QUEEN ANNE'S COUNTY

2006 COMPREHENSIVE WATER

AND SEWERAGE PLAN

Prepared by the Departments of Public Works, Planning and Zoning, and Environmental Health

For the Citizens and Commissioners of Queen Anne's County

February 28, 2006

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ELECTED OFFICIALS

County Commissioners of Queen Anne's County

Benjamin F. Cassell, Jr.
Joseph F. Cupani
Richard A. Smith
Gene M. Ransom III
Michael S. Koval

COUNTY ADMINISTRATION and STAFF

Paul W. Comfort, Esq., County Administrator
D. Steven Walls, Director, Public Works
Todd R. Mohn, P.E., Deputy Director, Public Works
Faith Elliott-Rossing, Director, Planning and Zoning
Steve Cohoon, Deputy Director, Planning and Zoning
John Borders, Director, Budget and Finance
Alan L. Quimby, P.E., Chief Sanitary Engineer
Megan Del Gaudio, GIS Specialist II
Jeffrey Rank, Analyst III

STATE

John E. Nickerson, Environmental Health Director

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Resolution

RESOLUTION NO. 06- 02

A RESOLUTION OF THE COUNTY COMMISSIONERS OF QUEEN ANNE'S COUNTY ADOPTING A REVISED AND UPDATED WATER AND SEWER ALLOCATION POLICY

WHEREAS, the County Commissioners of Queen Anne's County operate certain public water and sewerage systems within the County;

AND WHEREAS, the orderly and equitable allocation of water and sewer capacity in accordance with the County's land use and growth management goals is essential to the public health, safety and welfare in order to insure responsible growth and adequacy of infrastructure;

AND WHEREAS, the attached Water and Sewerage Allocation Policy has been formulated after thorough review of the proposed 2006 Comprehensive Water and Sewerage Plan and the current and proposed Comprehensive Plans for the County and is intended to facilitate the goals and objections of such plans.

NOW THEREFORE BE IT RESOLVED BY THE COUNTY COMMISSIONERS OF QUEEN ANNE'S COUNTY, MARYLAND that the attached Water and Sewer Allocation Policy be and is hereby ADOPTED.

WITNESS the hands and seals of the County Commissioners of Queen Anne's County, Maryland this 28 day of Feb, 2006.

ATTEST:

Margie A. Houck

Margie Houck
Executive Assistant

THE COUNTY COMMISSIONERS OF QUEEN ANNE'S COUNTY

Joseph F. Cupani, President

Benjamin F. Cassell

Michael S. Koval

Gene M Ransom III

Gene Ransom, III

Richard A. Smith

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Resolution

RESOLUTION NO. 06- 03

A RESOLUTION OF THE COUNTY COMMISSIONERS OF QUEEN ANNE'S COUNTY ADOPTING THE 2006 QUEEN ANNE'S COUNTY COMPREHENSIVE WATER AND SEWERAGE PLAN

WHEREAS, the County Commissioners of Queen Anne's County have updated and revised their comprehensive water and sewerage plan in accordance with the Environment Article of the Annotated Code of Maryland and the provisions of the Code of Maryland Regulations;

AND WHEREAS, the updated and revised plan, known as the 2006 Queen Anne's County Comprehensive Water and Sewerage Plan, has been submitted to each planning agency that has jurisdiction in Queen Anne's County, including any comprehensive planning agency with area wide jurisdiction for review and comment on consistency with planning programs for the area;

AND WHEREAS, the Queen Anne's County Department of Planning and Zoning has certified that the 2006 Queen Anne's County Water and Sewerage Plan is generally consistent with the County Comprehensive Plan;

NOW THEREFORE, BE IT RESOLVED BY THE COUNTY COMMISSIONERS OF QUEEN ANNE'S COUNTY, as follows:

1. The attached 2006 Queen Anne's County Comprehensive Water and Sewerage Plan be and is hereby ADOPTED.

2. The 2006 Queen Anne's County Comprehensive Water and Sewerage Plan shall be submitted to the Maryland Department of the Environment for review and approval.

WITNESS the hands and seals of the County Commissioners of Queen Anne's County, Maryland this 28 day of Feb, 2006.

ATTEST:

Margie A. Houck

Margie Houck
Executive Assistant

THE COUNTY COMMISSIONERS OF QUEEN ANNE'S COUNTY

Joseph J. Cupani, President

Benjamin F. Cassell

Michael S. Koval

Gene Ransom, III

Richard A. [illegible]

DEPARTMENT OF PLANNING & ZONING
QUEEN ANNE'S COUNTY
160 COURSEVALL DRIVE
CENTREVILLE, MARYLAND 21617

410-758-4088 Permits
410-758-3972 Fax
410-758-1255 Planning
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Thursday, February 16, 2006

Mr. Steve Walls, Director
Queen Anne's County Department of Public Works
P.O. Box 56
Centreville, MD 21617

RE: 2006 Comprehensive Water and Sewerage Plan Update

Dear Steve:

The Department of Planning and Zoning has reviewed the 2006 Comprehensive Water and Sewerage Plan update and find it generally consistent with the County's 2002 Comprehensive Plan as amended and adopted community plans.

While the service area maps presented in the 2006 Comprehensive Water and Sewerage Plan do not necessarily coincide with those of the current Comprehensive Plan or more particularly the Community Plans, we recognize the differences will largely be resolved as the County moves forward with the regular updates to the existing Community Plans.

Sincerely,

Faith Elliott Rossing

Faith Elliott Rossing, AICP
Planning Director

H:\W&S\2006 CW&S Plan Consistency with Comp Plan.doc

February 28, 2006

By motion on the above date, in accordance with COMAR 26.03.01.04B(1), this is to certify that the 2006 Comprehensive Water and Sewerage Plan was officially adopted by the County Commissioners of Queen Anne's County, Maryland.

Margie A. Houck, Executive Assistant

In accordance with COMAR 26.03.01.04B(2), this is to certify that this 2006 Comprehensive Water and Sewerage Plan has been submitted to the Maryland Department of the Environment and the Plan substantially meets the requirements of COMAR 26.03.01.02B.

Alan L. Quimby, P.E., Chief Sanitary Engineer

As required by COMAR 26.03.01.04B(3), this is to certify that those sections of the 2006 Queen Anne's County Comprehensive Water and Sewerage Plan covering engineering aspects of water and sewer projects have been prepared by a registered professional engineer licensed in the State of Maryland.

Alan L. Quimby, P.E. – MD No. 16974
Chief Sanitary Engineer

As required by COMAR 26.03.01.03D, this is to certify that the following planning agencies have been consulted in the preparation of the 2006 Queen Anne's County Comprehensive Water and Sewerage Plan:

Maryland Department of Planning, Queen Anne's County Planning Commission, Town of Barclay, Town of Centreville, Town of Church Hill, Town of Millington, Town of Queen Anne, Town of Queenstown, Town of Sudlersville, and the Town of Templeville.

Alan L. Quimby, P.E., Chief Sanitary Engineer

QUEEN ANNE'S COUNTY

2006 COMPREHENSIVE WATER AND SEWERAGE PLAN

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EXECUTIVE SUMMARY

Introduction

The Queen Anne's County Commissioners, in accordance with the requirements of the Code of Maryland Regulations, **Title 26, Subtitle 3, Chapter 01** entitled "Planning Water Supply and Sewerage Systems," has adopted this updated and revised County Comprehensive Water and Sewerage Plan. This Plan is an update of all previous plans, incorporating all amendments and revisions. It should be noted that the provisions of this Plan apply to both unincorporated (i.e. County) and incorporated (i.e. Towns) areas of the County.

This update of the Comprehensive Water & Sewerage Plan has three primary goals. They are to inventory existing and planned developments, to identify and address the water supply and sewerage treatment problem areas as identified by the County's professional staff, and to accommodate future growth in ways consistent with the County's Comprehensive Land Use Plan. It is acknowledged that it is the intention of this Plan to implement the land use goals of the County's Comprehensive Plan, and its associated Community Plans, and any discrepancy between the two Plans are unintentional and the County's Comprehensive Plan shall take precedence.

Sewerage Service Needs

At the present time, Queen Anne's County recognizes two sewerage disposal problem priority areas. In recognition of this issue, the County Commissioners, sitting as the Sanitary Commission, have set aside 500,000 gallons of the pending 1 million gallon wastewater plant expansion in order to begin addressing this concern. The greatest concern is for the MD Rt 8 corridor (Romancoke Road) area at the southern end of Kent Island due to the large number of existing septic systems that discharge directly to groundwater during seasonal high water table months. This area consists of nine 'older' subdivisions or communities as detailed herein. Another area of concern is the MD Rt 552 corridor, namely the Dominion-Marling Farms area located on the shores of Crab Alley Bay. However, the number of system failures is lower in this region.

It is the intent to serve the vast majority of the improved properties in these two corridors. Service to many of the existing vacant lots that are interspersed within these communities is also anticipated. **It is not the intent to service contiguous blocks of existing vacant lots of record within these communities that will not be adjacent to a**

proposed sewer line, or lots that may be identified as being environmentally sensitive. In addition, service to any large tracts of vacant or agricultural properties located outside of the designated communities along these two corridors will be strictly prohibited.

<u>MD Rt 8 Corridor</u>

Kent Island Estates and Romancoke on the Bay Collection Sub-Area:

These two subdivisions were platted in the late 1950s, are directly adjacent to each other, and are located near the southern extremity of Kent Island. They share similar soil conditions and both have small lot sizes (typically 10,000 to 20,000 square feet). Currently it is estimated that there are 1,585 lots of which 765 are improved.

The Environmental Health Department has estimated that 80% of the existing septic systems in the Kent Island Estates/Romancoke area discharge directly into groundwater on a seasonal basis (March and April) and that constitutes an uncorrectable failure. Uncorrectable failures are defined as those that cannot be remedied without utilizing direct groundwater penetration, or a holding tank, during the high water table season. Because of the small lot sizes, poor soil conditions, and seasonal high water table, on-site correction is not considered a long-term viable alternative.

Queen Anne Colony and Kentmorr Collection Sub-area:

These two subdivisions were also platted in the 1950s and 1960s and are immediately adjacent to each other. While Queen Anne Colony typically has one-acre lots, the poor permeability of the soils and the high water table, particularly the properties along Price Creek, have uncorrectable failures. Kentmorr, on the other hand, has very small lots and most improved properties consist of two or more lots of record.

These two subdivisions have approximately 323 improved properties and 350 vacant lots. However, Kentmorr has large blocks of vacant lots that are not proposed to be served. It is estimated that the total number of vacant lots to be served from this service area is approximately 70.

Chesapeake Estates, Sunny Isle of Kent, Normans/Batts Neck and Matapeake Estates Collection Sub-Area:

These three subdivisions were also platted in the 1960s with Chesapeake Estates and Sunny Isle of Kent being immediately adjacent to each other. The community of Normans, also known locally as Batts Neck, is also in this vicinity and predates any of the subdivisions.

These four areas have approximately 202 improved properties and 220 vacant lots. However, Sunny Isle of Kent has a few blocks of vacant lots that are not proposed to be served. It is estimated that the total number of vacant lots to be served from this service area is approximately 117.

Dominion and Marling Farms Collection Sub-Area:

Dominion is a community located between Crab Alley Bay and Little Creek on Kent Island. It extends from the southern end of Route 552 to the west along Crab Alley Bay. Presently there are 225 parcels, 200 of which contain single-family dwellings. Marling Farms is a subdivision located on Kent Island adjacent and to the east of Dominion that begins at the end of Route 552 and extends southeastward to Norman's Point. The area contains 405 parcels, 310 of which contain single-family dwellings. The predominant soil of the area is Mattapex Silt Loam with Butlertown, Elkton and Keyport Loams all present. Seasonally high water table and slow permeability cause some septic systems severe problems. This community is being assigned a lower priority than the MD Rt 8 communities in order to focus County resources on the more populated problem area.

Water Service Needs

The water service situation is greatly complicated by the prohibition by the Maryland Department of the Environment (MDE) of any future groundwater appropriation permits into the Aquia aquifer on Kent Island. MDE has reported that the Aquia aquifer is being threatened by salt-water intrusion from the aquifer's outcrop within the deep trench of the Chesapeake Bay. In order to lessen the rate of intrusion, MDE prohibits any further withdrawals from the Aquia on Kent Island. Aquia wells are typically 150 to 250 feet deep and have dissolved iron contents of less than 1 parts per million (ppm).

Given this prohibition, the logical choice for the County was to drill to the next available aquifer, which is the Magothy. However, the Magothy has such a high iron content in the

Grasonville and Kent Island areas that it is difficult, and up to four times as expensive, to treat. Magothy wells on Kent Island are typically 400 to 700 feet deep, but have dissolved iron contents of between 25 and 40 ppm.

Therefore, the County has begun a well replacement program into the lower Patapsco aquifer. These wells are typically 1,500 to 1,700 feet deep, but have dissolved iron contents of less than 10 ppm.

The professional staff of Queen Anne's County has determined that while no high priority areas exist for water from a health concern basis, the need to improve the water quality within the existing community systems, i.e. to find a raw water source naturally low in iron, or to find a technology that is superior in removing the iron, is a high priority.

There are two areas, Love Point and Kingstown/Chester Harbor, which have been designated low priority problem areas as it is believed that individual on-site corrective measures would be the most cost effective to both the County and the citizens. This need is further discussed below.

<u>Optimization of Existing Kent Island Water Service Area</u>

The Kent Island water service area serves an approximate population of 8,500 but consists of eight different water treatment plants divided into four distribution systems. Of these eight water treatment plants, four draw raw water from the Magothy which has an iron content as high as 40 ppm, and one draws from the lower Patapsco with an iron content of between 5 and 10 ppm. The other 3 draw from the Aquia aquifer with raw water iron content of less than 1 ppm, however MDE has prohibited any expansion to these facilities. Iron is considered a secondary contaminant by the federal government and the recommended maximum level in drinking water is 0.3 ppm with an optimum level of 0.0 ppm.

The primary goal is to first connect the Stevensville plants with the north Chester plants. The second goal would be to connect the north Chester plants with the south Chester plants. This will enable the consideration of decommissioning the least efficient plants. More technical information in regards to these water treatment plants is included in Appendix IV.

Stevensville Distribution Sub-Area

There are three interconnected water treatment plants for the Stevensville Area. They are the Chesapeake Bay Business Park, Stevensville, and Thompson Creek water treatment plants. The plants are connected via a 12-inch water main. Although interconnected, there are two pressure zones due to the area being served by two water towers of different height. Route 50/301 is the dividing line with the higher-pressure zone being south of Route 50/301.

North Chester Sub-Area

There are two interconnected water treatment plants serving the north Chester area. These plants are Bayside and Queens Landing. The plants are connected via a 10-inch water main.

South Chester Sub-Area

There are two interconnected water treatment plants and a single isolated plant serving the south Chester area. The two connected plants are Bridge Pointe and Kent Island Village. The plants are connected via an 8-inch water main. The third plant is the Riverside plant that serves an affordable housing development owned by the County. It is too far away, and has too little demand, to be interconnected at this time.

Kingstown - Chester Harbor

This area fronts the Chester River and straddles MD Route 213 opposite Chestertown and is underlain by a family of highly permeable soils. This results in septic effluent and/or fertilizers potentially contaminating vulnerable aquifers with excessive nitrates. The latest available water quality information indicates that approximately 5 to 10 percent of the wells provide water with nitrate levels exceeding the drinking water standard of 10 ppm. This represents no increase from the data given in the 1990 plan. These few water supplies have been equipped with treatment systems that are capable of providing potable water. While the Environmental Health Department views this area with concern, it places a lower priority on establishing a municipal water system, as on-site remediation would be more cost effective.

Love Point

This small community of 90 homes is located on the northernmost tip of Kent Island, approximately 1.7 miles north of Cloverfields. It is above a sub-crop of the Aquia and is subject to the brackish water intrusion. The properties between Love Point and Cloverfields are currently zoned for lowest density development and are above the terminus of the Nanjemoy/Calvert Formation. Love Point residents have begun to drill new wells into the Magothy Formation, accepting the costs of drilling and treatment. As such, Love Point is not an area recommended for a community water system.

Growth Sub-Areas

In 1992, Maryland adopted the Economic Growth, Resource Protection and Planning Act as an amendment to Article 66B. The Act requires all local governments to reduce sprawl development, concentrate growth in and around existing developed areas, promote economic development and protect sensitive natural resources. In 1993, consistent with the 1992 Planning Act, the County Comprehensive Plan recommended that specific development plans be prepared for each of the County's six designated growth areas.

During 1997 and 1998, community plans were adopted for the areas of Stevensville, Chester, Grasonville, Queenstown and Centreville. The Citizens Advisory Committee recently completed revisions to the Chester and Stevensville Community plans. The revised plan is currently under review by the Planning Commission and County Commissioners. The Kent Narrows Plan and its associated zoning changes were previously adopted in 1990 as part of the implementation of the 1987 Comprehensive Plan, but it is currently under review. Full copies of each individual plan are available from the Department of Planning and Zoning.

While the service area maps presented in this plan do not necessarily coincide with those of the current Comprehensive Plan or more particularly some of its Community Plans, the County Commissioners believe they have a mandate to reduce the scope of the growth areas and this reduction in scope is reflected in the service area maps. As the County's Comprehensive Plan, or its Community Plans, become updated, this Plan will be amended.

An essential component to the successful implementation of the growth area plans is the ability to serve these areas with municipal sewer. Municipal water was also a requirement, but given the abundance of aquifers suitable for individual wells, water has never been a constraining factor to development. However, as discussed below, both the County Commissioners and Planning Commission are becoming increasingly concerned with the lack of municipal water in the growth areas.

Unfortunately, there were no financial implementation strategies outlined to accomplish this vision from a water and sewer infrastructure point of view. The County's General Fund has a long-standing tradition of not funding water and sewer infrastructure. The Sanitary District, which is an enterprise fund whose revenues come solely from its existing users, could not afford to construct the necessary infrastructure to implement the Community Plans. As a result, future developers are required to provide the majority of the necessary water and sewer infrastructure to serve new growth. The one exception to this approach is sewer treatment capacity, which is provided by the County for the Stevensville, Chester, Kent Narrows, and Grasonville Growth Areas and areas identified with public health concerns.

Another consideration is that the County controls the water and sewer in only four of the six identified Growth Areas. The other two areas, Queenstown and Centreville, are incorporated towns and their willingness and cooperation will be necessary for the community plans to be fully implemented.

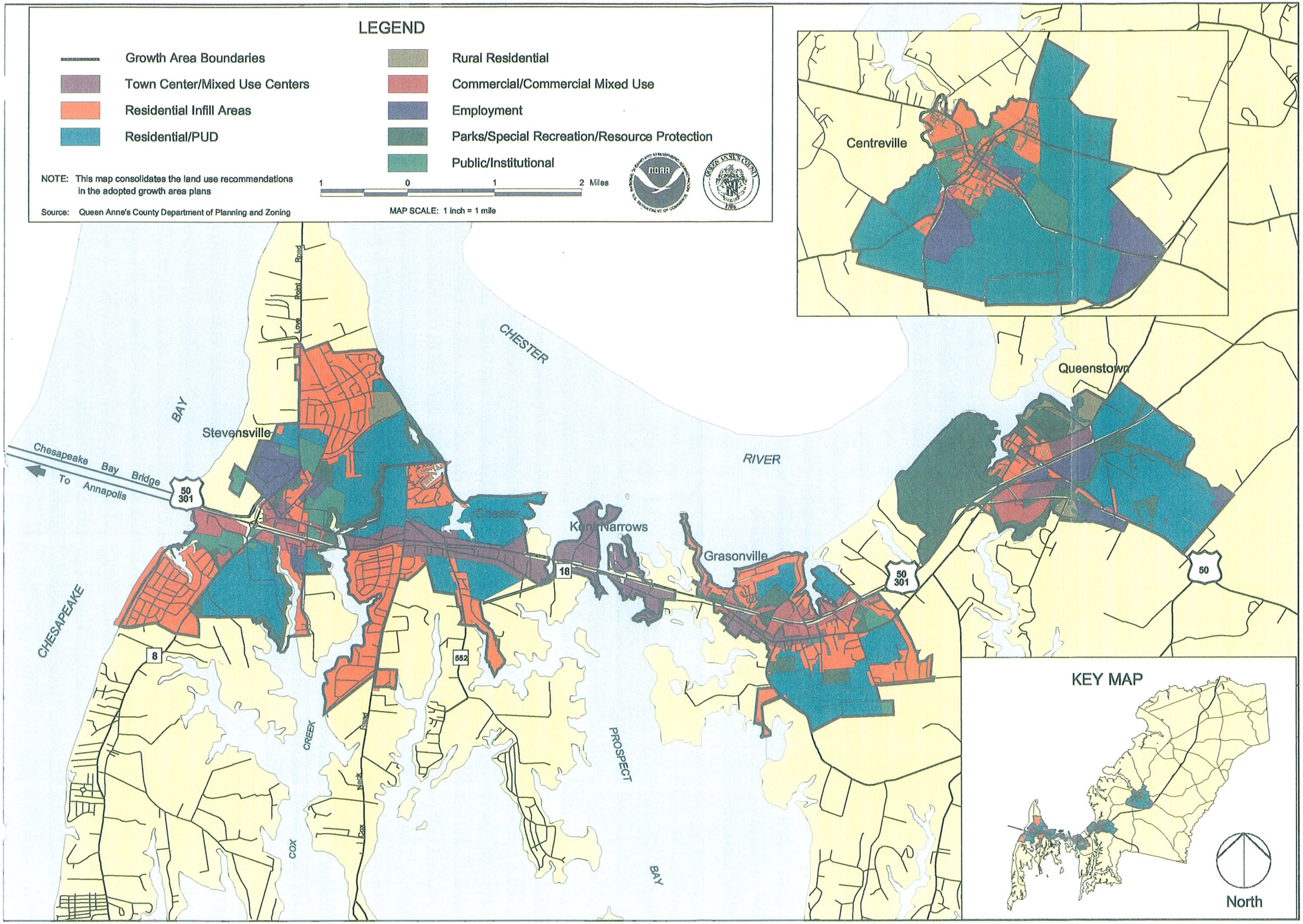
More detailed descriptions of the necessary water and sewer infrastructure needed for the implementation of each Growth Area are presented in Chapters 3 (water) and 4 (sewerage).

Water Service in Growth Areas – Mandatory Connection

Both the County Commissioners and the Planning Commission have expressed concern with the lack of municipal water available to serve the four County growth areas in their entirety. Currently approximately 50% of the properties have access to a water main. With the exception of benefit assessment areas, where water and sewer service is provided to an entire community, the County has always made connection to existing water mains optional. The only restriction being that new development must connect, when the service is available, and the existing improved properties must connect should their well fail.

As there are insufficient funds available to the Sanitary District to extend water mains into the unserved areas without a dedicated revenue source, typically in the past any extension that occurred was to serve a development project. The Sanitary District has developed a 'rebate' program that acts to provide a portion of the funds from any new connections to the developer as recognition that the water main may benefit properties other than their own. To better manage this situation, the County Commissioners are willing to consider mandatory connections for both existing water service areas and new water service areas.

Additional issues due consideration are that many of the water systems supplying water to the areas may not have sufficient capacity to comfortably meet the demand that would be occasioned by such a mandatory program. Also the fees currently incorporated in the rate schedule only cover the cost of treatment and metering. An additional fee, or an increase in one of the existing fees, would be required to cover the cost of new water mains in the areas not currently served.



Growth Areas: Generalized Land Use Plans

Queen Anne's County, Maryland

MAP 2

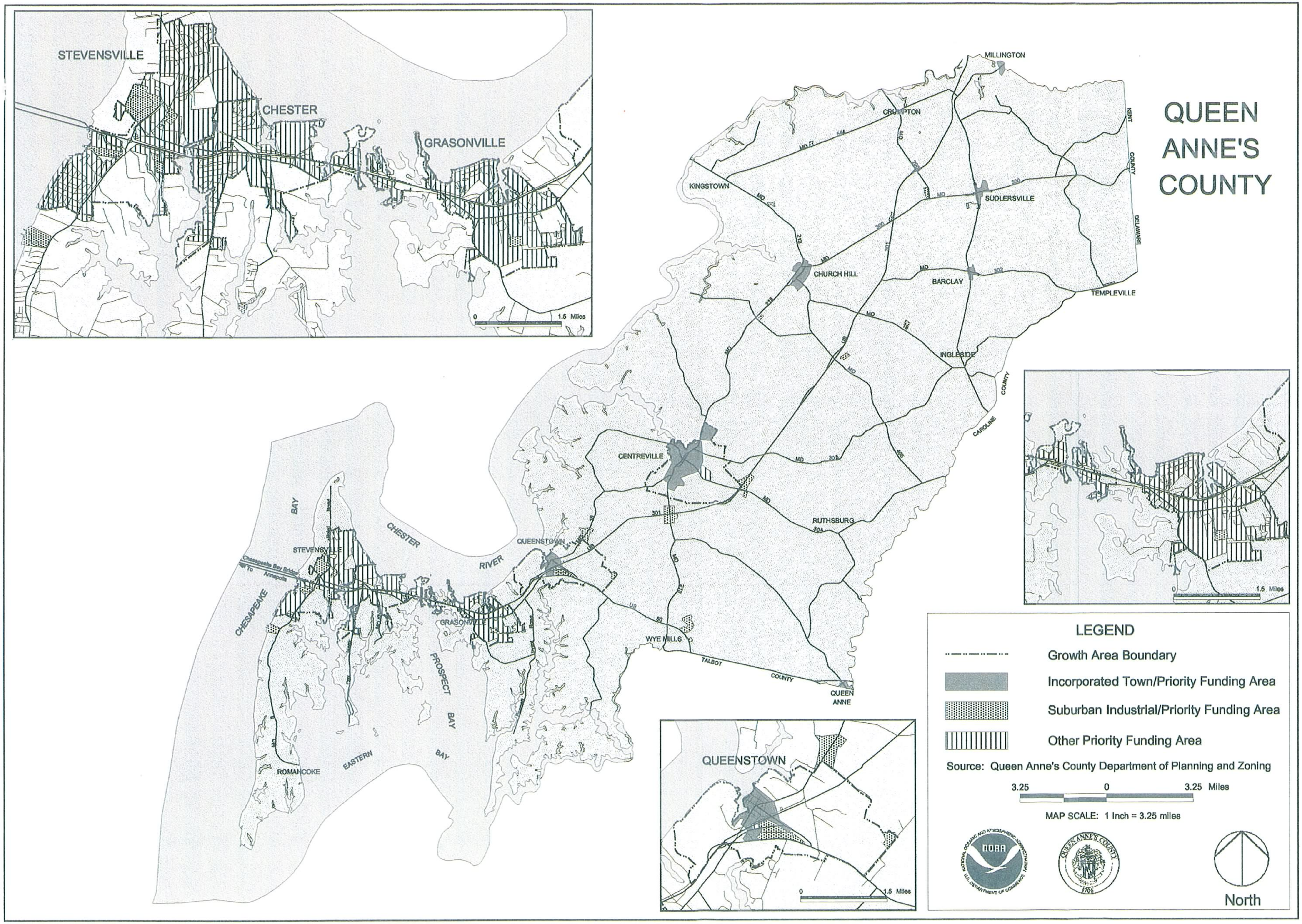
Date: January 2002

Growth Areas/Priority Funding Areas

Queen Anne's County, Maryland

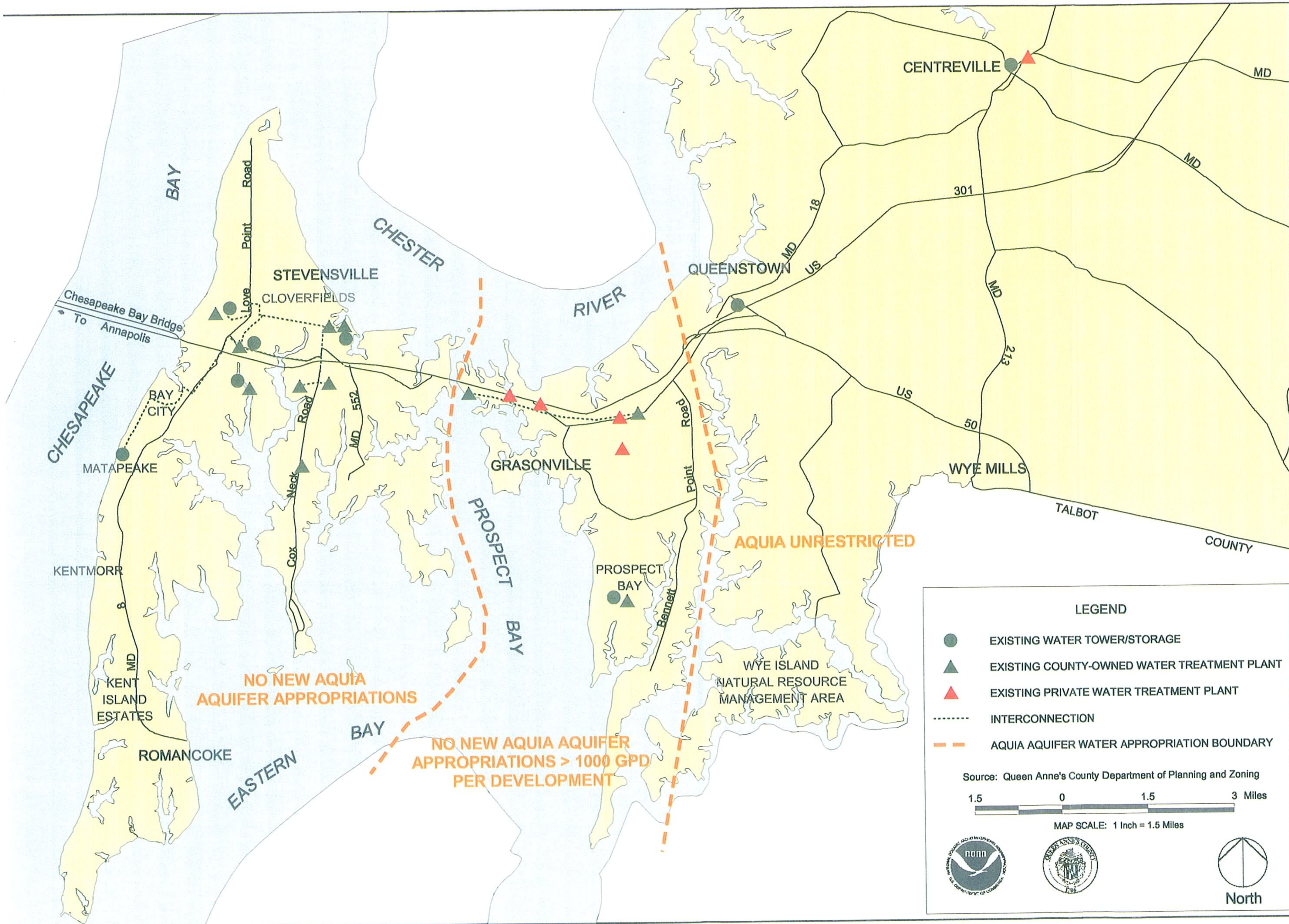
MAP 6

Date: January 2002



Water Planning Issues

Queen Anne's County, Maryland

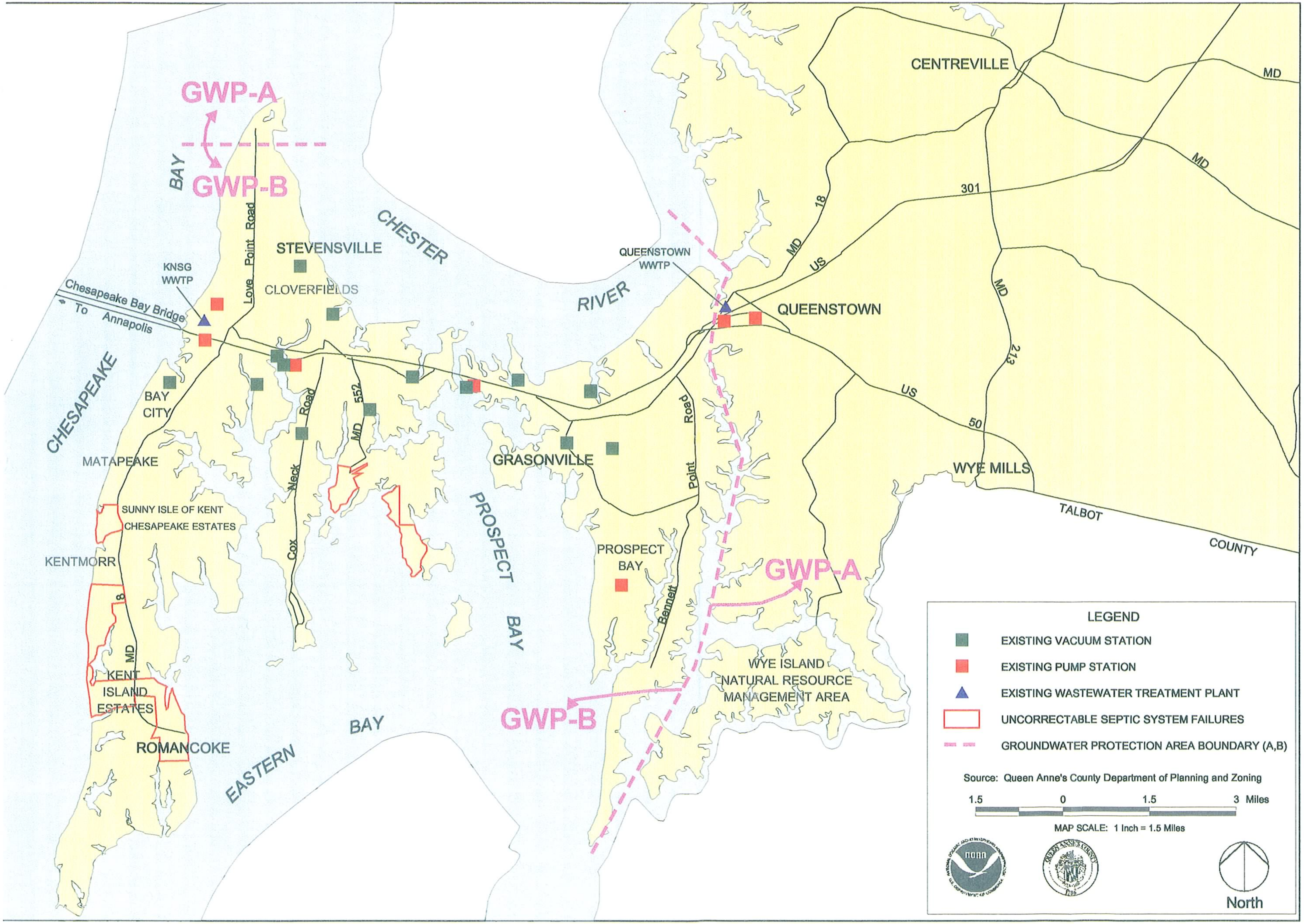


MAP 7

Date: January 2002

Sewer Planning Issues

Queen Anne's County, Maryland



MAP 8

Date: January 2002

INTRODUCTION AND ORGANIZATION

1.1 General

The County Commissioners (in accordance with the requirements of the Code of Maryland Regulations, Title 26, Subtitle 3, Chapter 01 entitled “Planning Water Supply and Sewerage Systems”) has adopted this updated and revised County Comprehensive Water and Sewerage Plan. This Plan is a revision of all previous plans, incorporating all amendments and revisions, and was prepared as required by Environmental Articles 9-501 through 9-512, Annotated Code of Maryland. This Plan shall be fully updated triennially, as required by the Maryland Department of the Environment (MDE). The County Commissioners of Queen Anne’s County also sit as the Queen Anne’s County Sanitary Commission.

This Plan was prepared with the cooperation and support of the Queen Anne’s County Departments of Environmental Health, Planning and Zoning, Public Works, and Budget and Finance. It is intended to be fully integrated with the Comprehensive Land Use Plan, and to complement it as a growth management tool. This document is expected to be a working guide, a long-term programmatic plan, and a tool to direct and manage growth and development.

This updated Comprehensive Water and Sewerage Plan was written with a view to the needs of both the past and the future. It presents solutions for existing problems and, in conjunction with the Comprehensive Plan, guidelines for future development. Past development has left a legacy of problem areas in need of practical solutions. By compiling all available information on the identified problem areas and providing practical solutions that are consistent with other plans, this document will attempt to correct the problems of the past. This Plan also attempts to provide a means of preparing for and absorbing development in an orderly and economical fashion.

1.2 Goals

In addition to the goals outlined above, this Plan seeks to achieve the following:

1.2.1 The preservation of as much prime agricultural land as possible, while meeting the growth needs of the County, in conformance with the Comprehensive Land Use Plan.

1.2.2 The use of innovative methods of on-site treatment and disposal of wastewater to resolve existing public health concern problem areas, when practical.

1.2.3 The requirement that all municipalities, public and private communities, multi-use facilities, industries, and individuals provide adequate and appropriate water and wastewater facilities with due regard for future need.

1.2.4 The conservation of water supplies through the fullest possible compliance with the Maryland Water Conservation Plumbing Fixtures Act, including but not limited to, encouragement of retrofitting, public education, qualified management, and other measures.

1.2.5 The adoption of such ordinances, policies, guidelines, or regulations as may be required to fulfill this Plan.

1.2.6 The timely amendment and updating of this Plan as required by changing conditions, needs, or State law.

1.2.7 The combination of existing and proposed water treatment facilities to eliminate the smaller, less efficient facilities.

1.2.8 To accommodate development in the Growth Sub-Areas as designated in the Comprehensive Land Use Plan.

1.3 Organization

1.3.1 Queen Anne's County Commissioners

The Commissioners sit as the Sanitary Commission and have the authority and responsibility for all municipal water and wastewater facilities in the unincorporated areas of the County. The Commissioners are responsible for maintaining oversight and ensuring adequate financing and efficient operation of the Sanitary District.

1.3.2 Queen Anne's County Department of Public Works

The Department of Public Works is the professional staff of the Sanitary Commission. It performs the daily operations and maintenance function, and the long-range planning for the Commission.

1.3.3 Queen Anne's County Sanitary District

The entire County except for incorporated municipalities is constituted as a Sanitary District. The Sanitary District is also considered the name of the division within the Department of Public Works that bears the daily operation and maintenance duties of the County's sanitary facilities.

1.3.4 Queen Anne's County Environmental Health Department

The Environmental Health Department is the local unit of the Maryland Department of Health and Mental Hygiene, partially funded by the County and responsible for local implementation of programs of the State Departments of Health and Mental Hygiene, Environment, and Natural Resources, as well as administering local ordinances. The Environmental Health Department is the sole approving authority over individual, multi-use, and non-community water and sewer systems. This department is also the approving authority for new subdivisions and must determine the adequacy of the appropriate water and/or wastewater system prior to approving any plats.

1.3.5 Queen Anne's County Planning Commission

The Commission and its staff, the Department of Planning and Zoning, are responsible for ensuring the planned, orderly growth of the County.

1.3.6 Queen Anne's County Department of Budget and Finance

The Department of Budget and Finance prepares the operating budget and capital improvement program budget for review and adoption by the County Commissioners. The Department provides bond issuance, cash management, payroll, accounts payable, and customer billing and receipt financial services as well as financial and operating reports. In addition, the Department coordinates the annual independent audit and provides external financial reporting.

1.4 Municipalities

1.4.1 Town of Queenstown – The Town of Queenstown owns a municipal water and wastewater system and is responsible for preparing and implementing a capital improvement program to maintain and/or upgrade the systems. These systems are operated and maintained by a contractor hired by the Town. Planning and Engineering are handled by consultants hired by the Town.

1.4.2 Town of Centreville - The Town of Centreville owns a municipal water and wastewater system and is responsible for preparing and implementing a capital improvement program to maintain and/or upgrade the systems. These systems are operated and maintained by a contractor hired by the Town. Planning and Engineering are handled by consultants hired by the Town.

1.4.3 Town of Church Hill - The Town of Church Hill owns a municipal wastewater system and is responsible for preparing and implementing a capital improvement program to maintain and/or upgrade the system. The system is operated and maintained by a contractor hired by the Town. Planning and Engineering are handled by consultants hired by the Town.

1.4.4 Town of Sudlersville - The Town of Sudlersville owns a municipal wastewater system and is responsible for preparing and implementing a capital improvement program to maintain and/or upgrade the system. The system is operated and maintained by a contractor hired by the Town. Planning and Engineering are handled by consultants hired by the Town.

1.4.5 Town of Millington - The Town of Millington owns a municipal water and wastewater system and is responsible for preparing and implementing a capital improvement program to maintain and/or upgrade the system. The system is operated and maintained by a contractor hired by the Town. Planning and Engineering are handled by consultants hired by the Town.

1.5 Objectives

1.5.1 The County Commissioners should fully implement this Plan so as to correct the existing public health concern areas and eliminate future ones to ensure the health and safety of visitors and citizens of the County.

1.5.2 All municipal water and/or wastewater facilities in new subdivisions outside incorporated towns shall be designed and built to specifications approved by the Queen Anne’s County Department of Public Works. All such projects must be in compliance with the goals of the Queen Anne’s County Comprehensive Land Use Plan. All planned community facilities should be sized to provide service for the maximum development permissible by the Zoning Ordinance. If it is necessary to alleviate problem areas nearby as identified by the Environmental Health Department, the Maryland Department of the Environment, or the Department of Natural Resources, the proposed facility may be required to be sized to meet both the on-site and off-site needs.

1.5.3 The County Commissioners should take such actions as may be necessary to gradually integrate the various water supply systems on Kent Island into a consolidated service area.

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PLANNING

2.1 General

Queen Anne's County is approximately 373 square miles in size and is located on the Delmarva Peninsula of Maryland. It is bordered by Kent County, Delaware, on the extreme northeast; Kent County, Maryland, to the north; Caroline County to the east; and Talbot County to the south. The Chesapeake Bay surrounds the western extremities of the Kent Island-Grasonville area.

The County is predominantly rural, but is experiencing increasing development pressure on its southwestern side from the Annapolis-Baltimore-Washington metropolitan region over the Chesapeake Bay (William Preston Lane Memorial) Bridge. Some in-migration pressure is also occurring in the north from Chestertown, in Kent County, Maryland.

2.2 Aquifers

Groundwater is the sole source for municipal, industrial and private water supplies in the County. This is due to the availability of groundwater of good quality and the lack of suitable surface impoundment sites. In the Aquia little treatment is required for potable water supplies, although water quality can vary within an aquifer. The Magothy has high iron content that requires more extensive treatment. The Coastal Plain geologic region underlies Queen Anne's County. There are nine formations considered to be important, or potentially important, water supplies. Beginning with the surface formations and proceeding to the deepest, each will be reviewed for its accessibility, water quality, and current and future utilization. A more detailed description of the aquifers is presented in the Queen Anne's County Groundwater Protection Report.

2.2.1 Wicomico Formation

This formation is a major part of the Pleistocene Series that exists as surface deposits over most of Queen Anne's County. The deposits fall into two general types--terrace and plains deposits. The terrace deposits have little value as a source of groundwater supply. The thickness of the plains deposits varies considerably depending on the topography. In the eastern, flat-lying areas it is only about 25 feet thick. Along the Bay shore there are deposits ranging from 60-90 feet thick.

Because nearly all wells tapping the Wicomico Formation are domestic dug or driven wells equipped with pumps yielding only a few gallons a minute, reliable data on yields is not available.

