tables or Lookup Tables are needed for the following data:

- A. Land Use/Zoning Precedence Table
- B. Flow Factor Table (GPD/DU and GPD/AC), by zoning type
- C. Density Table (DU/AC), by zoning type
- D. Sewer Return Factor
- E. I/I Factor Table (GPD/AC)

FINAL

AMENDED
April 15 and May 6, 2013

COUNTY COUNCIL OF ANNE ARUNDEL COUNTY, MARYLAND

Legislative Session 2013, Legislative Day No. 5

Bill No. 11-13

Introduced by Mr. Walker, Chairman
(by request of the Acting County Executive)

By the County Council, February 19, 2013

Introduced and first read on February 19, 2013
Public Hearing set for and held on March 18, 2013
Bill AMENDED on April 15, 2013
Public Hearing on AMENDED BILL set for and held on May 6, 2013
Public Hearing on SECOND AMENDED BILL set for and held on May 20, 2013
Bill Expires May 25, 2013

By Order: Elizabeth Jones, Administrative Officer

A BILL ENTITLED

1 AN ORDINANCE concerning: Planning and Development – Master Plan for Water Supply
2 and Sewerage Systems

3
4 FOR the purpose of adopting a certain Master Plan for Water Supply and Sewerage Systems;
5 and providing for the permanent filing of the Master Plan.

6
7 BY repealing and reenacting, with amendments: §18-2-103(a)(5)(vi)
8 Anne Arundel County Code (2005, as amended)

9
10 SECTION 1. *Be it enacted by the County Council of Anne Arundel County, Maryland,*
11 That Section(s) of the Anne Arundel County Code (2005, as amended) read as follows:

12
13 **ARTICLE 18 ZONING**

14
15 **TITLE 2. GENERAL PROVISIONS**

16
17 **18-2-103. Planning for future development.**

EXPLANATION: CAPITALS indicate new matter added to existing law.
[Brackets] indicate matter stricken from existing law.
Underlining indicates amendments to bill.
~~Strikeover~~ indicates matter stricken from bill by amendment.

(a) **Guides.** The following documents shall be used as a guide in the future development of land in and the location of public services and facilities by the County:

(5) the following additional County plans:

(vi) the Anne Arundel County Master Plan for Water Supply & Sewerage Systems, [2007-2010] 2013, amended and adopted by [Bill No. 84-07 and as further amended by Bill No. 93-08, Bill No. 89-09, Bill No. 60-11, and Bill No. 2-12] BILL NO. 11-13; and

SECTION 2. And be it further enacted, That the Anne Arundel County Master Plan for Water Supply & Sewerage Systems, 2013 ("the Plan") is hereby amended as follows:

1. On the Acknowledgements page of the Plan, under "County Executive" strike "John R. Hammond, Acting" and substitute "Laura Neuman"; under "Anne Arundel County Council" strike "Derek Fink" and substitute "Jerry Walker", strike "Jerry Walker" and substitute "John J. Grasso", and after "Dick Ladd" insert "Derek Fink"; and under "Planning Advisory Board" strike "Paul L. Higgins, Jr.", strike "Ralph Luther" and substitute "Paul L. Higgins, Jr.", and strike "Joel Wexler" and substitute "Jerry Pesterfield".

2. On page 1-5 of the Plan, at the end of the first paragraph, following "industrial property.", insert "Additional State legislation adopted in 2012 requires that as of January 1, 2013, all new on-site sewage disposal systems installed must utilize Best Available Technology (BAT) for removal of nitrogen.".

3. On page 1-7 of the Plan, at the end of Paragraph E, insert "In addition, these systems must be managed by a MDE approved controlling authority.".

4. On page 1-9 of the Plan, after Paragraph Y and before Section 1.2, add a paragraph: "Z. When State funding is requested for any extension of public water or sewer systems outside of the County's certified Priority Funding Area (PFA), the County must submit a request for a PFA Exception or a Determination of Extraordinary Circumstance to the State Smart Growth Coordinating Committee and/or the State Board of Public Works, in accordance with State requirements.".

5. On page 1-13 of the Plan, in Paragraph G, in the first line, after "used" insert "as permitted by State law"; and in Paragraph G, after "connection of" in the first and second lines, insert "existing".

6. On page 1-19 of the Plan, in the paragraph beginning with "Step 2.", in the first sentence, strike "approved" and substitute "provided an advisory recommendation".

7. On page 1-23 of the Plan, after the paragraph beginning with "Community Water Supply System", add a new paragraph: "Controlling Authority – A unit of government, a body public and corporate, or an intercounty agency authorized by the State, County, or a municipal corporation to provide for the management, operation, and maintenance of a community sewerage system, shared facility, or multi-use system.".

8. On page 2-17 of the Plan, in the second paragraph, in the sentence beginning with “Estimates for the period 2000-2010”, strike “14% births, 40% deaths and 74% net migration” and substitute “69 percent net natural increase (births minus deaths) and 31 percent net migration.”; in the same paragraph, in the last sentence, strike “48,919” and “9.8”, respectively, and substitute “48,819” and “9.1”, respectively.