The permeability and porosity of the sand and gravel that make up the formation favor the storage and recovery of groundwater. Because of its proximity to the surface, there is a high probability of groundwater contamination in this formation.

2.2.2 Calvert Formation

The Calvert Formation is part of the Miocene Series. It dips about 15 feet per mile toward the southeast, thickening in the direction of the dip. It outcrops near Millington and at spots along the Wye and Chester rivers. This formation also occurs as in-fill in paleochannels penetrating the Nanjemoy Formation Aquiclude.

Quality of the groundwater is generally good except for high silica content that may necessitate treatment if used for boiler purposes. The high yields and specific capacities of the few wells tapping the formation are probably the result of vertical leakage from the overlying Pleistocene deposits. Many wells have been drilled through the Calvert Formation to deeper aquifers as water was not found in the formation in sufficient quantity. It is not considered to be as important as some of the other aquifers found in Queen Anne’s County.

2.2.3 Aquia Greensand Formation

This formation is part of the Eocene Series. The dip is toward the southeast and varies from 30 feet per mile in the north, to 15 feet per mile in the south. Outcrop of the formation is poor and appears mostly in a belt lying along the sides of the topographic rise that forms the backbone of Kent County. Because of the limited outcropping, it is thought that the formation is mainly recharged indirectly from overlying pervious sediments. Subcropping beneath the Talbot and Kent Island Formation at Love Point and beneath the sediments of the Bay has been identified.

The Aquia Greensand is currently the most important source of groundwater in Queen Anne’s County. Several hundred wells withdraw water from this formation. Most of the wells are located in a limited area on Kent Island and on the mainland at Grasonville and Queenstown. Analyses show that the groundwater from this formation contains less iron and is softer than that from the Monmouth Formation. However, saltwater intrusion is being experienced on Kent Island. The Maryland Geological Survey and the Maryland Department of Natural Resources has published a Report of Investigation No. 51 that includes extensive modeling of the aquifers involved. The cone of depression created by heavy pumping in the Talbot County towns of Easton and St. Michael’s areas has, when combined with the Kent

Island pumpage, created brackish water intrusion that is beginning to affect water quality on the northwestern half of Kent Island.

Recent years of summer droughts have created a great demand for irrigation purposes by agricultural uses into the Aquia aquifer raising concern that the irrigation demand may impact adjacent residential wells.

2.2.4 Monmouth Formation

This formation is part of the Upper Cretaceous Series. It dips southeast at about 25 feet per mile. The best exposures of the formation are in the northern portion of the County and in the State of Delaware along the Chesapeake and Delaware Canal. Water from this formation requires treatment due to excessive iron content. In the southern parts of Queen Anne's County this formation acts as a layer separating aquifers.

2.2.5 Piney Point Formation

The Piney Point Aquifer overlies the Nanjemoy Formation and is overlain by the Calvert Formation in the southeast portion of the County. The chemical constituents of the water in the Piney Point indicate that the overlying Calvert Formation recharges the aquifer. Water in this aquifer ranges in chemical character from calcium bicarbonate, containing less than 250mg/l-dissolved solids, to sodium chloride bicarbonate containing more than 1,000 mg/l-dissolved solids. This aquifer is an important source of water in southeast Queen Anne's County.

2.2.6 Magothy Formation

This formation is also part of the Upper Cretaceous Series. The Magothy is the oldest of those formations that have a fairly broad lateral distribution of homogeneous material. It appears to be closely connected hydrologically with the adjacent formations and, as a result, has often been passed by as an aquifer. The formation crops out along a two-mile band in Cecil County and dips southeast about 30 feet per mile.

The Magothy Formation is an important potential source of groundwater; however iron removal will almost certainly be required. An increasing number of wells in Queen Anne's County are penetrating the Magothy Formation at this time as a result of new Aquia Greensand appropriations being restricted in the Grasonville and Kent Island area. For Kent Island, the Magothy and deeper formations will be the only sources available due to the over pumping and brackish water intrusion of the Aquia.

2.2.7 Raritan Formation

This formation is part of the Lower Cretaceous Series. The Raritan Formation lies just above the Patapsco Formation and is lithologically and hydrologically similar. The formation dips and thickens toward the southeast about 30 feet per mile. Outcrops of the Raritan Formation appear in Cecil County and reappear in Kent County.

Water from this formation has high iron concentrations. Although seldom tapped at this time due to its depth, the Raritan Formation is a potential water-bearing formation for the future.

2.2.8 Patapsco Formation

This formation is the deepest part of the Lower Cretaceous Series. It is made up of lenticular bodies of cross-bedded sand, clay, and sandy clay. Although lenses may be thin and of limited lateral extent, taken together they form a large unit of water-bearing material. The Patapsco has a southeast dip of about 40 feet per mile. Limited outcrops appear in a belt averaging nine miles wide that crosses central Cecil County in a northeast direction.

During the winter of 1999, the Sanitary District constructed a test well into the Patapsco aquifer at the Stevensville water treatment plant. The results of the water quality analysis indicated an iron content of less than 5 parts per million, only one-sixth the iron produced by the on-site Magothy aquifer wells. As a result the Sanitary District has now drilled a production well into the Patapsco to replace the Magothy as the primary source of potable water.

2.2.9 Patuxent Formation

This formation, which makes up the Lower Cretaceous Series, lies on Precambrian crystalline basement rocks. The thickness varies because of non-conformities becoming generally thicker in the direction of its dip toward the southeast. Its outcrop in Cecil County is poorly exposed and extends over a large area. The Patuxent Formation is a very deep aquifer in Queen Anne's County, and because large quantities of water are readily available in other aquifers, the Patuxent must be considered a reserve source rather than a source to be tapped in the immediate future. There is a potential problem with brackish water conditions.

2.3 Soil Associations and Drainage Characteristics

The majority of the soils in Queen Anne's County are of a sandy nature with varying contents of clay and silt. This mixture results in an extreme variation in permeability and, consequently, some are very well drained, while others are poorly drained. In addition to the variations in permeability, which affect drainage, most areas of the County experience a high water table. This condition reduces the effectiveness of even highly permeable sands for sewerage disposal. The major soil classifications in the County and their characteristics are as follows.

2.3.1 Galestown-Lakeland-Downer Association

The Galestown-Lakeland-Downer Association contains somewhat excessively drained sands and loamy sands. Except in steeper areas, the Galestown and Lakeland soils have few characteristics that limit their use for residential developments or for disposing of sewerage effluent from septic tanks, except for the risk of groundwater contamination.

2.3.2 Sassafras-Woodstown Association

The Sassafras-Woodstown Association contains well-drained and moderately well drained soils that have a friable (easily crumbled) sandy clay-loam subsoil. In most places, there are few limitations affecting the use of Sassafras soils for disposing of sewerage effluent from septic tanks. However, seepage and down slope pollution are a possibility on some of the steeper slopes. Using the Woodstown soils for disposing of sewerage effluent is severely restricted due to a high water table.

2.3.3 Matapeake-Butlertown Association

The Matapeake-Butlertown Association contains well-drained silty soils that have a friable to firm silty clay loam subsoil. Except in steeper areas, the Matapeake soils have only slight limitations that affect their use for residential developments or for disposing of sewerage effluent from septic tanks. The Butlertown soils are severely limited for septic tank use because the soils are slowly permeable and are saturated when the water table is high.

2.3.4 Mattapex-Keyport Association

The Mattapex-Keyport Association contains moderately drained silty soils that have a firm silty clay loam to plastic clay subsoil. The Mattapex and Keyport soils have characteristics that severely limit their use for septic tank disposal fields. Tiling or ditching should drain all building sites. Tile lines are satisfactory in the Mattapex soils, but ditches may be necessary in the more slowly permeable Keyport soils.

2.3.5 Elkton-Othello Association

The Elkton-Othello Association contains poorly drained silty soils that have a firm silty clay loam to plastic clay subsoil. A high water table limits these soils for disposing sewerage effluent from septic tanks.

2.3.6 Fallsington-Pocomoke Association

The Fallsington-Pocomoke Association contains poorly and very poorly drained soils that have a friable to firm sandy clay loam subsoil. Even if they are drained, the soils in this association generally have severe limitations that restrict their use for residential developments and for disposing sewerage effluent from septic tanks. Most buildings constructed in areas of the association are located on knolls, which consist of minor soils that have good drainage, but make up only a small part of the total acreage.

2.4 Summary of Soils

The main area of the County that experiences on-site sewerage disposal problems due to soil conditions is the Kent Island-Grasonville area.

Poor drainage combined with a high water table is causing serious problems with septic tank failure throughout the Kent Island-Grasonville area. The introduction of the KN/S/G Sewerage Treatment Plant has replaced many septic systems, thus reducing the level of pollution to nearby waterways. However, large areas of failing septic systems still exist and must be corrected.

Conversely, even though soils in an area are excessively drained, they still may not be the best choice for septic tank construction. An example of this type of condition in Queen Anne’s County occurs in a narrow strip along the Chester River from Kingstown to Millington. In this area, soils percolate so well that there can be groundwater contamination due to a heavy concentration of septic tank disposal systems and/or excessive fertilizer application on farms.

2.5 Topography

Queen Anne’s County is situated on the Atlantic Coastal Plain, on the western edge of the Delmarva Peninsula, which separates the Chesapeake Bay from the Atlantic Ocean. The majority of its acreage is on the mainland with the remainder being islands scattered mostly in the southwest area. Kent Island and Wye Island are the two largest.

The topography of the County is generally separated into two major areas by a line running between Queenstown and the eastern tip of Wye Island. The western area of the County, which includes Kent Island and Wye Island, is a low, almost level plain that is less than 20 feet above sea level in most places. Many small bays branching from the Chesapeake Bay create narrow peninsulas known locally as necks. Few streams dissect the surface of this area.

Except for narrow areas along the Chester River, South East Creek, Corsica River and some of their major tributaries, the eastern part of the County is more than 20 feet above sea level. This area generally consists of an upland plain that is very gently sloping but in places is moderately rolling. Many streams dissect this plain and as a result there is generally good surface drainage.

The exception in the eastern portion of the County is the small area to the east and south of Sudlersville adjoining Kent County, Delaware, that is nearly level, marked by numerous depressions, and has an average elevation of about 70 feet. This area is very poorly drained, with numerous swamps.

2.6 Surface Water Patterns

The entire drainage system in Queen Anne's County is part of the Chesapeake Bay Watershed. Most of the surface water drains in one of three directions from the highest natural point in the County, located one mile northwest of Starr--into the Chester River, the Choptank River (via Tuckahoe Creek) or Eastern Bay (via the Wye River, Prospect Bay, Crab Alley Bay, and Cox Creek). The western edge of Kent Island drains directly into the Chesapeake Bay. The Chester River basin is the largest drainage area in the County.

Because the County is relatively flat and near sea level, the streams in the County are slow moving. The downstream portion of many rivers in the County are influenced by the tides and tend to have very slow "flushing" rates, reducing their ability to act as points of discharge for sewerage treatment systems.

2.6.1 Surface Water Quality

All surface waters of Queen Anne's County have been classified as Class I or Class II. Class I waters are to be maintained suitable for contact recreation and aquatic life. Class II waters are to be maintained suitable for shellfish harvesting. COMAR 26.08.02 gives the specific water quality parameters for both classes.

Limitations have been set for bacteria, nitrogen, phosphorus, sedimentation, oil, and several other pollutants.

2.6.2 Surface Water Quality Problems

Queen Anne's County lies within the Choptank and Chester River sub-basins. The MDE 1985-1987 Maryland Water Quality Inventory rates these sub-basins as "Fair" to "Good." This terminology is defined as ranging from intermittent severe or continued low-level degradation, to minimal pollution. The primary causes are listed as agricultural runoff and malfunctioning septic systems. Municipal discharges and urban runoff are contributors in some areas. The Inventory found that there is insufficient data for trend analysis, so that the impact of past efforts cannot be accurately determined yet.

Many of the causes of the reduced quality of the County's surface water resources are beyond the scope of this Plan. The discharge of septic effluent can and will be addressed.

2.6.3 Surface Water Quality and the Impact of Total Maximum Daily Loads and Nutrients

Total Maximum Daily Loads (TMDL) are a provision in the federal Clean Water Act that requires states to establish Water Quality Standards, determine if a body of water meets these standards and if not, determine what the particular pollutant is, determine the source of the pollutant, determine that maximum amount of the pollutant that can be safely assimilated by the water body, and then suggest a means to remove the impairment. Until such time that the impairment is removed or reduced to acceptable levels, new sources of the pollutant could be restricted.

Similarly, the State of Maryland has determined that excess nutrients, predominantly nitrogen and phosphorus, are the predominant cause of the dissolved oxygen water quality impairment of the Chesapeake Bay and its Tributaries. The excess nutrients cause excess algae during the warmer months, which when the algae decomposes, robs the water column of the dissolved oxygen necessary for aquatic life. As such Maryland, as well as other partners in the Chesapeake Bay Agreement, has set a nutrient cap by state and major watershed basin. It is hoped that reaching, and then maintaining, this cap will restore the Chesapeake Bay to a semblance of its former state of health.

Either of these programs could inhibit the expansion of existing wastewater plants or prevent new wastewater discharges into surface waters already deemed impaired.

2.6.4 Shellfish Harvesting Restrictions

The following areas are currently "restricted" (shellfish harvesting prohibited):

Chester River above Northwest Point
Corsica River above Cedar Point
Queenstown Creek
Kent Narrows
Shipping Creek
Little Greenwood Creek
Wye East River
Wye Narrows
Headwaters of Wye River
Wells Cove
Little Creek

Other large areas of water are classified as "conditionally approved" which limits harvesting for three days following a one-inch in 24-hour rain event.

Cox Creek
Warehouse Creek
Thompson's Creek
Crab Alley Bay
Crab Alley Creek
Marshy Creek
Chester River between Spaniard Point and Northwest Point
Greenwood Creek

(Note: from MDE "Oyster and Clam Harvesting Waters" map dated 3/15/02.)

As the various Bay programs take effect, water quality should begin to slowly improve. The areas and classifications may also change.

2.7 Population

Queen Anne's County has one of the lowest population densities of all the counties of Maryland, with an estimated density of 109 persons per square mile in 2000, up from 90 persons per square mile in 1990. The entire population of the County is classified as "rural" by the U.S. Census Bureau definition. Centreville, the largest town and the County seat, had a population of approximately 1,970 in 2000.

The population of Queen Anne's County is best discussed using its seven election districts. The districts, listed in order of decreasing population, are District No. 4 (Kent Island), District No. 5 (Queenstown), District No. 3 (Centreville), District No. 2 (Church Hill), District No. 1 (Sudlersville), District No. 7 (Crumpton), and District No. 6 (Ruthsburg). The most heavily populated locations are on the extreme western section of the County, which are

Districts 4 and 5 and District 2 in the north. Kent Island is the most densely populated area, whereas the Ruthsburg District (located in the eastern section of the County) is the least densely populated area.

The population of Queen Anne's County has demonstrated moderate growth in the past, with Districts No. 4 and 5 experiencing the greatest population increases. The high rates of growth in the Kent Island-Grasonville area are a direct result of the establishment of a commuter community for workers in the Annapolis, Baltimore and Washington, D.C. areas.

In addition to residential populations, the Kent Island-Grasonville area is host to a large transient population. This consists of several major groups including:

a. people who occupy the many vacation homes in the area only a few months during the year,

b. people who occupy their boats on weekends during warmer seasons and who are attracted by the many marina facilities located in the area,

c. people attracted daily by the many private and public boat ramps, and

d. people going to or from the shore points of Delaware and Maryland via the Bay Bridge.

2.7.1 Projections

Population projections are based on many diverse factors such as the economy, land use regulations, past trends, birth and death rates, availability of funds, politics, etc. These projections are only as good as the information available and the judgment of persons making them and should be used only as a guide. The farther into the future projections are made, the less certain and reliable they become.

Wide variations in projections of planning agencies are evident after the year 2000. The County Department of Planning and Zoning projects greater population increases due to the introduction of water and sewerage systems which will facilitate additional migration from the Baltimore, Washington and Annapolis areas to the County. The State Department of Planning's more conservative projection probably differs most because of the State's lower estimate of migration rates from the western shore. The County's use of an historical building permit database may contribute to a higher projection.

Moderate growth over the period is anticipated by each of the seven areas. Districts No. 4 and 5, the most densely populated areas, are predicted to grow at a greater rate than any of the other districts due to their relative proximity to the Baltimore-Washington-Annapolis metropolitan area. This growth moderates as the distance from Baltimore increases, illustrated by the decrease in growth rates for Districts No. 1 and 6 (which are extremely rural areas with very few if any incorporated towns). The 2nd District, with an annual population increase of 1.3 percent, is increasing mainly due to the Kingstown area. This area is experiencing migrations from Chestertown located just across the Chester River. The 3rd District, dominated by the incorporated Town of Centreville, also shows an annual increase of 1.3 percent. The Ruthsburg area, District 6, shows very slight absolute population increase over the next 20 years mainly due to the rural farming practices that dominate the location.

2.8 Land Use

Land use is the pattern of development in a specified area. The land use plan as developed in the Comprehensive Land Use Plan (prepared by the Planning Commission) designates areas for specific uses based on the goals and objectives of the County. The plan is designed to meet the growing needs of the population and maintain a desirable living environment.

While the service area maps presented in this plan do not necessarily coincide with those of the current Comprehensive Plan or more particularly some of its Community Plans, the County Commissioners believe they have a mandate to reduce the scope of the growth areas and this reduction in scope is reflected in the service area maps. As the County's Comprehensive Plan, or its Community Plans, become updated, this Plan will be amended.

2.9 Major Public Facilities

The populations of the public schools listed below are the County's Major Public Facilities.

APPROXIMATE POPULATION OR ENROLLMENT OF MAJOR PUBLIC FACILITIES

Institutions	1990 Population	1995 Population	2000 Population	2005 Population
Sudlersville Elementary School	327	402	397	378
Church Hill Elementary School	215	300	345	315
Centreville Elementary School	512	697	486	461
Kennard Elementary School	---	---	379	463
Grasonville Elementary School	270	327	385	369
Kent Island Elementary School	992	1,055	716	475
Bayside Elementary School	---	---	746	458
Matapeake Elementary School	---	---	---	578
Sudlersville Middle School	290	242	347	350
Centreville Middle School	718	751	638	668
Stevensville Middle School	612	750	764	812
Q.A.C. High School	1,425	1,503	936	1094
Kent Island High School	---	---	1,093	1292
Subtotal Public Schools	5,361	6,027	7,232	7,713
Gunston School	68	58	133	na
Seventh-Day Adventist School	na	na	200	na
Chesapeake Community College	1,700	2,200	2,200	na

na - Information not available.

2005 numbers include pre-kindergarten

CENSUS TRACTS

POPULATION 1990 - 2020

Election District	Census Tract	1990[1]	2000[1]	2010[2]	2020[2]	1990-2000 Change	Growth Rate %
1	8102	2362	2417	2955	3393	55	2
2	8103	3514	3750	4585	5265	236	7
3	8104	4664	4183	5115	5873	-481	-10
4	8108	2807	5065	6193	7111	2258	80
4	8109	6360	7563	9248	10618	1203	19
4	8110	3662	4184	5116	5874	522	14
5	8106	4091	4795	5863	6732	704	17
5	8107	2519	2978	3641	4181	459	18
6	8105	1397	2869	3508	4028	1472	105
7	8101	2577	2759	3374	3874	182	7
TOTAL		33,953	40,563	49,600	56,950	12,380	19

Census Tracts:

8101 Crumpton Area
8102 Sudlersville Area
8103 Church Hill Area
8104 Centreville Area
8105 Ruthsburg Area
8106 Queenstown & Wye Mills Area
8107 Grasonville
8108 Kent Island North of Rt 50/301
8109 Kent Island South of Rt 50/301 and West of Cox Creek
8110 Kent Island South of Rt 50/301 and East of Cox Creek

Percent Change in Total Population:

Year	Population	% Change
1970	18,113	
1980	25,169	+ 39 %
1990	33,953	+ 35 %
2000	40,563	+ 19 %
2010	49,600	+ 22 %
2020	56,950	+ 15 %

[1] US Census Bureau
[2] MD Dept of Planning

LAND USE IN QUEEN ANNE'S COUNTY

	1990		1997		2020	
Use	Acres	%	Acres	%	Acres	%
Residential	15,751	6.6	14,594	6.1	20,463	8.6
Commercial/Industrial	1,214	0.5	1,779	0.7	2,243	0.9
Institutional/Parks	988	0.4	2,206	0.9	2,206	0.9
Under Construction	541	0.2	na	---	na	---
Agriculture	149,515	62.6	151,256	63.7	147,873	62.2
Forest	66,630	27.9	63,663	26.8	61,214	25.8
Wetlands	4,216	1.8	3760	1.6	3,760	1.6
Barren	122	0.1	323	0.1	323	0.1
Total Land	238,977		237,582		237,581	
Water	87,621		88,261		88,622	
	326,598		325,845		325,845	

1990 Source: Maryland Office of Planning, Maryland Land Use/Land Cover Forecast, 1992

1997 & 2020 Source: Maryland Department of Planning, Maryland's Changing Land , 2001

WATER SUPPLIES

3.1 Introduction

This chapter presents a tabulation of existing water supply systems and a description of authorized systems under development. Planning for future growth concludes the chapter with a focus on six Growth Sub-Areas. Problem areas are discussed in Appendix VI with a description of the problem, alternative solutions, and recommendations.

3.2 Water Service Costs

The largest factor driving the cost of providing water is the cost of treatment. Treatment is the process of converting the raw water as it comes out of the ground into potable water that must comply with the federal Safe Drinking Water Act. This analysis assumes that each equivalent dwelling unit (EDU) equals 250 gallons per day (gpd). It further assumes a 7 day week, 20 hour per day treatment plant operation as is typical with the County's Sanitary District. If a safety factor of 2.0 is used, as is typical in the water industry, the treatment capacity per EDU is as follows:

$$2 \times (250 \text{ gpd} / 1200 \text{ minutes}) = 0.42 \text{ gpm/EDU}$$

The capital cost of treatment of the Aquia aquifer is relatively inexpensive and in many cases only requires a well with chlorination for disinfection. The cost to construct treatment plants for the Aquia is typically only $1,785 per gallon per minute of treatment capacity (including well), or $750 per EDU. However, due to the problem with saltwater intrusion into the Aquia on Kent Island, the Department of the Environment prohibits additional withdrawal from the Aquia on Kent Island and limits new withdrawals in the Grasonville area to less than 1,000 gallons per day.

The capital cost of treatment of the Magothy aquifer (including well) is extremely expensive, due largely to iron removal requirements. The cost of construction of this treatment process is more than $5,000 per gallon per minute of treatment capacity or more than three times that of the Aquia. For the purpose of this analysis, a cost of Magothy treatment is $3,400/EDU and reflects the actual cost of treatment, well, and storage at the Grasonville treatment plant, adjusted for inflation.

From an operation and maintenance standpoint, the spread between these two aquifers is similar. The cost to produce and deliver Aquia water is approximately $2 per 1,000 gallons (assuming there are no Arsenic issues to be addressed). Magothy costs are over $5 per 1,000 gallons. In addition to the greater treatment cost, Magothy plants produce a great amount of backwash (on the order of 100,000 gpd for all the plants) which takes away from the available wastewater plant capacity.

A production well into the lower Patapsco aquifer was completed at the Stevensville plant in late 1999 that initially yielded a raw water iron content of between 3 to 5 ppm. Unfortunately, after a few years the iron content increased to approximately 10 ppm and seems to have stabilized at a concentration between 7 and 8 ppm. Nonetheless, it is believed all future County wells in the Grasonville/Kent Island area will utilize this resource in the future. This new water source will not significantly lower treatment capital costs as any cost savings in the treatment process due to the lower iron is made up in the expense of drilling a well to this depth (the well mentioned was 1,600 feet deep). However the cost of operation and maintenance on a per gallon basis to treat the water has been much less (approximately $2.25 per 1,000 gallons). In addition, as the finished water has less iron remaining, it is a far superior end product.

Distribution costs, with fire flow protection, cost approximately $2,400 per connection for construction based on the costs for Bay City in 1993. This equates to $3,155 in 2005 dollars when adjusted for inflation.

Storage costs are approximately $0.65 per gallon for ground storage and $1.50-$2.50 for elevated storage depending on the foundation specifics. However, in order to utilize ground storage, bigger pumps are necessary. The pump cost is not included in the ground storage cost. It is assumed all problem areas are to be served with elevated storage at a cost of $2.00 per gallon.

Note that all of the above capital costs are for pure construction only. True project costs including design, inspection, funding, administration, etc., generally add 20% to the construction costs.

For the purpose of this study, the water supply cost estimates provided will be the total number of parcels to be served multiplied by the value of the following formula:

For Magothy: ($3,155 + $3,400 + $625) x 1.2% = ~$8,600/EDU
For Aquia: ($3,155 + $ 750 + $625) x 1.2% = ~$5,400/EDU

$3,155 = distribution cost per EDU
$3,400 = treatment cost per EDU for Magothy
$ 750 = treatment cost per EDU for Aquia
$ 625 = storage cost per EDU

3.3 Inventory of Existing Water Supply Systems and Systems Under Development

There is a great diversity of water supply systems in Queen Anne's County. Systems range from a potential of 1 million gallons per day (MGD) to systems supplying only 1,000 gpd. With the exception of a few outlying commercial and institutional systems, water supplies are either in municipalities or are part of the Kent Island-Grasonville patchwork of independent systems. Systems under development are first described, followed by County water systems, town water systems, and ultimately, private water systems.

3.3.1 Systems Under Development

3.3.1.1 Kent Narrows Elevated Storage Tower and System

A 250,000-gallon elevated storage tower is proposed to be built by the county in the Southeast quadrant of Kent Narrows. The tower will utilize the existing Oyster Cove water treatment plant and wells. The tower will provide potable water and fire flow protection to the eastern half of the Kent Narrows. Construction of the tower is anticipated to begin whenever funds become available.

3.3.1.2 Stevensville Ultra-Filtration Water Treatment Plant

Design was underway to construct a 1,500-gpm ultra-filtration water treatment plant on the site of the existing Stevensville water treatment facility but has been put on hold due to ongoing revisions to the Chester and Stevensville growth area plans. The design was to utilize submerged ultra-filtration membranes to treat the water. The intent is to address chronic oxidized iron in the distribution system.

3.3.1.3 Four Seasons Water Tower

In accordance with the Developers Rights and Responsibility Agreement, the Four Seasons on Kent Island development is to construct a 500,000-gallon water tower to service its development. Design is currently underway. The tower is to be located on Four Seasons' lands (that be will deeded fee simple to the County) just north of the Piney Creek Service Road in Chester.

3.3.1.4 Four Seasons Ultra-Filtration Water Treatment Plant

In accordance with the Developers Rights and Responsibility Agreement, the Four Seasons on Kent Island development is to construct a 750-gpm ultra-filtration plant to serve the second phase of its development (second phase being defined as its 401st building permit). The plant is to be located on County lands just north of the KN/S/G wastewater plant. The plant is to be designed to be expandable to 1,500 gpm. The plant is to utilize two new wells, also to be constructed by Four Seasons, into the lower Patapsco aquifer formation. The Ellendale and Gibson's Grant developments will also be required to construct additional (beyond the Four Seasons 750 gpm) treatment capacity at this facility.

3.3.2 County Water Treatment Plants

3.3.2.1 Bayside

This facility has two 10" wells into the Magothy aquifer (one of which had a casing failure in 2005 and is inoperable). It has a treatment capacity of 90 gpm with a maximum output of 108,000 gallons per day assuming a 20-hour run time as the maximum allowable. An ion exchange unit is being added in 2005 to enhance iron removal in an attempt to improve the water quality. Its daily production in fiscal year 2004 was 71,300 gpd.

Storage consists of a 14,000-gallon clear well and the system is connected via a 10" main to the Queens Landing standpipe.

3.3.2.2 Bridge Pointe

This facility has two 6" wells into the Magothy aquifer. It has a treatment capacity of 90 gpm with a maximum output of 108,000 gallons per day assuming a 20-hour run time as the maximum allowable. An ion exchange unit was added in 2002 to enhance iron removal. Its daily production in fiscal year 2004 was 46,500 gpd.

Storage consists of one 10,000-gallon and one 7,000-gallon hydro pneumatic tank, as well as a 300,000-gallon ground storage tank serviced by a booster pump station.

3.3.2.3 Chesapeake Bay Business Park

This facility has one 12" well into the Monmouth aquifer. It has a treatment capacity of 50 gpm with a maximum output of 60,000 gallons per day assuming a 20-hour run time as the maximum allowable. Its daily production in fiscal year 2004 was only 4,000 gpd. This plant's treatment efficiency is severely hampered by the extremely high iron concentration in the well water. As part of the first phase of the Four Seasons on Kent Island development, a new well into the lower Patapsco will be drilled to service this plant and other improvements to the plant are required.

Storage consists of a 250,000-gallon elevated tower shared with Thompson Creek and Stevensville and a 20,000-gallon clear well.

3.3.2.4 Kent Island Village/Stevensville Village

This facility has one 6” well into the Aquia aquifer. It has a treatment capacity of 85 gpm with a maximum output of 102,000 gallons per day assuming a 20-hour run time as the maximum allowable. This system, and Bridge Pointe’s system, were linked together in 1999 via an 8” main.

Its daily production in fiscal year 2004 was only 2,400 gpd as the Sanitary District has shifted almost full reliance on the Bridge Pointe plant to provide water to the service area.

Storage consists of a 10,000-gallon hydro pneumatic tank.

3.3.2.5 Oyster Cove

This facility has two 6” wells into the Aquia aquifer. It has a treatment capacity of 250 gpm with a maximum output of 300,000 gallons per day assuming a 20-hour run time as the maximum allowable. However, production from this site is restricted to 88,000 gpd due to the Groundwater Appropriation Permit. Its daily production in fiscal year 2004 was 77,000 gpd.

Storage consists of a 20,000-gallon ground storage tank and a 180,000-gallon ground storage tank.

3.3.2.6 Prospect Bay

This facility has two 10” wells into the Aquia aquifer. It has a treatment capacity of 220 gpm with a maximum output of 264,000 gallons per day assuming a 20-hour run time as the maximum allowable. Its daily production in fiscal year 2004 was 73,000 gpd.

Storage consists of a 300,000-gallon elevated storage tower.

The Sanitary District received an EPA grant to construct an Arsenic removal full-scale pilot test in 2003. The facility, a skid-mounted fixed media pressure filter plant manufactured by Severn Trent, was placed in service in late June 2004 and has produced good results. The Arsenic concentration in the raw water is approximately 20 ppm and needs to be reduced to less than 10 ppm by January 2006 due to recently adopted federal regulations.

3.3.2.7 Queens Landing

This facility has two 10” wells into the Aquia aquifer. It has a treatment capacity of 150 gpm with a maximum output of 180,000 gallons per day assuming a 20-hour run time as the maximum allowable. Its daily production in fiscal year 2004 was 32,000 gpd.

Storage consists of a 425,000-gallon standpipe (of which only 120,000 gallons is considered usable from an adequate pressure point of view) shared with Bayside’s water system.

3.3.2.8 Riverside

This facility has one 6” well into the Magothy aquifer. It has a treatment capacity of 30 gpm with a maximum output of 36,000 gallons per day assuming a 20-hour run time as the maximum allowable. Its daily production in fiscal year 2004 was 6,000 gpd.

Storage consists of a 5,000-gallon hydro pneumatic tank.

3.3.2.9 Stevensville

This facility has a single 20” well into the lower Patapsco. It has a treatment capacity of 375 gpm with a maximum output of 450,000 gallons per day assuming a 20-hour run time as the maximum allowable. Its daily production for the fiscal year 2004 was 446,000 gpd.

Storage consists of a 36,000-gallon clear well and a 290,000-gallon ground storage tank.

3.3.2.10 Thompson Creek

This facility has one 6” well into the Aquia. The water plant can only be run on an emergency basis due to the restrictions on the Groundwater Appropriation Permit. It has a treatment capacity of 210 gpm with a maximum output of 252,000 gallons per day assuming a 20-hour run time as the maximum allowable. Its daily production in fiscal year 2004 was 111,000 gpd.

Storage consists of a 270,000-gallon ground storage tank.

3.3.2.11 Grasonville Water Treatment Plant

This facility has two 10” wells into the Magothy each with a yield of 700 gpm. The treatment capacity initially will be 120 gpm. The site also has a 290,000-gallon ground storage tank. Its daily production in fiscal year 2004 was 43,000 gpd. An ion exchange unit is to be added in 2005 to enhance iron removal.

3.3.3 Town Systems

3.3.3.1 Barclay (no system)

The residents of Barclay, a small incorporated community, obtain their water from private wells. Many are shallow wells which range from a depth of 25 to 35 feet and utilize the surface deposits of the Wicomico Formation for their source of water. Because the shallow aquifer has shown increasing nitrate/nitrogen levels, new wells and replacement wells are being drilled in the Aquia aquifer.

Two 4-inch wells are used for fire protection. One is 54 feet deep with a yield of 45 gpm and the other is 60 feet deep with a yield of 270 gpm. The location of the two wells permits every building in the town to be protected from fire damage using normal fire fighting equipment.

Existing facilities for water supply are considered adequate and can be expected to serve well into the future.

3.3.3.2 Centreville

The incorporated community of Centreville has a water supply system that serves most of the town and some adjacent properties. Presently there are approximately 925 building connections serving an estimated 2,500 people throughout an area of about 1,450 acres.

The source of water supply is from two deep wells utilizing the Monmouth and Aquia Formation aquifers. The only treatment to date has been disinfection. This is accomplished using gas chlorination. However, the wells have Arsenic concentrations of 20 ppb and 28 ppb, respectively. Treatment for arsenic will be required to meet the 10 ppb standard that becomes effective in January 2006.

The main distribution lines are of 6-inch, 8-inch, and 10-inch diameters. Storage is provided by a three elevated tanks with capacities of 100,000-, 200,000- and 300,000-gallons. Any 4” service mains still existing will be eliminated as funds allow to upgrade the distribution system.

Presently, the entire area within the corporate limits is serviced and the only areas outside the town limits receiving service are Queen Anne’s County High School and Centreville Middle School. Ultimately, the Centreville water system may be expanded to reach other developments that may occur within corporate limits upon annexation.

The Centreville water system is authorized to use an average of 355,000 gpd and a maximum use of 400,000 gpd.

The Centreville water service map also shows an area designated as W-3 at the intersection of U.S. Rt 301 and Md Rt 304. This is an area that has a mixture of commercial, industrial and municipal uses. In addition, there are some parcels that are currently agricultural. It is the intent that the vacant areas be developed into a County-developed business park.

Water service would either be by the Town of Centreville, or by a County owned and operated water plant. No planning or design has been initiated as yet.

3.3.3.3 Church Hill (no system)

In the past, residents of the incorporated Town of Church Hill obtained their water from surface deposits using private shallow wells. Most of these wells have been abandoned in favor of deep wells that are more reliable in dry periods.

The deep wells in the area are about 130 to 140 feet deep utilizing the Aquia Greensand Formation. Yields range from 20 to 60 gpm and the water quality is generally good.

For fire protection there are two public deep wells located throughout the town. A sewerage system has been built which should protect the groundwater in the surface deposits from further contamination.

One private system was amended into this Plan in 2005:

3.3.3.3.1 The Pond at Church Hill - This site is shown on Tax Map 17 as Parcel 71 and 110. The site consists of approximately 7 acres. The water system proposed was to service 43 age-restricted senior housing units. The anticipated average daily water flow is 4,300 gallons per day.

3.3.3.4 Crumpton (no system)

Crumpton is an unincorporated community whose residents use individual wells for their water source. There still exist some old shallow wells at 20 to 25 feet deep utilizing the surface deposits of the Wicomico Formation. Because several wells have gone dry during drought periods, some owners have been forced to drill deeper wells. All new wells are required to be from 110 feet (Aquia) to 320 feet (Magothy) deep, or more.

The present well conditions indicate that there is no immediate need for a community water system although the soil's high rate of permeability may be cause of some concern as the area also relies on on-site septic systems to treat their waste.

3.3.3.5 Millington (no system)

Most of the incorporated town of Millington lies in Kent County. However, a small portion of the Town is within Queen Anne's County. At the present time, all water needs are supplied by private wells, some of them being deep wells. Sufficient water yield is obtained from the Aquia Greensand Formation at depths of 85 to 105 feet. Except for moderate iron content, the water is of good quality.

The Town completed a feasibility study in 2000 on serving the incorporated limits, as well as areas within Kent County outside of the incorporated limits, with central water. The proposal calls for two wells into the Aquia aquifer, with chlorination, and elevated storage. This project is currently under construction with a planned completion date of January 2006. The wells will be screened in the Aquia at 155 feet to 185 feet. Elevated storage of 250,000 gallons will also be provided.

The service area will be the entire incorporated town, including the Queen Anne's County portion, as well as the existing sewer service area located within Kent County west of town.

3.3.3.6 Queen Anne (no system)

The small incorporated community of Queen Anne lies in both Queen Anne's County and Talbot County. Presently, private wells supply all the water needs of the area except fire protection. Most of the wells are deep and a few are shallow. The shallow wells obtain a sufficient quantity of water from the Wicomico Formation at depths of 20 to 30 feet. However, water quality from these wells is high in iron content. The deep wells appear to get water of better quality utilizing the Cheswold Formation found at 80 to 100 feet or the Piney Point aquifer at 160 to 200 feet.

To provide for fire protection, Queen Anne has a dry main and hydrant system. When required, water is pumped from Tuckahoe Creek into a distribution system of 4-inch diameter piping.

3.3.3.7 Queenstown

The Charter of the incorporated town of Queenstown requires all developed properties within the Town limits be served by a public water system owned and operated by the Town of Queenstown. In addition, the Town provides water service to Friel's Lumber Company and the Queen Anne's County Animal Control Facility which are located outside the corporate limits of the Town. The Town presently serves water to approximately 645 people plus daytime commercial use, through approximately 255 building connections, servicing both residential and commercial.

The Town of Queenstown has three wells drilled into the Aquia aquifer. Currently, the Town draws water from only two wells. They are referred to as the Del Rhodes Avenue Well and the Outlet Center Well. The Del Rhodes Ave Well and the Outlet Center Well each have pumps rated at 150 gallons per minute (gpm). The third well is located at the Wall Street tower and is in the process of being abandoned.

The water distribution system, which contains approximately 27,228 feet of pipe ranging in size from 1" up to 10" in diameter, was originally installed around 1935.

Two elevated storage tanks serve the Town. One is located by the Wall Street Well which has a capacity of 50,000 gallons. The other one is located by the Outlet Center Well and has a capacity of 100,000 gallons. Both tanks are inspected and serviced on a regular basis and are in good condition.

The Town's water appropriation permit allows for the average daily withdrawal of 77,000 gallons per day (gpd). The Town filed an application with the State in 2004 to increase its permit allocation to 90,000 gpd.

The Town monitors closely all water quality related issues. Water quality is an issue the Town will have to address in the near future. The newly established federal limit for arsenic in drinking water is 10 ppb. Water quality tests for each of the Town's wells approaches the Federal threshold. The Town is updating its water system plan to address treatment options should treatment be required.

The Town's and the County's current comprehensive plans call for a mix of residential and commercial land uses on lands adjacent to the town and within the Queenstown growth area. If any of these lands were to be annexed, the Town will provide water and sewer service per the Town's charter. The density and timing of potential future growth is not known though engineering studies performed by the Town in the past indicate that additional water service of 300,000 to 600,000 gpd will be required to serve full build-out of the growth area as currently mapped.

The Town anticipates in the near term a small increase in water demand that could be provided if the State issues a new groundwater appropriation permit to the Town.

3.3.3.8 Sudlersville (no system)

Sudlersville is an incorporated community whose residents presently use individual wells for their water supply needs. Some wells are shallow, utilizing the surface deposits of the Wicomico Formation. All new wells and replacement wells are utilizing the Aquia aquifer as their water source.

Water system plans for Sudlersville were prepared by Rummel, Klepper & Kahl Engineers and have been available since 1974.

A proposal was amended into this Plan in 2005 to initially supply the proposed Foxxtown senior housing project and senior center, as well as the adjacent Sudlersville Elementary school. It is the intent to design and construct this water facility, which will require Arsenic removal, to be expandable to ultimately serve the entire Town.

3.3.3.9 Templeville (no system)

Templeville is a small incorporated community that has two-thirds of its population living in Queen Anne's County and the other third living in Caroline County. Residents use individual wells for their water supply. Many of the wells are shallow, utilizing the Wicomico Formation at depths from 15 to 30 feet. The most dependable source of good water in the area is the Aquia Greensand Formation used by deep wells of 150 to 200 feet.

Present conditions are adequate at this time and will remain so providing that the surface deposits do not become contaminated.

3.3.4 Other Institutional Systems

3.3.4.1 Chesapeake College

Chesapeake College, the regional community college, operates an existing multi-use water system serving approximately 3,500 students at Wye Mills.

3.3.4.2 Eastern Correctional Camp

The State of Maryland operates an existing multi-use water system serving the Eastern Correctional Camp. The present population of the camp is approximately 175.

3.3.4.3 Matapeake Multi-Use Field Station & Bay Model

The State of Maryland operates an existing multi-use water system serving the Matapeake Multi-Use Field Station.

3.3.4.4 Camp Pecometh

This property has been a church camp for many years. The latest expansion would be to construct four bunkhouses. However, they have adopted a master concept plan that envisions a total water consumption of 29,500 gpd in the future.

3.3.5 Privately Owned Water Treatment Plants in the Unincorporated Areas

3.3.5.1 Acme (aka Bittorf)

Tax Map 57, Parcel 446, Stevensville

This water treatment plant was constructed in the mid 1970s utilizing the Aquia aquifer. It currently services the Stevensville Pizza Hut, Hardee’s, and Acme.

3.3.5.2 Beach Harbor

Tax Map 57, Parcel 140, near Grasonville

This water treatment plant was constructed in 1984 utilizing the Aquia aquifer. It currently serves a campground with 272 sites and a club house.

3.3.5.3 Bay View

Tax Map 58, Parcel 785, near Grasonville

This water treatment plant was constructed in 1986 utilizing the Aquia aquifer. It currently serves 33 residential condominiums.

3.3.5.4 Fox Run

Tax Map 58A, Parcel 714, near Grasonville

This water treatment plant was constructed in 1986 utilizing the Aquia aquifer. It currently serves 27 condominiums.

3.3.5.5 Kent Towne Market

Tax Map 57, Parcel 468, near Chester

This water treatment plant was constructed in 1986 utilizing the Aquia aquifer. It currently serves the Kent Towne Market Shopping Center.

3.3.5.6 Pine Springs Mobile Home Park

Tax Map 57, Parcel 196, near Crumpton

This water treatment plant was constructed in 1988 utilizing the Magothy aquifer. It currently serves 88 mobile home rental sites.

3.3.5.7 Swan Cove

Tax Map 57, Parcel 452, near Kent Narrows

This water treatment plant was constructed circa 1978 utilizing the Aquia aquifer. It currently serves 12 town home sites.

3.3.5.8 Phoenicia Mobile Home Park

Tax Map 56, Parcel 19, near Thompson Creek Road

This water treatment plant utilizes the Aquia aquifer. It currently serves 23 mobile home sites.

3.4 Planning for Consolidation of Existing Facilities

In the US 50-301 corridor and its side extensions, there are approximately 15 separate multi-user water supply systems between Stevensville and Grasonville, not counting hundreds of individual on-site wells. While some of these systems are privately operated, the Sanitary District currently operates eleven of them. In addition, some of these systems and most of the individual wells derive their water from the Aquia. This contributes to the loss of hydraulic head that may aggravate brackish water intrusion problems. As a result of the saltwater intrusion problem, MDE prohibits any additional appropriation permits into the Aquia on Kent Island, and limits new appropriations to no more than 1,000 gallons per day in the area between Kent Narrows and Queenstown.

The corridor through Kent Island to Grasonville, centered along US 50-301, has been divided into two service areas, Kent Island and Grasonville, with Kent Island broken into four sub-areas. The intent is to integrate the patchwork of water supplies into unified sub-areas in preparation for interconnection in the future. The ultimate goal is to provide connections between the Kent Island sub-areas to reduce the number of existing county operated plants.

3.5 Growth Sub-Area Plans

In 1992, Maryland adopted the Economic Growth, Resource Protection and Planning Act as an amendment to Article 66B. The Act requires all local governments to reduce sprawl development, concentrate growth in and around existing developed areas, promote economic development and protect sensitive natural resources. In 1993, consistent with the 1992 Planning Act, the County Comprehensive Plan recommended that specific development plans be prepared for each of the County's six designated growth areas.

During 1997 and 1998, community plans were adopted for the areas of Stevensville, Chester, Grasonville, Queenstown and Centreville. The sixth area, Kent Narrows, had its associated zoning changes previously adopted in 1990 as part of the implementation of the 1987 Comprehensive Plan.

While central sewer is an essential component to the success with these plans given the densities desired, as is further detailed in Chapter 4, it is also envisioned to serve these areas with central water. However, the abundance of aquifers suitable to individual wells makes central water much less a constraining factor to the success of the implementation of the Growth Plans.

The County Commissioners and the Planning Commission have both expressed concern with the lack of municipal water serving the entire areas of the four County growth areas. Currently approximately 50% of the properties have access to a water main. With the exception of benefit assessment areas, where water and sewer service is provided to an entire community, the County has always made connection to existing water mains somewhat optional. The only restriction being that new developments must connect, when the service is available, and the existing improved properties must connect should their well fail.

As there are insufficient funds available to the Sanitary District to extend water mains into the unserved areas without a dedicated revenue source, typically in the past any extension that occurred was to serve a development project. The Sanitary District has developed a ”rebate” program that acts to provide a portion of the funds from any new connections to the developer as recognition that the water main may benefit properties other than their own. To better manage this situation, the County Commissioners are willing to consider mandatory connections for both existing water service areas and new water service areas.

Additional issues due consideration are that many of the water systems supplying water to the areas may not have sufficient capacity to comfortably meet the demand that would be occasioned by such a mandatory program. Also, the fees currently incorporated in the rate schedule only cover the cost of treatment and metering. An additional fee, or an increase in one of the existing fees, would be required to cover the cost of new water mains in the areas not currently served.

The following is a brief discussion on each of the plans and what is required to serve the area. For consistency, all of the Growth Areas are assumed to build-out at 75% the maximum number of residential dwellings and 50% the maximum allowable non-residential floor areas. Equivalent Dwelling Units (EDU = 250 gallons per day) and commercial floor areas are taken from the appendices of the Community Profile report prepared by LDR International, Inc. in August 1999.

3.5.1 Stevensville

There are two large and two small areas slated for growth in the 1998 Stevensville plan. Total acreage for this area is 863 acres with an estimated build-out of 2,208 EDUs and 1,686,970 square feet (ft^2) of commercial area. The existing service area’s average daily water demand is 350,000 gpd (300 gpm). The August 1999 Community Profile prepared by the Comprehensive Plan’s consultant indicates a probable build-out average daily demand of an additional 636,000 gpd (530 gpm). Given the industry standard treatment safety factor of 2.0, this would indicate a treatment capacity need within 20 years of 1,660 gpm. Current treatment capacity is 430 gpm with an additional 300 gpm available during emergencies. This equates to a future shortfall of 1,230 gpm.

3.5.1.1 Route 8 Area

The first area is a large block of land on the east side of MD Rt 8 south of US Rt 50/301 and consists of 5 parcels with a total acreage of approximately 420 acres. The estimated EDUs of this area would have been approximately 990, which would produce a water demand of 183,750 gallons per day. One of the 5 parcels has concept and allocation approval to construct 285 dwellings and a clubhouse (Ellendale Subdivision). The other four parcels were removed from the growth area in the draft Stevensville-Chester community plan, and upon direction of the County Commissioners, these parcels have been removed from the sewer and water service area of this Plan as well. This area has a 12-inch water main running along MD Rt 8 that connects the three Stevensville area water treatment plants to the Bay City community. The 400,000-gallon Matapeake water tower also serves the area. While the water main and the tower would appear adequate, there is inadequate treatment capacity available to service this area. It will be required of Ellendale to expand the treatment capacity of the new Four Seasons plant discussed in section 3.3.1.4.

3.5.1.2 Thompson Creek Area

The second area is a small block of land on the east side of Thompson Creek Road and consists of Lots 1 and 2 of the Fair Prospect Farm subdivision and has a total acreage of 40 acres. Both lots have approved development plans and have been built out to 95 single-family dwellings (the Anchorage and Cox Creek landing subdivisions). These two developments are being adequately served with existing water infrastructure.

3.5.1.3 East of Cloverfields Area

The third area is a large block of land to the east and south of the Cloverfields subdivision. The western most parcel has been developed into an 80-lot subdivision (Mallard Run) and is being served by the Stevensville water service area. The remaining six parcels containing 480 acres would need to be served by a new water treatment facility planned to be constructed adjacent to the existing Chesapeake Bay Business Park water plant. The bulk of this area consists of the vacant Davidson Farm as well as a portion of the Bittorf farm. The Bittorf farm is a portion of the lands proposed to be developed into the Four Seasons on Kent Island development.

Servicing this area is further discussed in section 4.4.2 under the Chester Growth Area.

3.5.1.4 West of Cloverfields

The final area is a small group of eight parcels west of Cloverfields on both sides of MD Rt 18. These areas should be able to be served by existing water treatment and storage infrastructure, however distribution mains would need to be extended to service the areas.

3.5.2 Chester

There are three large areas that make up the 1997 Chester Growth Area. Total acreage for this area is 573 acres with an estimated build-out of 2,321 EDUs and 311,999 square feet (ft^2) of commercial area in the 1997 growth area plan, however the pending draft Stevensville-Chester plan has reduced the lands available for development to some degree. The existing service area's average daily demand is 95,000 gpd (80 gpm). The August 1999 Community Profile prepared by the Comprehensive Plan's consultant indicates a probable build-out average daily demand of an additional 693,000 gpd (580 gpm). Given the industry standard treatment safety factor of 2.0, this would indicate a treatment capacity need within 20 years of 1,320 gpm. Current treatment capacity is 200 gpm with an additional 150 gpm available during emergencies. This equates to a future shortfall of 1,120 gpm. It is the intent to combine the Stevensville and Chester service areas at the earliest opportunity.

3.5.2.1 Castle Marina Area

The first area is a group of three parcels that are west and south of the existing Castle Marina subdivision. This area, combined with a portion of the Stevensville growth area described in section 3.5.1 above, will need to be served by a new 750 gpm water treatment plant (expandable to 1500 gpm) to be built adjacent to the Chesapeake Bay Business Park by the Four Seasons development. It will also require a new 500,000-gallon elevated storage tank proposed to be located near the intersection of Piney Creek Service Road and Chester Station Road. The estimated EDUs on this site is approximately 600 which would produce a water demand of 150,000 gpd. In addition to a new treatment plant and storage, a 12-inch water main will need to be constructed from State Street in Stevensville, across Cox Creek, to the existing Bayside water plant.

3.5.2.2 Piney Creek Area

This second area initially consisted of a group of three parcels between Macum Creek and Piney Creek. Any development in this area will also have to be served by the expansion to the 750-gpm Four Seasons water treatment plant mentioned in section 3.3.1.4. The estimated EDUs on this site under the 1997 growth plan were approximately 720 which would produce a water demand of 180,000 gpd.

3.5.2.3 Rt 552 Area

This final area is a group of four parcels on both sides of MD Rt 552. The parcel to the west of MD Rt 552 is currently fully developed into a 120-lot subdivision known as Clayborne Woods. This is being served by the Bridge Pointe water treatment facility. The other three parcels are all east of MD Rt 552 and have a development potential of approximately 400 EDUs. It is assumed that these developments will need to extend the water main currently serving the Clayborne Woods subdivision listed above.

3.5.3 Kent Narrows

While designated a growth area, it in fact has little development potential over what currently exists. Only the east side of the Narrows currently has water service available, however less than half the properties are currently connected. It is assumed the majority of the properties will gradually connect as time passes. Otherwise the only option is to extend the water main under Kent Narrows, which is being proposed by a private developer in order to supply water to his 15-unit condominium project (The Tides).

The existing service area's average daily demand is 33,000 gpd (28 gpm). The August 1999 Community Profile prepared by the Comprehensive Plan's consultant indicates no vacant lands exist to add to the future demand. However as not all existing properties are currently connected, it is estimated an additional 50,000 gpd (42 gpm) exists. Given the industry standard treatment safety factor of 2.0, this would indicate a treatment capacity need within the near future of 140 gpm. Current treatment capacity is 150 gpm.

3.5.4 Grasonville

There are two large, and two small, areas that make up the Grasonville Growth Area. Total acreage for this area is 486 acres with an estimated build-out of 1147 EDUs and 266,354 square feet (ft^2) of commercial area. The existing service area's average daily demand is negligible (8,000 gpd – 6 gpm) however only a small portion of the service area is actually served. The August 1999 Community Profile prepared by the Comprehensive Plan's consultant indicates a probable build-out demand of an additional 377,000 gpd (315 gpm). Given the industry standard treatment safety factor of 2.0, and assuming the existing uses currently not served are to be served, this would indicate a treatment capacity need within 20 years of 640 gpm. Current treatment capacity is 200 gpm but can be doubled at an expense of approximately $500,000. Therefore a future shortfall of 440 gpm currently exists.

3.5.4.1 Chester River Beach Area **–** The first area consists of one large and three small parcels. The large parcel is currently under development into 46 single-family homes known as the Winchester subdivision. The other parcels are rather small and do not have a great deal of development potential. This area is currently served via individual wells and will continue to be so for the foreseeable future.

3.5.4.2 Route 50 Area **–** The second area straddles US Rt 50/301 and is slated for commercial growth. As with the Chester River Beach Area, there is no central water in the area north of US Rt 50/301, however the County has recently extended a water main from Grasonville Cemetery Road to the Chester River Beach overpass as part of a State Highway Administration project to upgrade MD Rt 18. Although it would be expensive, the area north of US Rt 50/301 could be served by extending the main under the highway.

3.5.4.3 Perry's Corner Road Area **–** The third area consists of six parcels east of Perry's Corner Road. Only one parcel has a great deal of development potential with the possibility of approximately 125 EDUs. This parcel is immediately adjacent to the existing water service area and a water main extension would be required of the developer to connect to the water.

3.5.4.4 Grasonville Cemetery Road Area **–** The final area straddles Grasonville Cemetery Road and consists of six parcels. One parcel is already under development into a 120 lot residential subdivision known as the Greenwood subdivision. The full development potential is estimated to be approximately 640 EDUs. The water extended by the Greenwood subdivision's developers can serve these parcels.

3.5.5 Queenstown

While the growth area as anticipated in the Queenstown Community Plan was almost 10 times the size of the current incorporated limits, on December 21, 2004 the County Commissioners adopted the Resolution 04-70 that states the following:

"In order to achieve consistency between the 2002 Comprehensive Plan and the

> zoning maps adopted subsequent to the Plan as part of the adoption of Chapter 18 of the County Code, the 2002 Comprehensive Plan is hereby amended to provide that the densities and land use categories set forth on the zoning maps shall be the land use element of the 2002 Comprehensive Plan for the Queenstown Planning Area until such time as a new Queenstown Community Plan is adopted or the Queenstown Community Plan is revised."

This action removed the zoning density envisioned for the growth area lands by the Queenstown community plan and restored the predominantly low density Countryside, Agricultural, Suburban Estate and Suburban Residential zoning.

Increased drafting of the Aquia aquifer is a concern to MDE because of the potential to exacerbate salt-water intrusion in the portion of the formation beneath Kent Island. The wells serving the Town are located above an area of the Aquia designated by the state as one where new appropriations will be scrutinized for the effect on salt-water intrusion. It is unknown at this time if there are limits to the volume that Queenstown can appropriate from the aquifer. Aquia aquifer water is of such quality that chlorination is the only treatment necessary at this time. Treatment for arsenic may be necessary to meet the 10 ppb standard.

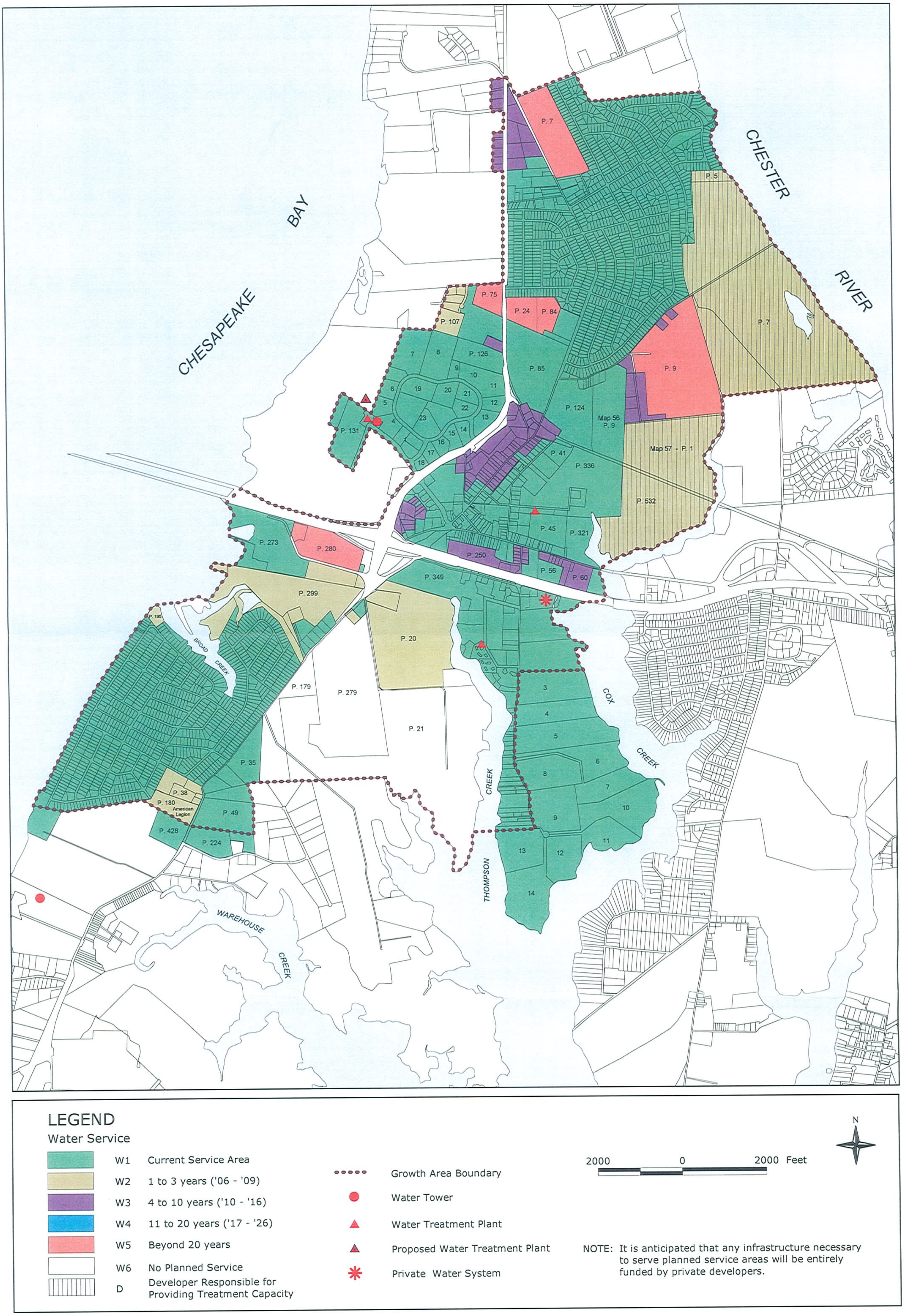
Directly beneath the Aquia lies the Matawan formation that in the vicinity of Queenstown is a productive aquifer containing high quality water. Presumably one or several slightly more expensive wells drilled into this formation could support a large increase in development related demand. Presumably, expansion of Queenstown's treatment capacity, or the construction of an entirely new, independent facility, would be relatively inexpensive even if new wells and storage were required.

3.5.6 Centreville

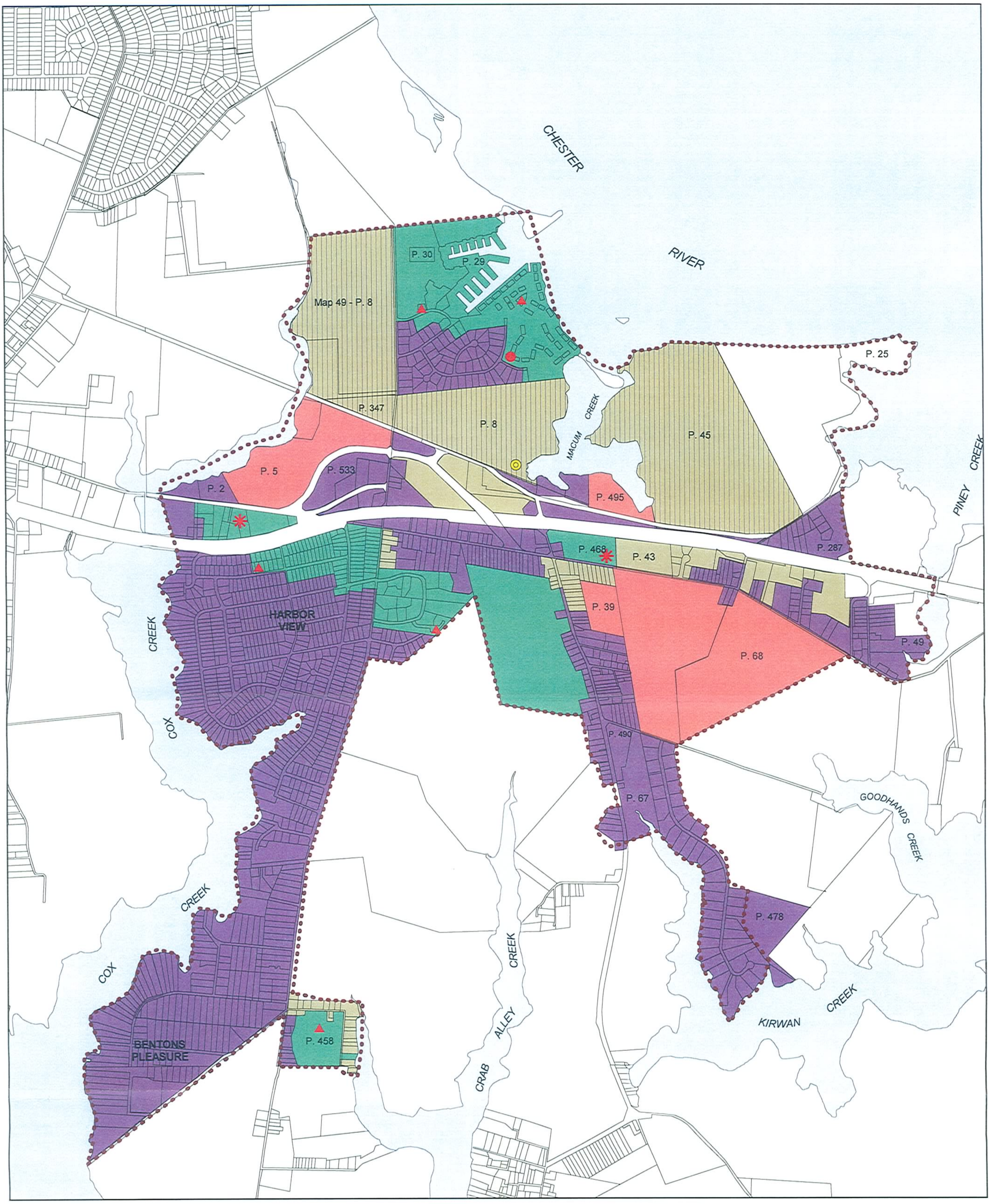
This growth area is about twice the size of the current incorporated limits. Total acreage for this area is 1,500 acres with an estimated build-out of 3,630 EDUs and 650,460 square feet (ft^2) of commercial area. It extends east and south from the existing town limits with the majority of the lands being to the east extending to US Rt 301 along MD Rt 304.

The situation with water service to this area is largely identical to Queenstown. They provide only chlorination for treatment due to the good quality of the Aquia aquifer. However they will have to address Arsenic in some manner by 2006.

Stevensville Growth Area Water Service Area



Chester Gro th Area
Water Service Area



LEGEND

Water Service

W1	Current Service Area
W2	1 to 3 years ('06 - '09)
W3	4 to 10 years ('10 -'16)
W4	11 to 20 years ('17 - '26)
W5	Beyond 20 years
W6	No Planned Service
D	Developer Responsible for Providing Treatment Capacity

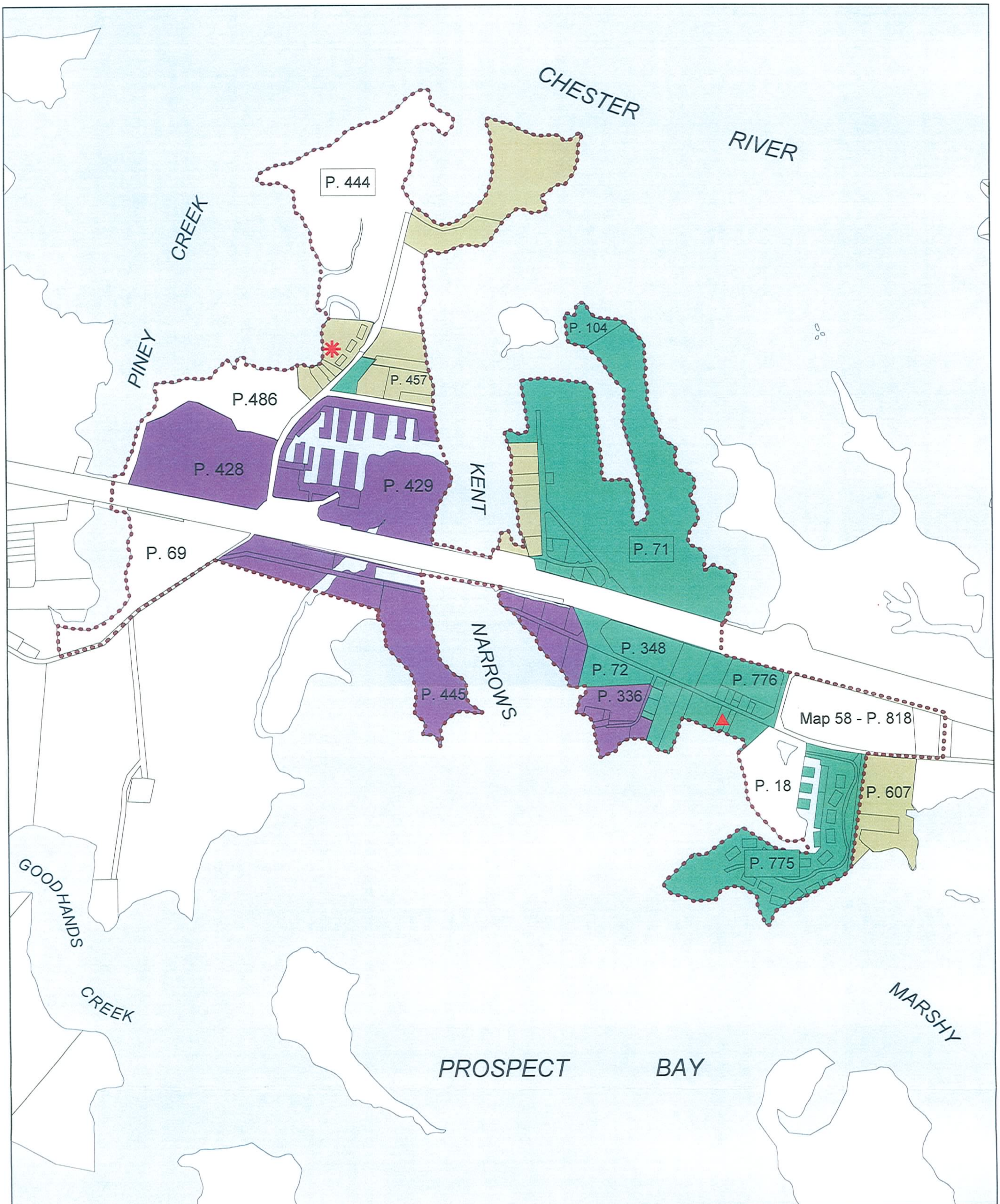
- Growth Area Boundary
- Water Tower
- Proposed Water Tower
- Private Water System
- Water Treatment Plant

1500 0 1500 Feet

N

NOTE: It is anticipated that, with the exception of Benton's Pleasure, any infrastructure necessary to serve planned service areas will be entirely funded by private developers. Benton's Pleasure will be funded by benefit assessments.

Kent Narrows Growth Area
Water Service Area



LEGEND

Water Service

W1	Current Service Area
W2	1 to 3 years ('06 - '09)
W3	4 to 10 years ('10 - '16)
W4	11 to 20 years ('17 - '26)
W5	Beyond 20 years
W6	No Planned Service

Growth Area Boundary

Private Water System

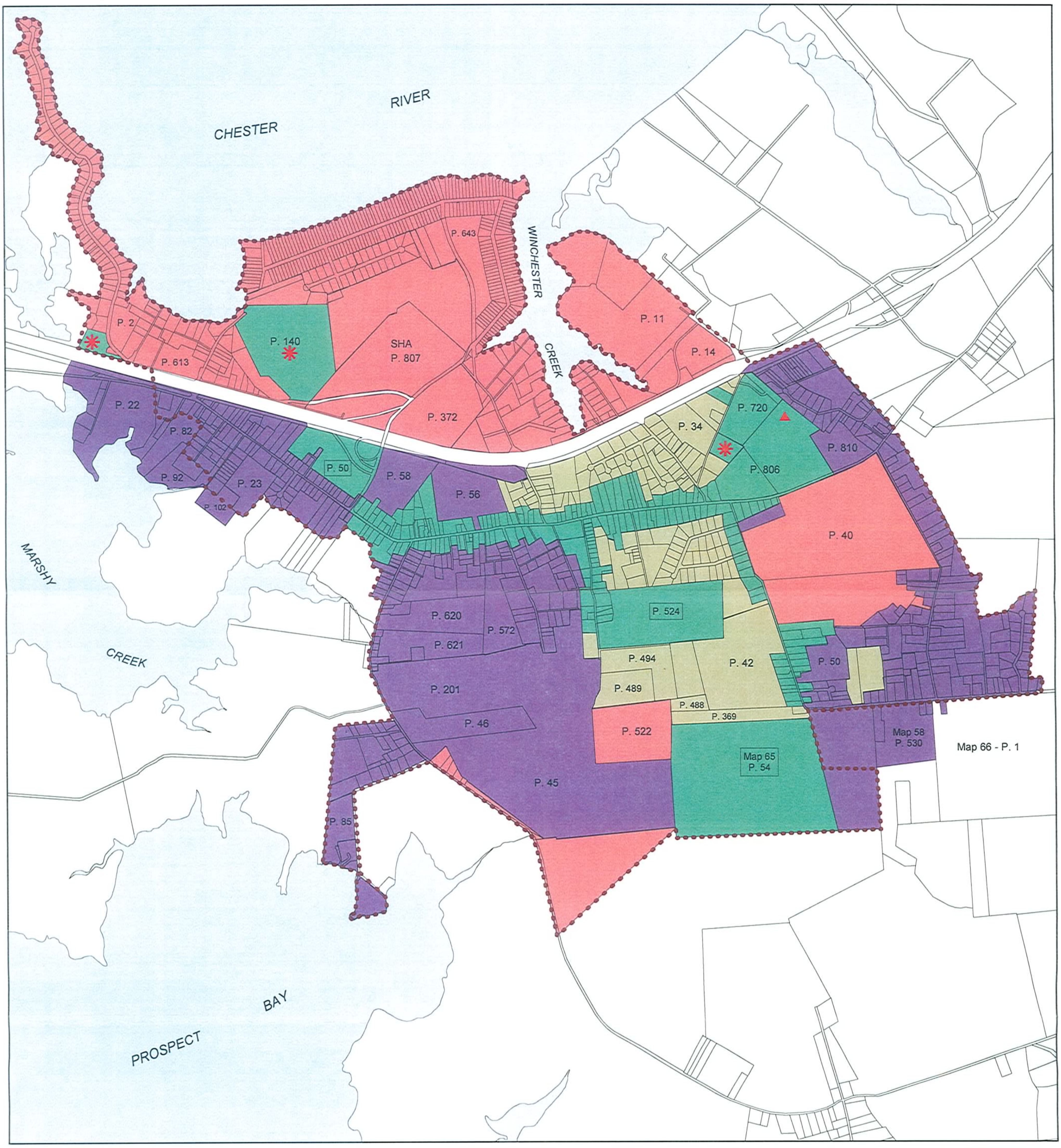
Water Treatment Plant

850 0 850 Feet

N

NOTE: It is anticipated that any infrastructure necessary to serve planned service areas will be entirely funded by private developers.

Grasonville Growth Area
Water Service Area



LEGEND

Water Service

W1	Current Service Area	
W2	1 to 3 years ('06 - '09)	
W3	4 to 10 years ('10 -'16)	
W4	11 to 20 years ('17-'26)	
W5	Beyond 20 years	
W6	No Planned Service	

Growth Area Boundary

Water Treatment Plant

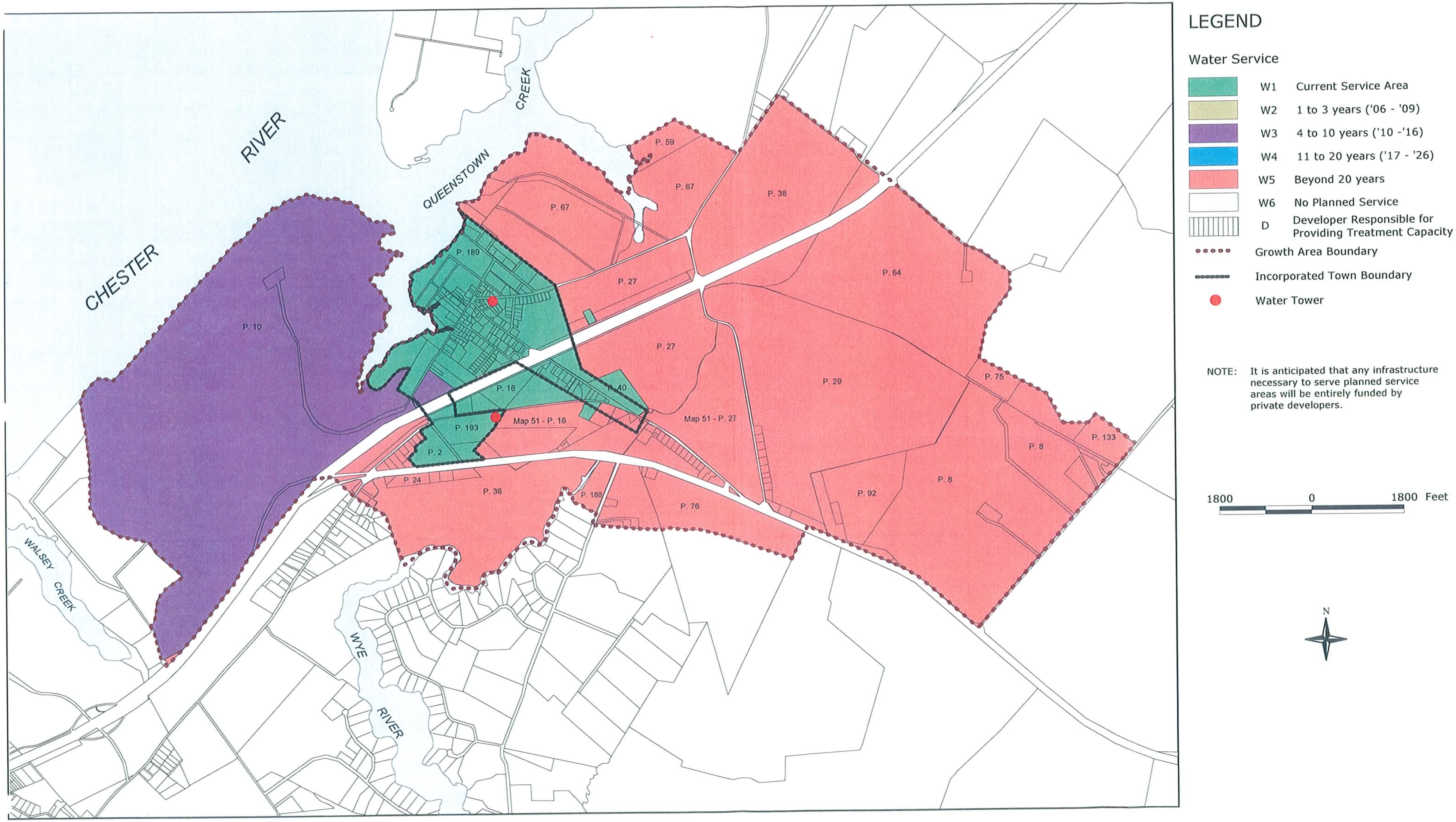
Private Water System

1500 0 1500 Feet

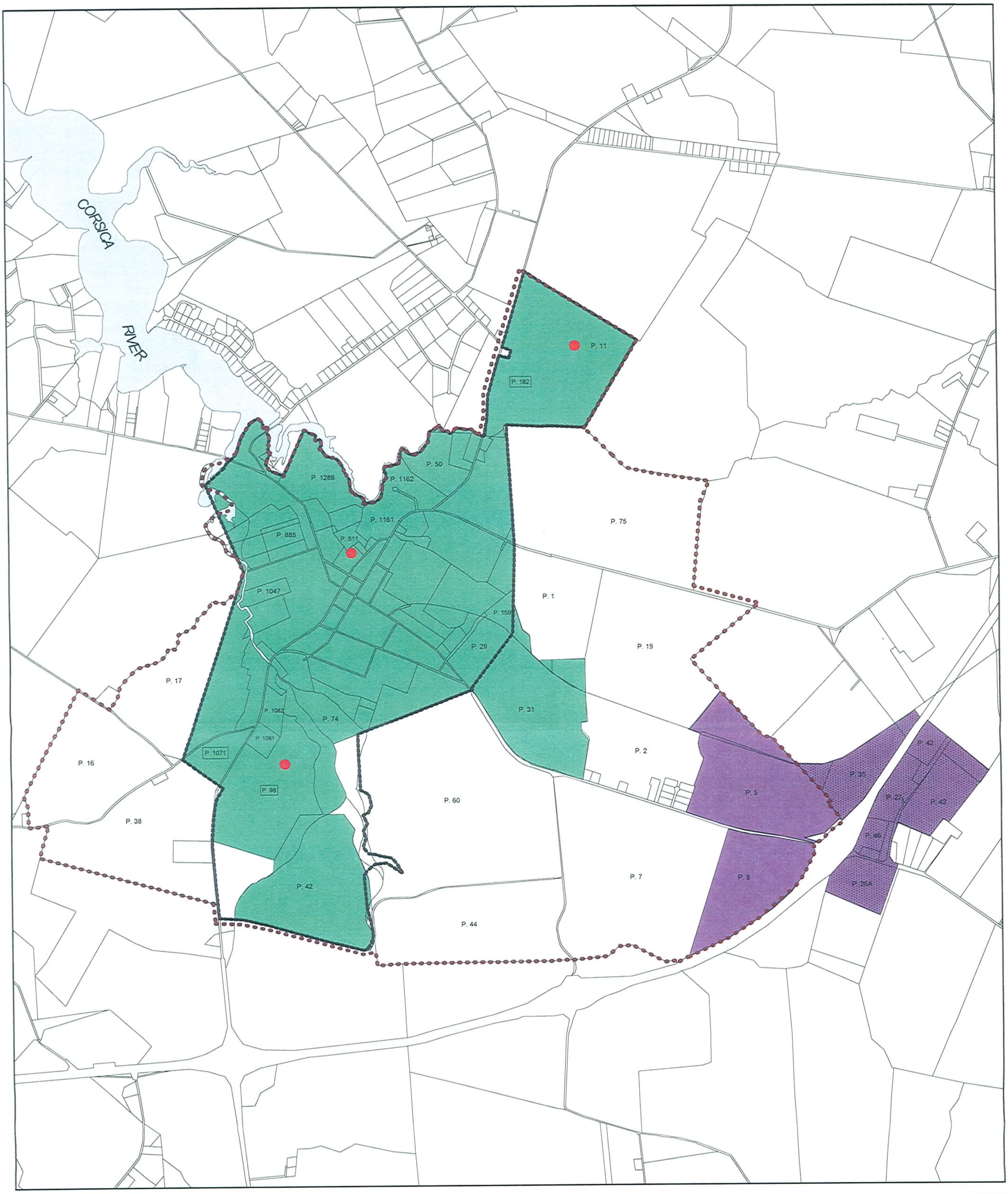
N

NOTE: It is anticipated that any infrastructure necessary to serve planned service areas will be entirely funded by private developers.

Queenstown Growth Area
Water Service Area



Centreville Growth Area
Water Service Area



LEGEND

Water Service

W1	Current Service Area	
W2	1 to 3 years ('06 - '09)	
W3	4 to 10 years ('10 -'16)	
W4	11 to 20 years ('17-'26)	
W5	Beyond 20 years	
W6	No Planned Service	
D	Developer Responsible for Providing Treatment Capacity	
P	Public Health Concern	

Growth Area Boundary

Incorporated Town Boundary

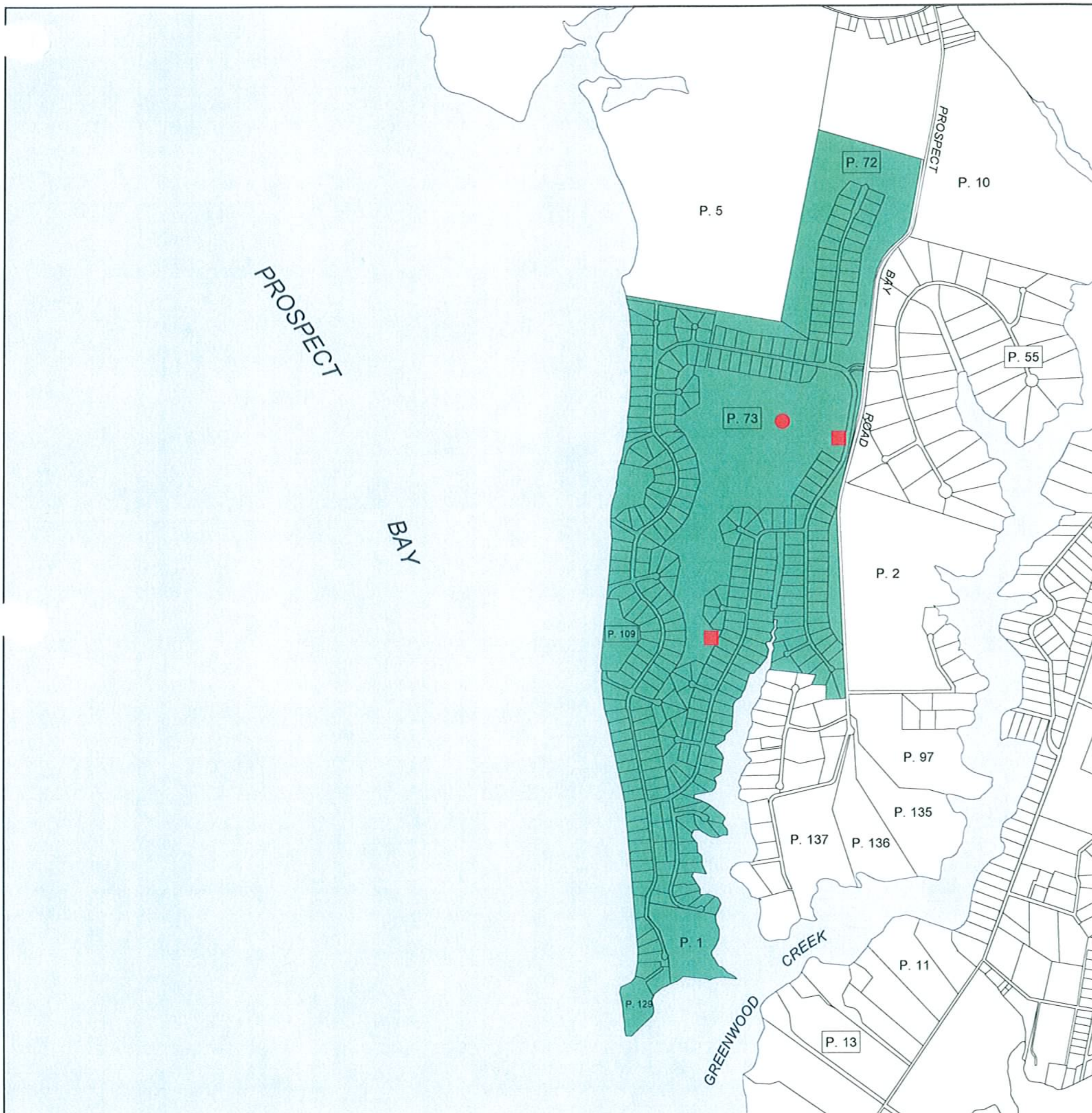
Water Tower

2200 0 2200 Feet

N

NOTE: It is anticipated that any infrastructure necessary to serve planned service areas will be entirely funded by private developers.