9. On page 3-9 of the Plan, strike Table 3-3 in its entirety and substitute the following:

TABLE 3-3
Population and Household Projections, 2010 - 2035

<u>WATER PRESSURE ZONES</u>	<u>POPULATION</u>					
	<u>2010</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>2030</u>	<u>2035</u>
<u>Airport Square</u>	<u>20,634</u>	<u>21,526</u>	<u>22,601</u>	<u>22,237</u>	<u>23,545</u>	<u>23,794</u>
<u>Broad Creek</u>	<u>38,848</u>	<u>39,222</u>	<u>39,649</u>	<u>40,033</u>	<u>40,156</u>	<u>40,604</u>
<u>Broadneck</u>	<u>45,225</u>	<u>45,850</u>	<u>46,586</u>	<u>47,368</u>	<u>47,880</u>	<u>48,588</u>
<u>Brooklyn Park (North)</u>	<u>3,271</u>	<u>3,269</u>	<u>3,268</u>	<u>3,268</u>	<u>3,273</u>	<u>3,309</u>
<u>Brooklyn Park (South)</u>	<u>6,115</u>	<u>7,238</u>	<u>7,383</u>	<u>7,568</u>	<u>7,607</u>	<u>7,685</u>
<u>Crofton</u>	<u>26,392</u>	<u>26,685</u>	<u>26,885</u>	<u>26,966</u>	<u>26,970</u>	<u>27,289</u>
<u>Gibson Island</u>	<u>272</u>	<u>272</u>	<u>272</u>	<u>271</u>	<u>271</u>	<u>277</u>
<u>Glen Burnie High</u>	<u>65,422</u>	<u>65,947</u>	<u>66,775</u>	<u>67,631</u>	<u>68,249</u>	<u>69,034</u>
<u>Glen Burnie Low</u>	<u>132,166</u>	<u>134,290</u>	<u>136,205</u>	<u>138,332</u>	<u>139,776</u>	<u>141,636</u>
<u>Herald Harbor</u>	<u>1,942</u>	<u>1,942</u>	<u>1,967</u>	<u>2,002</u>	<u>2,048</u>	<u>2,120</u>
<u>Jessup</u>	<u>10,881</u>	<u>12,105</u>	<u>13,292</u>	<u>14,203</u>	<u>15,645</u>	<u>15,937</u>
<u>Kings Heights/Odenton</u>	<u>44,836</u>	<u>47,304</u>	<u>48,631</u>	<u>49,478</u>	<u>51,021</u>	<u>51,848</u>
<u>Maryland City</u>	<u>16,278</u>	<u>16,358</u>	<u>16,403</u>	<u>16,440</u>	<u>16,948</u>	<u>17,081</u>
<u>Rose Haven</u>	<u>442</u>	<u>442</u>	<u>441</u>	<u>440</u>	<u>440</u>	<u>445</u>
<u>Ft. Meade (Private)</u>	<u>8,792</u>	<u>9,184</u>	<u>9,551</u>	<u>9,938</u>	<u>10,308</u>	<u>10,464</u>
<u>City of Annapolis</u>	<u>38,394</u>	<u>39,445</u>	<u>40,497</u>	<u>41,548</u>	<u>42,600</u>	<u>42,600</u>
<u>Rural</u>	<u>77,745</u>	<u>80,306</u>	<u>81,038</u>	<u>81,736</u>	<u>82,395</u>	<u>83,765</u>
<u>COUNTY TOTAL</u>	<u>537,656</u>	<u>551,384</u>	<u>561,444</u>	<u>570,461</u>	<u>579,131</u>	<u>586,474</u>
<u>WATER PRESSURE ZONE</u>	<u>HOUSHOLDS</u>					
	<u>2010</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>2030</u>	<u>2035</u>
<u>Airport Square</u>	<u>7,779</u>	<u>8,294</u>	<u>8,908</u>	<u>9,300</u>	<u>9,544</u>	<u>9,802</u>
<u>Broad Creek</u>	<u>17,985</u>	<u>18,437</u>	<u>18,872</u>	<u>19,285</u>	<u>19,474</u>	<u>19,659</u>
<u>Broadneck</u>	<u>17,233</u>	<u>17,762</u>	<u>18,316</u>	<u>18,850</u>	<u>19,270</u>	<u>19,698</u>
<u>Brooklyn Park (North)</u>	<u>1,223</u>	<u>1,249</u>	<u>1,270</u>	<u>1,300</u>	<u>1,321</u>	<u>1,344</u>
<u>Brooklyn Park (South)</u>	<u>2,407</u>	<u>2,948</u>	<u>3,067</u>	<u>3,202</u>	<u>3,270</u>	<u>3,355</u>
<u>Crofton</u>	<u>10,225</u>	<u>10,516</u>	<u>10,760</u>	<u>10,939</u>	<u>11,056</u>	<u>11,181</u>
<u>Gibson Island</u>	<u>232</u>	<u>236</u>	<u>238</u>	<u>239</u>	<u>240</u>	<u>241</u>
<u>Glen Burnie High</u>	<u>25,063</u>	<u>25,789</u>	<u>26,570</u>	<u>27,267</u>	<u>27,929</u>	<u>28,592</u>
<u>Glen Burnie Low</u>	<u>51,341</u>	<u>53,028</u>	<u>54,647</u>	<u>56,213</u>	<u>57,403</u>	<u>58,571</u>
<u>Herald Harbor</u>	<u>888</u>	<u>908</u>	<u>928</u>	<u>949</u>	<u>971</u>	<u>992</u>
<u>Jessup</u>	<u>2,290</u>	<u>2,838</u>	<u>3,402</u>	<u>3,835</u>	<u>4,563</u>	<u>5,080</u>
<u>Kings Heights/Odenton</u>	<u>17,793</u>	<u>19,087</u>	<u>19,903</u>	<u>20,507</u>	<u>21,422</u>	<u>22,006</u>
<u>Maryland City</u>	<u>6,642</u>	<u>6,739</u>	<u>6,816</u>	<u>6,887</u>	<u>7,206</u>	<u>7,377</u>
<u>Rose Haven</u>	<u>210</u>	<u>211</u>	<u>212</u>	<u>213</u>	<u>214</u>	<u>214</u>
<u>Ft. Meade (Private)</u>	<u>2,571</u>	<u>2,727</u>	<u>2,877</u>	<u>3,034</u>	<u>3,192</u>	<u>3,307</u>
<u>Annapolis City</u>	<u>17,845</u>	<u>18,013</u>	<u>18,182</u>	<u>18,351</u>	<u>18,351</u>	<u>18,520</u>
<u>Rural</u>	<u>30,837</u>	<u>32,354</u>	<u>33,061</u>	<u>33,699</u>	<u>34,191</u>	<u>34,643</u>
<u>COUNTY TOTAL</u>	<u>212,562</u>	<u>221,136</u>	<u>228,030</u>	<u>234,070</u>	<u>239,616</u>	<u>244,583</u>

Sources: 1. Projections based on Census 2010 SF-1 Data, change rate with 2010 Projections

provided in the County's Round 7C, February 2010 and applied to the Round 7C data for years 2015-2035. 2. City of Annapolis P&Z

10. On page 4-69 of the Plan, strike Figure 4-13 in its entirety and substitute the revised Figure 4-13 as shown in the attached Exhibit A.

11. On page G-1 of the Plan, following paragraph B.3., insert "4. Change from Planned Service to No Public Service within the Maryland City SSA for property that is preserved as part of the Oxbow Natural Area (Grid B10); Also Map S-4 (Grids B10, B11)", and on pages G-1 through G-4, renumber paragraphs B.4. through B.28. to be B.5. through B. 29., respectively.

12. On pages G-1 through G-5 of the Plan, in paragraphs 6, 16, 22, 24, and 25, respectively, strike "P18", "P25", the first "P21", "P27", "P29" and "P30", respectively, and substitute "P17, P21", "P24", "P20", "P26", "P28 and P29", respectively; on page G-2, in paragraph 8 strike "parkland" and substitute "conservation land", and strike "Grid H14" and substitute "Grids I13, I14, J14"; on page G-4 in paragraph 3 strike "Cox Creek SSA" and substitute "Glen Burnie Low WPZ", and in paragraph 5 strike "Grid E4" and substitute "D12, E12"; and on page G-5 of the Plan, in paragraph 7, at the end of the second sentence, insert "(Grid I11)".

13. On page G-13 of the Plan, in row 28, strike "Changed 16" TM for Laurel Heights WBS from capital facilities service to planned service" and substitute "Changed 16" TM for Laurel Heights BPS to 20" and revised alignment per the Arundel Gateway planned development".

(Amendment No. 1)

SECTION 3. And be it further enacted, That the maps of the Anne Arundel County Master Plan for Water Supply and Sewerage Systems, 2013, are hereby amended as follows:

1. On Map S-7, change the boundary of Onsite Wastewater Management Problem Area P23 as shown on the attached Exhibit B.

(Amendment No. 2)

2. On Map W-4, change the location of the Planned Water Pipe on Old Portland Road to follow Laurel-Ft. Meade Road as shown on the attached Exhibit C.

(Amendment No. 2)

3. On Map W-6, change the boundary of the Crofton WPZ as shown on the attached Exhibit D, and include the indicated properties, Tax map 43, parcel 116 and part of parcels 62 and 30, in the No Public Service timing category; and edit Figure 3-1 in the Plan accordingly..

(Amendment No. 3)

4. On Map W-6, change the boundary of the Crofton WPZ as shown on attached Exhibit E, and include the properties indicated, Tax Map 43, Parcels 63, 179, 110, and Parcel 1, Lots 3 through 8, in the Planned Water Service timing category; and edit Figure 3-1 in the Master Plan document accordingly.

(Amendment No. 4)

5. On Maps S-5 and S-7, change the sewer timing category from Future Sewer Service to Planned Sewer Service for the area indicated in attached in Exhibit F, Tax Map 41, Parcels 234, Lot 13 – 40, Parcel 28, Lots 1-11R, Parcel 50, and Parcel 30, Lots 4-11; and edit Figure 4-1 in the Mater Plan document accordingly.

(Amendment No. 5)

6. On Map S-7, change the sewer timing category from Future Sewer Service to Planned Sewer Service for the area indicated in attached in Exhibit G, Tax Map 40, Parcel 137; and edit Figure 4-1 in the Master Plan document accordingly.

(Amendment No. 6)

7. On Map S-7, change the sewer timing category from Planned Sewer Service to Future Sewer Service for the area indicated in attached in Exhibit H, Tax Map 39, Parcels 163, 164, 167, 168, 169, 170, and 266; and edit Figure 4-1 in the Master Plan document accordingly.

(Amendment No. 7)

8. On Map S-4, change the sewer timing category from Other Service to Planned Sewer Service for the area indicated in attached in Exhibit I, Tax Map 20, part of Parcel 12, and include it in the Maryland City Sewer Service Area; and edit Figure 4-1 in the Master Plan document accordingly.

(Amendment No. 8)

SECTION 2: 3. And be it further enacted, That the “Anne Arundel County Master Plan for Water Supply & Sewerage Systems, 2013”, prepared by the Office of Planning and Zoning, which includes the Master Plan Document and Official 2000 Scale Maps (Sheets W1 – W12 and S1 – S12 at the scale of 1 inch equals 2000 feet), as amended collectively, “the Plan”, is hereby adopted.

SECTION 3: 4. And be it further enacted, That a certified copy of the Plan as amended and adopted by this Ordinance shall be permanently kept on file with the Administrative Officer to the County Council and the Office of Planning and Zoning.

SECTION 4: 5. And be it further enacted, That this Ordinance shall take effect 45 days from the date it becomes law.

BILL AMENDED: April 15 and May 6, 2013

READ AND PASSED this 20th day of May, 2013

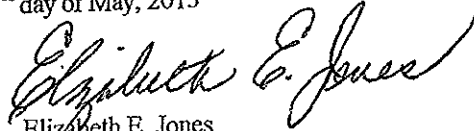
By Order:


Elizabeth E. Jones
Administrative Officer

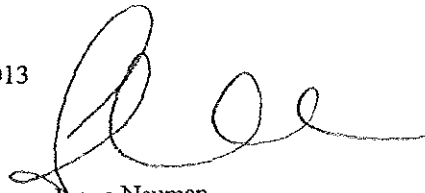
Bill No. 11-13

Page No. 6

PRESENTED to the County Executive for her approval this 21st day of May, 2013

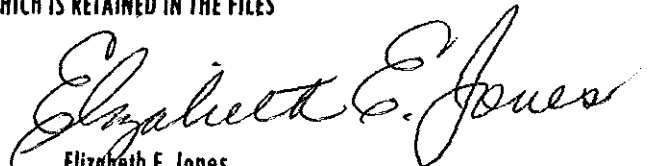

Elizabeth E. Jones
Administrative Officer

APPROVED AND ENACTED this 23rd day of May, 2013


Laura Neuman
County Executive

EFFECTIVE DATE: July 7, 2013

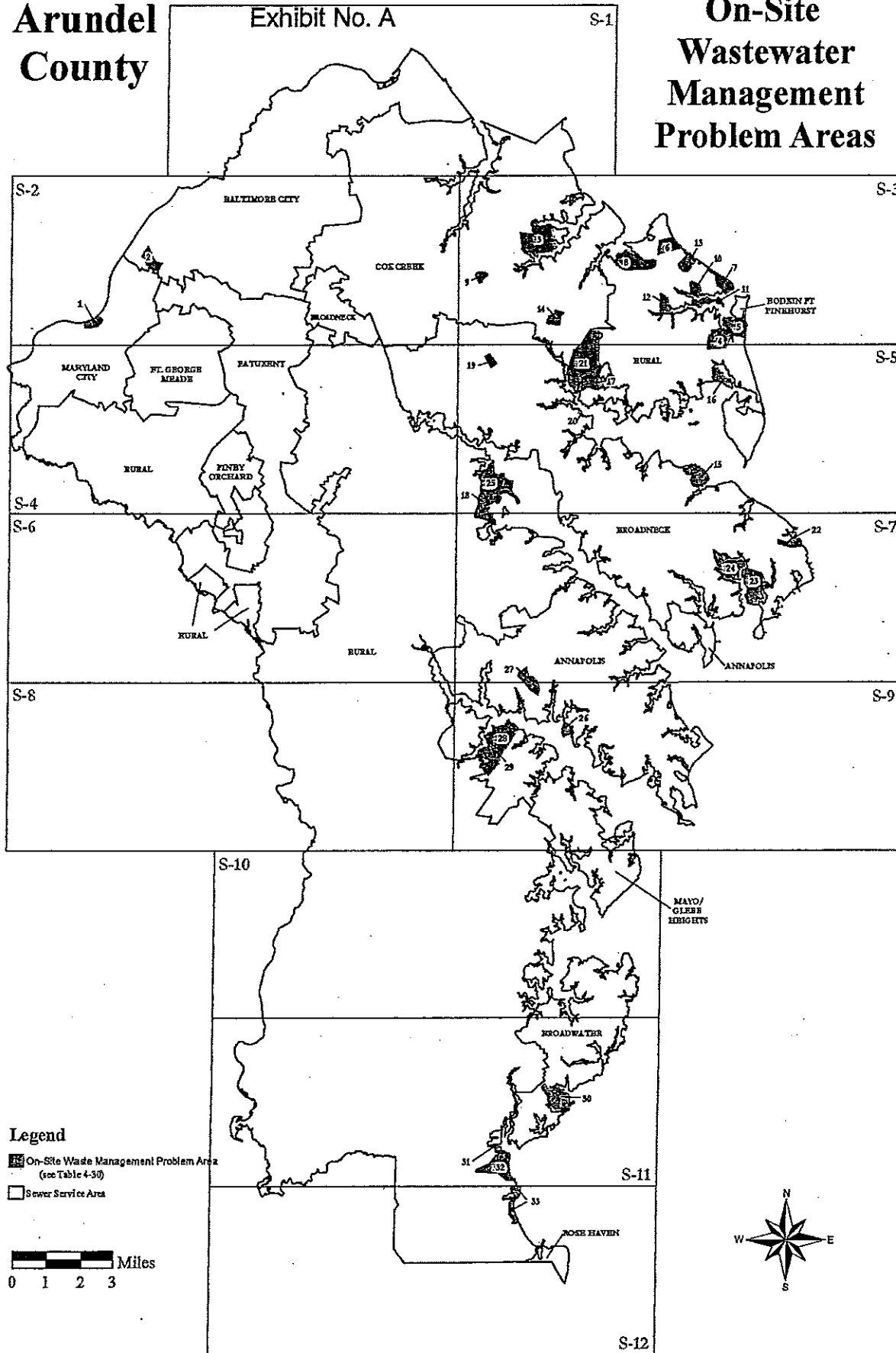
I HEREBY CERTIFY THAT THIS IS A TRUE AND CORRECT COPY OF BILL NO.
11-13, THE ORIGINAL OF WHICH IS RETAINED IN THE FILES
OF THE COUNTY COUNCIL.