Prospect Bay Subdivision
Water Service Area



LEGEND

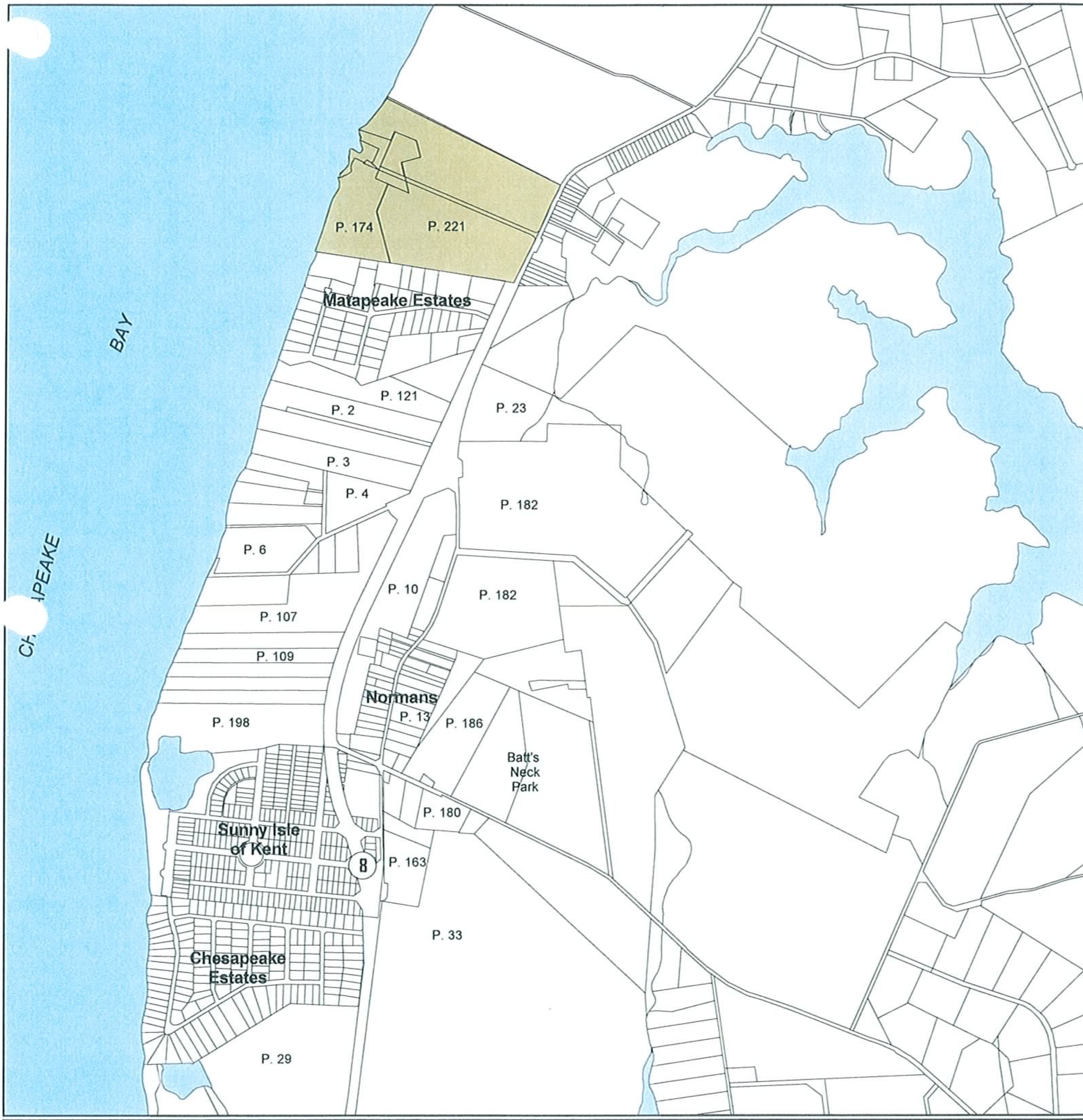
Water Service

W1	Current Service Area	Water Tower
W6	No Planned Service	Well House

2000 0 2000 Feet

N

Chesapeake Estates/Sunny Isle of Kent/Batt's Neck/Matapeake Estates Proposed Water Service Area



LEGEND

Water Service

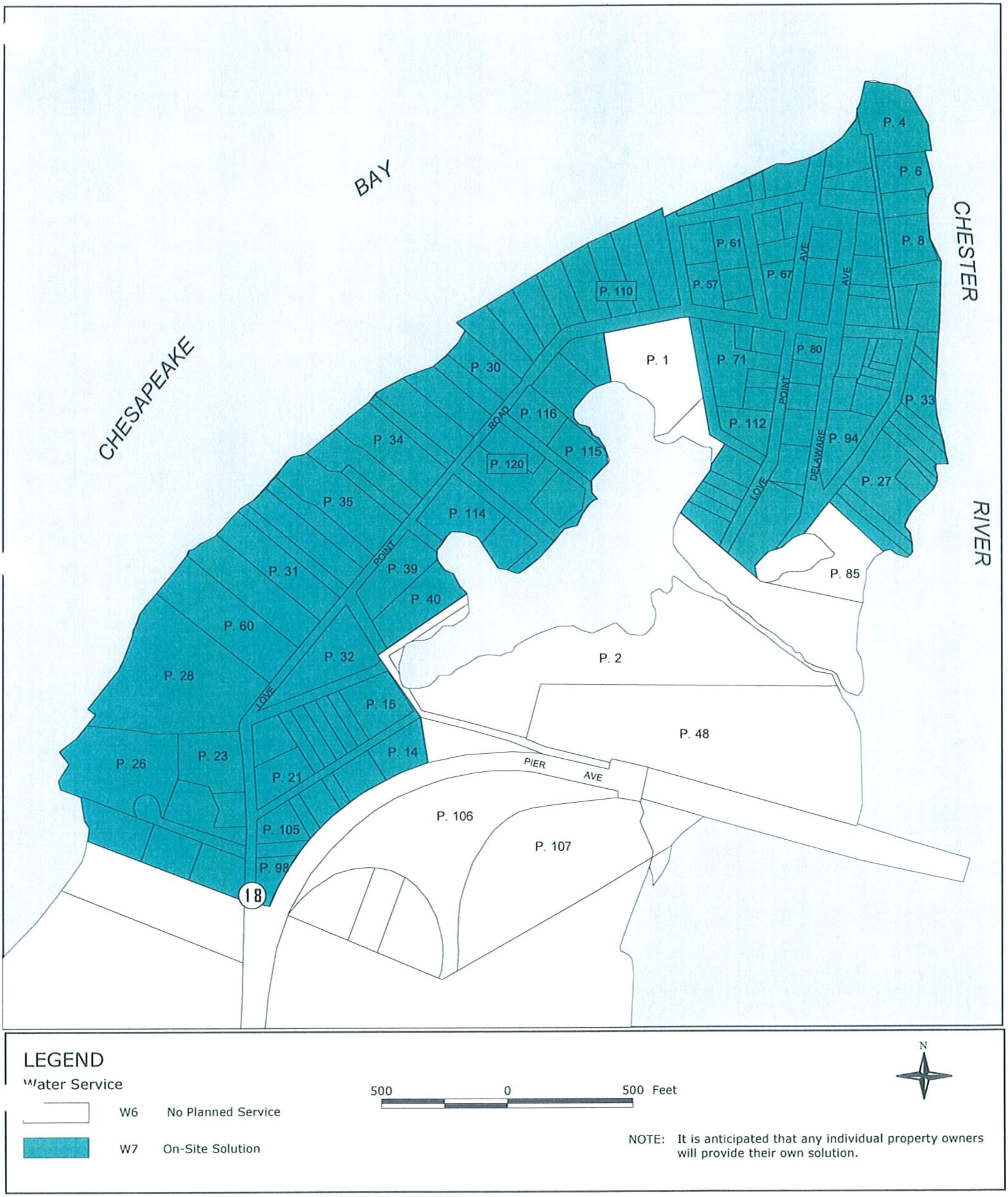
	W2	1 to 3 years ('06 -'09)
	W3	4 to 10 years ('10 -'16)
	W4	11 to 20 years ('17 - '26)
	W6	No Planned Service

1500 0 1500 Feet

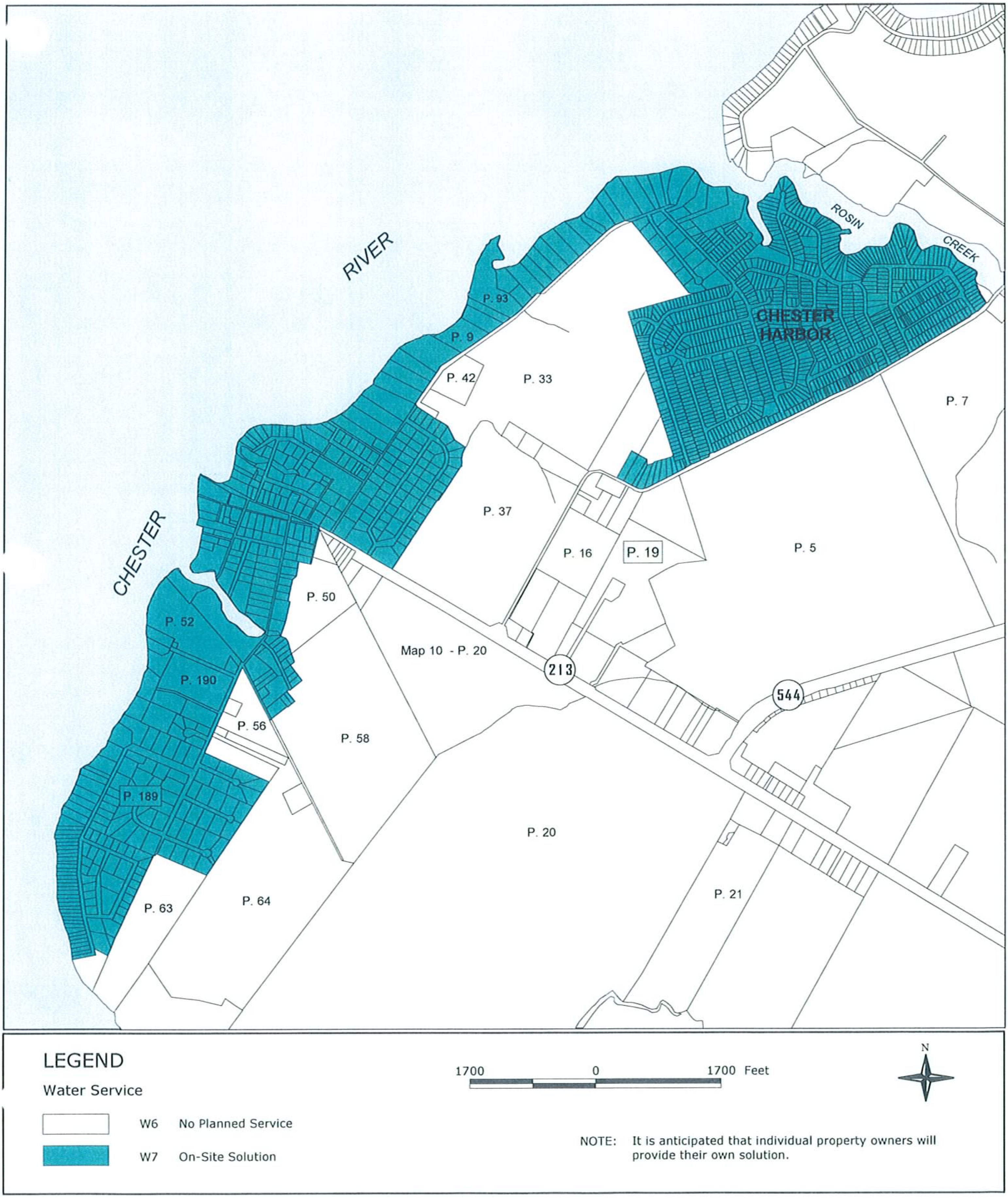
N

NOTE: It is anticipated that any infrastructure necessary to serve planned service areas will be funded by benefit assessments.

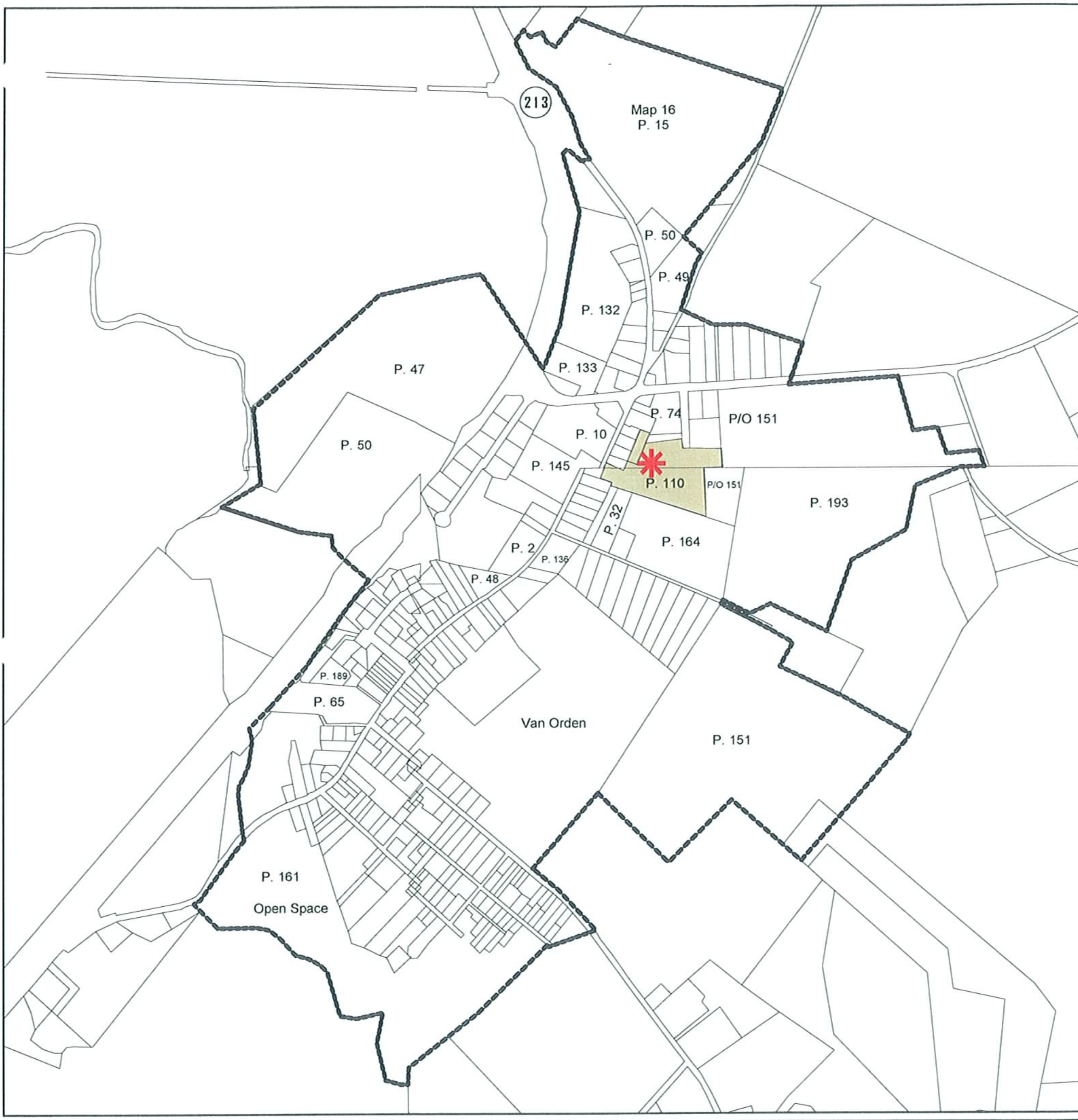
Love Point
Water Problem Area



Kingstown/Chester Harbor
Water Problem Area



Town of Church Hill
Water Service Area



LEGEND

Sewer Service

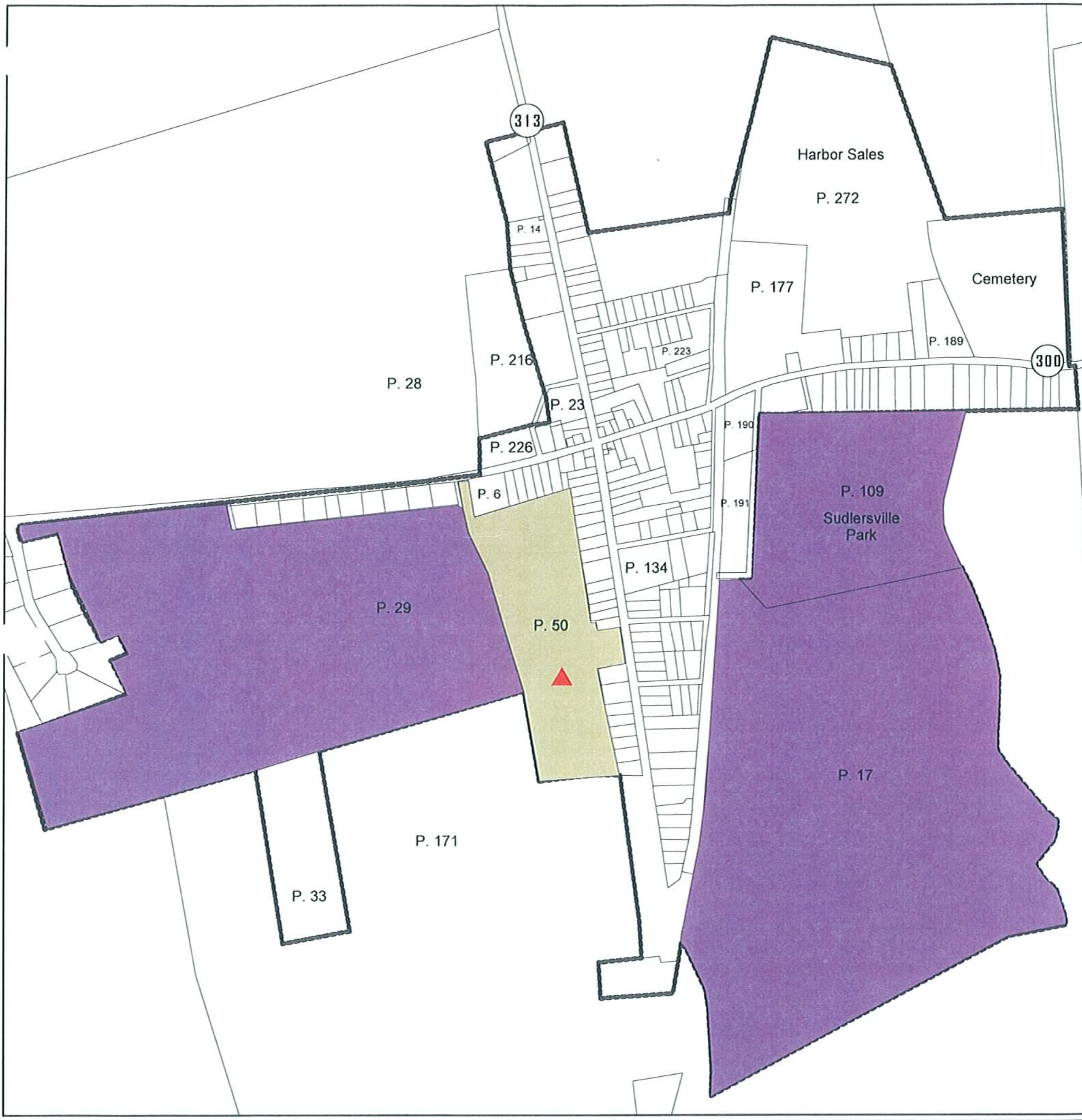
W1	Current Service Area	Incorporated Town Boundary
W2	1 to 3 years ('05 -'08)	Private Water System
W4	11 to 20 years ('16 - '25)	
W5	Beyond 20 years	
W6	No Planned Service	

950 0 950 Feet

N

NOTE: Service Area Maps should be used for planning purposes only.

Town of Sudlersville
Water Service Area



LEGEND

Sewer Service

W1 Current Service Area

W2 1 to 3 years ('06 - '09)

W3 4 to 10 years ('10 - '16)

W6 No Planned Service

850 0 850 Feet

N

Incorporated Town Boundary

Water Treatment Plant

NOTE: Service Area Maps should be used for planning purposes only.

SEWERAGE DISPOSAL

4.1 INTRODUCTION

This chapter will inventory existing wastewater treatment plants and authorized expansions to the collection system under development. Finally, a brief description is provided on what is necessary to implement the necessary sewer service within the adopted Growth Areas. Problem areas are discussed in Appendix VI, with a description of the problem, alternative solutions, and recommendations.

As defined in COMAR, a “sewerage service” area is an area served by, or potentially served by, a system of sanitary sewers connected to a treatment plant. Potential service areas were developed around centers of concentrated population, existing or projected, and areas of concern as identified by the County Departments of Environmental Health, Planning and Zoning, Public Works, and MDE.

The limits of the service areas were developed to be consistent with the Comprehensive Land Use Plan and its Growth Area plans. Alternatives were developed within the constraints listed above and reviewed based upon naturally existing conditions (soils, wetlands, shellfish waters, etc.), existing development problems, Land Use Plans, and economic feasibility.

At the present time, the Environmental Health Department estimates that approximately 67 percent of the County's population depends on on-site individual wastewater or septic systems, which have approximately a 15- to 25-year lifetime. This septic system lifetime has been greatly expanded on lots created since 1987 due to more stringent on-site soil testing criteria. In view of the soil conditions (especially on Kent Island) and development pressures, this proportion will be changing as sewerage systems are extended or built to correct problems recognized over 20 years ago.

4.2 SEWERAGE SERVICE COSTS

Sewerage service construction costs are made up of four primary construction components: collection, transmission, treatment and disposal. For the purposes of this plan, collection and transmission costs are combined, as are treatment and disposal costs.

The cost of providing the construction of the vacuum collection and transmission system for the Bay City subdivision in 1994 was $5,000 per connection. However, treatment costs (including disposal) were at a reduced rate of only $1,565 per residential connection or $6.26 per gallon per day. Actual rates in effect at the time were $2,850 or $11.40 per gpd. Rates for 2005 were $4,650.

Note all of the above capital costs are for pure construction only. True project costs including design, inspection, funding, administration, etc. generally add 20% to the construction costs.

4.3 Inventory of Existing Sewerage Systems and Systems Under Development

The major sewerage facility is the County plant known as Kent Narrows/ Stevensville/ Grasonville, or KN/S/G, serving the Route 50-301 corridor from Stevensville to Grasonville. Four incorporated towns also provide sewerage systems within or close to their boundaries. There are also minor wastewater systems serving single developments, institutions, and businesses. These facilities are summarized in this chapter.

4.3.1 County Systems

4.3.1.1 Kent Narrows/Stevensville/Grasonville Wastewater Subdistrict

The KN/S/G Wastewater Subdistrict is a consolidation of the Chester, Kent Narrows, Grasonville, and Stevensville subdistricts. Stevensville and Chester are on Kent Island, a 30 square mile island located in the southwest portion of Queen Anne's County, which comprises the entire Fourth Election District. The Grasonville area, as recognized in this report, is the region located in the Fifth Election District between Queenstown and Kent Island. A narrow strip of water known as Kent Narrows separates the two areas. U.S. Route 50/301 bisects all of these communities. In recent years the region has experienced a high population growth and this trend is expected to continue. The plant is currently flowing approximately 1,600,000 gpd.

Construction of a central sewerage system for this service area was completed in October of 1981 utilizing EPA grants. The system is operated by the County's Sanitary District. The initial facilities consist of 12 vacuum collection stations, 2 pump stations, a force main transmission system for the Route 50-301 corridor, and a 0.8 MGD treatment plant with sludge handling facilities, and a 24" outfall which carries the treated effluent 6,000 feet into the Chesapeake Bay.

The KN/S/G Sewerage Treatment Plant was re-rated to 1.0 MGD in May 1986 after actual plant loadings and performance were evaluated and showed that effluent parameters could be met at higher hydraulic flows. The treatment capacity was then doubled to 2.0 MGD in 1990 by constructing a second, parallel treatment train. During this expansion, phosphorous removal capabilities were also added for the entire plant. In 1993 two additional aerobic digesters were added. The plant could have accommodated a third 1.0 MGD treatment train without major modification. Unfortunately, the current treatment process is not capable of removing nitrogen. Nitrogen, along with phosphorus, are the two primary nutrients targeted for reduction by the Chesapeake Bay Initiative as their over abundance in the Bay and its tributaries are believed to be the primary cause of the continued decline of the health of the Bay. Major components of the existing wastewater treatment facilities are a septage handling station, primary clarification, secondary treatment utilizing rotating biological contactors (RBC), final clarification, chlorination, dechlorination, re-aeration, sludge handling with aerobic digesters, drying beds, flow equalization lagoon, and an emergency storage lagoon. Due to the outfall's location within shellfish waters, an emergency storage lagoon capable of holding 24 hours of flow is required.

The current wastewater collection system is a vacuum system now consisting of 14 vacuum collection stations, approximately 310,000 feet of small-diameter PVC piping, 2,200 vacuum valves, and other associated appurtenances. The wastewater transmission system is a force main consisting of five pump stations and approximately 106,330 feet of piping.

A pilot project to evaluate constructed wetlands for their Biological Nutrient Removal ability was concluded in December 1996 with the conclusion that the method would not be capable of satisfying the future expanded growth of the service area.

Construction is underway to replace the existing RBC with a 3.0 MGD activated sludge treatment plant capable of achieving Enhanced Nutrient Removal in accordance with the goals of the Chesapeake Bay nutrient reduction initiatives. The intent is to also utilize UV disinfection. This construction should be complete in 2007.

A number of projects have been constructed, developed and/or authorized to utilize the KN/S/G Sewerage Treatment Plant. The completed projects are listed in tabular form in the Appendices.

4.3.1.2 Prospect Bay Wastewater Subdistrict

The Prospect Bay Subdistrict is defined by the 326-lot subdivision known as Prospect Bay West Subdivision, adjacent to Grasonville. A community sewerage system was built for the Prospect Bay West Subdivision by the developer. The system was completed and accepted by the County in 1981. No extension of the collection system to the Prospect Bay East Subdivision is expected at this time because conditions and lot sizes (being typically 5 acres) in this area appear to be sufficient for on-lot, individual disposal systems. The facility utilized an activated sludge system with primary filters and storage lagoons used for secondary clarifying. Post chlorination of the treated effluent was required as the effluent was utilized as spray irrigation for a private golf course. The plant was rated at 135,000 gpd.

In August 1997, MDE delivered an Administrative Order to abandon the entire treatment and disposal process and connect Prospect Bay to KN/S/G. A Consent Order was subsequently negotiated with a deadline of July 2000 to decommission the Prospect Bay sewer subdistrict.

This deadline was met and as such the Prospect Bay wastewater subdistrict has been connected to the Kent Narrows/Stevensville/ Grasonville (KN/S/G) wastewater subdistrict by an 8-inch High Density Poly Ethylene (HDPE) **denied access** pipe placed along and within the County right of way known as Perry's Corner Road. The Prospect treatment plant has been taken off-line and raw sewerage is being pumped into the KN/S/G wastewater subdistrict by a 300 gallon per minute pumping station located immediately adjacent to the existing wastewater plant.

The following conditions apply to this arrangement:

1) The physical placement of this wastewater pipe extension from KN/S/G wastewater subdistrict to the Prospect Bay wastewater subdistrict shall not be considered a change in character of the Prospect Bay community or any other area of Grasonville through which the wastewater pipe is to be placed.

2) The physical placement of this wastewater pipe extension from KN/S/G wastewater subdistrict to the Prospect Bay wastewater subdistrict shall not become a source of public sewerage disposal for properties currently not

served by public sewerage outside of the Prospect Bay subdistrict unless there is a clear showing of serious health risks which could be alleviated by public sewerage disposal. As such, the pipeline shall be considered a denied access facility until such time that another amendment is made to overturn, in whole or part, this denied access provision.

3) The Grasonville Growth sub-area boundary shall not be influenced by the proximity of the extended public sewer line to the Prospect Bay subdistrict.

4.3.2 Municipal Systems

4.3.2.1 Barclay (no system)

Barclay is a small incorporated town in Election District One. All residents currently use on-site individual sewerage disposal systems. The Environmental Health Department has reported a significant rate of septic system failure.

Design was completed on a grinder pump collection system for the area east of MD Rt. 313. This would have served approximately one half of the town's 70 parcels. The effluent was planned to be disposed of via a shared subsurface drain field. The drain field was to be sized to service the entire town should additional funds become available.

However even though grant funds were secured in 1999 to pay for 100% of the construction of the first phase of the project, the residents of the Town decided not to proceed with the construction. As such the project has been tabled indefinitely.

4.3.2.2 Centreville

The incorporated community of Centreville has a sewerage system that serves the entire town and some adjacent properties. Presently there are approximately 950 building connections serving an estimated 2,500 people. The system is authorized an average daily flow of 500,000 gpd. The average daily flow for the years 2002, 2003 and 2004 was 284,000 gpd, 371,000 gpd, and 311,000 gpd, respectively, for a combined three-year average of 322,000 gpd. The present treatment plant was designed to treat medium strength domestic sewerage with no heavy organic loadings requiring special treatment. Discharge is a combination of a surface water discharge into Gravel Run stream and a groundwater discharge via a new spray irrigation facility.

The Town recently completed construction expanding its treatment capacity from 375,000 gallons per day to 500,000 gallons per day by constructing a new wastewater treatment plant at the current treatment plant site. The new treatment facility utilizes a Sequential Batch Reactor (SBR) method of treatment that allows the wastewater to be treated to meet the current Biological Nutrient Removal standard as well as the new Reclaimed Water standard.

The Town has purchased a farm (Tax Map 45, Parcel 3) for seasonal spray irrigation of the 500,000 gpd of treated wastewater. This facility is operated under a State groundwater discharge permit which provides for spray operations between March 1st and November 30th. The facility includes a storage lagoon to be used to hold the treated effluent when conditions prohibit spray application. The lagoon capacity is approximately 23 million gallons which will provide 45 days of storage at maximum permitted flows. No other treatment process, other than that necessary to accomplish the irrigation in accordance with the NPDES permit, will be allowed without an amendment into this Plan as well as the review and approval by the County Planning Commission. The Town must plant a hedgerow or other tall vegetation to provide a buffer for adjacent properties from spray operations.

The Town must maintain the point discharge for seasonal use when spray irrigation is not permitted. The SBR plant has been designed to be able to treat up to 750,000 gpd. However additional spray irrigation lands need to be acquired in concert with this future expansion.

The majority of the system's collection lines are 8-inch gravity sewers. There are presently three pumping stations in the system that were rebuilt in 1959 and a fourth pumping station was recently constructed to service the 395 unit Symphony Village development located south of town. Also a grinder pump service area is currently under development to service the 437 unit North Brook subdivision.

Presently, the only area outside the town limits that is serviced is the Queen Anne's County High School and the Centreville Middle School located just east of Centreville on Route 304. Ultimately, the Centreville sewerage system may be expanded to reach other developments as annexation occurs, but the town has no plans to extend service beyond its corporate limits.

The Centreville sewer service map also shows an area designated as S-3 at the intersection of U.S. Rt 301 and Md Rt 304. This is an area that has a mixture of commercial, industrial and municipal uses all of which suffer to varying degrees of inadequate on-site wastewater disposal systems. These areas carry the “Public Health Concern” hatching. In addition there are some parcels that are currently agricultural. It is the intent that the vacant areas be developed into a County sponsored business park.

Wastewater service would either be by the Town of Centreville, served by a ‘denied access’ line to keep the intervening properties as No Planned Service. Or by a County owned and operated wastewater plant. No planning or design has been initiated as yet.

4.3.2.3 Church Hill

At the present time, the majority of homes in the incorporated town of Church Hill use the treatment facility located on Taylor’s Branch next to Route 213. The treatment consists of a lagoon-type facility. The collection facility consists of approximately 14,500 feet of 8-inch gravity sewer and 1,100 feet of 6-inch force main, and two pump stations. The system is designed for an average flow of 80,000 gpd and a peak flow of 140,000 gpd. The average daily flow for the years 2002, 2003, and 2004, was 34,000 gpd, 54,000 gpd, and 44,000 gpd, respectively, for a three year combined average of 44,000 gpd.

4.3.2.4 Crumpton (no system)

Crumpton is an unincorporated community that presently uses individual septic tank systems for sewerage disposal. Galestown, the predominant soil type in the area, is very permeable, and as a result there have been very few septic system failures. Individual septic systems are expected to provide adequate service for the foreseeable future. However, because of the high permeability of the local soils, a monitoring program should be developed to maintain a check for groundwater contamination problems due to the possible seepage of untreated sewerage into an aquifer supplying drinking water.

4.3.2.5 Millington

The incorporated town of Millington, which lies mostly in Kent County, has an existing sewerage system designed to serve 989 people. There are presently 210 building connections serving about 630 people throughout an area of 400 acres. Twenty homes west of the town limits on Route 291 and 36 homes in Sandfield to the east are also served by the Millington system. The former Howard Johnson's Restaurant on U.S. Route 301 also pumps its septic tank effluent into the Millington system for treatment. The normal daily flow to the Millington Sewerage Treatment Plant is 35,000 to 42,000 gpd.

The collection system in Millington consists of 4, 6, 8, and 10-inch lines. In addition, there are three pumping stations--one has a capacity of 150 gpm @ 28 TDH, the second is an ejector with a capacity of 50 gpm @ 17 TDH, and the third is the Sandfield area which is connected via a lift station.

The present package sewerage treatment plant was designed and built in 1966 and is located on the Queen Anne’s County side of town. Treatment is accomplished using a contact stabilization process. The plant consists of a reinforced concrete tank with a diameter of 29 feet and contains prefabricated units to complete the contact stabilization process. It is designed to treat 70,000 gpd with 90 percent BOD removal. The point of discharge is the Chester River. The plant has been upgraded in the past to include flow equalization, sludge beds, chlorination, and dechlorination.

The Town recently completed constructing an expansion of the treatment plant to 105,000 gallons per day as well as adding nutrient removal and other advanced treatment components (sand filters, UV disinfection) as well as sludge drying beds and an influent pumping station. The increase in capacity is to serve areas within the Town and Kent County.

4.3.2.6 Queen Anne (no system)

The small incorporated community of Queen Anne lies in both Queen Anne’s County and Talbot County. Presently, most of the residents use individual septic tank systems for sewerage disposal. Small lot conditions in the area may be unsuitable for long-term septic system use.

4.3.2.7 Queenstown

The Town operated on individual septic systems until 1971. The Town then constructed a single train wastewater treatment system consisting of a clarigester, a trickling filter, a secondary clarifier, and a chlorine contact chamber. This treatment system was designed with a hydraulic capacity of 65,000 gpd. The treated wastewater was, and is still currently, discharged into Little Queenstown Creek through a submerged 8 inch outfall. A vitrified clay pipe (VCP) wastewater collection system was also constructed at this time. The Town amended its Charter to require all properties in the Town to be served by this publicly owned utility.

In the mid 1980’s, the trickling filter was replaced with two parallel RBC trains. Another secondary clarifier and chlorine contact chamber were added, so the discharge from each RBC train remained separate. The trickling filter tank was then converted into an aerobic digester. Additional sludge drying bed capacity was added in an enclosed structure. The solids removed from the secondary clarifiers are diverted to the aerobic digester before being dewatered directly on the sludge dewatering beds. All other components of the original system remained the same. The State modified the Town’s wastewater discharge permit to reflect the increased capacity of the plant which is currently rated at 85,000 gpd.

The Town’s and the County’s comprehensive plans called for a mix of residential and commercial land uses on lands adjacent to the town and within the Queenstown growth area. If any of these lands were to be annexed into the town, the town will provide water and sewer service per the town’s charter. The density and timing of potential future growth is not known though engineering studies performed by the town in the past indicate that additional sewer service of 300,000 to 600,000 gpd will be required to serve full build-out of the current Growth Area boundaries.

The existing wastewater treatment system continues to meet or exceed all of its discharge permit limitations and is adequate to handle the current needs of the Town. The Town will continue to evaluate its options as proposals for development are received.

4.3.2.8 Sudlersville

The incorporated town of Sudlersville has constructed a community sewerage system with a capacity of 90,000 gpd designed to serve 900 people. There are presently 168 building connections serving 425 people throughout an area of 144 acres. The plant had an average daily flow in 2002, 2003 and 2004 of 30,000 gpd, 63,000 gpd, and 34,000 gpd for a three-year average of 42,000 gpd.

Sewerage treatment consists of two stabilization lagoons followed by chlorination. Dechlorination is provided by gravity feeding a sodium metabisulfite solution into a walled-off section of the existing chlorine contact tank. The maximum pipe size in the collector system is 10 inches. There are three ejector stations as follows:

Location	Type	Capacity
North Ejector Station, N Church Street	Single Pump	50 gpm @ 22 TDH
East Ejector Station, Main Street	Single Pump	50 gpm @ 43 TDH
Duplex Ejector Station, S Church Street	Duplex Pump	300 gpm @ 42 TDH

The system is authorized an average flow of 90,000 gpd and peak flow of 160,000 gpd. Recent improvements include the installation of two baffles in each lagoon to alleviate short-circuiting of the treatment flow. Thirteen aerators have been installed in the two lagoons (7 in the north, 6 in the south) to add air into the process to increase dissolved oxygen levels and reduce biological oxygen demand.

4.3.2.9 Templeville (no system)

The incorporated town of Templeville is located in a relatively high elevation area and is part of both Queen Anne's County and Caroline County. At this time, residents use individual septic tank systems for sewerage disposal. Although the soils in the area have sufficient permeability, there are some reported septic tank failures during the wet seasons due to high water table. Caroline County is currently considering the feasibility of a regional sewerage disposal system that may include Templeville as well as Henderson and Marydel.

4.3.3 Other Institutional Systems

4.3.3.1 Chesapeake College

Chesapeake College, the regional community college, operates an existing multi-use wastewater system serving approximately 3,500 students at Wye Mills. The method of treatment is an extended aeration unit followed by settling, chlorination, and dechlorination with discharge of the effluent to a tributary of the Wye East River. The collection system consists of 8-inch diameter gravity sewer lines and contains no pumping stations. The system is authorized an average flow of 15,000 gpd and a peak flow of 27,000 gpd.

4.3.3.2 Eastern Correctional Camp

The State of Maryland operates an existing multi-use wastewater system serving the Eastern Correctional Camp. The present population of the camp is approximately 175. The current method of treatment is a lagoon followed by chlorination with discharge of the effluent to a tributary of Southeast Creek. The system is authorized an average flow of 25,000 gpd and a peak flow of 44,000 gpd.

4.3.3.3 Matapeake Multi-Use Field Station & Bay Model

The State of Maryland operates an existing multi-use wastewater system serving the Matapeake Multi-Use Field Station. The current method of treatment consists of an on-site mound-type wastewater disposal system. MDE currently considers it to be malfunctioning and inadequate for an expansion of the activities on the site. The system is authorized an average flow of 12,000 gpd and a maximum flow of 38,500 gpd. The adjacent old Bay Model currently has no means of waste disposal.

4.3.3.4 Camp Pecometh

This property has been a church camp for many years. The latest expansion would be to construct four bunkhouses. However they have adopted a master concept plan that envisions a total wastewater generation of 29,500 gpd in the future. Wastewater is disposed of on-site through a number of septic tanks and drainfields. Due to the fact that the parcel contains 275 acres of well-drained soils, on-site wastewater disposal should be adequate for this use.

4.3.3.5 Route 18 Park

The County Department of Parks and Recreation has constructed a septic tank effluent alternating low pressure dosing subsurface drainfield to service a restroom pavilion. Although a conventional system was originally planned, it was believed this alternative system would perform better.

4.3.4 Private Systems

4.3.4.1 S.E.W. Friel – Queenstown

This Queenstown facility operates a seasonal tomato canning operation which disposes its liquid wastes via spray irrigation from the cannery operation in adjacent woods.

4.3.4.2 S.E.W. Friel – Wye Mills

This Wye Mills facility operates a seasonal corn canning operation which disposes its liquid wastes from the cannery operation in adjacent woods.

4.3.4.3 Con Agra

This Queenstown facility operates a year-round meat processing plant and disposes of its process wastewater via spray irrigation in an adjacent field.

4.3.4.4 Hunters Oak Golf and Country Club

This resort is serviced via a large, privately owned and operated septic system with a capacity of approximately 15,000 gpd.

4.4 GROWTH SUB-AREA PLANS

In 1992, Maryland adopted the Economic Growth, Resource Protection and Planning Act as an amendment to Article 66B. The Act requires all local governments to reduce sprawl development, concentrate growth in and around existing developed areas, promote economic development and protect sensitive natural resources. In 1993, consistent with the 1992 Planning Act, the County Comprehensive Plan recommended that specific development plans be prepared for each of the County's six designated growth areas.

During 1997 and 1998, community plans were adopted for the areas of Stevensville, Chester, Grasonville, Queenstown and Centreville. The Kent Narrows Plan and its associated zoning changes were previously adopted in 1990 as part of the implementation of the 1987 Comprehensive Plan.

A brief discussion on each of the growth areas follows with a description of the anticipated sewer infrastructure required to serve the area. For consistency sake, all the growth areas are assumed to build-out at 75% the maximum number of residential and 50% the maximum allowable non residential. Equivalent Dwelling Units (EDU = 250 gallons per day (gpd)) and commercial floor areas (5 gallons per day per 100 square foot of floor area) are taken from the appendices of the Community Profile report prepared by LDR International, Inc. in August 1999.

It should be noted that at the time of this writing, the Stevensville and Chester growth area plans are under review and it appears a trend is developing to reduce the amount of land area contained within these two growth areas.

4.4.1 Stevensville

There are two large and two small areas slated for growth in the current Stevensville plan. Total acreage for this area is 863 acres with an anticipated build-out of 2,208 EDUs and 1,686,970 square feet (ft^2) of commercial area. This equates to an average daily demand of 636,000 gpd.

4.4.1.1 Route 8 Area

The first area is a large block of land on the east side of MD Rt 8 south of US Rt 50/301 and consists of 5 parcels with a total acreage of approximately 420 acres. The estimated EDUs on this site would have been approximately 990 and would have produced a sewerage flow of approximately 250,000 gpd. One of the 5 parcels has concept and allocation approval to construct 285 dwellings and a clubhouse (Ellendale Subdivision at 72,250 gpd).

This area has no sewer infrastructure and initially was proposed to serve all five parcels via a new vacuum collection station to be designated collection area ‘X’. However, given the revisions suggested for the Community Plan for this area, it appears now that the Ellendale parcel may be the only parcel to be developed. Further, the developer was directed by the County to utilize a gravity collection system to serve this parcel only.

There is an existing 8-inch sewer force main adjacent to the area serving the Bay City community (collection area ‘R’) and Pier 1 Road (collection area ‘S’). This main would have been insufficient to accommodate approximately 250,000 gpd of additional flow. As the development potential would seem to now be restricted to the Ellendale project, Ellendale will evaluate the capacity of the existing 8-inch line.

4.4.1.2 Thompson Creek Area

The second area is a small block of land on the east side of Thompson Creek Road and consists of Lots 1 and 2 of the Fair Prospect Farm subdivision and has a total acreage of 40 acres. Both lots have approved development plans and have been built out to 95 single-family dwellings (the Anchorage and Cox Creek landing subdivisions). These two developments are served by existing collection area ‘B’.

4.4.1.3 East of Cloverfields Area

The third area is a large block of land to the east and south of the Cloverfields subdivision. The western most parcel has been developed into an 80-lot subdivision (Mallard Run) and is being served by collection area ‘Q’. The remaining six parcels containing approximately 480 acres would need to be served by a new collection area to be designated ‘U’. The bulk of this area consists of the vacant Davidson Farm as well as a portion of the Bittorf farm. The Bittorf farm is a portion of the lands proposed to be developed into the Four Seasons on Kent Island Development. This area is further discussed in section 4.4.2 under the Chester Growth Area.

4.4.1.4 West of Cloverfields

The final area is a small group of eight parcels west of Cloverfields on both sides of MD Rt 8. These areas should be able to be served by collection area ‘Q’ although some off-site upgrades to the existing collection mains may be required.

4.4.2 Chester

There are three large areas that make up the Chester Growth Area. Total acreage for this area is 573 acres with an estimated build-out of 2,321 EDUs and 311,999 ft^2 of commercial area. This equates to an average daily demand of 693,000 gpd.