Elizabeth E. Jones
Administrative Officer

Anne Arundel County

Bill No. 11-13
Amendment No. 1
Exhibit No. A

**Figure 4-13
On-Site
Wastewater
Management
Problem Areas**



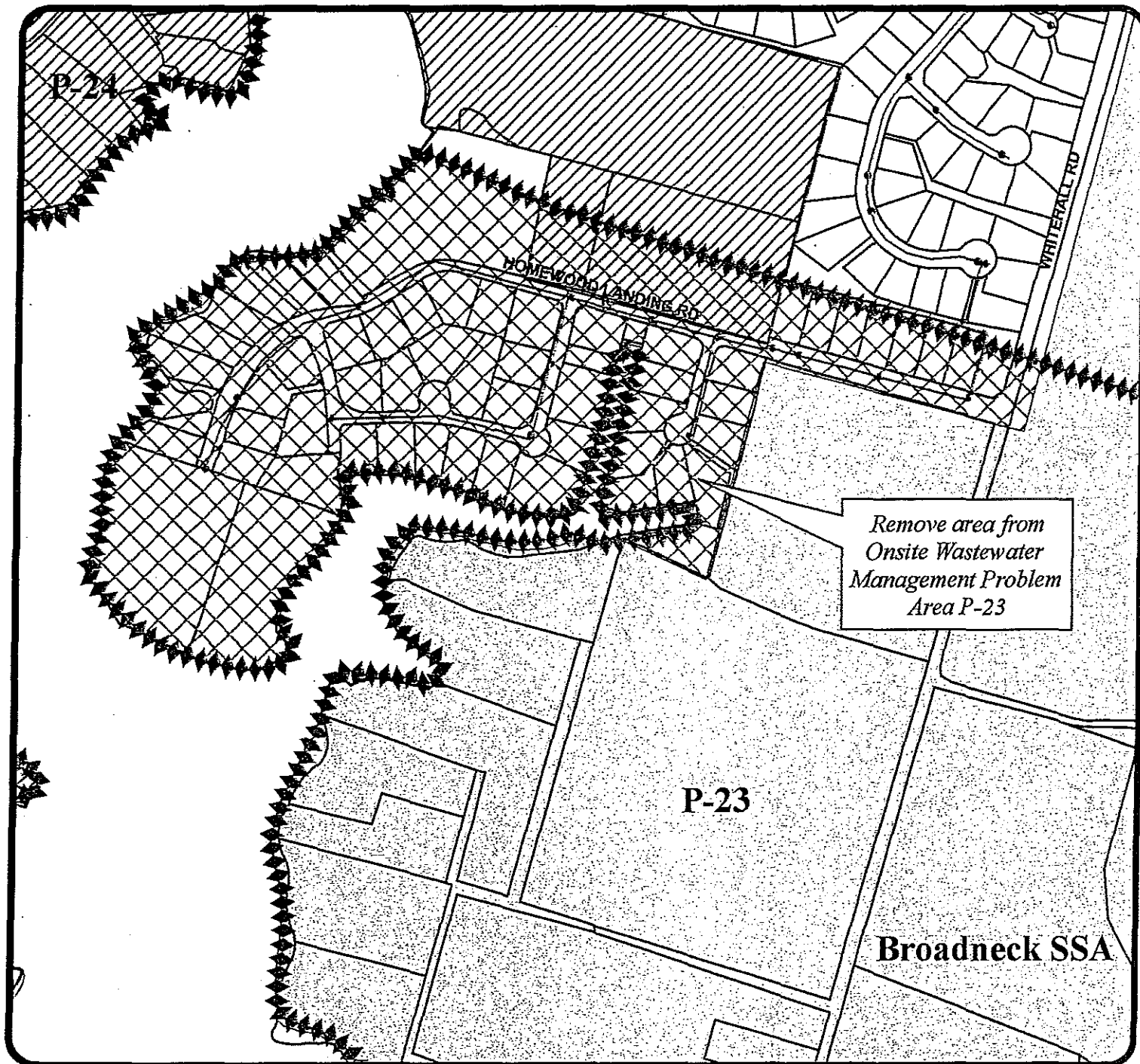
Date: Bill> (Effective Date) 2013
File: H:\Projects\SewerMasterPlan_2013-12.mxd
Produced by: Long Range Planning Division,
Office of Planning and Zoning
Copyright 2013

Sewer Map S-7

Amendment No.2

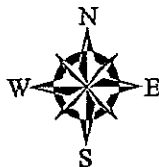
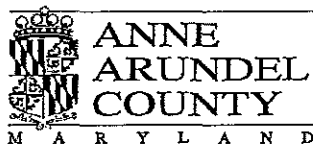
Bill No. 11-13

Exhibit No. B

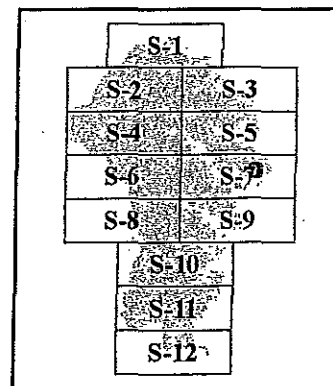


Legend

- Sewer Line
- Onsite Wastewater Management Problem Area
- Existing Service
- Capital Facilities
- Future Service
- No Public Service
- Other
- Planned Service
- Amendment Area