4.4.2.1 Castle Marina Area

The first area is a group of three parcels that are west and south of the existing Castle Marina subdivision. This area, combined with a portion of the Stevensville growth area described in section 4.4.1 above, will need to be served by a new collection area to be designated ‘U’. The estimated EDUs on this site are approximately 600 that would produce a sewerage flow of 150,000 gpd. In addition to a new collection station, a new force main will need to be constructed from this site to the KN/S/G treatment plant. The existing force main cannot accept the additional capacity from this area or the next area discussed. All of this area is consumed by the proposed Four Seasons on Kent Island project.

4.4.2.2 Piney Creek Area

The second area is a group of three parcels between Macum Creek and Piney Creek. The estimated EDUs on this site are approximately 720 that would produce sewerage flow of 180,000. The one parcel that has development approval, Gibson's Grant (285 dwellings at 71,250 gpd) has been directed to construct a gravity sewer collection area.

This area will have to share the new force main described in 4.4.2.1.

4.4.2.3 Rt 552 Area

The final area is a group of four parcels on both sides of MD Rt 552. However the parcel to the west of MD Rt 552 has been developed into a 120-lot subdivision (Clayborne Woods) and is being served by collection area 'F'. The other three parcels are all east of MD Rt 552 and have a development potential of approximately 400. It is unclear how these areas should be served. If they are to support a large residential component, a new collection area may be necessary. If they are to be primarily commercial retail areas, it is possible the area could be split between existing collection areas 'F' and 'G' although significant off-site upgrades and collection station upgrades are to be anticipated.

4.4.3 Kent Narrows

While designated a growth area, in fact the east bank has little new development potential over what currently exists although there may be some re-development projects. Any development on the eastern shore of the Narrows will be handled by collection station 'H'. The western bank has a couple of vacant parcels that may have moderate development potential. Any development on the western shore of the Narrows will be handled by collection station 'G'. Some off-site collection system upgrades may be required.

4.4.4 Grasonville

There are two large, and two small, areas that make up the Grasonville Growth Area. Total acreage for this area is 486 acres with an estimated build-out of 1,147 EDUs and 266,354 square feet (ft^2) of commercial area. This equates to an average daily demand of 377,000 gpd.

4.4.4.1 Chester River Beach Area

The first area consists of one large, and three small parcels. The large parcel has been developed into 46 single-family homes (Winchester subdivision). The other parcels are rather small and don't have a great deal of development potential. Collection Station 'L' is adequate to handle this area.

4.4.4.2 Route 50 Area

The second area straddles US Rt 50/301 and is slated for commercial growth. It is assumed collection area 'L' will serve the northern portion, the western portion by collection station 'J' and the eastern portion by collection station 'K'. In all cases, some off-site upgrades should be anticipated.

4.4.4.3 Perry's Corner Road Area

The third area consists of six parcels east of Perry's Corner Road. Only one parcel has a great deal of development potential with the possibility of approximately 125. It is assumed that this area will be served by existing collection station 'K' although significant off-site upgrades to the collection mains and station are to be anticipated.

4.4.4.4 Grasonville Cemetery Road Area

The final area straddles Grasonville Cemetery Road and consists of six parcels. One parcel is currently under development into a 120 lot residential subdivision known as Greenwood. The full development potential is estimated to be approximately 640. It is assumed that this area will be served by existing collection station 'M' although significant off-site upgrades to the collection mains and station are to be anticipated.

4.4.5 Queenstown

While the growth area as anticipated in the Queenstown Community Plan was almost 10 times the size of the current incorporated limits, on December 21, 2004 the County Commissioners adopted the Resolution 04-70 that states the following:

> "In order to achieve consistency between the 2002 Comprehensive Plan and the zoning maps adopted subsequent to the Plan as part of the adoption of Chapter 18 of the County Code, the 2002 Comprehensive Plan is hereby amended to provide that the densities and land use categories set forth on the zoning maps shall be the land use element of the 2002 Comprehensive Plan for the Queenstown Planning Area until such time as a new Queenstown Community Plan is adopted or the Queenstown Community Plan is revised."

This action removed the zoning density envisioned for the growth area lands by the Queenstown community plan and restored the predominantly low density Countryside, Agricultural, Suburban Estate and Suburban Residential zoning.

The existing wastewater treatment capacity is 85,000 gallons per day.

The town is studying the requirements for expanding treatment capacity to about 200,000 gpd, in light of the pending annexation and development of two parcels (known as the Dudley and Wheatley farms) abutting the town boundaries. Increasing the permitted discharge through the existing outfall to 200,000 gpd may be problematic based on public opposition and the extent and duration of the studies required to support claims that the water quality in Little Queenstown Creek would not be degraded and could possibly be improved by the increase.

The more expedient approach in theory for providing the additional disposal capacity may be to permit an alternative discharge point or to dispose of the additional flow using spray irrigation technology.

The County has not had good experiences with a land disposal option as evidenced by the State ordered closure of the Prospect Bay sewer treatment plant. In addition to the normal complications with the operation of any spray irrigation system caused by weather events that prohibit the spray of the treated effluent (frozen or saturated ground, too windy, etc.), this option has the potential to repeat the primary cause of the situation responsible for Prospect's problem; the reliance on third parties for the disposal of the treated effluent. The problem with relying on third party lands to irrigate is that the third parties control when, and how much, can be irrigated. This is a very critical flaw in this option and it is unlikely the County would agree to any situation that has the potential to repeat Prospect's experience.
Connection to KN/S/G may be much more reliable. The KN/S/G plant has neither the real estate or outfall constraints that Queenstown has, at least not in the near term (10 years). The primary problem with this option is the existing transmission system to which Queenstown would connect would have to be carefully evaluated and significant upgrades to the system should be anticipated.

4.4.6 Centreville

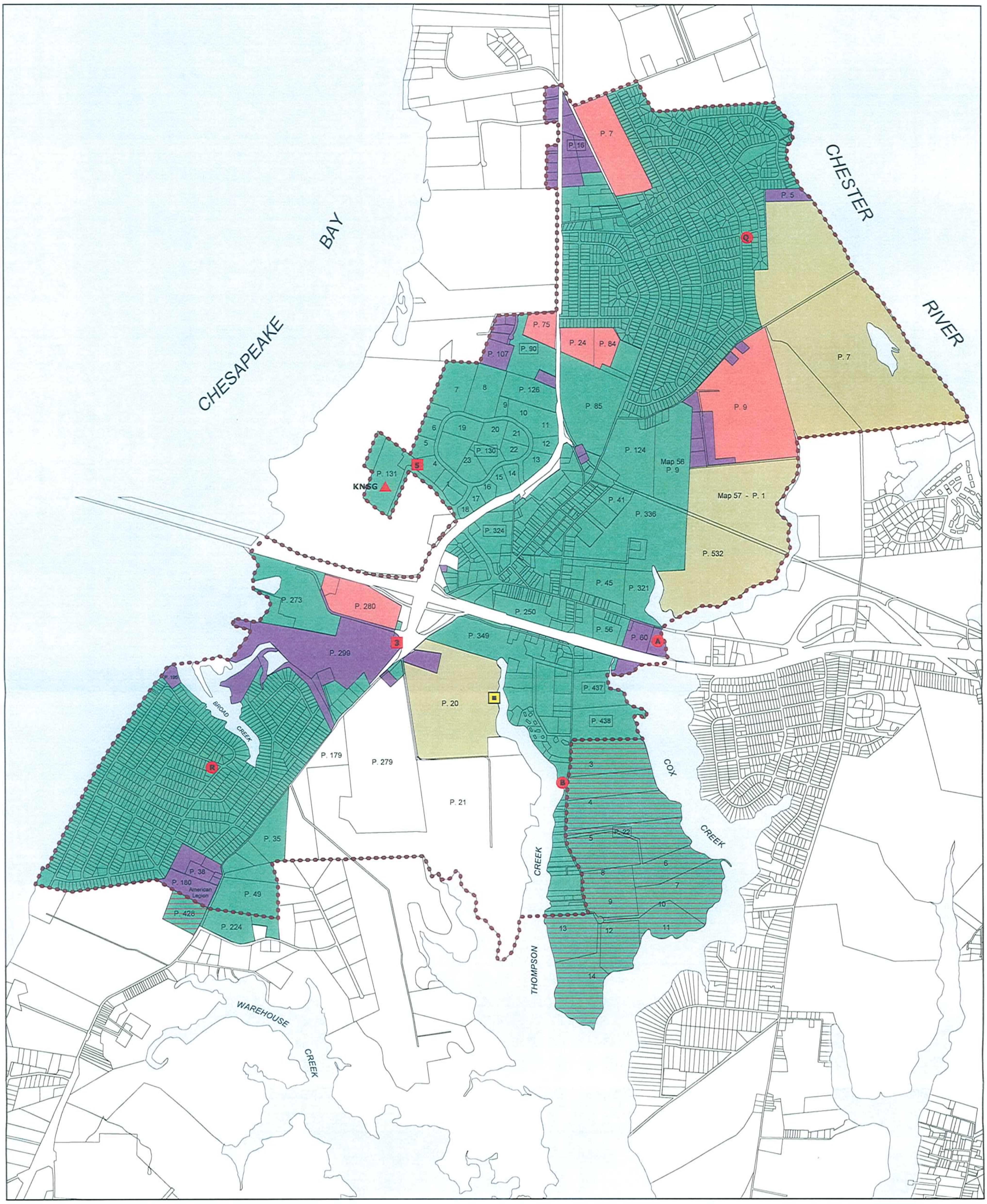
This growth area is about twice the size of the current incorporated limits. Total acreage for this area is 1,500 acres with an estimated build-out of 3,630 EDUs and 650,460 square feet (ft^2) of commercial area. This equates to an average daily demand of 940,000 gpd. It extends east, and south from the existing town limits with the majority of the lands being to the east extending to US Rt 301 along MD Rt 304. Centreville's existing wastewater treatment capacity is permitted to flow 500,000 gallons per day (2,000 EDUs).

The State allowed for the expansion of the treatment plant only on the condition that spray irrigation be used to the fullest extent possible. To this end, the Town has purchased farmland to the east of the Town on MD Rt 305 for that purpose.

In addition, as a condition to approving the amendment to this Plan to allow for the treatment plant expansion to 500,000 gpd, the County required that the existing outfall also be kept in service to act as a ‘relief valve’ during period of excessive rain or other weather event that would prohibit the ready disposal of the treated effluent.

This current expansion recently completed to 500,000 gallons per day (2,000 EDU) may not be adequate to meet the full build out of existing lots of record within the Town. To meet the full development potential of the Town, additional expansion of the Town’s treatment and disposal facilities will be required and this Plan will need to be amended to that end.

Stevensville Growth Area
Sewer Service Area



LEGEND
Sewer Service

	S1	Current Service Area
	S2	1 to 3 years ('06 - '09)
	S3	4 to 10 years ('10 -'16)
	S4	11 to 20 years ('17 - '26)
	S5	Beyond 20 years
	S6	No Planned Service
	L	Properties with Limited Sewer Allocation

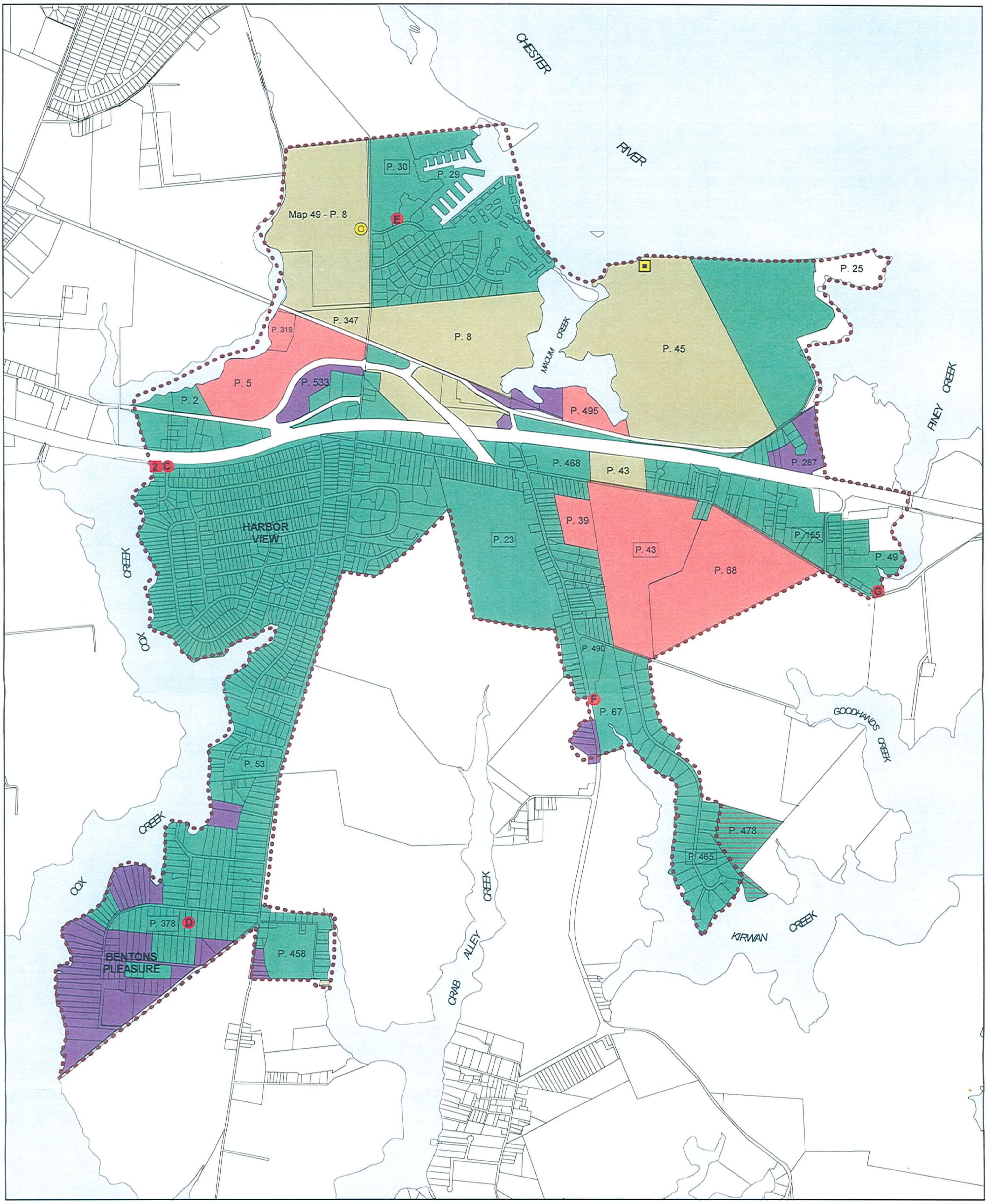
Growth Area Boundary
Collection Station
Pump Station
Proposed Collection Station
Waste Water Treatment Plant

2000 0 2000 Feet

N

NOTES: 1) It is anticipated that all collection and transmission systems to serve planned service areas will be entirely funded by private developers.
2) Service Area Maps should be used for planning purposes only.

Chester Gro..th Area
Sewer Service Area



LEGEND
Sewer Service

S1	Current Service Area	
S2	1 to 3 years ('06 - '09)	
S3	4 to 10 years ('10 -'16)	
S4	11 to 20 years ('17 - '26)	
S5	Beyond 20 Years	
S6	No Planned Service	
L	Properties with Limited Sewer Allocation	

Growth Area Boundary

Collection Station

Pump Station

Proposed Collection Station

Proposed Pump Station

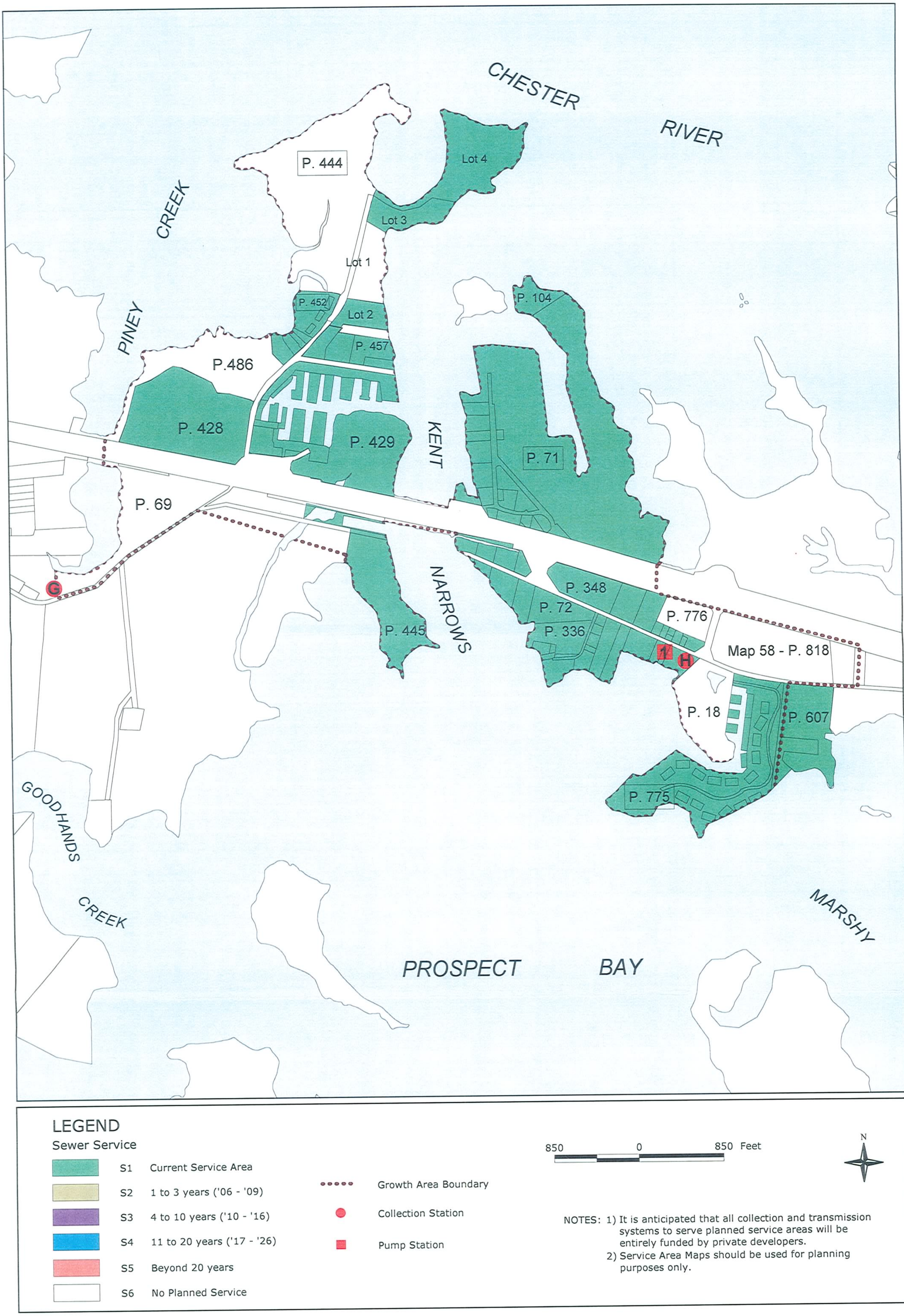
1500 0 1500 Feet

N

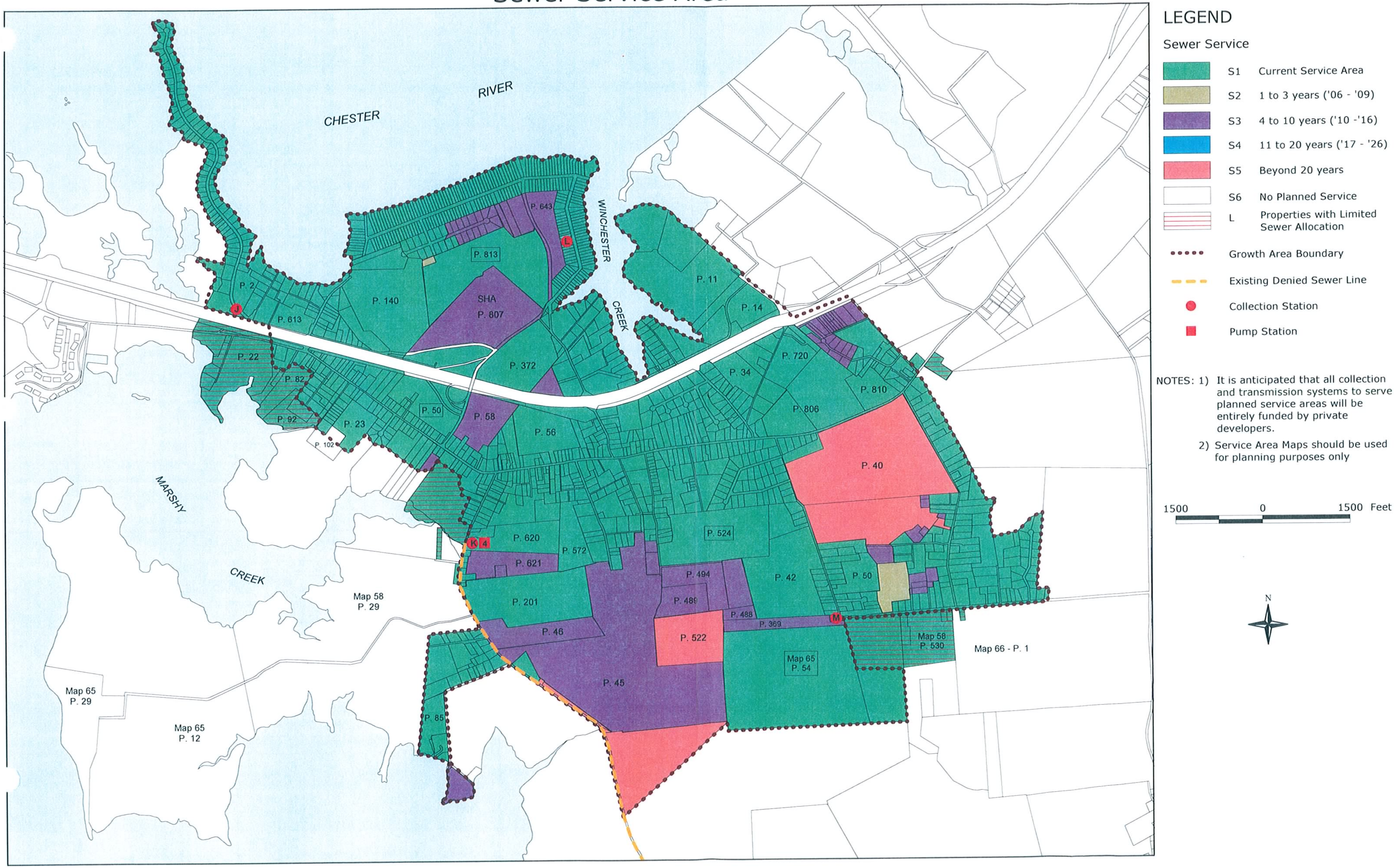
NOTES: 1) It is anticipated that all collection and transmission systems to serve the planned service areas will be entirely funded by private developers with the exception of Benton's Pleasure which will be funded via the special benefit assessment process.

2) Service Area Maps should be used for planning purposes only.

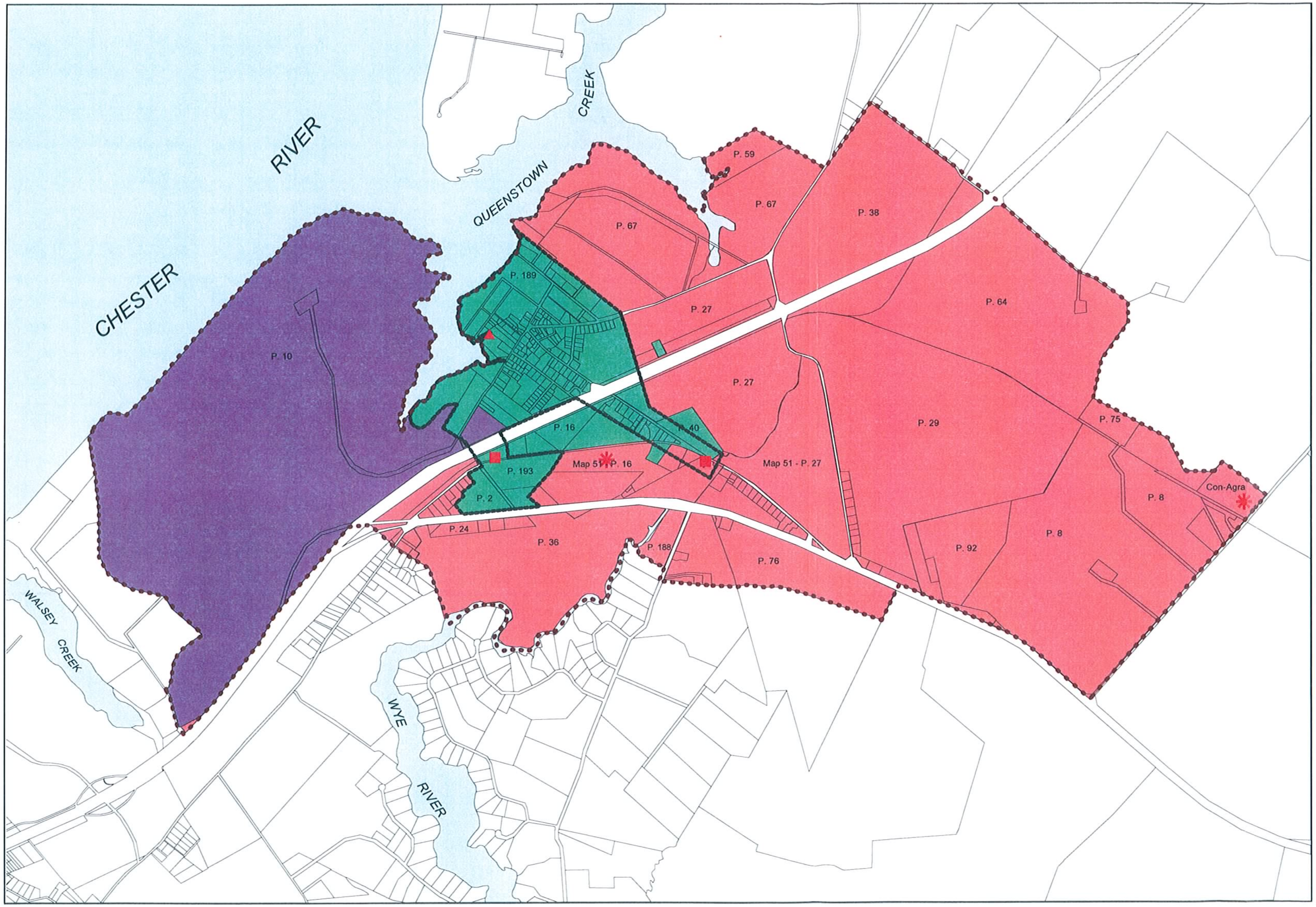
Kent Narrows Growth Area
Sewer Service Area



Grasonville Growth Area
Sewer Service Area



Queenstown Growth Area
Sewer Service Area



LEGEND

Sewer Service

S1	Current Service Area
S2	1 to 3 years ('06 - '09)
S3	4 to 10 years ('10 -'16)
S4	11 to 20 years ('17 - '26)
S5	Beyond 20 years
S6	No Planned Service
D	Developer Responsible for Providing Treatment Capacity

Growth Area Boundary

Incorporated Town Boundary

Pump Station

Wastewater Treatment Plant

Private Sewer System

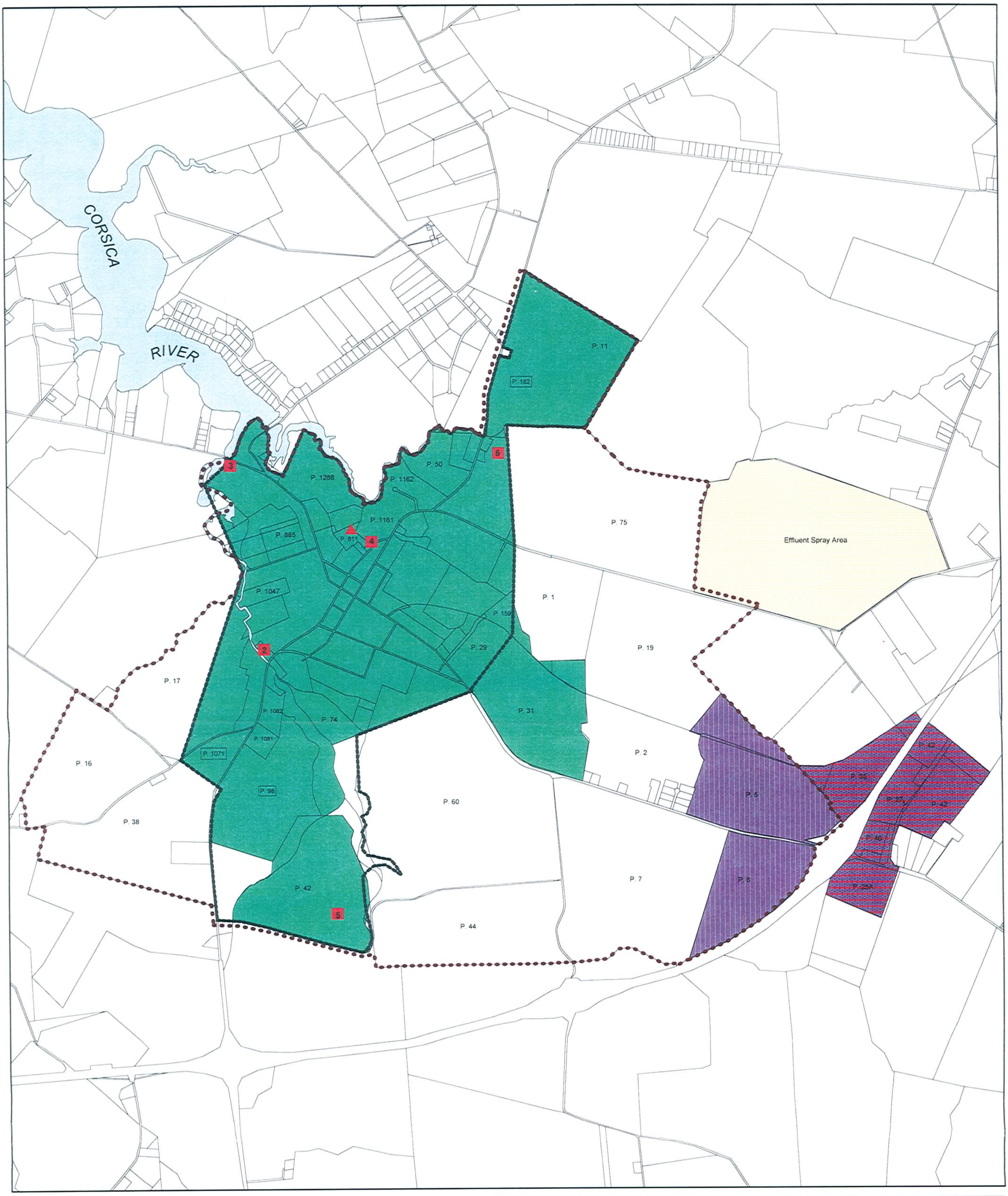
NOTES: 1) It is anticipated that all collection transmission and treatment systems to serve planned service areas will be entirely funded by private developers.

2) Service Area Maps should be used for for planning purposes only.

1800 0 1800 Feet

N

Centreville Growth Area
Sewer Service Area



LEGEND
Sewer Service

	S1	Current Service Area
	S2	1 to 3 years ('06 - '09)
	S3	4 to 10 years ('10 -'16)
	S5	Beyond 20 years
	S6	No Planned Service
	L	Properties with Limited Sewer Allocation
	P	Public Health Concern
	D	Developer Responsible for Providing Treatment Capacity
		Effluent Spray Field

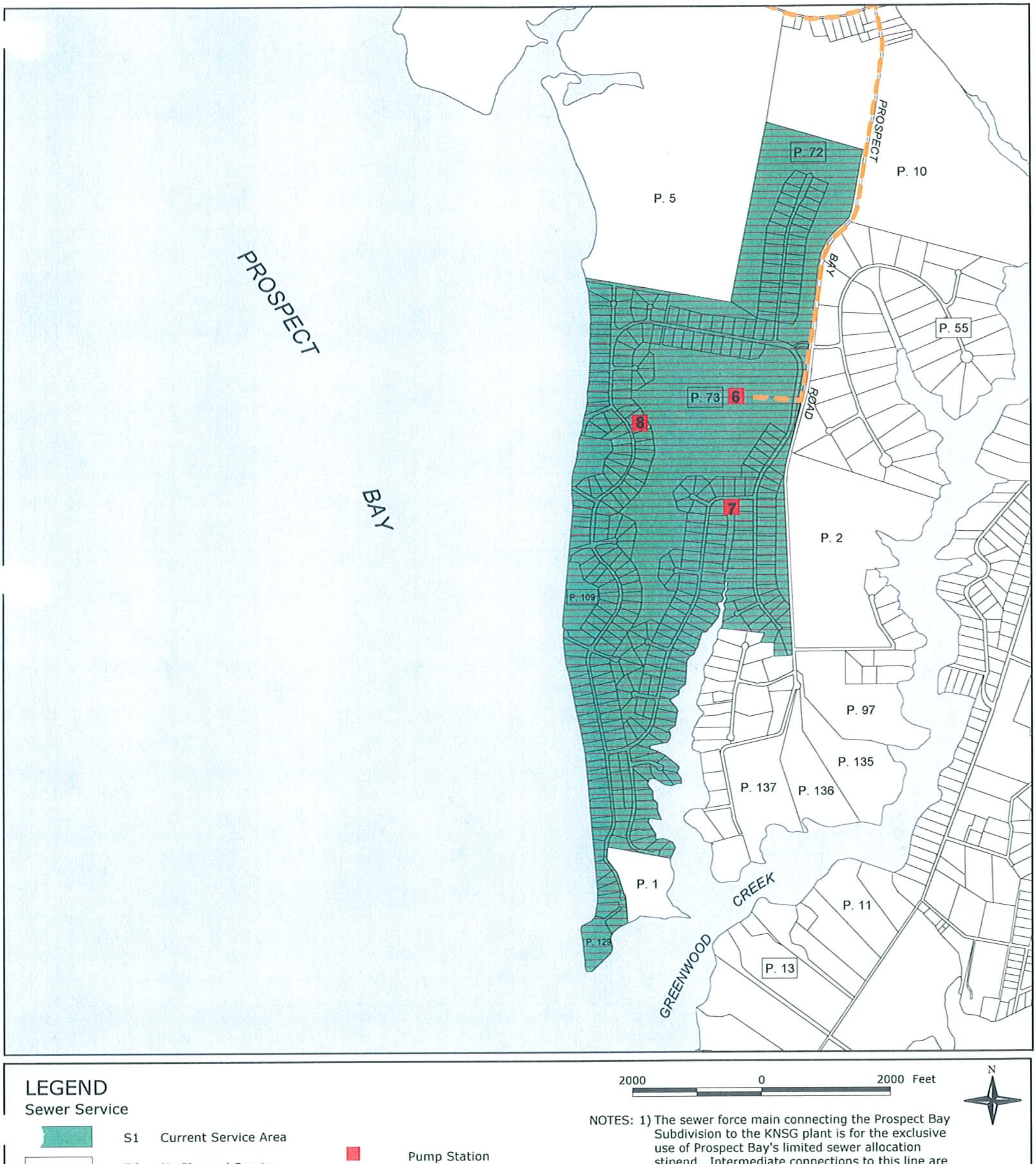
Growth Area Boundary
Incorporated Town Boundary
Pump Station
Proposed Pump Station
Wastewater Treatment Plant

N

2200 0 2200 Feet

NOTES: 1) It is anticipated that all collection transmission and treatment systems to serve planned service areas will be entirely funded by private developers.
2) Service Area Maps should be used for planning purposes only

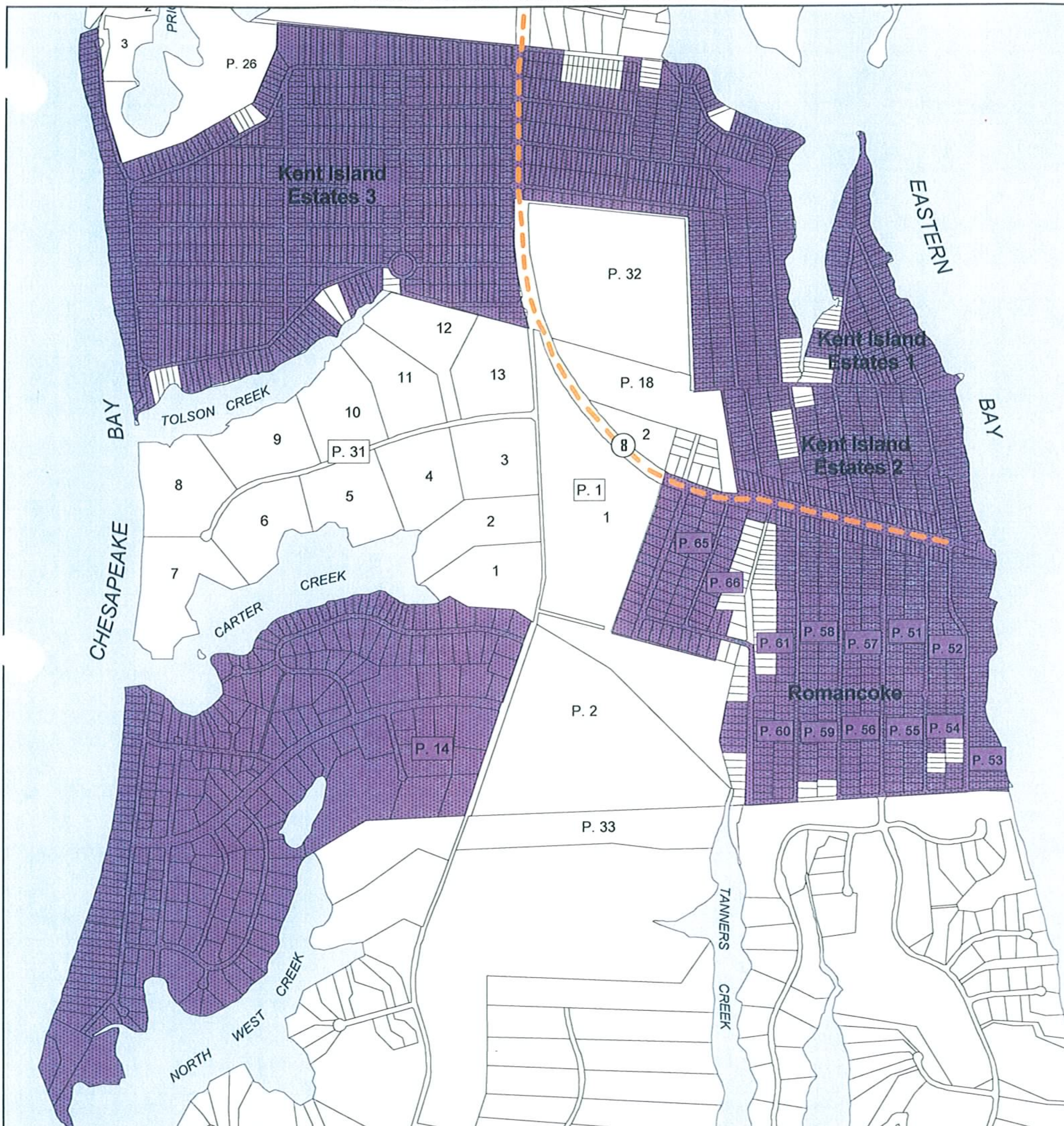
Prospect Bay Subdivision
Sewer Service Area



NOTES: 1) The sewer force main connecting the Prospect Bay Subdivision to the KNSG plant is for the exclusive use of Prospect Bay's limited sewer allocation stipend. Intermediate connections to this line are prohibited.

2) Service Area Maps should be used for planning purposes only.

Kent Island Estates/Romancoke Public Health Sewer Service Area



LEGEND

Sewer Service

	S3	4 to 10 years ('10 -'16)
	S6	No Planned Service
	P	Public Health Concern

Proposed Denied Access Line

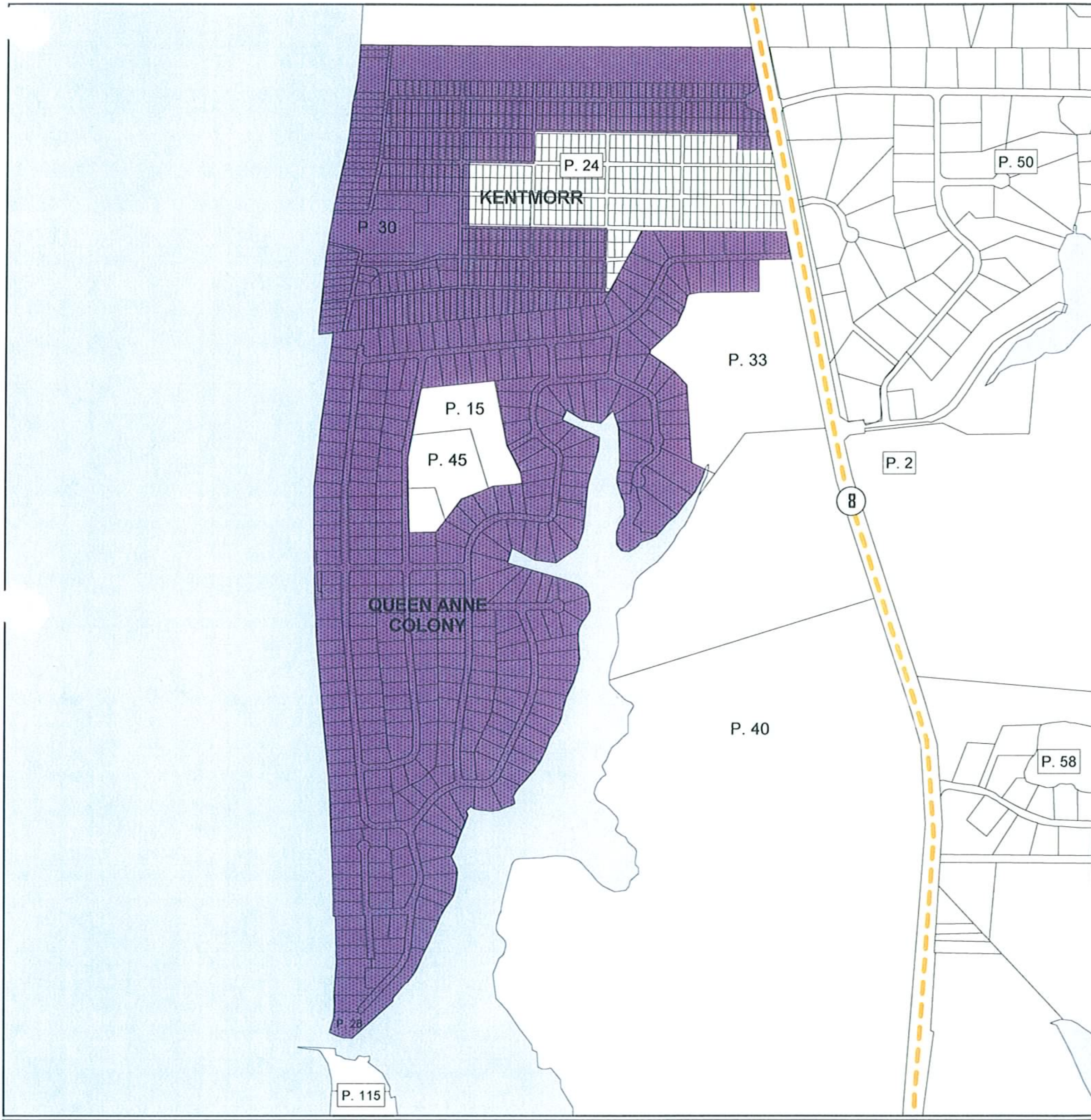
1350 0 1350 Feet

N

NOTES: 1) It is anticipated that this service area will be funded via the special benefit assessment process.