0 0.04 0.08 0.12 0.16 0.2 Miles



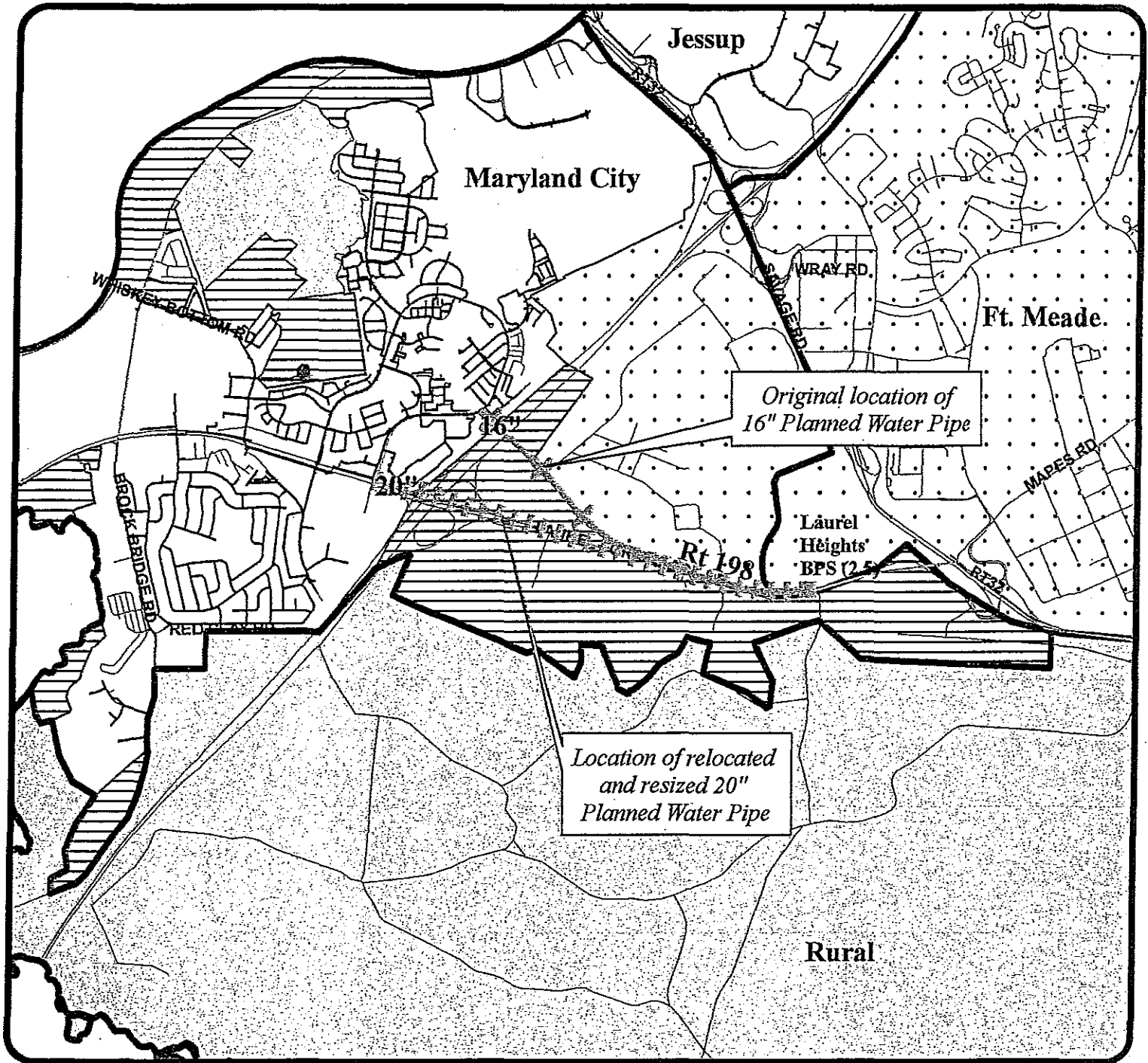
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Water Map W-4

Amendment No.2

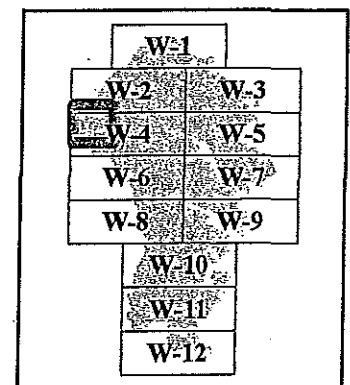
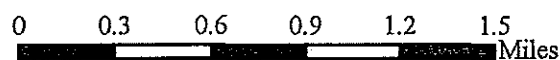
Bill No. 11-13

Exhibit No. C



Legend

- Water Pipes**
- Amendment - Realigned Water Pipe
 - Existing
 - Capital Facility
 - Future
 - Planned
- Water Timing Categories**
- Existing Service
 - Capital Facilities
 - Future Service
 - No Public Service
 - Other
 - Planned Service