2) Service Area Maps should be used for planning purposes only. Refer to section 5.14.1.f for more information.

Queen Anne Colony and Kentmorr
Public Health Sewer Service Area



LEGEND

Sewer Service

S3 4 to 10 years ('09 - '15)

S6 No Planned Service

P Public Health Concern

Proposed Denied Access Line

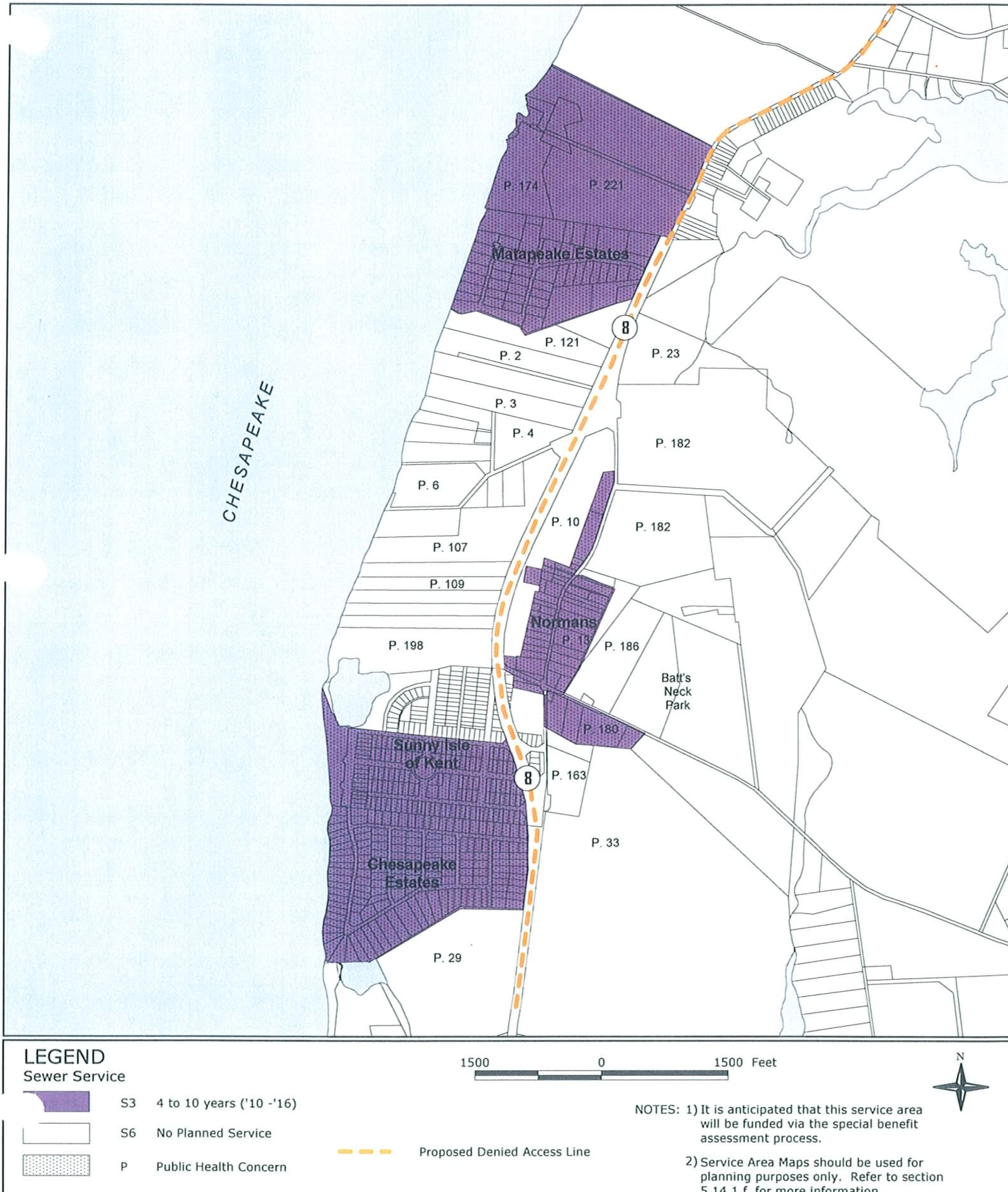
1000 0 1000 Feet

N

NOTES: 1) It is anticipated that this service area will be funded via the special benefit assessment process.

2) Service Area Maps should be used for planning purposes only. Refer to section 5.14.1.f for more information.

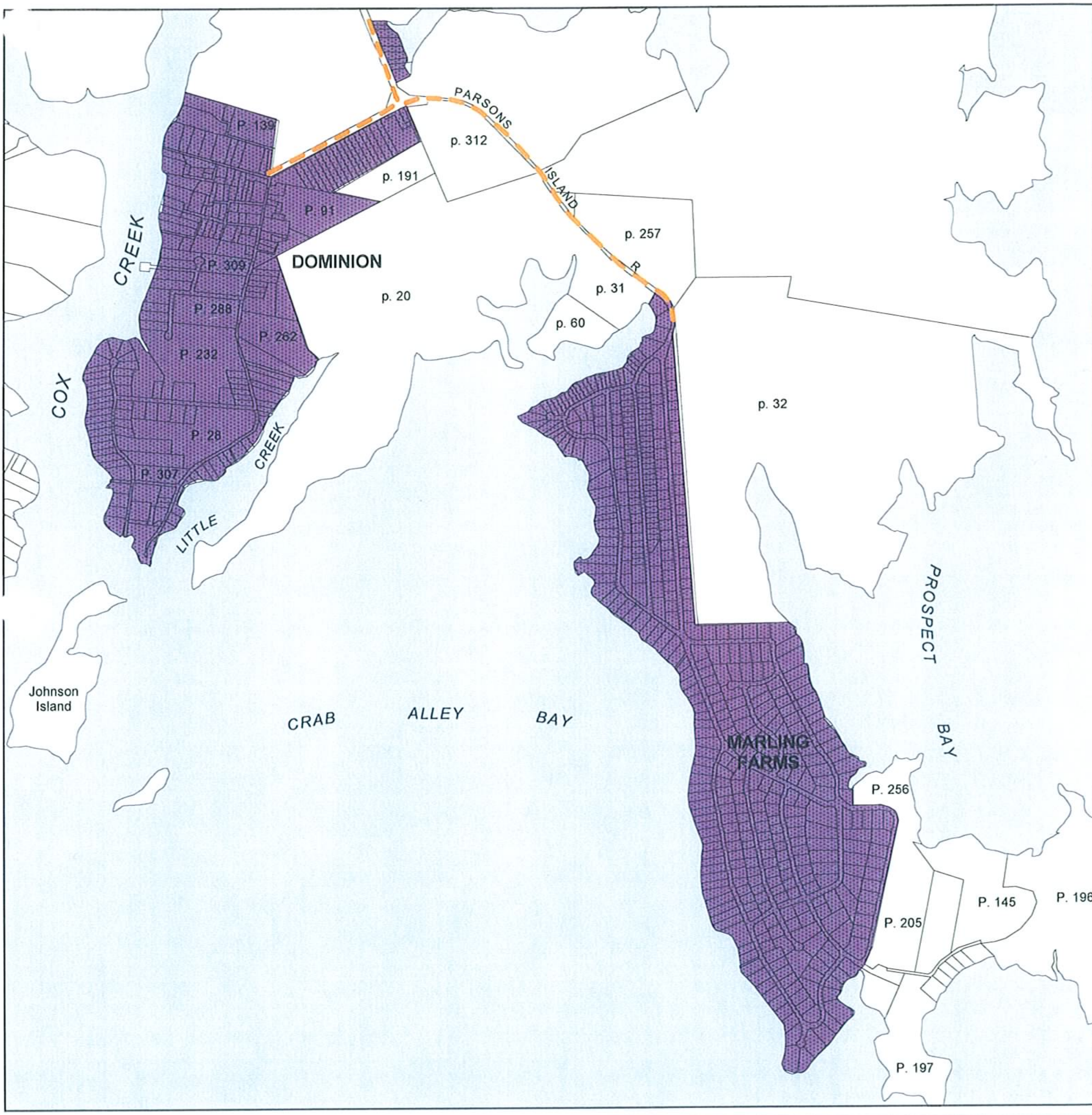
Chesapeake Estates/Sunny Isle of Kent/Batt's Neck/Matapeake Estates Public Health Sewer Service Area

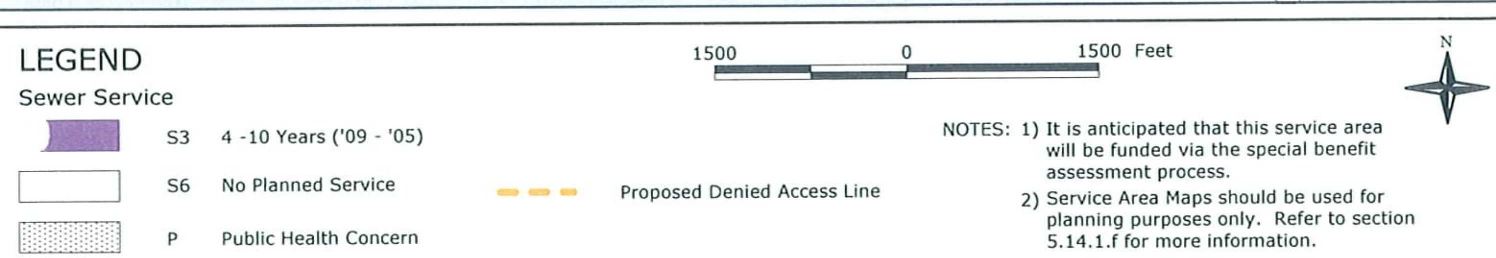


NOTES: 1) It is anticipated that this service area will be funded via the special benefit assessment process.

2) Service Area Maps should be used for planning purposes only. Refer to section 5.14.1.f for more information.

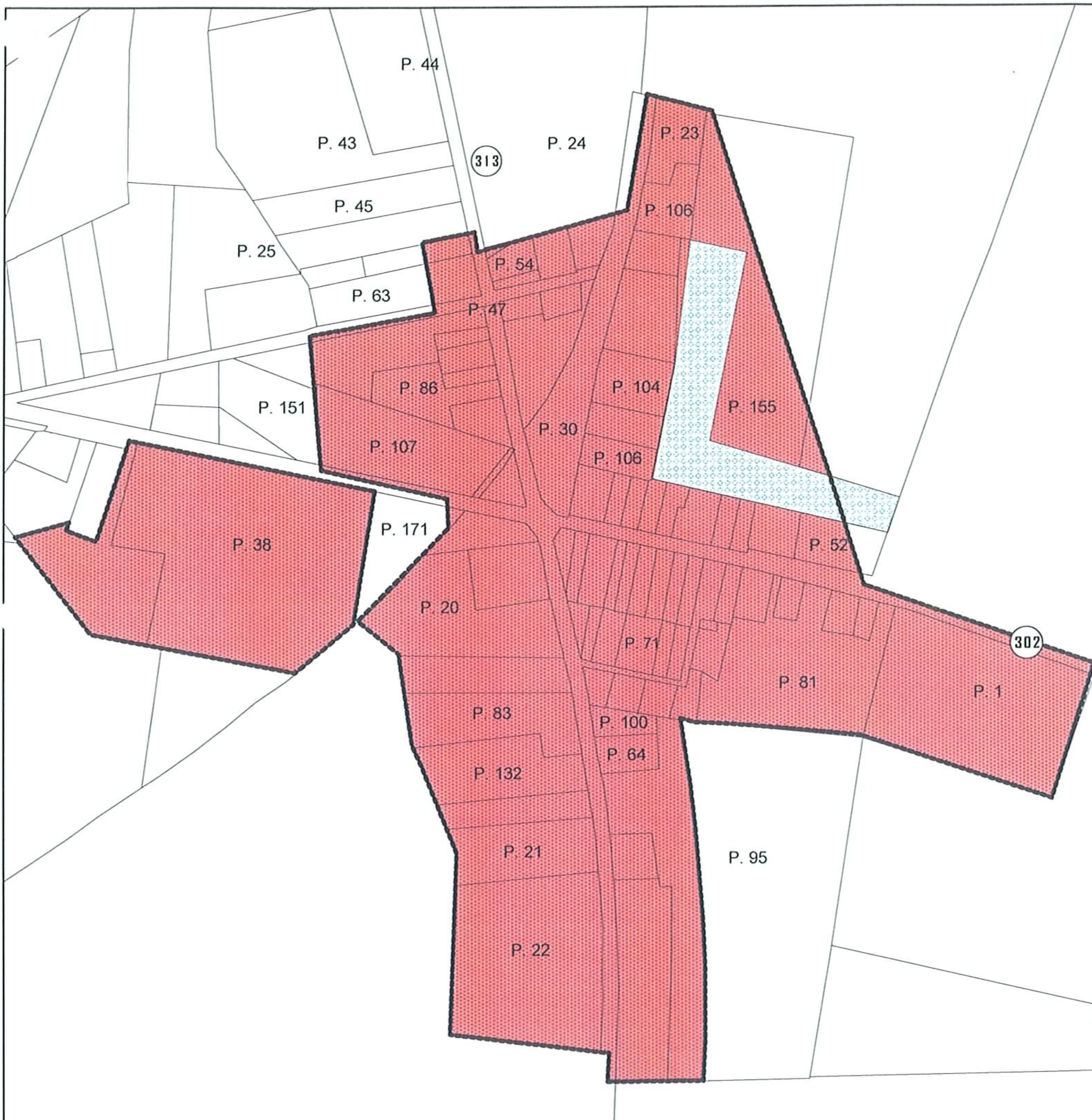
Marling Farms/Dominion
Public Health Sewer Service Area





NOTES: 1) It is anticipated that this service area will be funded via the special benefit assessment process.
2) Service Area Maps should be used for planning purposes only. Refer to section 5.14.1.f for more information.

Town of Barclay
Proposed Sewer Service Area/Public Health Service Area



LEGEND

Sewer Service

S5	Beyond 20 years
S6	No Planned Service
P	Public Health Concern
	Potential Shared Drainfield

Incorporated Town Boundary

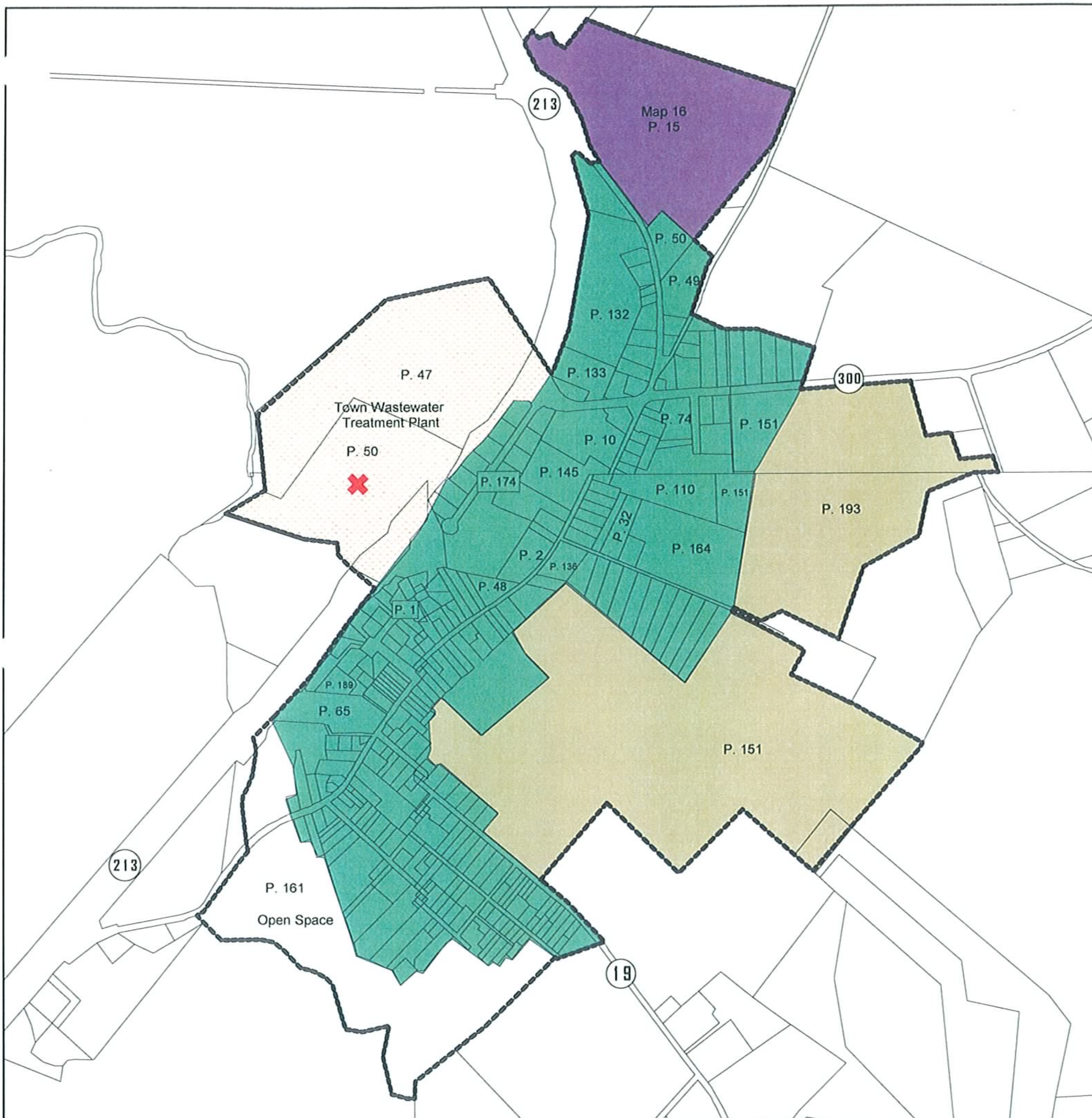
425 0 425 Feet

N

NOTES: 1) It is anticipated that this service area will be funded via the special benefit assessment process.

2) Service Area Maps should be used for planning purposes only.

Town of Church Hill
Sewer Service Area



LEGEND
Sewer Service

S1 Current Service Area
S2 1 to 3 years ('06 -'09)
S3 4 to 10 years ('10 - '16)
S5 Beyond 20 years
S6 No Planned Service

950 0 950 Feet

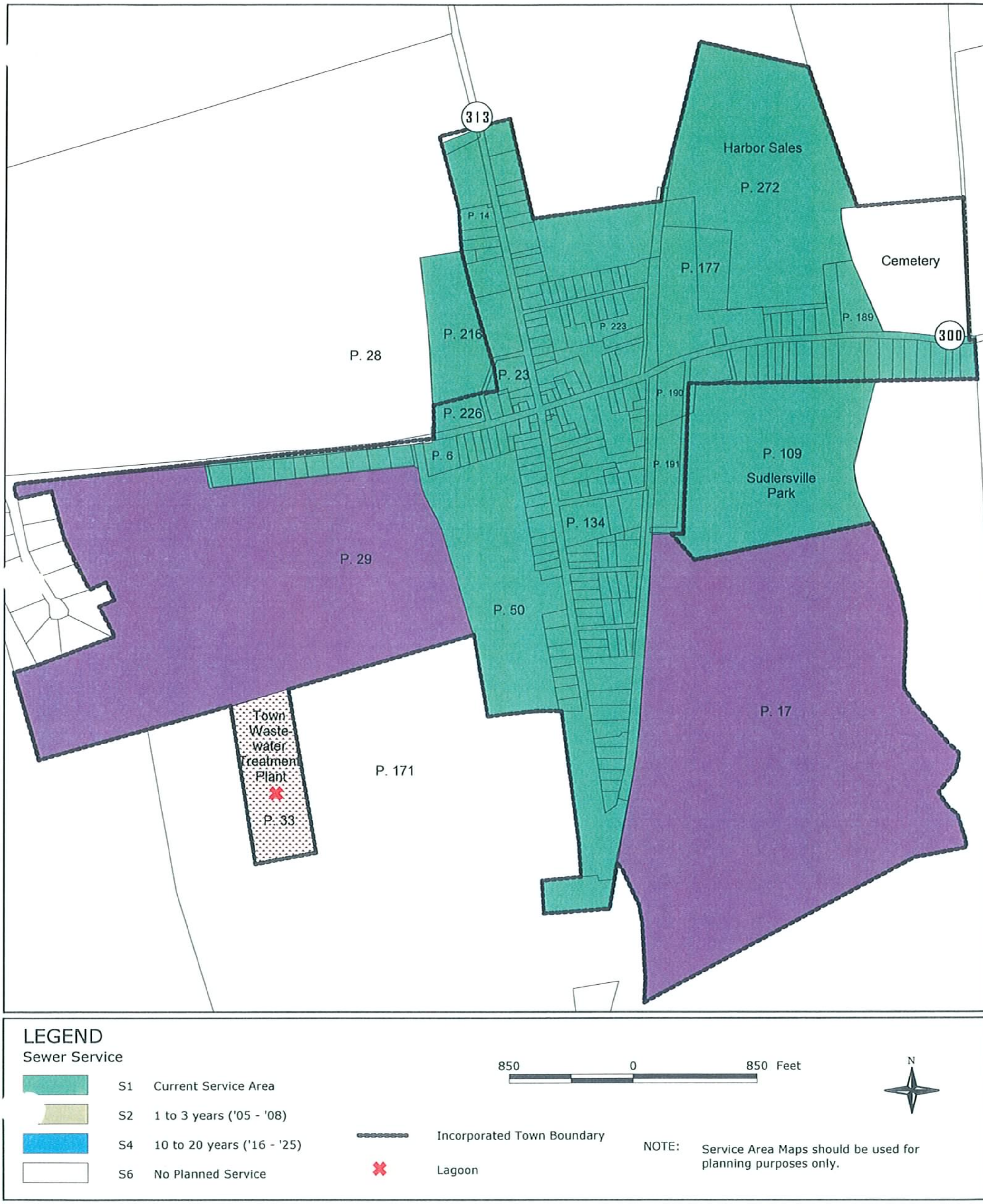
N

Incorporated Town Boundary

Lagoon

NOTE: Service Area Maps should be used for planning purposes only.

Town of Sudlersville
Sewer Service Area



COUNTY POLICIES, REGULATIONS, AND GUIDELINES

5.1 General Policy on Water and Wastewater Facilities

Consistent with the 1992 Maryland Economic Growth, Resource Protection and Planning Act, Queen Anne's County Department of Planning and Zoning has adopted six community plans since 1995. These community plans were developed for areas identified to receive growth to avoid development sprawl throughout the County's rural areas. The areas selected were located where water and wastewater infrastructure exists. The areas are Kent Narrows, Chester, Stevensville, Grasonville, Queenstown, and Centreville.

Within identified growth areas it is desirable to provide and utilize municipal water and/or wastewater facilities. **Municipal facilities are defined as those whose operation and maintenance is provided by either the County or an incorporated town.** To the extent possible, municipal systems will be encouraged within the designated growth area boundaries and the use of individual or multi-use systems will be limited according to the designations as outlined in Section 5.20.

Generally, outside of the limits of growth areas, community systems, multi-use systems, or individual wells and individual septic tank/drain field systems may be permitted. (Refer to the Glossary for the differences between these types of systems). The burden of proof of feasibility and design shall rest on the developer. The developer shall submit such information as may be required to review the application.

Within and outside of proposed service areas, cluster-type shared facility systems of an interim or a permanent nature may currently only be permitted for the correction of existing problems. These systems must be in compliance with COMAR and County Ordinances, Plans, Policies, and Guidelines, as determined by the Approving Authorities. Refer to the Queen Anne's County Groundwater Protection Report as developed by the Environmental Health Department for more details.

5.2 Policy Guidelines on Individual Water Supply and Individual Sewerage Systems

An individual system is defined as a system that is privately owned and operated and serves only one property. Although there can be variations, typically the water system is a well into a shallow, but confined, aquifer, and the sewerage system is a septic tank and a drain field or mound system of a conventional nature (conventional being defined as a soil percolation rate of at least 1” per 30 minutes for trenched drain fields or at least 1” per 60 minutes for mounded systems).

An individual water supply or individual sewerage system may not be permitted to be installed where a municipal water or wastewater facility with adequate capacity is available. In such cases, properties will be required to connect to the municipal system. If an existing municipal water or sewerage facility is inadequate or is not available, an individual water and sewerage system may be used as set forth below. The installation of individual water supply or individual sewerage systems shall be subject to the following requirements:

5.2.1 Individual water supply and sewerage systems, unless otherwise prohibited, may be permitted to be installed in any portion of the County where municipal systems will be programmed for construction with the S-3, S-4, S-5 and W-3, W-4, W-5 map designations, provided that:

a. Such systems are adjudged by the local Environmental Health Department and the Department of Public Works to be adequate, safe, and in compliance with pertinent State and local regulations, including minimum lot ownership as set forth in COMAR Regulation 26.03.01 (Regulations for Planning Water Supply and Sewerage Systems), COMAR Regulation 26.04.03.03 (Regulations for Minimum Ownership), the Queen Anne's County Groundwater Protection Report (as prepared by the Environmental Health Department), any applicable provisions of the Zoning Ordinance and Subdivision Regulations of the County, as well as meeting the provisions of this Plan’s Section 5.20 – Guidelines for Development Densities and System Design Criteria.

b. Permits for such systems shall bear a notice regarding the interim nature of the permit and state that connection to a future municipal system shall be made, at the applicable cost, when such system becomes available. Further, any plats to be recorded will carry a similar note of the interim nature of the system and the requirement to connect to a future municipal system.

c. When such systems are used, provisions shall be made whenever possible to locate such systems so as to permit connection to the public facilities in a most economical and convenient manner.

5.2.2 Individual water supply or sewerage systems may be permitted to be installed in any portion of the County where municipal systems are not planned (i.e. areas mapped No Planned Service). Such installations shall be governed by COMAR 26.04.02, 26.04.03, and 26.04.04 as minimum requirements, and such requirements as the Environmental Health Department and the County Commissioners may from time to time impose.

5.2.3 Individual on-site wastewater disposal systems are routinely considered to be short term systems because the actual disposal portions (drain fields, seepage beds, etc.) are anticipated to have an average 15 to 20 year lifetime with proper design, construction, and maintenance. If a municipal sewerage disposal system is not available within this time span, adequate correction reserve areas must be provided. The amount of area reserved for the correction of a failing or malfunctioning system is to allow for two drain field replacements for new lots and one replacement for lots of record platted prior to 1973. The potential occupancy of the dwelling and the soil/groundwater conditions determine the actual land area required for the disposal system. The number of corrections times the area for one system yields the area to be reserved which is known as the septic reserve area or SRA. SRA's are typically shown on subdivision plats.

5.2.4 Newly constructed individual on-site wastewater disposal systems for properties located within the 300-foot shore buffer from tidal waters are encouraged to utilize systems capable of biological nutrient removal.

5.2.5 Wells serving a single property are to be of their nominal diameter for the first 200 feet in length, i.e. telescoping to a small diameter pipe in the bottom of a shallow well is prohibited. This telescoping practice greatly reduces the usable life of the well as it inhibits the ability to drop the well pump to below the lowered aquifer water level.

5.3 Policy Guidelines on Multi-Use Systems

Multi-use systems are defined as a single system privately owned and operated serving a single lot under private or collective ownership but serving a group of users.

All multi-use systems having an average daily treatment capacity of less than 5,000 gpd (or less than 8 pounds BOD_5 per day, and less than 10 pounds TSS per day) shall, for regulatory purposes, be considered individual systems.

Systems between 5,000 gpd and 30,000 gpd are to be considered multi-use systems and are to be operated and maintained privately.

Systems in excess of 30,000 gpd are to be considered municipal systems. They are to be operated and maintained by the local government entity, or their authorized agent, in whose jurisdiction the system serves.

All multi-use and municipal systems having average daily water treatment capacities of 5,000 gpd or more, or average daily wastewater treatment capacities of 5,000 gpd or more (or handling more than 8 pounds BOD_5 per day, or handling more than 10 pounds TSS per day) shall need to be authorized by the County Commissioners via an amendment into this Plan.

5.4 Policy Guidelines on Innovative and Alternative Wastewater Systems

Alternative systems are defined as systems with percolation rates of wastewater in excess of those recognized as conventional. Examples include sand mounds with infiltration rates of 60 to 120 minutes per inch, shallow low-pressure distribution systems with percolation rates of 30 to 60 minutes per inch, shallow alternating trench drain fields with percolation rates of 30 to 60 minutes per inch. These systems may be permitted on existing vacant lots of record even if the lots **do not** meet the criteria of a conventional wastewater system, and new lots of record that **do** meet the criteria for a conventional system.

Innovative systems are defined as those wastewater systems that are not classified as conventional or alternative as they have percolation rates in excess of those which fall into the alternative category. These systems shall not be permitted merely to allow property owners to develop previously undevelopable properties. However, as the County has a special responsibility to correct existing problems resulting from previous construction of on-site wastewater systems, their use in existing problem areas will be considered on a case-by-case basis.

Where septic tank/drain field systems are malfunctioning, innovative and alternative systems such as aerated tank/drain field systems, aerated tank/mound systems, and bermed infiltration pond systems, or shared facilities, may be considered by the Environmental Health Department for the correction of existing problems. These systems require regular monitoring, competent operation, and routine maintenance by an experienced operator. The County desires to avoid the proliferation of these systems.

It must be made clear that the County is not discouraging innovative/alternative wastewater systems that are approved by the State. Systems that fall under this category will be considered on a case-by-case basis, taking into account their usefulness in specific situations, and the County's ability to review the design and monitor operations in conjunction with MDE. Both innovative and alternative systems may be used in approved conventional waste disposal areas.

5.5 Policy Guidelines on Shared Facilities

Although allowed by State regulation for new development, it shall be the policy of Queen Anne's County to prohibit the use of shared facilities for new development for the time being. While shared sewer drain field facilities have been suggested by some as a means to preserve agricultural lands and/or to create more open space, it has not been demonstrated that this is in fact the case.

Should the decision be made to utilize this method in the future, the County will have to first adopt an ordinance to allow for their construction and maintenance. Some minimum considerations to allow such shared sewer drain field systems are listed below:

5.5.1 State law requires two distinct entities to implement this program. The Approving Authority, who reviews the soils at the selected site and the proposed design, and the Controlling Authority who implements the program once the system is installed. The Approving Authority would be the Environmental Health Department and the Controlling Authority would be the Department of Public Works (DPW). These facilities would be owned and operated by the Controlling Authority.

5.5.2 The developer would be required to construct the sewer mains and the drain field and to have them fully functional prior to the issuance of any certificate of occupancy.

5.5.3 Each property using the shared facility would be required to pay a quarterly 'user fee' to cover the cost of operation and maintenance, as well as to build up a capital reserve fund.

5.5.4 Each property would typically have its own grinder pump that is owned and operated by the property owner. In addition to the above 'user fee' the property owner would be required to hold a service contract with the vendor of the grinder pump. This requirement would be put in the covenants.

5.5.5 The lands of the drain fields, as well as the property's building pads, are considered all part of the net buildable area, i.e. not part of the required open space.

5.5.6 The County would own the drain field lands in fee simple as well as be granted easements for the pipe network connecting the homes to the drain field.

5.5.7 In order to maximize the life of the drain fields, the developer would be required to construct two drain fields, each capable of serving the entire development (or section of development, if there is more than one drain field serving the development) in order to dose and rest one field at a time.

5.5.8 All construction would need to be inspected for which the County would be reimbursed by inspection fees paid by the developer.

5.5.9 Any such system, regardless of size, would require an amendment into the County's Comprehensive Water and Sewerage Plan for inventory purposes.

5.5.10 Any system with an average flow of 5,000 gpd, or more, may be required to obtain a groundwater discharge permit from the Maryland Department of the Environment. It is quite possible given the need for a discharge permit, MDE would include nutrient reduction technology as a condition of the permit.

5.5.11 Shared facilities shall be allowed to correct existing problems.

5.6 Policy Guidelines on Community Systems

Although allowed by State regulation for new development, it shall be the policy of Queen Anne's County to prohibit the use of privately owned and operated community facilities for new **residential** development in the unincorporated areas of the County. It is deemed not in the long-term best interest of the County, nor of the residents to be served, to allow the proliferation of community facilities due to the long-term liability assumed by the residents to be served to keep this system functioning properly in perpetuity. It has been the experience of the County that the residents served by such privately owned and operated community systems eventually determine that such a system is a perpetual burden and they then request the County to operate the system. Any existing community systems currently in operation are grandfathered. The County discerns no benefit to allowing these types of systems to proliferate.

Community systems may be allowed to correct existing problems. They may also be considered for commercial applications on a case-by-case basis provided no municipal systems are available and provided the property served is owned by a single entity.

5.7 Flow Reduction Program

Substantial reductions in the operational costs of water and wastewater facilities and withdrawal of groundwater are possible through the implementation of a flow reduction program.

All existing structures within a proposed water or wastewater service area shall be required to upgrade plumbing fixtures when the plumbing system is remodeled. The installation of water-conserving devices as an interim measure shall be encouraged as strongly as possible.

All new structures to be constructed within the County shall be required to incorporate the following flow reduction measures:

a. A pressure reducer will be required to maintain a system pressure not in excess of 65 psi.

b. No toilet utilizing in excess of 3.5 gallons per flush will be permitted.

c. Shower heads utilizing in excess of 3.0 gallons per minute at 40 psi will not be permitted.

d. Faucet aerators will be required for all kitchen sinks and bathroom lavatories.

e. Whenever possible, retrofitting of water-conserving devices and/or fixtures shall be encouraged in all situations short of remodeling as defined in the Water Conservation Plumbing Fixtures Act.

The Policy is adopted Countywide in order to reduce groundwater withdrawal to the minimum possible.

5.8 Guidelines on Denied Access Facilities

In order to properly regulate development and direct growth to appropriate locations in accordance with the Comprehensive Plan, access will not be permitted to lines identified as "Denied Access Facilities" except under the following conditions:

a. To provide service only to areas designated on the service area maps for municipal sewer facilities in accordance with the provisions of the Comprehensive Water and Sewerage Plan.

b. To provide service to areas where the Environmental Health Department determines access is necessary to solve a potential health related problem and the service area is subsequently amended into the Comprehensive Water and Sewerage Plan.

c. Any change to the status of a denied access line will require an amendment to the Comprehensive Water and Sewerage Plan approved by a unanimous vote of all five County Commissioners. Prior to such a vote, a vote in the affirmative to consider the change must be received from the Planning Commission. Should a vote by the County Commissioners to change the status of a denied access line be successful, a subsequent hearing must then be held to amend the service area maps on a parcel-by-parcel basis following the typical procedures outlined in section 5.16.

5.9 Guidelines for the Construction of Municipal Wastewater Facilities in Vicinity of Shellfish Waters

All new municipal wastewater facilities constructed where shellfish waters may be affected will be subject to the following requirements:

5.9.1 Multiple units of each critical wastewater treatment component shall be provided, such that with the largest flow capacity unit out of service, the remaining units shall have a design flow capacity of at least 50 percent of the total design flow for that unit operation.

5.9.2 Multiple units of final and chemical sedimentation basins, trickling filters, filtration units, activated carbon columns, and other flow sensitive components designated by MDE shall be provided such that with the largest flow capacity unit out of service, the remaining units shall have a design flow capacity of at least 50 percent of the total design flow for that unit operation.

5.9.3 An auxiliary power generator sufficient to operate all vital components during peak wastewater flow conditions, together with critical lighting and ventilation, shall be provided for each treatment plant. Each auxiliary power system shall be equipped with an automatic switchover device and suitable sound attenuation.

5.9.4 An alarm system shall be provided at the wastewater treatment facilities. The alarm system shall monitor high liquid level in tanks and basins, power supply to plant, auxiliary power source, critical mechanical equipment, and a test function. An audiovisual alarm system signaling a municipal location where competent personnel are available 24 hours per day will be required.

5.9.5 A 24-hour emergency holding basin shall be provided at each treatment plant to receive bypass flows during plant failures. Each holding basin shall be capable of recycling the flow back through the plant until correction of the failure.

5.9.6 Adequate bypass piping shall be provided to permit the removal from service of any one treatment plant component without necessitating the removal from service of additional upstream or downstream components.

5.9.7 Pump Stations:

a) At least two pumps shall be provided at each pump station. When two units are provided, each shall have the capability to handle the peak flow of 3.5 times the average design flow. Where three or more units are provided, they shall be of such capacity that with any one unit out of service, the remaining units will have the capability to handle the peak flow of 3.5 times the average design flow.

b) An auxiliary power generator sufficient to operate enough pumps to deliver the design peak flow, together with critical lighting and ventilation, shall be provided for each pump station. Each auxiliary power system shall be equipped with an automatic switchover device.

c) An alarm system shall be provided for all pump stations. The alarm system shall monitor high wet well level, operation of each pump, power supply to the station, auxiliary power source, and a test function. An audiovisual alarm system signaling a municipal location where competent personnel are available 24 hours per day will be required.

d) Emergency storage equal to two hours average flow is required. Note vacuum collection stations are not considered pump stations in this regard.

5.10 Guidelines for the Construction of Municipal Wastewater Facilities in Special Flood Hazard Areas

Where it is necessary that wastewater facilities be constructed within special flood hazard areas, these facilities will be subject to the Queen Anne's County Floodplain Management Ordinance and the following requirements:

5.10.1 Treatment Facilities:

a) All operational components of the treatment facilities shall be located at an elevation that is not subject to flood or wave action created by the 100-year flood or storm, or shall otherwise be adequately protected against the 100-year flood.

b) The treatment facilities shall remain fully operational and accessible during the 50-year flood.

c) All critical equipment should be protected from debris carried by the waters of the 100-year flood where practical.

5.10.2 Pump Stations:

a) Entrance tubes for all pump stations shall extend above the 100-year flood level. Where this is not practical, flood-proof hatches shall be provided.

b) Auxiliary power systems, alarms, and controls shall be located above the 100-year flood level. Where this is not practical, watertight enclosures shall be provided.

c) Wet well vents, dry well vents, and generator exhausts shall extend above the 100-year flood level.

d) Wet well hatches shall be flood-proof.

5.10.3 Collection System:

a) In any gravity collection system a flood-proof cover shall be provided for any manhole top below the 100-year flood level.

b) Where watertight manhole covers are required and it is not possible to adequately vent the collection system through the main building stacks of nearby buildings, then vents extending above the 100-year flood level shall be provided at each manhole.

5.11 Guidelines on Marinas

In order to reduce waste discharges from vessels to the lowest possible level, all existing marinas shall be actively encouraged to retrofit or upgrade as soon as possible to meet these guidelines. In any case, upgrading shall be a requirement as part of any expansion. An expansion is defined as adding 10 or more slips.

All developers of new marinas shall be required to provide adequate water and wastewater facilities. The following minimum guidelines shall be used:

5.11.1 Pump-out facilities are required at service areas of marinas for the removal of the contents of wastewater holding tanks and recirculating toilets. Not less than one pump-out facility per 100 boat slips, or fraction thereof, shall be provided. The pump-out facility shall discharge to an approved multi-use community wastewater system or holding tank. Water service shall be available at each pump-out facility.

5.11.2 Adequate bathhouse facilities shall be provided onshore. The bathhouse facilities shall be conveniently located; the facilities shall not be more than 200 feet walking distance from the shore end of any dock they are intended to serve. The minimum facilities to be made available will vary with the size and type of installation according to the below table.

Number of Slips	Water Closets		Urinals	Lavatories		Showers	
or Moorings	Male	Female	Male	Male	Female	Male	Female
1 – 20	1	1	1	1	1	1	1
21 – 40	1	2	1	2	2	2	2
41 – 60	2	3	2	2	2	2	2
61 – 80	3	4	2	3	3	3	3
91 – 100*	3	5	3	3	3	3	3

* For more than 100 slips, there should be provided one additional water closet, lavatory, and shower for each sex for each additional 40 slips or fraction thereof, and one additional men's urinal for each 100 additional slips or fraction thereof.

5.11.3 If restaurants, motels, laundries, sales offices, or other establishments are to be serviced, sanitary facilities for these businesses shall be in addition to the facilities for the marina. Where two or more bathhouses are proposed, the ratio of fixtures specified above shall be in approximate relation to the number of boat slips located within 200 feet walking distance from each bathhouse.

5.11.4 Individual water service connections shall be provided to each slip or mooring. Individual wastewater service connections shall be provided to the slips or moorings to service those vessels occupied for extended periods, unless a contract is held with a marina waste hauler.

5.11.5 When designing facilities, an average flow of 15 gallons per vessel per day should be used as the basis for estimating the water and wastewater demand.

5.11.6 All water and wastewater facilities serving marinas shall be constructed in accordance with the standards and requirements of the Department of Public Works, Environmental Health and the MDE.

5.11.7 Any expansion by 10 slips or more to existing marinas will require the construction of a pump-out facility, if one is not readily available. Readily available being defined as being within 15 minutes travel time by water.

5.12 Guidelines on Campgrounds

All developers of new campgrounds or expansion of existing campgrounds shall be required to provide adequate water and wastewater facilities. The following guidelines shall be used:

5.12.1 Dump stations for the disposal of the contents of wastewater holding tanks and recirculating toilets aboard self-contained camping vehicles are required at service areas of campgrounds. Not less than one dump station per 100 campsites shall be provided. The dump station shall discharge to an approved multiuse or community wastewater system. Water service shall be available at each dump station.

5.12.2 Adequate bathhouse facilities shall be provided for all camping areas. The bathhouse facilities shall be conveniently located; the facilities shall not be more than 500 feet walking distance from any campsite they are intended to serve. The minimum facilities to be made available will vary with the size and type of installation according to the following table:

Number of Campsites	Water Closets Male	Water Closets Female	Urinals Male	Lavatories Male	Lavatories Female	Showers Male	Showers Female
1 – 15	1	1	0	1	1	1	1
16 – 30	2	2	0	2	2	1	1
31 – 45	2	3	1	3	3	1	1
46 – 60	3	4	1	3	3	2	2
61 – 75	4	5	1	4	4	2	2
76 – 90	4	6	2	4	4	2	2
91 – 105	5	7	2	4	4	3	3
106 – 120	6	8	2	5	5	3	3
121 – 135	6	9	3	5	5	3	3
136 – 150*	7	10	3	5	5	4	4

* For more than 150 campsites, there should be provided one additional water closet, lavatory, and shower for each sex for each additional 30 campsites or fraction thereof, and one additional men's urinal for each 100 additional campsites or fractions thereof.

5.12.3 If restaurants, motels, laundries, sales offices or other establishments are to be serviced, sanitary facilities for these businesses shall be in addition to the facilities for the campgrounds. Where two or more bathhouses are proposed, the ratio of fixtures specified above shall be in approximate relation to the number of campsites located within 500 feet walking distance of each bathhouse.

5.12.4 Individual water service connections shall be provided to each campsite. Individual wastewater service connections shall be provided to not less than 10 percent of the campsites to service those camping vehicles occupied for extended periods.

5.12.5 When designing facilities, the following table should be used as the basis for estimating water demand and wastewater flows.

Type of Camp	Water Demands (gpd)	Waste Water Flow* (gpd)
Pioneer Type Camp	50 per site	45 per site
Day Camp (No meals)	15 per person	15 per person
Labor Camp	45 per person	40 per person
Travel Trailer Camp (w/o hook-ups)	100 per site	90 per site
Travel Trailer Camp (w/ hook-ups)	150 per site	135 per site

* Use a design BOD_5 concentration of 600 mg/1 and a design SS concentration of 600 mg/1.

5.12.6 All water and wastewater facilities serving campgrounds shall be constructed in accordance with the standards and requirements of the Department of Public Works and MDE.

5.13 Priority Classification Mapping System

The County Commissioners have established a priority classification mapping system for water and sewer service areas in accordance with state regulations cited in COMAR 26.03.01. The priority system is designed to show a logical, timely means to provide and obtain such facilities, while maintaining the integrity of both the County Comprehensive Plan and this Comprehensive Water and Sewerage Plan. The priority system is designed to show need and intent of the County, its incorporated towns, and the development community for providing treatment capacity and establishing or extending public water and sewer systems. The service area definitions outlined in section 5.14 further detail the applicability conditions and interpretation of the priority classification categories.

While every effort has been made to ensure the maps are accurate, the accuracy of the maps is limited by the accuracy of the available base maps that show the property lines. The maps should only be used as a guide and any information for a particular property must be confirmed with County staff. This is particularly true with the Public Health Concern maps.

5.13.1 County Sewer Service

The County Commissioners have determined that it is in the best interest of County citizens to plan and provide sewerage treatment capacity within designated service areas over specific time periods. The designated service areas include the Stevensville, Chester, Grasonville and Kent Narrows Growth areas and regions outside of the growth areas identified with a public health concern. This will permit orderly expansion of the County system consistent with Capital Budgeting, the County Comprehensive Plan and this Comprehensive Water and Sewerage Plan. For purposes of this document, it is not intended nor is it the obligation of the County Commissioners to provide sewerage treatment capacity to any incorporated town within the 10-year planning period of this Plan.

The Kent Narrows/ Stevensville/ Grasonville (KN/S/G) wastewater treatment plant is currently permitted for a total discharge capacity of 3.0 million gallons per day (MGD), in anticipation of the ongoing construction of the replacement plant, but the existing plant has only a capacity of 2.0 Mgd. The remaining uncommitted treatment capacity in the system is approximately 0.1 Mgd. In addition to providing additional treatment capacity, this new and expanded plant will provide greatly improved effluent water quality via the enhanced biological nutrient removal process. This project is consistent with the goals of the State's initiative for reducing point source nutrient loading into the Chesapeake Bay. It is anticipated that the plant expansion will be on-line by 2007. The County Commissioners recognize this plant expansion may not provide sufficient sewerage treatment capacity for the entire service area and all regions with public health concerns and understands that future expansion(s) may be needed over time. As it is the intent of this Plan to provide for the orderly and fiscally responsible expansion of the system, the sewer service area mapping objectives are as follows:

a) The County should plan for and provide 1.0 Mgd treatment capacity expansions approximately every 20 years.

b) Priority mapping classifications should consider regions with public health concerns, commercially zoned properties, infill development, and other active development proposals.

c) Properties located in the S-1, S-2, S-3 and S-4 service areas should be accommodated by the sum of the remaining capacity and planned expansion capacity over the next twenty years (2006-2026). In the case of the County's wastewater plant, that equates to all the remaining capacity from the existing 2.0 Mgd plant, as well as all of the capacity from the pending expansion to 3.0 Mgd.

d) Properties located in the S-5 service areas should be provided with sewerage treatment capacity from a future expansion in a period of time beyond the twenty-year period listed above.

e) Capacity reservations should be made to accommodate regions with public health concerns, public service projects, economic growth, and affordable housing.

Schedule "A" as contained in the Water and Sewerage Allocation Policy attached to this plan as Appendix I, provides a numeric relationship between service area designations, allocated sewerage treatment capacity, and time between expansions consistent with the property's priority classification as depicted on the sewer service area maps contained in this Plan's Chapter 4. This schedule may be updated as outlined in the Water and Sewerage Allocation Policy.

5.13.2 County Water Service

The County currently operates eleven (11) water treatment plants combined to form seven (7) distribution systems providing municipal services. Additional details of these existing water treatment systems are outlined in sections 3.3 as well as in Appendix IV. Currently many of these treatment systems are operating at or near capacity. Any significant new development will be required to construct new treatment capacity for dedication to the Sanitary District for operation.

5.13.3 Centreville Sewer and Water Service

The Town of Centreville operates a municipal wastewater and water system. Additional details of the existing wastewater treatment plant and community water system are outlined in sections 4.3 and 3.3 respectively.

Both the wastewater treatment and water system are operating at or, very near capacity. Additional treatment capacities may be required for any development to occur outside of the current municipal boundaries within the designated Centreville Growth Area. However the Centreville Community Plan adopted in 1998 envisioned using "innovative land-based waste disposal systems in order to discourage larger lot sizes and encourage more efficient concentrated development" for these properties that are not intended for annexation. The practical reality is such systems (i.e. shared systems) are not currently allowed within the County. Therefore developments in these areas have relied on conventional individual septic systems to date.

Expansion of both the wastewater and water systems is anticipated by the County to serve a region east of Town along MD Rt 304 with public health concerns as depicted on the service area maps included with this Plan. Also largely vacant properties adjacent to the public health concern areas have been identified as a possible business park and as such would likely require municipal water and sewer service. Should the Town be unwilling or unable to extend its service beyond Town limits, the County may have to service the area with a new County owned and operated facility.

Properties located in the S-1, S-2, S-3 and S-4 service areas should be accommodated by the sum of the remaining capacity and planned expansion capacity over the next twenty years (2006-2026). In the case of Centreville's wastewater plant, that equates to all the remaining capacity from the recent expansion to 0.500 Mgd and the planned subsequent expansion to 0.750 Mgd. The new plant already has the ability to treat 0.750 Mgd, however the Town needs to purchase additional lands for additional spray irrigation fields.

Centreville Officials have outlined the following objective for new development proposals within this growth area:

a) Treatment capacities for wastewater and water systems must be provided by a developer in conjunction with any large-scale project and dedicated to the Town after construction.

5.13.4 Queenstown Sewer and Water Service

The Town of Queenstown operates a municipal wastewater and water system within the incorporated town boundaries. Additional details of the existing wastewater treatment plant and community water system are outlined in sections 4.3 and 3.3 respectively.

Both the wastewater treatment and community water system are operating at or, very near capacity. Additional treatment capacities will be required for any development to occur outside of the current municipal boundaries within the designated Queenstown Growth Area.

Properties located in the S-1, S-2, S-3 and S-4 service areas should be accommodated by the sum of the remaining capacity and planned expansion capacity over the next twenty years (2006-2026). In the case of Queenstown's wastewater plant, that equates to only the capacity remaining, if any, from the current 0.085 Mgd plant.

Queenstown Officials have outlined the following objectives for new development proposals within this growth area envelope:

a) Treatment capacities for wastewater and water systems must be provided by a developer in conjunction with any project and dedicated to the Town after construction.

b) Expansion of wastewater and water systems should be staged to initially serve the commercially zoned properties adjacent to the Town and south of US Route 50.

c) As suggested in the Comprehensive Plan, consideration for a future connection to the KN/S/G Wastewater treatment Plant should be evaluated, however in a time period beyond the planning period of this Plan.

5.13.5 Church Hill Sewer Service Area

The Town of Church Hill operates a municipal wastewater system within the incorporated town boundaries. Additional details of the existing wastewater treatment plant are outlined in section 4.3.2.3.

The wastewater treatment system is operating at very near capacity when outstanding commitments are counted.

Properties located in the S-1, and S-2 service areas should be accommodated by the remaining capacity. Properties located in S-3 may have some available capacity but it is not expected to be sufficient for full build-out.

Church Hill Officials have outlined the following objectives for new development proposals within any new annexation properties:

a) Treatment capacities for wastewater, and possibly water, systems must be provided by a developer in conjunction with any project and dedicated to the Town after construction.

5.13.6 Sudlersville Sewer Service Area

The Town of Sudlersville operates a municipal wastewater system within the incorporated town boundaries. Additional details of the existing wastewater treatment plant are outlined in section 4.3.2.8.

The wastewater treatment system has some capacity remaining although it is not clear if this remaining capacity will be sufficient to meet the desires of the developers of the two recently annexed farms.

Properties located in the S-1, and S-2 service areas should be accommodated by the remaining capacity. Properties located in S-3 may have some available capacity but it is not known if it will be sufficient for full build-out.

Sudlersville Officials have outlined the following objectives for new development proposals within any new annexation properties:

b) Treatment capacities for wastewater, and possibly water, systems must be provided by a developer in conjunction with any project and dedicated to the Town after construction.

5.14 Service Area Mapping Definitions

This section defines the service area map designations as shown on the maps in the back of chapters 3 and 4. The service area definitions and the strategy that was utilized to categorize properties within the designated service areas follow the objectives of the priority classification system as outlined in section 5.13 of this Plan.

5.14.1 Overview

a) Service areas designated as S-1/W-1 currently have sewerage and water service as evidenced by an active customer account (i.e. the property is being billed periodically for the service). Note there is an exception for W-1 mapping in that while W-1 indicates areas where service is available, certain properties may still be unconnected as connection to the water system is not mandatory as it is for the sewer system.

b) Service areas designated as S-2/W-2 are properties with a known proposed development that was recently amended into the Comprehensive Water and Sewerage Plan. Areas mapped as S-2/W-2 are essentially to be considered 'conditional S-1/W-1' as defined in 5.14.3.2. As such advancement from S-2/W-2 to S-1/W-1 is automatic once the development satisfies all conditions imposed on the development during the development review process. These automatic-mapping changes will be made administratively each January.

c) Service areas designated as S-3/W-3 are those properties intended to be served within the next 10 years (2006 thru 2016). Regions designated with this classification were limited by the amount of sewerage treatment capacity that is available or will be provided by the County, or Town, during this time period. Refer to item f below in regards to Public Health Concern areas.

d) Service areas designated as S-4/W-4 are those properties intended to be served in the 10 to 20 year timeframe (2016 thru 2026). Regions designated with this classification were limited by the amount of sewerage treatment capacity that is available or will be provided by the County, or Town, during this time period.

e) Service areas designated as S-5/W-5 are those properties intended to be served at some point beyond the 20-year period listed above. Regions designated with this classification were limited by the amount of sewerage treatment capacity planned for availability during this future time period.

f) Public Health Concern areas have all been given a sewer service designation of S-3 to show the County Commissioner's commitment to resolve the concern. However it must be noted that only the first one or two of the four areas will actually be served within the '4 to 10 year' timeframe associated with the S-3 designation. The other areas would be served in the S-4 timeframe of '11 to 20 years'. Once the order of when the areas will be served is determined, the maps will be amended to reflect this reality. Also note it is not the intent to serve vacant lots that are either assumed to be wetlands, or are part of large contiguous blocks of vacant lots. While the maps attempt to show these areas as 'No Planned Service', the final determination as to which lots are not to be served will not be made until such time as the final design work is completed.

g) Areas with no service designation are in "No Planned Service" areas and correspond to COMAR's S-6/W-6. Any development in these areas would typically rely on individual systems to satisfy their water and sewer needs.

h) Service areas designated W-7 are water areas of concern where individual on-site solutions are deemed the best answer to any problems that may develop.

i) Several suffixes, outlined in 5.14.3.7, may follow the service area mapping definitions. These indicators may be appended in any combination to a service area classification in order to clarify, restrict, or more completely define or demonstrate the intentions and objectives of the County, Town and this Plan.

5.14.2 Each January the County Commissioners, sitting as the Sanitary Commission, will re-evaluate treatment capacity consistent with the Water and Sewerage Allocation Policy and the County adopted Capital Improvement Program. This process could result in a proposal to re-classify, amend or exchange properties between various priority service areas, as detailed in this section, in order to be consistent with treatment capacity availability, timing of future expansions, and to meet the overall objectives of the Comprehensive Plan and this Plan. The following examples outline some of the potential proposals that may result from this re-evaluation or re-rating of treatment capacity availability.

5.14.2.1 Once a year, at the regularly scheduled February hearing (refer to Appendix II), and upon the request of the property owner or the County, and through the quarterly amendment procedure as defined in section 5.16:

a) Properties designated S-5/W-5 could be reclassified to S-4/W-4 before a future treatment capacity expansion, provided that excess treatment capacity is determined to be available.

b) Properties designated S-5/W-5 could be reclassified to S-4/W-4 before a future treatment capacity expansion, provided that another property(s) mapped with a priority classification of S-4/W-4 or S-3/W-3 is exchanged and moved back to a priority classification of S-5/W-5. Properties involved in the exchange must have similar estimated sewerage allocation requirements.

c) Properties mapped with a priority classification of S-3/W-3 or S-4/W-4 could be moved back to an S-5/W-5 priority classification if it becomes evident during the annual evaluation of treatment capacity that the amount of available capacity is less than previously thought, or to allow appropriate time for planning of a future treatment capacity expansion.

5.14.2.2 Based on actual treatment plant flow data reported to the Maryland Department of the Environment and the recommendations of the Directors of Public Works and Planning and Zoning and the Environmental Health Director, sewerage allocation target reservations for public health projects, public service needs, commercial development or wet weather reserve may be adjusted as outlined by "Schedule A" of the Water and Sewerage

Allocation Policy (Appendix I).

5.14.3 Service Area Definitions

The system for presenting the existing and planned sequence for water and sewer construction is as follows:

Service Map Designation	Code	Mapped
Existing Service	S-1/W-1	Yes
Service within 1 thru 3 Years	S-2/W-2	Yes
Service within 4 thru 10 Years	S-3/W-3	Yes
Service within 11 to 20 Years	S-4/W-4	Yes
Service beyond 20 Years	S-5/W-5	Yes
No Planned Service	S-6/W-6	No
Water Solution On-site	W-7	Yes
Public Health Concern Areas	S-3	Yes

5.14.3.1 **S-1 and W-1** **Properties** or areas with an active utility account served by municipal water supply and sewerage systems. These are either already existing improved properties, existing vacant lands within the service area, or properties that are under/pending construction. Applicability conditions are as follows:

Not withstanding items 6 & 7 below, parcels, lots or areas assigned to this service area must be in a designated growth area as defined by the County Comprehensive Plan.

1. Unconditional final site plan or subdivision approval has been obtained from the Planning Commission.

2. Design drawings and plans for sewer-water facilities have received final approval from the Department of Public Works and/or Municipality.

3. The project has met the conditions of the Adequate Public Facilities Ordinance, if applicable.

4. The County Commissioners or Municipality has executed a Public Works Agreement outlining the terms for sewerage and water allocation capacity.

5. The County Commissioners or Municipality have approved all necessary financial agreements and/or developer agreements.

6. Properties that have been previously amended and mapped as S-1/W-1 via the 1996 Master Water and Sewer Plan process may not meet all of the above stated conditions. Public Service and Public Health projects may be exempt from some or all of the conditions enumerated above.

7. A few properties outside of the Growth Area may be currently mapped S-1/W-1 due to their inclusion into a service area prior to the adoption of the Growth Area Plans. In the future, additional properties outside of the Growth Area Plan may be amended in as S-2/W-2 if the properties have unique features and it is determined by the County Commissioners to be in the best interest of the County to provide service to the properties. In both cases the property's service area designation will carry the 'L' suffix to indicate a limited development potential.

5.14.3.2 **S-2 and W-2 –** Properties or areas that are planned to be serviced in a 1 thru 3 year time period from the date of adoption of this Plan where improvements to, expansion of, or construction of new municipal water systems or sewer systems, which are in the final planning and design stage. Applicability conditions are as follows:

1. Concept plan approval is required by the County (or Municipality) Planning Commission prior to receiving this designation.

2. Critical Area growth allocation for the development must be awarded if necessary to support the project.

3. Sewerage and/or water allocations have been granted by the County

Commissioners and secured by the developer by the necessary cash deposit.

4. Rated sewerage and water capacities of treatment facilities necessary to serve the project are adequate or are programmed by the County or Municipality* to be available to accommodate the proposed project flows.

5. The Maryland Department of the Environment approves the requested service area amendment.

6. Public Service and Public Health projects may be exempt from the conditions enumerated above.

5.14.3.3 **S-3 and W-3 –** Properties or areas to be serviced in a 4 thru 10 year time period from the date of adoption of this Plan where improvements to, expansion of, or construction of new, municipal water supply and/or sewerage treatment systems are planned or programmed by the County or Municipality and for which water and/or sewerage treatment capacity is available or programmed to be available by the County or Municipality* that are anticipated to be fully developed by 2016. Areas and/or parcels assigned to this service area must be located in a designated growth area, or in an area of Public Health Concern, and the proposed development thereof must in all other respects comply with the County Comprehensive Plan. All properties shown as S-3/W-3 will not necessarily be served with public water or sewerage service within this time period, however sewerage treatment capacity is projected to be provided by the County or Municipality* and available for these areas.

5.14.3.4 **S-4 and W-4 –** Properties or areas to be serviced in a 11 thru 20 year time period from the date of adoption of this Plan where improvements to, expansion of, or construction of municipal water supply and/or sewerage treatment systems are planned or programmed by the County or Municipality and for which water and/or sewerage treatment capacity is available or programmed to be available by the County or Municipality* that are anticipated to be fully developed by 2026. Areas and/or parcels assigned to this service area must be located in a designated growth area, or in an area of Public Health Concern, and the proposed development thereof must in all other respects comply with the County Comprehensive Plan. All properties shown as S-4/W-4 will not necessarily be served with public water or sewer service within this time period, however sewerage treatment capacity is projected to be provided by the County or Municipality* and available for these areas.

5.14.3.5 **S-5 and W-5-** Properties or areas to be serviced beyond a 20 year time period (after 2026) where improvements to, expansion of, or construction of municipal water supply or sewerage systems are planned or programmed by the County or Municipality and for which water and/or sewerage treatment capacity is <u>currently insufficient</u> but may be planned to be available through future County or Municipal* expansions within this time period. Areas and/or parcels assigned to this service area must be located in a designated growth area, or in an area of Public Health Concern, and the proposed development thereof must in all other respects comply with the County Comprehensive Plan. All properties shown as S-5/W-5 will not necessarily be served with public water or sewerage service within this time period. This sewerage service category is provided to facilitate planning and staging of capital improvements to meet future service needs.

Notes:

1. The Incorporated Towns of Queenstown and Centreville do not have any known current capital improvement programs or plans to provide additional sewerage and/or water treatment capacity beyond what is mentioned herein. Any programmed sewerage and/or water treatment capacity expansion within these growth areas is assumed to be developer sponsored.

5.14.3.6 **S-6/W-6 -** Areas of “No Planned Service”. Any development in these areas would typically rely on individual systems to satisfy their water and sewer needs. Refer to sections 5.20.1.5 and 5.20.3.5 for restrictions on development within these areas.

5.14.3.7 **W-7 –** Two areas in the County have been identified as areas of concern for drinking water; Love Point and Kingstown/Chester Harbor. The Environmental Health department is monitoring these areas and should remediation be required, it is believed individual on-site solutions would be the most cost effective.

5.14.3.7 **Suffix Definitions:**

A "**P**" suffix may be applied to a map designation indicating that the property or area has been identified as a public health concern region.

An "**L**" suffix may be applied to a map designation indicating that the property or area is served with public sewer and/or water but the allocated flows are limited to serve existing uses, or areas with former public health concerns. This designation is generally used outside of the designated growth areas where demands for public water and sewer service should be minimized. **No additional development can occur without an amendment into this Plan and no allocation may be granted administratively.**

A "**D**" suffix may be applied to a map designation indicating that the property or area is contingent on a developer sponsored treatment capacity expansion. The County Commissioners, County Staff or Municipality may require additional support materials to justify this sub-category. Failure by the applicant to meet these contingency shall revert the priority classification back to its original category.

5.15 Triennial Update Procedures for the Comprehensive Water and Sewerage Plans

State regulations, pursuant to Title 9, Subtitle 5 of the Environment Article, Annotated Code of Maryland, as well as COMAR 26.03.01, requires the governing body of the County, after reasonable opportunity for public hearing, to adopt a triennially revised County Water and Sewerage Plan and have it approved by the MDE.

The adopted Plan for Queen Anne's County and its incorporated Towns shall be reviewed and updated triennially. For this purpose, municipal and County agencies, as well as the Maryland Department of Planning, will be furnished copies of the draft changes for comment. A public hearing with the County Commissioners will then be held. Notice of the public hearing shall be advertised in the Record-Observer newspaper or other local paper once each week for three successive weeks with the first notice appearing at least fourteen days prior to the public hearing. Following the public hearing, the County Commissioners shall take appropriate action.

Following the decision of the County Commissioners, the updated Plan shall be sent to the MDE for its review and final approval. The updated Plan will not become effective until notification of final approval is received from the State, but in the event the State does not approve or reject the updated Plan within 90 days, or request an additional 90 day review period, the Plan shall be considered approved by the State.

During the period between County Commissioner adoption and State approval, the County may use its proposed County plan at its own risk. Once the County Commissioners adopt the proposed County plan, a person shall follow the provisions of that plan except to the extent that the State modifies or disapproves that plan.

5.16 Quarterly Update Procedures for the Comprehensive Water and Sewerage Plan

State regulations, pursuant to Title 9, Subtitle 5 of the Environment Article of the Annotated Code of Maryland, require that the County Commissioners of Queen Anne's County review and adopt a revised County Comprehensive Water and Sewerage Plan on a triennial basis. In addition, State regulations permit the County Commissioners to amend the Water and Sewerage Plan more frequently by inserting, altering or deleting content provided the public is given adequate notice to express its opinion before the amendment is adopted. Amendment requests will be considered on a quarterly basis, unless otherwise determined by the County Commissioners. It is the intent of this section to serve as a guide for applicants by clarifying when amendments are required, and when amendments are not required, and to identify term limits for amendments, and to provide an outline of the procedures necessary to amend the Plan.

There are two types of quarterly amendments, a map amendment and a project amendment. A map amendment is required whenever a service area designation is changed, i.e. to advance from S-4 to S-3, as defined in section 5.16.1.1. A project amendment is required when any of the conditions of 5.16.1.2 thru 5.16.1.7 apply. While there may be exceptions, typically these two amendments are combined for any single project into one amendment hearing. However in cases where the property is already designated S-1 and/or W-1, a project amendment would be all that is required.

This Plan also functions as an inventory document for the public and several agencies. Regardless of the care taken in preparing policy and guidelines, decisions will have to be made that were not anticipated by this Plan. Therefore, what is listed below may not be an exhaustive listing. Anyone considering a development should contact the Department of Public Works, Environmental Health, and Planning and Zoning, in advance.

It should be noted that an amendment approval is not a commitment of sewerage and/or water allocation. The granting of allocation is a separate action undertaken by the Sanitary Commission. Refer to the instructions of the Allocation Policy contained as Appendix I.

5.16.1 Amendment Hearing Required:

5.16.1.1 Any request to amend the priority classification of a service area map designation from S-5/W-5 to S-4/W-4, S-4/W-4 to S-3/W-3 or from S-3/W-3 to S-2/W-2. Priority classification amendments will only be considered if the applicant is requesting a single classification upgrade. For example, a property designated S-4/W-4 must first be re-classified to S-3/W-3 prior to requesting an S-2/W-2 classification. Note these mapping amendments can only occur once per year per property. Refer to section 5.16.4.3. Exceptions to this procedure may be considered by the County Commissioners upon request by an incorporated Town, or for public service projects, or for commercial projects, or for areas of public health concern.

5.16.1.2 Any proposed community or mult-use water or sewer supply system having an overall **average** daily capacity equal to, or greater than, 5,000 gpd.

5.16.1.3 Any proposed modification, expansion, or upgrade to any existing multi-use facility with flows in excess of 5,000 gpd, whether currently included in this Plan or not.

5.16.1.4 Any new or amended residential or business facility within an S-1/W-1 service area which would produce an average daily flow equal to, or greater than, 5,000 gpd.

5.16.1.5 Any significant increase in the average daily flow above the amount advertised in the public hearing notice by a previously amended project. Significant is to be defined as a percentage increase in proposed flow using the following guidelines. KN/S/G

0 – 500 gpd	200% the approved amendment flow
500 – 2,500 gpd	175% the approved amendment flow
2,500 – 5,000 gpd	150% the approved amendment flow

5,000 – 10,000 gpd	125% the approved amendment flow
over 10,000 gpd	110% the approved amendment flow

5.16.1.6 Any significant change in use from what was advertised by a previously amended project. A finding of significance is to be made by the County Commissioners.

5.16.1.7 Any development proposal intending to provide a single on-site well for water usage, and/or a single on-site sewerage disposal system, within a "No Planned Service" area, having an overall **average** daily capacity equal to, or greater than, 5,000 gpd.

5.16.1.8 Any project or map amendment deletion required in accordance with the amendment term limits detailed in section 5.16.3.

5.16.1.9 Any shared facility, when and if allowed by County law, not withstanding 5.16.2.3.

5.16.2 Amendment Hearing Not Required:

5.16.2.1 Priority re-classifications from service area S-2/W-2 to service area S-1/W-1 at such time the application meets the S-1/W-1 applicability conditions defined in this Plan (5.14.3.1) and satisfactorily completes any other conditions or obligations enumerated in the previous amendment to the S-2/W-2 service area.

5.16.2.2 No facility intended strictly for agricultural irrigation or aquacultural supply shall require an amendment to this Plan provided no wastewater is generated. Other permits may be required.

5.16.2.3 Water and/or sewerage disposal systems serving one or two households, or a commercial, industrial, or institutional property, for the sole purpose of correcting existing septic system or well problems. Environmental Health Department documentation of the problem will be required.

5.16.2.4 Upon direction from the County Commissioners, the Director of the Department of Public Works may update, amend or correct minor omissions or errors of fact, update service area maps consistent with approved amendments and update or modify any of the information presented in the appendices of this Plan administratively. These administrative updates, amendments and corrections are not required to follow the quarterly amendment procedures outlined in this Plan.

5.16.2.5 Any residential subdivision of any size in the 'No Planned Service' area relying on individual conventional septic systems, and individual on-site wells, notwithstanding the provisions of 5.20.1.5 and 5.20.3.5.

5.16.3 Application and Amendment Term Limits:

5.16.3.1 Any amendment application that requires additional information or resolution of other issues that are raised during the hearing process must be addressed in a manner that enables a decision to be made within 60 days following the public hearing date. Should the deadline not be met, the amendment will be denied and the applicant will have to reapply.

5.16.3.2 Notwithstanding the provisions of Subsection 5.16.3.3;

5.16.3.2.1 Any project with an approved S-4 and/or W-4 map or project amendment that does not advance to S-3 and/or W-3 within three (3) years from the date of the amendment approval by the County will be deleted from the Plan, and the map amendment will be removed from the maps following a public hearing. The property will then revert back to S-5 and/or W-5.

5.16.3.2.2 Any project with an approved S-3 and/or W-3 map or project amendment that does not advance to S-2 and/or W-2 within three (3) years from the date of the amendment approval by the County will be deleted from the Plan, and the map amendment will be removed from the maps, following a public hearing. The property will then revert back to S-4 and/or W-4.

5.16.3.2.3 Any project with an approved S-2 and/or W-2 map or project amendment that does not begin construction within three (3) years from the date of amendment approval by the County will be deleted from the Plan, and the map amendment will be removed from the maps, following a public hearing. The property will then revert back to

S-3 and/or W-3 designation.

5.16.3.2.4 Any project with an approved S-1 and/or W-1 project amendment that does not begin construction within three (3) years from the date of amendment approval by the County will be deleted from the Plan, following a public hearing. The property will still retain a S-1 and/or W-1 designation but will need to reapply for project amendment should any of the conditions of 5.16.1 apply.

5.16.3.2.5 Any project that is advanced from a No Planned Service area to an S-2 and/or W-2 designation due to a Public Service, Public Health, or other policy exemption, that does not satisfy the conditions stated in the amendment approval within three (3) years from the date of amendment approval by the County will be deleted from the Plan, and the map amendment will be removed from the maps, following a public hearing. The property will revert back to its 'No Planned Service' designation.

5.16.3.3 The County Commissioners may extend a map amendment or project amendment only on a showing by the applicant that the failure to advance the project to the next step toward development within three (3) years from the date of amendment approval is not the result of the inaction or delay by the applicant. The length of each extension is to be 18 months. The processes to be considered for an extension are detailed below:

5.16.3.3.1 Prior to the three-year term limit date being reached, the Director of Public Works shall attempt to notify the project's representative of the impending expiration. This is only a courtesy and failure to receive any notification is in no way a waiver of the obligation of the project's representative to be bound by the following steps.

5.16.3.3.2 The project's representative shall then make a written request to the Director of Public Works indicating reasons, beyond their control, why the project has not succeeded in proceeding through the County development review process and/or initiated construction.

5.16.3.3.3 The Technical Review Committee (County Administrator, Director of Public Works and Director of Planning & Zoning) shall review this initial request. In their review, the Technical Review Committee shall evaluate the reasons given for the delay.

5.16.3.3.4 Based on the review, the Technical Review Committee may then grant an 18-month term limit extension, or forward the extension request to the County Commissioners for consideration.

5.16.3.3.5 If forwarded to the County Commissioners, the County Commissioners will then review the extension request. In their review, the County Commissioners will evaluate the reasons given for the delay.

5.16.3.3.6 Based on the County Commissioners' review, they may vote to grant an 18-month term limit extension, or set the project for a public hearing during the next regularly scheduled Plan amendment hearing date. In the event a public hearing is scheduled, the County Commissioners shall allow the applicant to present the project and outline the delays and receive public comment. Following the public hearing the County Commissioners can either delete the project's Plan amendment, or renew the project's Plan amendment for a 3-year term limit extension.

5.16.3.3.7 If the first extension request is granted, and the project still is unable to complete the review process and initiate construction, the project's representative shall attempted to be notified as a courtesy of the impending first (or second, etc.) extension's expiration.

5.16.3.3.8 The project's representative shall then make a written request to the County Commissioners indicating reasons, beyond the their control, why the project has not succeeded in proceeding through the County development review process and/or initiated construction.

5.16.3.3.9 Repeat steps 5.16.3.3.5 through 5.16.3.3.9 until the project has initiated construction or is deleted from the Plan as a concluding action following a scheduled Public Hearing.

5.16.3.4 The term limits only apply to actual amendments to this 2006 Plan. These term limit provisions will not affect priority service area designations for properties that were shown on the original service area maps as adopted with the Plan although the properties may be affected by the provisions of section 5.14.2.

5.16.4 Quarterly Amendment Procedures

5.16.4.1 Applications for amendment to the adopted Plan for water or sewerage for Queen Anne's County and its incorporated municipalities may be submitted for review in accordance with the schedule for 2006 detailed in Appendix II. Schedules for future years will be provided when needed and will be of a similar format and timeframe.

5.16.4.2 Requests for proposed amendments to the Comprehensive Water and Sewerage Plan may be submitted to the Queen Anne's County Department of Public Works, Sanitary District, 310 Bateau Drive, PO Box 10, Stevensville, MD 21666-0010. Refer to Appendix III for an application form and a summary listing of the minimum supplemental materials required as a part of the application.

5.16.4.2.1 In addition to the minimum requirements listed in Appendix III, amendment applications for properties located within the incorporated limits of a town must also supply the following information along with the application:

5.16.4.2.1.1 Signed letter from the town planner stating the amendment is consistent with the town's comprehensive plan.

5.16.4.2.1.2 Signed letter from the town that sewer (and/or water) capacity is available, and has been reserved, for the project.

5.16.4.2.1.3 Signed letter from the town requesting the project be amended into the County Water and Sewer Plan.

5.16.4.3 The County Commissioners will consider amendments to priority classification mapping, text, and projects of the adopted Comprehensive Water and Sewerage Plan. All properties seeking a priority classification amendment (i.e. a map amendment) shall only be considered once annually. Priority classification amendments for properties proposing to develop only to a minimal percentage of the property's overall potential will be discouraged unless there is a documented public health concern. Should this type of amendment be approved in any event, only the portion of the property proposed to be developed shall be reclassified. The remaining portion of the lands will retain the existing designation.

5.16.4.4 The County Commissioners may also consider requests for amendments to the Comprehensive Water and Sewerage Plan for public service projects, desirable commercial projects, and from its incorporated towns outside of the normal review cycle as established by this plan. A written request shall be addressed to the County Commissioners seeking permission for a special hearing along with supporting materials that justify the request.

5.16.4.5 It shall be the responsibility of the Queen Anne's County Department of Public Works to coordinate the review of amendments to the Comprehensive Water and Sewerage Plan.

5.16.4.6 All materials received by the hearing's public comment deadline are considered public record and are available for public review at the Department of Public Works, Sanitary District.

5.16.4.7 A public informational meeting shall be held during a regularly scheduled County Commissioners meeting two weeks prior to a public hearing unless specifically excused by the County Commissioners on recommendation from the County Administrator, and the Directors of Public Works and Planning and Zoning. The purpose of the meeting is to provide the public with a forum to acquire information concerning the proposed amendments.

5.16.4.8 Before the County Commissioners can hear any revision or amendment request for the Plan, they must:

a) Publish a legal notice for the public hearing detailing, at a minimum the time and place of the hearing, as well as a summary of proposed amendments, in at least one newspaper of general circulation, once each week for three successive weeks with the first notification appearing at least 14 days prior to the hearing;

b) With respect to notices of a priority classification mapping amendment, at least 14 days prior to the date of the hearing, each property that would receive a new or different classification by reason of a proposed map amendment shall be posted conspicuously with notice of the time, place and purpose of the public hearing and the present and proposed priority classifications of the property.

c) The County must notify all adjacent property owners via certified mail three weeks before the hearing.

d) Give Incorporated Towns at least two weeks notice of the hearing if the amendment request is within, or contiguous to, town limits.

5.16.4.9 A public hearing before the County Commissioners will be held to provide an opportunity for the public to comment on the proposed amendment. The County Commissioners will receive oral or written testimony at this public hearing.

5.16.4.10 The County Commissioners may approve, approve with conditions, disapprove, or defer requests. Requests for service area amendment must meet the criteria for priority re-classification established in this Comprehensive Water and Sewerage Plan.

5.16.4.11 Following the decision of the County Commissioners to approve the amendment, the amendment to the Plan shall be sent to the Maryland Department of the Environment for its review and final approval. The State has 90 days from receipt of the County's amendment package to review the materials. The State can extend the review period by another 90 days. If the letter informing the County of the results of the MDE review is not received during the initial 90-day review period, or is not extended the second 90 days by letter, the County Commissioners' decisions are official. The pre-amendment version of the Plan will remain in effect until that time.

5.16.5 Amendment Guidance For Requesting Service Area Mapping Designation Changes

The following guidance is provided in order for a property to **successfully apply** for a map amendment. What is listed below should be considered the minimum requirements and additional information to justify the map amendment is strongly encouraged. This section seeks to augment section 5.14.3.

5.16.5.1 No Planned Service (S-6/W-6) to S-2/W-2

a) Evidence, supported by documentation by the Environmental Health Department that not serving the property would perpetuate, or increase the potential of, a health or environmental issue of concern.

5.16.5.2 S-5/W-5 to S-4/W-4

a) A statement of intent by the developer describing his project in enough detail to determine the approximate amount of treatment capacity required for the project as well as providing enough detail to allow the Planning Commission and/or Planning Staff to evaluate the project's consistency with the Comprehensive Plan.

b) A finding of available water and/or sewer treatment capacity by the Department of Public Works staff.

c) A finding of consistency with the Comprehensive Plan by the Planning Commission and/or Planning Staff.

d) An evaluation of proximity of the project's location and existing infrastructure. Properties surrounded by infrastructure would be given precedence over a project located beyond the limits of existing infrastructure. A project immediately adjacent to existing infrastructure would be given precedence over a project not immediately adjacent, particularly if serving that project would entail 'leap-frogging' of unserved properties.

e) These particular service area mapping changes will only be considered once per year, refer to section 5.14.2.1.

5.16.5.3 S-4/W-4 to S-3/W-3

a) Approval of a Concept Plan by the Planning Commission (if required).

b) Positive recommendation by the Planning Commission and/or Planning Staff for the amendment.

c) These particular service area mapping changes will only be considered once per year, refer to section 5.14.2.1.

5.16.5.4 S-3/W-3 to S-2/W-2

a) Approval of an Adequate Public Facilities Study (if required).

b) Approval of a Concept Plan by the Planning Commission (if required).

c) Positive recommendation by the Planning Commission and/or Planning Staff for the amendment.

5.16.5.5 S-2/W-2 to S-1/W-1

a) Unconditional final approval of the project, refer to section 5.14.3.1.

5.16.6 Fees

A fee schedule established by the County Commissioners is to be applied to all applicants requesting revisions to the Comprehensive Water and Sewerage Plan. These fees are not refundable, and must be paid at the time application is made by the applicant. The application cannot be processed without this fee. Refer to Appendix III for a fee schedule.

5.17 Water and Sewerage Allocations

5.17.1 When a property within the County's KN/S/G's service area is amended into this Plan with a priority classification of at least S-2/W-2, that action allows for a request for allocation to be made. **It should be noted that an amendment approval is not a commitment of sewerage and/or water allocation. The granting of allocation is a separate action undertaken by the Sanitary Commission.** This procedure is detailed in Appendix I, "Water & Sewerage Allocation Policy".

5.17.2 Water and sewerage allocations within, or contiguous to, the incorporated Towns and their associated water and sewer service areas may be administered by an authorized Board or designee of the Town.

5.17.3 All water and sewer service providers manage their allocations in a cost-effective manner, consistent with the Maryland Economic Growth, Resource Protection and Planning Act of 1992 and the Smart Growth – Priority Funding Areas Act of 1997.

5.18 Guidelines for Amendments Within Incorporated Towns

As none of the incorporated towns have their own Water and Sewerage Plans, the Towns must follow the same requirements, with regard to when an amendment is required, as those for projects not located within incorporated towns. In addition to those situations listed in section 5.16.1, any proposal that would require a permit from MDE, such as an increase in the NPDES wastewater discharge permit, an increase in the Groundwater Appropriation Permit, or a modification to an existing water and/or sewer system that would require a MDE construction permit, whether for the town, or for a private development in the town (i.e. such as a private water system), would also require an amendment. Also any water or sewer project requesting State financial assistance would need an amendment.

Section 5.16.4.2.1 indicates information required for an amendment request within the incorporated limits of a Town. In addition to these required submittals, any amendment request for an increase in sewer (and/or water) treatment capacity must be accompanied by a suggested revised service area map showing the parcels intended to be served with this new capacity, and the anticipated treatment capacity needed per parcel, if the new areas to be served are located beyond the current limits of the Town (i.e. areas proposed for annexation).

Also attention is directed to section 5.16.1.1 which indicates the Town's have the ability to request service area map changes that allow for 'leap-frogging' of service area designations, i.e. the ability of going from S-4 directly to S-2 and skipping S-3. Finally section 5.16.4.4 allows for Town's to request amendment hearings outside of the normal hearing schedule upon a showing of good cause.

While recognizing a Town's sovereignty to determine its own future, it is conceivable that the Town and the County would not agree on the need or desirability of a particular amendment request. In such cases, the Town and the County are encouraged to negotiate a compromise on the amendment. If no compromise can be met, both parties are to request guidance from the State on how to resolve the issue.

5.19 Guidelines for Lands Being Annexed into Incorporated Towns

On occasions where an annexation would also entail changes to either the water service area, or the sewer service area, or both, a map amendment application request to this Plan must be made concurrent with the distribution of the adopted annexation resolution. In addition to the normal amendment application form, a copy of the "Outline for Extension of Services and Public Facilities (Annotated Code of Maryland – Article 23A – Section 19(o)) shall also be submitted with the application for review.

An approval of the map amendment request shall serve as the de facto waiver of the 5-year rule on zoning as described in Annotated Code 23A Section 9. Should the map amendment request not be approved, this action shall also represent the County's act to not waive the existing zoning.

5.20 Guidelines for Development Densities and System Design Criteria

This section provides development density thresholds and minimum design requirements for the establishment of municipal water supply and sewerage systems consistent with State and County laws, ordinances and plans.

5.20.1 Facilities Required For Sewerage Treatment

5.20.1.1 All new development proposed within the areas designated as S-2 shall be required to extend existing municipal wastewater facilities consistent with the Comprehensive Water and Sewerage Plan.

5.20.1.2 All new development proposed within the areas designated as S-3 shall first be required to be amended as S-2 and then extend existing municipal wastewater facilities consistent with the Comprehensive Water and Sewerage Plan should any one of the following conditions apply:

a) The development consists of more than 5 dwellings or residential lots,

b) Any of the lots to be created are less than 20,000 square feet,

c) Any proposed non-residential, mixed non-residential/residential, commercial, industrial, or institutional development would generate more than an average of 1,250 gpd of wastewater,

d) The cost of extending the municipal sewerage collector system is less than or equal to twice the cost of constructing a community wastewater facility, or less than or equal to twice the aggregate cost of all the individual on-site sewer systems, or

e) The nature of the subdivision or non-residential development, or its environs, is such that the absence of a municipal wastewater system may compromise water quality or the public health, as determined by the Environmental Health Department or the MDE.

f) If none of the above conditions are applicable, development may proceed with individual on-site systems subject to the provisions of 5.2.1.

5.20.1.3 All development proposed within the areas designated by the Department of Public Works as S-4 shall be required to be amended as S-3, then S-2 and then extend existing municipal wastewater facilities consistent with the Comprehensive Water and Sewerage Plan should any one of the following conditions apply:

a) The development consists of more than 20 dwellings or residential lots,

b) Any of the lots to be created are less than 20,000 square feet,

c) Any proposed non-residential, mixed non-residential/ residential, commercial, industrial, or institutional development would generate more than an average of 5,000 gpd of wastewater,

d) The cost of extending the municipal sewerage collector system is less than or equal to twice the cost of constructing a community wastewater facility, or less than or equal to twice the aggregate cost of all the individual on-site sewer systems, or

e) The nature of the subdivision or non-residential development or its environs is such that the absence of a municipal wastewater system may compromise water quality or the public health, as determined by the Environmental Health Department or the MDE.

f) If none of the above conditions are applicable, development may proceed with individual on-site systems subject to the provisions of 5.2.1.

5.20.1.4 All development proposed within the areas designated by the Department of Public Works as S-5 shall be required to extend existing municipal wastewater facilities consistent with the Comprehensive Water and Sewerage Plan should any one of the following conditions apply:

a) The development consists of more than 50 dwellings or residential lots,

b) Any of the lots to be created are less than 20,000 square feet,

c) Any proposed non-residential, mixed non-residential/ residential, commercial, industrial, or institutional development would generate more than an average of 12,500 gpd of wastewater,

d) The cost of extending the municipal sewerage collector system is less than or equal to twice the cost of constructing a community wastewater facility, or less than or equal to twice the aggregate cost of all the individual on-site sewer systems, ore)the nature of the subdivision or non-residential development or its environs is such that the absence of a municipal wastewater system may compromise water quality or the public health, as determined by the Environmental Health Department or MDE.

e) If none of the above conditions are applicable, development may proceed with individual on-site systems subject to the provisions of 5.2.1.