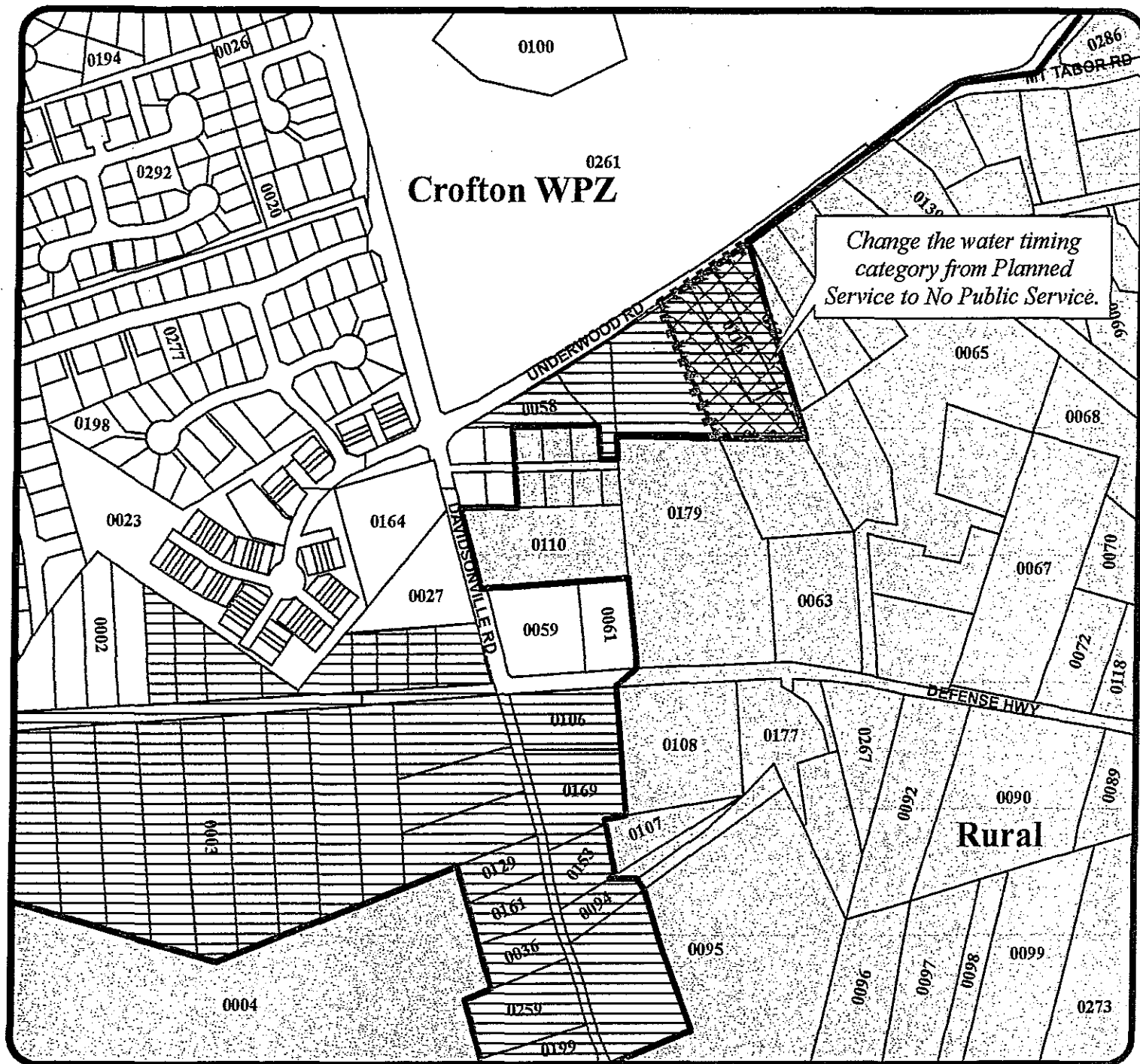


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Water Map W-6

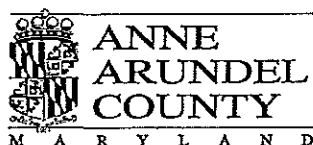
Amendment No.3

Bill No. 11-13
Exhibit No. D

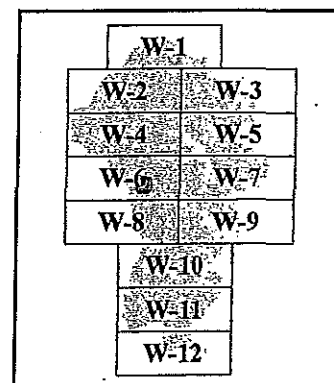


Legend

- Existing WPZ Boundary
- Proposed WPZ Boundary
- Existing Service
- Capital Facilities
- Future Service
- No Public Service
- Other
- Planned Service
- Amendment Area



0 0.05 0.1 0.15 0.2 0.25 Miles

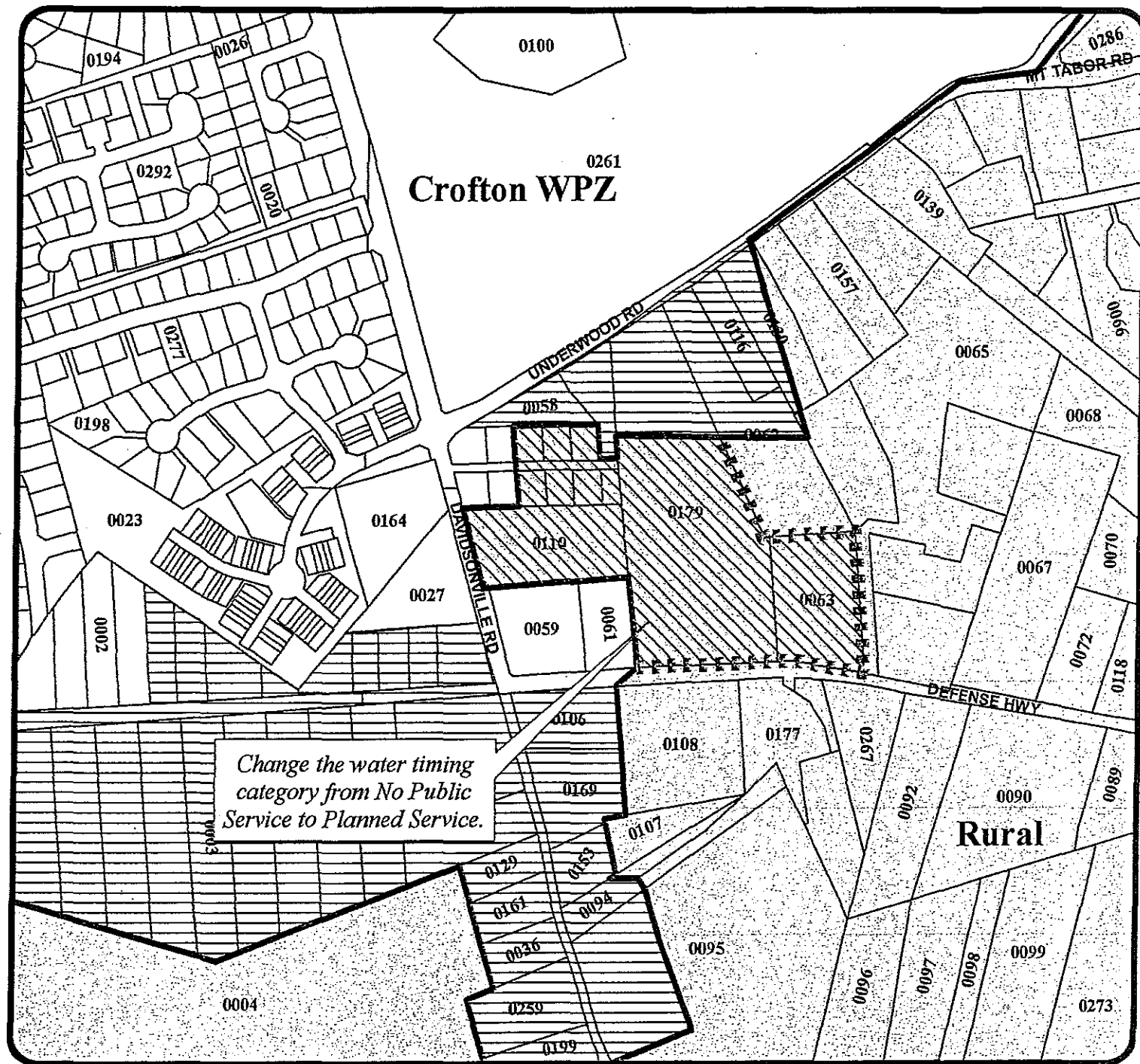


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Water Map W-6 Amendment B.mxd

Water Map W-6

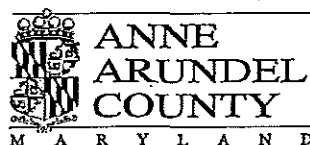
AMENDMENT NO. 4

Bill No. 11-13
Exhibit No. E

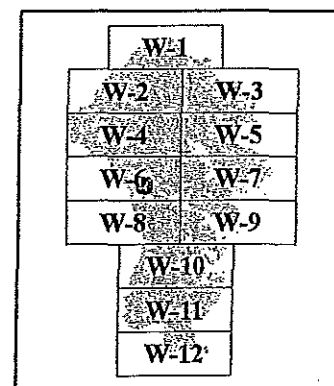


Legend

- Existing WPZ Boundary
- Proposed WPZ Boundary
- Existing Service
- Capital Facilities
- Future Service
- No Public Service
- Other
- Planned Service
- Amendment Area



0 0.05 0.1 0.15 0.2 0.25 Miles



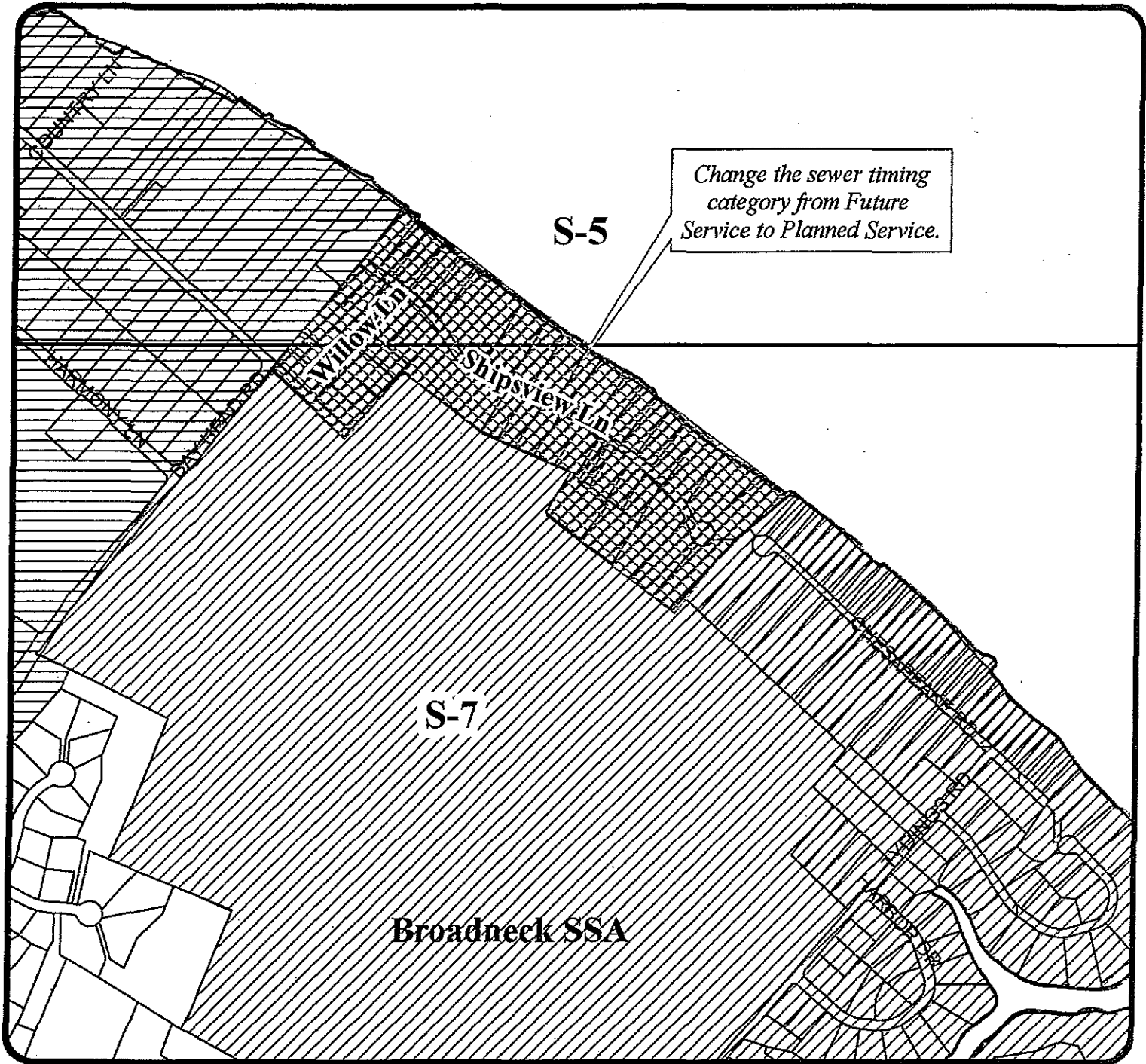
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Sewer Map S-5 & S-7

AMENDMENT NO. 5

Bill No. 11-13

Exhibit No. F

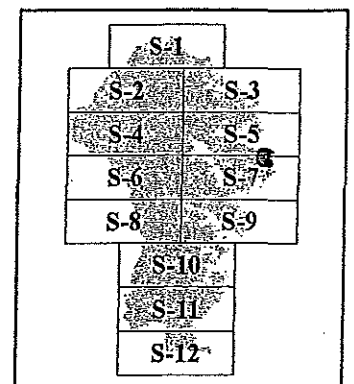


Legend

- Sewer Timing Categories**
- Existing Service
 - Capital Facilities
 - Future Service
 - No Public Service
 - Other
 - Planned Service
 - Amendment Area



0 0.065 0.13 0.195 0.26 0.325 Miles



Date Created: 4/5/2013
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Sewer Map S-5 & S-7 Amendment.mxd

Sewer Map S-7

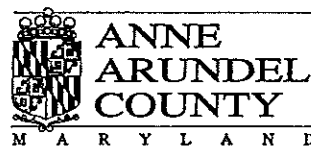
Amendment No. 6

Bill No. 11-13
Exhibit No. G



Legend

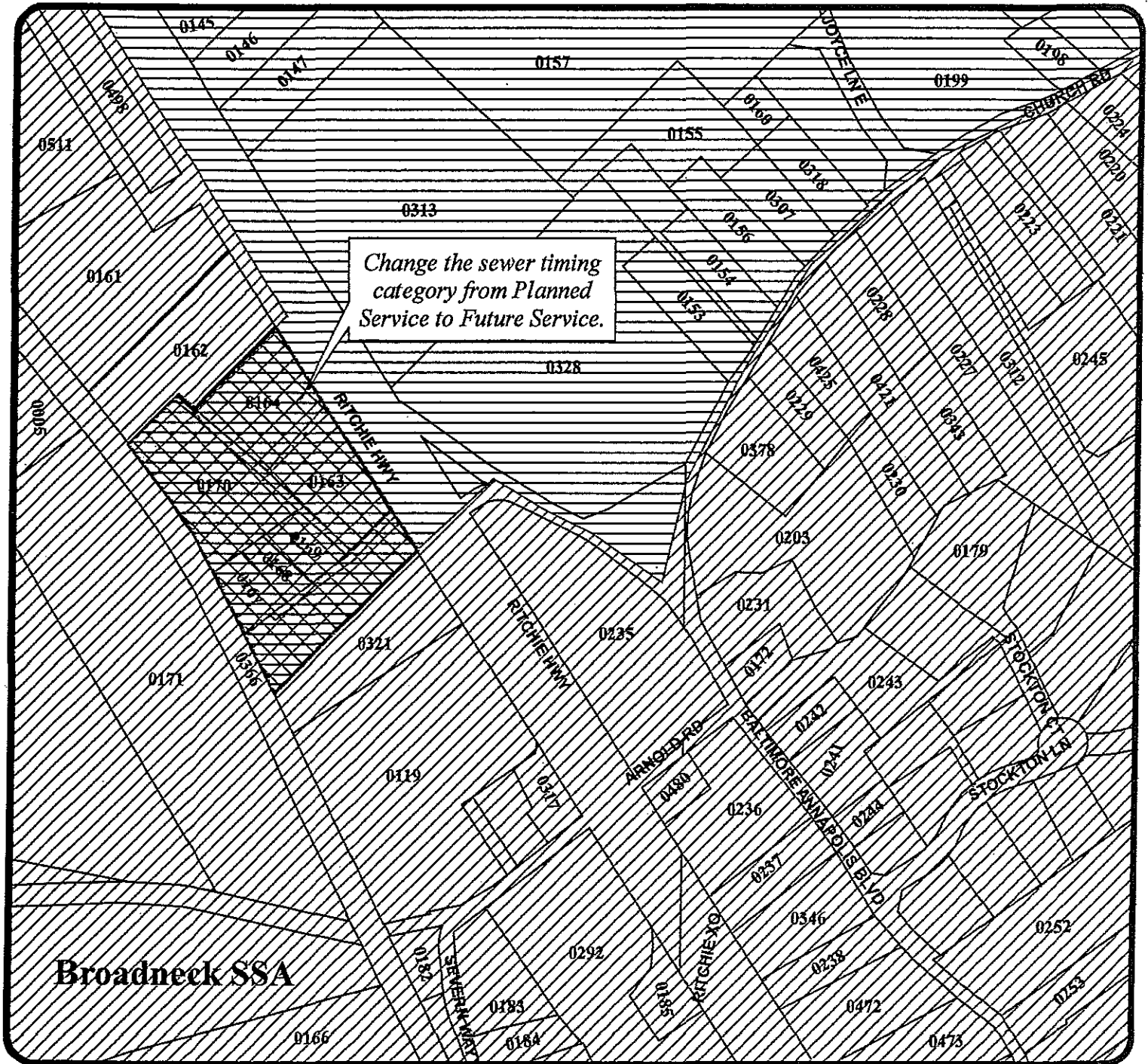
- Sewer Service Area
- Existing Service
- Capital Facilities
- Future Service
- No Public Service
- Other
- Planned Service
- Amendment Area



0 0.03 0.06 0.09 0.12 0.15 Miles

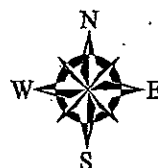
S-1	
S-2	S-3
S-4	S-5
S-6	S-7
S-8	S-9
S-10	
S-11	
S-12	

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Sewer Map S-7 Amendment B.mxd



Legend

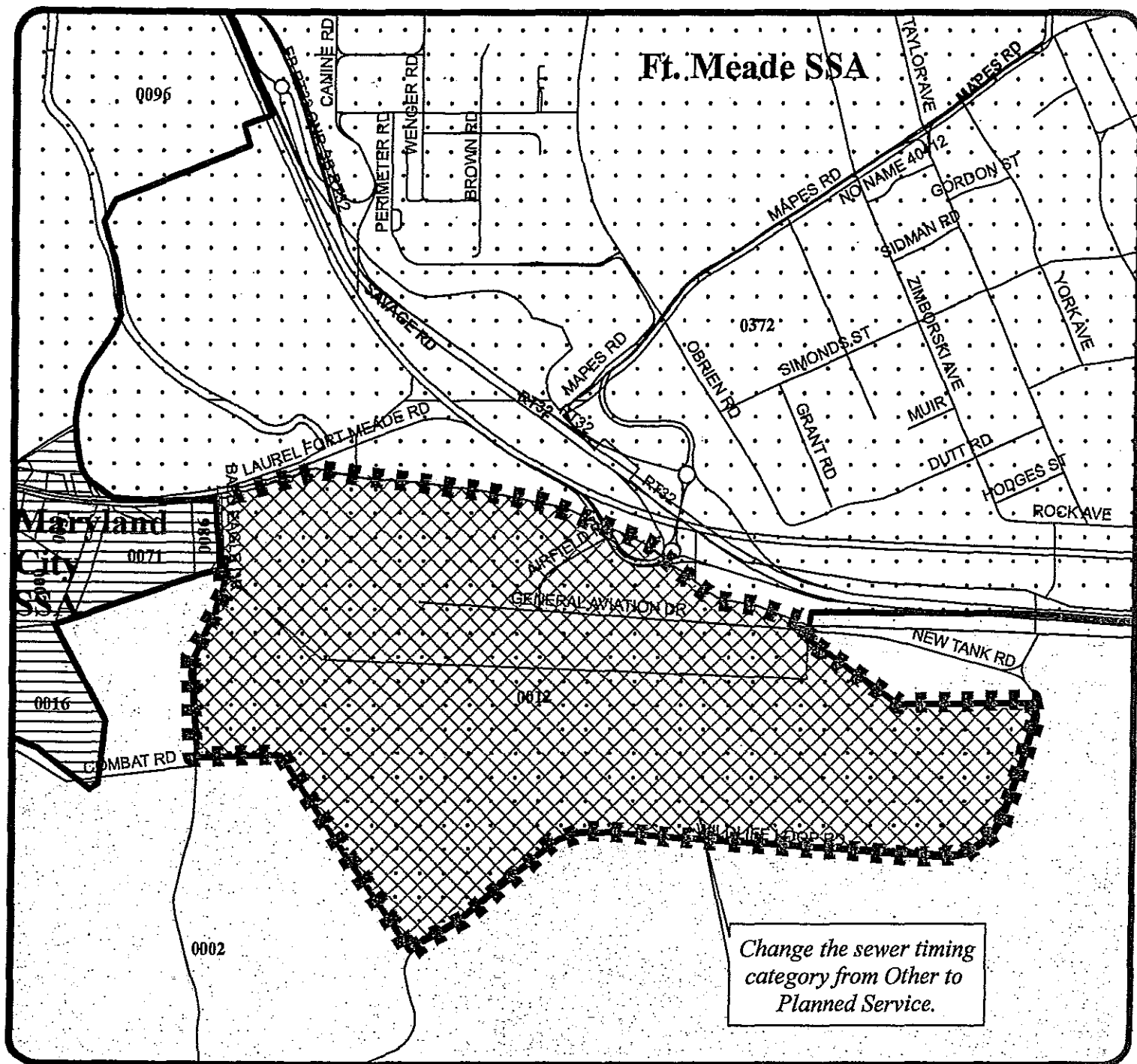
-  Sewer Service Area
-  Existing Service
-  Capital Facilities
-  Future Service
-  No Public Service
-  Other
-  Planned Service
-  Amendment Area



0 0.03 0.06 0.09 0.12 0.15 Miles

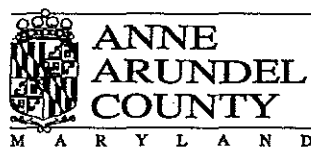
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S-2	S-3
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S-10	
S-11	
S-12	

Date Created: 4/26/2013
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Sewer Map S-7 Amendment C.mxd



Legend

- Proposed SSA Boundary
- Sewer Service Area
- Sewer Timing Categories**
 - Existing Service
 - Capital Facilities
 - Future Service
 - No Public Service
 - Other
 - Planned Service
- Amendment Area



0 0.1 0.2 0.3 0.4 0.5 Miles

S-1	
S-2	S-3
S-4	S-5
S-6	S-7
S-8	S-9
S-10	
S-11	
S-12	

Date Created: 4/12/2013
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Sewer Map S-4 Amendment.mxd