5.20.1.5 All development proposed within the areas designated by the Department of Public Works as S-6/W-6, "No Planned Service", shall be required to provide municipal wastewater facilities consistent with the Comprehensive Water and Sewerage Plan should any one of the following conditions apply:

a) The subdivision consists of up to 120 dwellings or residential lots

b) The subdivision consists of up to 150 dwellings or residential lots, utilizing the noncontiguous development technique, and the subdivision is located outside the boundaries of the mapped community planning areas as identified in the adopted community plans.

c) Any proposed non-residential, mixed non-residential/residential, commercial, industrial or institutional development would generate more than an average of 30,000 gpd of wastewater, or

d) The nature of the subdivision or non-residential development or its environs are such that the absence of a municipal wastewater system may compromise water quality or public health, as determined by the Environmental Health Department or the MDE.

e) If none of the above conditions are applicable, development may proceed with individual on-site systems subject to the provisions of 5.2.1.

5.20.2 Wastewater Facilities Design Criteria Guidelines

The Department of Public Works and, where applicable within designated growth or incorporated areas, the Municipality, shall evaluate the suitability of the proposed multiuse or community wastewater system, or the extension of a municipal wastewater system, based upon average flow generated and the character of the anticipated service area.

General guidelines for typical multiuse, community, and municipal wastewater systems are as follows:

5.20.2.1 Residential systems are to assume average usage of 250 gpd/dwelling. Commercial uses are to assume an average flow of 0.09 gpd per square foot (gpd/sf) of floor area for offices, 0.05 gpd/sf for retail and 0.03 gpd/sf for warehouse or production. All other uses are to determine their average flow by using 0.5 times the sewerage allocation for a particular use as designated in the Kent Narrows/Stevensville/Grasonville (KN/S/G) Sanitary Subdistrict rate schedule, or usages from technical papers accepted by the County as representative. In the case of the design of treatment facilities, the County will defer to MDE in this regard.

5.20.2.2 All systems generating in excess of 5,000 gpd (20 EDU) (or 8 lbs/day of BOD_5 or 10 lbs/day TSS) but not more than 30,000 gpd (120 EDU) (or 50 lbs/day of BOD_5 or 60 lbs/day TSS) shall consist of an aerobic treatment unit capable of biological nutrient removal (presettling, aeration, settling), disinfection, with disposal of the effluent in alternating ground absorption fields or spray irrigation, where soil conditions permit. Such systems shall be maintained privately and must meet all MDE requirements for private systems.

5.20.2.3 All systems generating in excess of 30,000 gpd (120 EDU) (or 50 lbs/day of BOD_5 or 60 lbs/day TSS) shall consist of an extended aeration treatment unit capable of enhanced nutrient removal (screening, separation, settling) followed by ultra violet disinfection and storage, with disposal of the effluent by spray irrigation, or surface water discharge, or a combination of both, if all local and state requirements can be met. The local government entity, or their authorized agent, shall maintain such systems. Treatment facilities are to be placed on a minimum 2-acre lot to be deeded in fee simple to the local government entity responsible for their operation.

5.20.2.4 Spray irrigation of treated wastewater effluent, if allowed, may be utilized in the circumstances, and within the guidelines, as listed below.

a) Spray irrigation may only be used for multi-use systems whose sole purpose is to dispose of industrial or commercial wastewater, and for municipal systems.

b) Primary spray disposal areas, suitable in size to accommodate the anticipated flows from the treatment facility, will also be owned in fee simple by the local government. The deed shall be restricted to clearly state that the disposal of the wastewater effluent shall take precedence over any other use, regardless of consequence.

c) Such systems are to provide 90 days of effluent storage, or 60 days of effluent storage if a permitted surface water point discharge is available. Said storage is to assume 60 inches of rain per year in their design.

d) Auxiliary spray irrigation fields, which are not owned by a local government entity, may be utilized provided the above minimum conditions are met and a satisfactory agreement is executed between the local government entity and owner of the auxiliary spray irrigation field.

e) The separation between the soil surface and the normal seasonal high water table shall be no less than 4 feet.

5.20.2.5 Connections to sewer transmission mains (also known as 'force mains') for the sole benefit of a private development are prohibited unless necessary to resolve an existing health concern as documented by the Environmental Health Department.

The above general guidelines are minimum standards for typical systems. Wastewater characteristics, flow surges, and other factors may necessitate additional requirements. Alternate systems designed to achieve similar goals may be considered where appropriate. Effluent standards will be those established by the MDE. In all cases, the burden of proof shall be on the developer.

5.20.3 Facilities Required for Water Treatment

5.20.3.1 All new development proposed within the areas designated by the Department of Public Works as W-2 shall be required to extend the existing municipal system consistent with the Comprehensive Water and Sewerage Plan.

5.20.3.2 All new development proposed of new subdivisions within the areas designated by the Department of Public Works as W-3 shall be amended as W-2 and be required to provide municipal water facilities consistent with the Comprehensive Water and Sewerage Plan should any of the following conditions apply:

a) The subdivision consists of more than 5 residential lots or dwellings,

b) Any of the lots to be created are less than 10,000 square feet,

c) The proposed commercial, industrial or institutional development would require an average of more than 1,250 gpd of water,

d) The nature of the subdivision or non-residential development, or its environs, is such that the absence of a municipal water system may compromise water quality or the public health, as determined by the Environmental Health Department or the MDE.

e) The cost of extending the municipal water distribution system, including allocation fees, is less than or equal to twice the cost of constructing a community water facility, or less than or equal to twice the aggregate cost of all the individual on-site water systems (including treatment) if a commercial project; or four times the cost of constructing a community water facility, or less than or equal to four times the aggregate cost of all the individual on-site water systems (including treatment), if a residential project, or;

f) If none of the above conditions are applicable, development may proceed with individual on-site systems subject to the provisions of 5.2.1.

5.20.3.3 All development proposed within the areas designated by the Department of Public Works as W-4 shall be required to be amended to W-3, then W-2 and then extend existing municipal water facilities consistent with the Comprehensive Water and Sewerage Plan should any one of the following conditions apply:

a) The development consists of more than 20 dwellings or residential lots,

b) Any of the lots to be created are less than 20,000 square feet,

c) Any proposed non-residential, mixed non-residential/ residential, commercial, industrial, or institutional development would demand more than an average of 5,000 gpd of water,

d) The cost of extending the municipal water distribution system, including allocation fees, is less than or equal to twice the cost of constructing a community water facility, or less than or equal to twice the aggregate cost of all the individual on-site wells with treatment (if necessary), if a commercial project; or four times the cost of constructing a community water facility, or less than or equal to four times the aggregate cost of all the individual on-site water systems (including treatment), if a residential project, or

e) The nature of the subdivision or non-residential development or its environs is such that the absence of a municipal water system may compromise water quality or the public health, as determined by the Environmental Health Department or the MDE.

f) If none of the above conditions are applicable, development may proceed with individual on-site systems subject to the provisions of 5.2.1.

5.20.3.4 All development proposed within the areas designated by the Department of Public Works as W-5 shall be required to be amended W-4, then W-3, then W-2 and then extend existing municipal water facilities consistent with the Comprehensive Water and Sewerage Plan should any one of the following conditions apply:

a) The development consists of more than 50 dwellings or residential lots,

b) Any of the lots to be created are less than 20,000 square feet,

c) Any proposed non-residential, mixed non-residential/ residential, commercial, industrial, or institutional development would demand more than an average of 12,500 gpd of water,

d) The cost of extending the municipal water distribution system, including allocation fees, is less than or equal to twice the cost of constructing a community water facility, or less than or equal to twice the aggregate cost of all the individual on-site wells with treatment (if necessary), if a commercial project; or four times the cost of constructing a community water facility, or less than or equal to four times the aggregate cost of all the individual on-site water systems (including treatment), if a residential project, or

e) The nature of the subdivision or non-residential development or its environs is such that the absence of a municipal water system may compromise water quality or the public health, as determined by the Environmental Health Department or the MDE.

f) If none of the above conditions are applicable, development may proceed with individual on-site systems subject to the provisions of 5.2.1.

5.20.3.5 All development proposed within the areas designated by the Department of Public Works as S-6/W-6, "No Planned Service", shall be required to provide municipal water facilities consistent with the Comprehensive Water and Sewerage Plan should any one of the following conditions apply:

a) The subdivision consists of up to 120 dwellings or residential lots

b) The subdivision consists of up to 150 dwellings or residential lots, utilizing the noncontiguous development technique, and the subdivision is located outside the boundaries of the mapped community planning areas as identified in the adopted community plans.

c) Any proposed non-residential, mixed non-residential/residential, commercial, industrial or institutional development would demand more than an average of 30,000 gpd of water, or

d) The nature of the subdivision or non-residential development or its environs is such that the absence of a municipal water system may compromise water quality or public health, as determined by the Environmental Health Department or the MDE.

e) If none of the above conditions are applicable, development may proceed with individual on-site systems subject to the provisions of 5.2.1.

5.20.4 Water Facilities Design Criteria Guidelines

5.20.4.1 The Department of Public Works shall evaluate the suitability of the proposed multiuse, community, or extensions of municipal water systems based upon the average flow required and the character of the anticipated service area. General guidelines are as listed below. These are minimum standards for typical systems. Additional requirements may be applied where appropriate. Lacking any other design standards, water facilities are to be in compliance with the industry guidelines known as the "10 State's Standard". As the availability of groundwater is always present, subject to a Groundwater Appropriation Permit from the Maryland Department of the Environment, the presence of municipal water by itself does not promote growth.

a) Residential systems are to assume an average usage of 250 gpd/dwelling. Commercial uses are to assume an average usage of 0.09 gpd per square foot of floor area for offices, 0.05 gpd/sf for retail and 0.03 gpd/sf for warehouse or production. All other users are to determine their average flow by using 0.5 times the sewerage allocation for a particular use as designated in the KN/S/G Sanitary Subdistrict rate schedule, or usages from acceptable technical papers accepted by the County as representative. In the case of the design of treatment facilities, the County will defer to MDE in this regard.

b) Where systems are required and have flows in excess of 5,000 gpd (20 EDU) but not more than 10,000 gpd (40 EDU), facilities shall consist of two well supplies on a 150 foot by 150 foot lot, with gas (or other approved means) chlorination, and other necessary treatment facilities as required by the raw water analysis to meet potable water standards. Adequate storage and distribution lines shall be provided to satisfy instantaneous demand. Instantaneous demand is defined as storage of a volume equal to 40% of the average daily demand. No mains are to be less than 4" diameter. These size systems must be privately operated and maintained.

c) Where systems are required and have flows in excess of 10,000 gpd (40 EDU) but not more than 30,000 gpd (120 EDU), facilities shall consist of two well supplies on a 150 foot by 150 foot lot, gas (or other approved means) chlorination, and other necessary treatment facilities as required by the raw water analysis to meet potable water standards. Adequate storage shall be provided to satisfy instantaneous and emergency demand. Instantaneous demand is defined as storage of a volume equal to 40% of the average daily demand. Emergency demand is defined as storage of a volume equal to 50% of the average daily demand, for an aggregate storage requirement of 90% of the average daily demand. Distribution lines shall be provided to satisfy future fire flow demands. No distribution lines are to be less than 8”. These size systems will be privately operated and maintained.

d) Where systems are required and have flows in excess of 30,000 gpd (120 EDU), facilities shall consist of not less than two well supplies on a 1 acre lot, gas (or other approved means) chlorination, and other necessary treatment facilities as required by the raw water analysis to meet potable water standards. Adequate storage and distribution lines shall be provided to satisfy instantaneous demand, emergency demand, and fire flow demands as detailed below. No distribution lines shall be sized less than 8" in diameter. These size systems will be County (or incorporated Town) operated and maintained.

e) Fire flow shall be provided with a residual pressure of 20 psi during peak demand as measured at the critical discharge point (typically the hydrant farthest from the storage system or the hydrant with the maximum elevation). Projects in excess of 30,000 gpd (120 EDU) shall be required to deliver 1,000 gpm for 4 hours preferably from an elevated storage tower of the water spheroid design.

f) The treatment technology chosen for iron removal must have 5 years of performance proven iron removal capabilities at its design flow, and at a raw water iron concentration equal to, or greater than, that being proposed to be treated and shall consistently produce a finished water with an iron concentration of less than 0.1 mg/l.

g) All water treatment plants not having elevated storage must have a diesel emergency generator and redundant fire flow pumps.

h) All water treatment plants and wells are to be enclosed by a 6-foot tall, black vinyl fabric, chain link fence with 3-strand barbwire. Wells are to be enclosed in a lockable steel box.

i) Any treatment system proposed must be able to meet all current federal and state drinking water standards, including the new arsenic standard of 10 ppb.

5.20.4.2 The MDE requires the following on all privately owned water systems:

a) The project must be described and shown in the County 10-Year Water and Sewerage Plan in the correct service area category designation.

b) A surface or groundwater appropriation permit must be obtained from the Maryland Department of the Environment.

c) A well construction permit must be obtained from the MDE via the Queen Anne's County Environmental Health Department.

d) A financial management plan must be submitted to the MDE Water Supply Program for review and approval. This plan shall detail estimated operating costs and the revenues required to support these costs.

e) All required financial agreements and sureties should be established, as may be required by the MDE.

f) An Operation and Maintenance (O&M) plan must be prepared and submitted to the MDE Division of Engineering and Permits, for review and approval.

g) A State water construction permit must be obtained from the MDE for the installation of the system. After the permit has been issued, the following additional requirements must be met prior to actual operation of the new system.

i. All County permits must be obtained, and all inspections performed, as may be required by the Approving Authorities.

ii. A water treatment plant superintendent and operator, certified in the appropriate classification by the Board of Waterworks and Waste System Operations, must be employed prior to start-up to attend the plant on a daily basis.

iii. Plans must be made for compliance with the monitoring and reporting requirement of COMAR 26.04.01 in advance of start-up to attend the plant on a daily basis.

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GLOSSARY

For the purpose of this Plan, the following definitions and terms are adopted:

Advanced waste treatment - the treatment of wastes or wastewaters to (a) reduce content of specific constituents, such as nitrogen and phosphorus, which are not controlled sufficiently by Best Practicable Control Technology Currently Available (BPCTCA) or by secondary treatment, or to (b) reduce organic oxygen demand beyond the level attainable by BPCTCA or secondary treatment, so as to comply with waste load allocations in water quality limited to waters. Refer also to **Biological Nutrient Removal** and **Enhanced Nutrient Removal**.

Alternative On-site Sewerage Disposal System - those wastewater systems that are not considered conventional or innovative. Typically these systems have percolation rates of wastewater in excess of those recognized as conventional. Examples include sand mounds with infiltration rates of 60 to 120 minutes per inch, shallow low-pressure distribution systems with percolation rates of 30 to 60 minutes per inch, shallow alternating trench drain fields with percolation rates of 30 to 60 minutes per inch. These systems are allowed only on new construction of existing lots of record or wherever a conventional system has been approved. Note the use of alternative systems will not change the requirements for set back distances, recovery areas, or unsaturated treatment zones.

Approving Authority - one or more officials, agents or agencies of local government designated by the local governing body or specified by other provisions of the Environment Title 9, Subtitle 5, Article C of the Code of Maryland to take certain actions as a part of implementing this plan. As it regards Shared Facilities, the Approving Authority would be the local office of the state's Environmental Health Department.

Aquifer - any formation of soil, sand, gravel, rock or other material, or any crevice from which underground water is or may be produced.

Average Flow - an hourly flow in a 24-hour period, including domestic, industrial, and commercial components as well as infiltration and inflow (I and I).

Average Daily Flow - the total gallonage of water for particular use in one year divided by 365, typically measured in gallons per day.

Base Flow - the discharge entering stream channels from groundwater or other delayed sources: i.e., stream flow periods not affected by recent precipitation.

Begin Construction – refer to Under Construction

Bermed Infiltration Pond - a means of wastewater disposal by discharge to groundwater through the water-bearing sands of the subsurface soil. This method is used in localities where there exists a seasonally high water table with minimal seasonal fluctuation. Each county's Groundwater Protection Report must describe where, and under what circumstances, this technique may be utilized. Currently there is no provision for the use of this technology for new development within Queen Anne's County.

Best Practicable Control Technology Currently Available (BPCTCA) - a feasible process which, as demonstrated by general use, demonstration process, or pilot plants, represents good engineering practice at reasonable cost at the time the State Discharge Permit is issued or thereafter modified or reissued. For discharges from publicly owned treatment works and other sewerage treatment facilities, BPCTCA means the secondary treatment levels specified by EPA in the State Discharge Permits.

Biochemical Oxygen Demand (BOD) - the amount of oxygen required by bacteria while stabilizing decomposable organic matter under aerobic conditions. BOD_5 is a standard laboratory test to determine oxygen demand of a sample incubated for a five-day period at $20^{o}C$: usually expressed as milligrams per liter (mg/l) or parts per million (ppm).

BOD – Refer to **Biochemical Oxygen Demand.**

Brackish Water - water with salinity in the 10-20 parts per thousand (ppt) range as opposed to ocean water with an average salinity of 35 ppt.

BNR – Biological Nutrient Removal - the general term for the wastewater treatment process that utilizes natural biological processes to convert nitrogen, from ammonium, to nitrogen gas, thereby removing the nitrogen from the treated effluent. Typically a total nitrogen concentration of the final effluent of 8 mg/l is considered BNR. Also refers to the use of natural processes to cause phosphorus to precipitate out as sludge, thereby removing the phosphorous from the treated effluent. Typically a total phosphorus concentration of the final effluent of 2 mg/l is considered BNR. However, most facilities rely on chemical processes to remove phosphorus as they are more reliable.

Buffer - an area designed to separate.

Collection System - Any system, whether publicly or privately owned, which serves as a conduit to collect and transport sewerage or industrial waste.

COMAR - Code of Maryland Annotated Regulations.

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

Community Water Supply System - means any system, whether publicly or privately owned and operated, serving two or more individual lots which provides a source of water and a distribution system, including any treatment and storage facility.

Confining Layer - a stratum of soil that has distinctly lower permeability than the strata above or below it. Usually a confining layer must be at least five (5) feet in thickness.

Controlling Authority – As it regards Shared Facilities, the controlling authority would be the Department of Public Works.

Conventional On-site Sewerage Disposal System - those wastewater disposal systems that meet current state regulations concerning soil percolation rates and groundwater separation zones (quantified as a percolation rate of at least 1" per 30 minutes for trenched drain fields or at least 1 inch per 60 minutes for mounded systems). They consist of a septic tank or aerobic treatment to trap any solids and some method of ground absorption and/or atmospheric evaporation of the resulting wastewater effluent. Examples include the standard septic tank with trenched drain field, septic tank with seepage pit, or septic tank with sand mound systems. These type systems can be used for all new development.

Cost-effectiveness Analysis - an evaluation of data including economic factors such as capital, operation, maintenance, financing and user costs, environmental effects, implementation capability, public acceptance, and other related factors demonstrating the most efficient and economic alternative over the life of the treatment works being analyzed.

County Plan - a Comprehensive Water & Sewerage Plan for the provision of adequate water and wastewater systems, whether publicly or privately owned, throughout the County, including all towns and municipal corporations, and including all amendments and revisions thereto.

Denied Access Facility - any facility which is designated and intended to function as part of the sewer system that has provisions attached to it that limit future connections to said system. Access will not be provided except as provided in the policies of this plan or as amended.

Developer - any entity that wishes to improve lands.

Diffusers - mechanical means within an outfall to adequately mix wastewater treatment plant's effluent into the receiving water body.

Discharge - an exit flow pattern from a higher pressure toward a lower pressure. The addition, introduction, leaking, spilling or emitting of any pollutant to waters of the State or the placing of any pollutant in a location where it is likely to pollute.

Disposal System - a system for disposing of wastes, either by surface or underground methods, and includes treatment works, disposal wells, and other systems.

Dissolved Oxygen (DO) - the amount of oxygen dissolved in liquid. Quantities are usually expressed as milligrams per liter (mg/l) or parts per million (ppm).

DNR - the Department of Natural Resources.

EDU – see Equivalent Dwelling Unit

Effluent - the outflow of waste into the waters of the State, whether treated or untreated, from an industrial process, holding tank, pond, sewer, or other point source.

Effluent Limitations - any restrictions or prohibitions established under State or Federal Law including, but not limited to, parameters for toxic and nontoxic discharges, standards of performance for new sources, or ocean discharge criteria. The restrictions or prohibitions shall specify quantities, rates, and concentrations of chemical, physical, biological, and other constituents that are discharged into State waters.

Effluent Limited Waters - waters of the State which the WRA has identified as those in which Best Practical Control Technology Currently Available for industrial discharges and secondary treatment for sewerage discharges is sufficiently stringent to maintain applicable water quality standards.

ENR - Enhanced Nutrient Removal – A wastewater treatment process that utilizes physical, chemical, and biological processes to remove total nitrogen in the final effluent to 3 mg/l and total phosphorus to 0.3 mg/l. Considered to be the practical limit of technology that new plants can achieve in nutrient reduction.

Environmental Impact - an impelling or compelling effect upon the environment.

EPA - the United States Environmental Protection Agency.

Equivalent Dwelling Unit - An "equivalent dwelling unit" (EDU) is used to describe the size of the systems in addition to average daily flow. An EDU is equal to an average daily flow of 250 gallons per day (gpd). (Note that for 'capacity remaining' planning purposes only, the County's wastewater system uses 200 gpd per dwelling as actual data suggests this is a more realistic number for a vacuum collection system. However for all other purposes, such as design, the County's system continues to use the EDU = 250 gpd value. Some incorporated towns have adopted an EDU = 200 gpd through the creation of a sewerage capacity management plan.)

Estuary/Estuarine - semi-enclosed coastal body of water having a free connection with the open sea and within which the seawater is measurably diluted with fresh water deriving from land drainage.

Evapotranspiration System - a means of wastewater disposal in localities where site conditions preclude soil absorption due to seasonal high groundwater. This method consists of evaporation (the loss of water vapor from land or water body surfaces to the air) and transpiration (the net movement of soil water through plants to the air).

Existing Development – a property where physical improvements have been made to the real property and which is typically occupied by a residence or business. A platted subdivision, which may have been grandfathered from current zoning regulations, but on which little if any physical improvements have been made, would not be considered an existing development if little other physical improvements had been made to the property.

Existing Service Area - that area that is currently served with water and/or sewer.

Facilities Plan - the initial phase (Step 1) in implementing federally aided construction of individual or central sewerage collection, treatment and disposal facilities under the now defunct EPA Construction Grants Program. A facilities plan study determines the most cost-effective method of providing adequate sewerage facilities in an area for preparation of design plans and specifications (Step 2) and construction (Step 3).

Fecal coliform - the portion of the coliform group which is present in the gut or the feces of warm-blooded animals. It generally includes organisms which are capable of producing gas from lactose broth in a suitable culture medium within 24 hours at 44.5^{o} +/- $.5^{o}$C.

Federal Water Pollution Control Act, as amended - the Federal Water Pollution Control Act Amendments of 1972 and 1977, or amendments thereto (codified as Title 33, U.S.C.).

Final Planning Stages - a work or works of community water supply and community sewerage system for which contract plans and specifications have been completed.

Fish - aquatic vertebrates which have bony skeletons and are covered by dermal scales, usually have spindle-shaped bodies, and swim by fins and breathe by gills.

Five-Year Period - five years following the date of adoption of the County Plan, its amendment, or revision by the County.

Formation - any sedimentary bed or consecutive series of beds sufficiently homogeneous or distinctive to be a unit.

gpd - gallons per day

gpm - gallons per minute

Groundwater - underground waters in a zone of saturation.

Groundwater monitoring - any sampling or observation conducted on groundwater.

Growth Area Plans – Community plans developed by the County's Planning Department in conjunction with Citizen Advisory Committees to establish specific growth management strategies for areas were growth should occur. These plans seek to compliment and conform to the 'Visions' of the 1992 Maryland Economic Growth, Resource Protection and Planning Act. The County has identified six growth areas; Stevensville, Chester, Kent Narrows, Grasonville, Queenstown and Centreville.

High water table - the seasonal high level of the groundwater in relation to the ground surface, typically in February, March, and April.

Hydraulic head - a means of expressing the resistance to pressure transmitted by a liquid in a column (such as water in a pipe).

Immediate Priority - a work or works of community water supply and community sewerage system for which the beginning of construction is scheduled to start within two years following the date of adoption of the County Plan, its amendment, or revision by the County.

Impacted - the force of impression of one thing on another.

Individual Sewerage System - a single system of sewers and piping, treatment tanks, or other facilities serving only a single lot and disposing of sewerage 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.

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.

Industrial waste - any liquid, gaseous, solid or other waste substance or combination thereof resulting from any process of industry, manufacturing, trade or business, or from the development of any natural resource including agriculture.

Infiltration - the water entering a sewer system and service connections from the ground, through such means as, but not limited to, defective pipes, pipe joints, connections, or manhole walls. Infiltration does not include, and is distinguished from, inflow.

Inflow - water improperly discharged into a sewer system from such sources as (but not limited to) roof leaders; cell, yard, and area drains; foundation drains; cooling water discharges; drains from springs and swampy areas; manhole covers; cross connections from storm sewers and combined sewers; catch basins; storm waters; surface run-off; street wash waters, or drainage. Inflow does not include, and is distinguished from, infiltration.

Infill Development – the development of vacant lands (usually individual lots or left over properties) in areas where the majority of lots or parcels are already developed, or the build out of existing vacant lots in designated sewer problem areas. To be distinguished from **Proposed Development** as the areas in question are typically already largely developed.

Infiltration/Inflow (I and I) - the total quantity of water from both infiltration and inflow without distinguishing the source. These two sources can significantly reduce the effectiveness of a sewer system as it is forced to convey and treat water unnecessarily.

Influent - the inflow of water whether treated or untreated, from another point source such as a collection system.

Innovative On-site Sewerage Disposal System - those wastewater systems that are not classified as conventional or alternative as they have percolation rates in excess of those which fall into the alternative category. Innovative systems can be used only to rectify existing failed systems or for new development for which a conventional system was granted approval.

Interconnection - where two or more objects or conditions blend or join together.

Intrusion - forcible entry. Example, salt-water intrusion into a fresh water aquifer.

KN/S/G - Kent Narrows/Stevensville/Grasonville Wastewater Treatment Plant.

Land disposal - discharging sewerage effluent into the groundwaters of the State, as opposed to into surface waters of the State.

Lateral - the sewer service connecting a particular property to the sewer main.

Lot - synonymous with parcel; the area contained within the boundary lines of a plat as recognized by the Maryland Department of Assessments and Taxation as property lines defining one lot.

Low-density belt - a land area with low-density zoning placed to separate two areas with higher density zoning.

Marina Facility - a dock, wharf, or basin providing mooring for boats which may contain on-board toilet facilities, operated under public or private ownership, either free or on a fee basis for the convenience of the public or club membership.

Maximum (or Max) Flow - the greatest hourly flow that would normally occur.

Maximum Daily Flow - two times the average daily flow. Typically measured as gallons per day.

MDE - the Maryland Department of the Environment.

Mgd - million gallons per day.

mpn – 'most probable number'. Statistical measurement used to count bacteria in wastewater.

Multiuse Sewerage System - a single system privately owned and operated serving a single lot under private or collective ownership and serving a group of users for the collection and disposal of sewerage or industrial wastes of a liquid nature, in capacities of 5,000 gpd or more. A multiuse sewerage system having a treatment capacity of less than 5,000 gpd shall, for regulatory purposes, be considered an individual sewerage system.

Multi-Use Water Supply System - facilities privately owned and operated utilizing a source of ground or surface water to supply a group of individuals on a single lot and having a capacity of 5,000 gpd or more. A multiuse water supply system having a capacity of less than 5,000 gpd shall, for regulatory purposes, be considered an individual water supply system.

Municipal Water System - A series of wells, treatment plants, and storage facilities used to supply potable water, and sometimes fire flow, through a distribution-piping network. A central system is typically owned and operated by the County or municipality, and serves all, or a portion, of the surrounding population.

Municipal Sewer System - A series of treatment plant components, disposal facilities, and collection piping, typically owned and operated by the County or municipality, that serves all, or a portion, of the surrounding population.

National Pollutant Discharge Elimination System (NPDES) - the national system for the issuance of permits as designated by the 1972 amendments to the Federal Water Pollution Control Act.

NPDES application - the uniform national forms for application for an NPDES permit.

NPDES permit - the permit issued under the Federal Water Pollution Control Act, as amended.

NPDES reporting form - the uniform national forms for reporting data and information pursuant to monitoring and other conditions of the NPDES permit.

Natural or **naturally occurring values** - the following values applicable to all the waters of the State:

(a) those water quality values that exist unaffected by, or unaffected as a consequence of, any water use by any person;

(b) those water quality values which exist unaffected by the discharge, or indirect deposit of, any solid, liquid or gaseous substance by any person; or

(c) any other water quality values which represent conditions that the MDE by its rules and regulations defines as natural. For the purposes of this definition the following conditions shall be considered as natural: infestations of water milfoil, Myriophyllum spicatum; infestations of water chestnut, Trapa natans; the presence of sea lettuce, Ulva Lactuca; and the presence of sea nettles, Aurelia sp.

New Development – see Proposed Development

Nitrates - the final oxidized state of nitrogen, exists as a salt, usually in solution when in water. Chemical symbol = NO_3^-. It often serves as an indicator of pollution and can cause methemoglobinemia or "blue baby's disease."

Non-Point Source - pollution originating from land run off where no specific outfall or "point source" can be identified.

Nutrients - those parameters or ingredients that promote growth. In wastewater, they can lead to unwanted or excessive growth such as algae blooms.

Nutrient loadings - the limits set on nutrients.

Offshore facility - any installation of any kind located in, on, or under any of the navigable waters within the State other than a vessel.

Off-site – facilities, or other components, that are beyond the property lines of a particular parcel, typically in road rights of way, or County owned properties.

On-Site - facilities, or other components, that are within the property lines of a particular parcel.

Onshore facility - any installation of any kind located in, on or under any land within the State.

Operator - that person or persons with responsibility for the management and performance of each water or wastewater facility.

Other aquatic life - all organisms, other than fish, which grow in, live in, or frequent water.

Other waste - means garbage, refuse, wood, sawdust, shavings, bark, sand, lime, cinders, ashes, offal, oil, tar, dyestuffs, acids, chemical, and all discarded substances other than sewerage or industrial waste.

Outfall - the pipe from the wastewater treatment plant that disposes of treated water into the receiving body of water.

Parcel - the area contained within the boundary lines of a plat as recognized by the Maryland Department of Assessments and Taxation as property lines defining one lot.

ppm - parts per million

Peak Flow - a rate of flow over sufficient length of time to adversely affect the detention time of treatment units or the flow characteristics of conduits (Maryland Design Manual).

Peak Daily Flow - 3.5 times the average daily flow.

Permeable - having pores or openings that permit liquids to pass through.

Permeability - the capability of a rock, aquifer, or confining bed to transmit water or gases (air).

Point of discharge - that location in or adjacent to a body of water at which any liquid, solid or gaseous substances are discharged or deposited.

Point Source - any discernible, confined and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are, or may be, discharged.

Pollutant - any wastes or wastewaters discharged from any publicly owned treatment works or industrial source and all other liquid, gaseous, solid or other substances which pollute any waters of this State.

Pollution - every contamination or other alteration of the physical, chemical, or biological properties of any waters of the State, including change in temperature, taste, color, turbidity, or odor of the waters; or the discharge or deposit of any organic matter, harmful organism, liquid, gaseous, solid, radioactive, or other substance into any waters of the State as will render the waters harmful, detrimental, or injurious to public health, safety, or welfare, domestic, commercial, industrial, agricultural, recreational, other legitimate beneficial uses, or livestock, wild animals, birds, fish or other aquatic life.

Potable water - water that is free from impurities in amounts sufficient to cause disease or harmful physiological effects and which conforms with COMAR 26.04.01 Quality of Drinking Water in Maryland.

Proposed Development – a project that intends to improve currently vacant lands by the construction of some form of residential, commercial, or institutional use. The infill of vacant lots or parcels within a largely developed subdivision or area would not be considered a proposed development.

Publicly owned treatment works - any facility for the treatment of pollutants owned by the State or any political subdivision thereof, municipality, or other public entity.

Public Health Projects – projects that have been documented by the Environmental Health Department with sewer and/or water service problems that cannot be corrected with individual on-site systems.

PWA - Public Works Agreement - the agreement between the County and a developer detailing the obligations of each party.

Receiving water - surface waters of the State into which wastes or wastewaters are, or may be, discharged.

Reclaimed Water – a standard for wastewater effluent that meets a 10 mg/l BOD5, 10 mg/l TSS, and a 3 mpn fecal coliform.

Remodel - the complete reconstructing or relocation of a whole plumbing system to another part of a building, per the Maryland Water Conservation Plumbing Fixtures Act.

Sanitary Commission - County Commissioners of Queen Anne's County.

Sanitary District - division of an area or geographical unit for the purpose of providing water and/or sewer service. Queen Anne's County is considered a Sanitary District which may be divided up into smaller sections and each considered a subdistrict.

Schedule of Compliance - a schedule of remedial measures including an enforceable sequence of actions or operations leading to compliance with the effluent limitation or water quality standard as specified by an order or permit requirement of the Environmental Protection Agency.

Secondary Treatment - the treatment of sewerage to produce effluent equal to or better than the following criteria:

(a) Five-day biochemical oxygen demand (BOD_5):

30 mg/l - average for a 30-day period

45 mg/l - average for a 7-day period

(b) Total suspended solids (SS):

30 mg/l - average for a 30-day period*

45 mg/l - average for a 7-day period

*This has been amended to 90 mg/l for lagoon discharges, only, where applicable.

(c) Bacterial Control:

As required to meet water quality standards, typically as measured by a count of fecal coliform within 100 milliliters of no more 200 mpn for typical surface water discharges, or no more than 14 mpn to discharges to shellfish waters.

(d) Total chlorine residual:

non detectible

Sewer – a pipe, or drain, or other conveyance system used to carry sewerage.

Sewerage – any human or animal excretion, street wash, domestic waste, or industrial waste.

Sewerage disposal - the act or method of getting rid of sewerage.

Sewerage treatment plant - a facility that cleans raw sewerage water to a state that allows the water to be discharged into waters of the State.

Sewerage Service Area - that area served by, or capable of being served by a system of sanitary sewers connected to a treatment plant, or in a very large system, sub-areas of sewerage service as delineated by the County.

Shared Facility – a water or sewerage system which serves more than one lot of land with any portion of the system located on a lot or parcel owned in common by the users or the controlling authority.

Shellfish harvesting waters - waters that are actual or potential areas for the harvesting of shellfish including oysters, soft shell clams and brackish water clams.

Silt loam - a soil texture description that consists of a mixture of silt, sand, and clay and where silt is the predominant soil particle size in the mixture.

State - the State of Maryland.

State Discharge Permit - a permit to discharge pollutants into waters of the State, issued by the Administration pursuant to Section 8-1413 of The Natural Resources Article, annotated Code of Maryland (1974 Volume) and Section 402 of the Federal Water Pollution Control Act Amendments, of 1972, or amendments thereto.

Stream flow - the nontidal water movement that occurs in a natural channel.

Sub-basin - one of the 19 watershed areas delineated by the Maryland Department of the

Environment, and comprising, in sum total, the surface waters of the State.

Sub-crop - the part of an unconsolidated deposit directly beneath another geologically distinctive unit. Example: the Aquia aquifer sub-crops beneath the Chesapeake Bay bottom sediments.

TDH - Total Dynamic Head - a criterion used to rate pumps. Specifically a measure of the total energy imparted to the fluid by the pump, usually stated in the number of feet a column of water would be elevated.

Ten-Year Period - the 10 years following the adoption of the Plan, its amendment or revision by the County.

Terminus - the end of a transporting line or pipe.

Total Suspended Solids – A measure of insoluble or particulate matter in wastewater, typically measured in mg/l or ppm.

Transmission line - the pipe that transports raw sewerage from a collection sub-area to the treatment plant.

Transmissivity (of an aquifer) - the rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of the aquifer under a unit hydraulic gradient.

Treatment works - any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewerage or industrial wastes of a liquid nature including intercepting sewers, outfall sewers, sewerage collection systems, pumping, power, and other equipment, and their appurtenances; and any works including site acquisition of the land that will be an integral part of the treatment process or is used for ultimate disposal of residues resulting from such treatment. This term also means any method or system for preventing, abating, reducing, storing, treating, separating, or disposing of municipal waste, including stormwater runoff, or industrial waste, including waste in combined stormwater and sanitary sewer systems.

TSS – Refer to **Total Suspended Solids**

Unconditional Final Approval – As it regards a development review process, a developer first achieves conditional final approval once the project has met all applicable planning, zoning, and utility standards. Typical conditions being the full payment of any fees, the placement of sureties for necessary work, obtaining any necessary easements or other similar land issues, and the issuance of any and all applicable permits. Once all these conditions are met, the site receives its full and final approval as evidenced by the signatures of the Planning Commission and/or Planning Department.

Unconfined aquifer - an aquifer not bounded above by a bed of distinctly lower permeability than that of the aquifer itself and containing groundwater under pressure approximately equal to that of the atmosphere. The term is synonymous with the term “water table aquifer.”

Under Construction - a work or works of community water supply and community sewerage systems where actual work is progressing or where a notice to proceed with a contract for such work has been let as of the adoption date of the Plan, its amendment or revision. As it regards private developers, in the context of being a milestone to satisfy certain policies and procedures contained herein, Under Construction shall be defined as having unconditional Planning Commission or Planning Department approval and having been issued a grading permit. Synonymous with Begin Construction.

Underground waters (Groundwater) - water below the surface of the ground.

Underlain - pertaining to something laid, lying or placed underneath.

Vessel - every watercraft or other artificial contrivance used or capable of being used, as a means of transportation on the waters of the State.

Waste load allocation - the identification and allotment by the MDE, as necessary to achieve compliance with Water Quality Standards, of quantities of residual wastes which may be discharged from point sources. This allotment shall include consideration of non-point sources.

Wastes - industrial wastes and all other liquid, gaseous, solid or other substances that will pollute any waters of the State.

Wastewaters - any liquid waste substance derived from industrial, chemical, municipal, residential, agricultural, recreational or other operations or establishments, and any other liquid waste substance containing liquid, gaseous, or solid matter and having characteristics that will pollute any waters of the State.

Water class unit - a distinct portion of a sub basin.

Water quality limited waters - shellfish waters and other waters of the State for which Best

Practicable Control Technology Currently Available for industrial discharges and secondary treatment for sewerage discharges is not sufficiently stringent to maintain applicable water quality standards.

Watercourse - a specific body or channel of water that is part of the waters of the State.

Waters - the liquid substance which is derived from a ground water source, or a surface source, or a piped supply, or any combination thereof, which will be discharged, without change in quality, into the waters of the State, with the exception of stormwater runoff.

Waters of the State - includes both surface and underground waters within the boundaries of the State subject to its jurisdiction, including that portion of the Atlantic Ocean within the boundaries of the State, the Chesapeake Bay and its tributaries, and all ponds, lakes, rivers, streams, public ditches, tax ditches, and public drainage systems within the State, other than those designed and used to collect, convey or dispose of sanitary sewerage. The flood plain of free-flowing waters determined by DNR-WRA on the basis of the 100-year flood frequency is included as waters of the State.

Water Treatment Plant - the facility that converts raw well water to potable water.

Withdrawing - the act of removing something (such as water) from where it was previously deposited.

WTP - water treatment plant for producing potable water.

WWTP - wastewater treatment plant for cleaning sewerage.

Zero Discharge Policy - the elimination of all point source pollutant discharges from wastewater treatment facilities to surface waters.

FINANCIAL MANAGEMENT ISSUES

Introduction

There are five entities that provide water and sewer service to the residents of Queen Anne's County. They are the four incorporated towns that provide sewer service (Queenstown, Centreville, Church Hill, and Sudlersville) and water service (Queenstown and Centreville), and the County's Sanitary District, a division of the Department of Public Works, which serves the unincorporated areas. Current service is restricted to an area that parallels US Rt 50/301 from Stevensville to Grasonville.

The towns fund their sanitary operations though a mixture of user rates and, when necessary, general fund dollars generated by property taxes. The County's Sanitary District is an enterprise account, and as such is solely funded by user fees. The following information only refers to the County's operations.

Fees and Exactions

The County's Sanitary District uses four methods to generate the funds, or to provide the service, necessary to operate:

User Fees

These fees cover the day-to-day operational costs of the system. Each property served, or has service available, pays a quarterly or monthly fee. Those properties that are metered pay a fee based in part on actual usage. Those properties that are un-metered pay a flat fee based on the type of use.

Allocation Fees

These fees, sometimes referred to as tap fees, are one-time fees that act to compensate the Sanitary District for treatment capacity. These fees are deposited in their own fund to be used to pay the debt service on the treatment facilities.

Benefit Assessments

These fees are typically used to reimburse the Sanitary District for costs of extending service to new service areas, typically existing residential subdivisions. Currently there are three active assessments, Cloverfields, Bay City, and Prospect.

Developer Exactions

These are fees paid by a developer to the Sanitary District to upgrade a particular component, but more often represent actual physical improvements to the system (i.e. upgrading pipe sizes) in order to serve their proposed development.

Water Allocation Rebate Program

While all the County's growth areas are served with sewer service, only approximately 50% of the growth areas are presently served with water. Given the lack of adequate enterprise funds to fund these extensions, developers are required to extend the water mains at their cost to serve their projects. In recognition of the fact that the mains may benefit other intervening property owners, the Sanitary District offers a rebate program within the Public Works Agreement. The source of the rebate funds are generated by a portion of any allocation fees collected by the Sanitary District from other properties that connect to the water main constructed by the developer. The typical provisions of the rebate program are one half of any allocation fee collected for up to 10 years from the water main construction are rebated to the developer who constructed the line. The maximum amount of the rebate is 50% of the cost of the water line's construction.

Water and Sewer Allocation Financing Program

The Sanitary District will finance, at 7% for up to 7 years, sewer and water allocation fees for any commercial project. In addition, any improved property, regardless of type of use, will be offered water allocation financing.

Bond Indebtedness

With the exception of the pending Water Quality Revolving Loan Fund for the new Kent Island Wastewater plant, the following paragraph lists the bond indebtedness of the Sanitary District.

Kent Island Wastewater Plant Funding

The new 3.0 Mgd wastewater plant is funded by four sources. The total project cost is estimated to be $32.3 million with the actual construction cost of $26.4 million.

BNR Grant (23.2% of Project Cost) – This State of Maryland grant pays for 50% of the cost of any eligible treatment components. To be eligible, the component must be active in reducing nutrient discharges to 8 mg/l for nitrogen, and 2 mg/l for phosphorus.

ENR Grant (21.4% of Project Cost) – This State of Maryland grant, also known as the Bay Restoration Fund, pays for 100% of any eligible treatment components. To be eligible, the component must be active in reducing nutrient discharges to 3 mg/l for nitrogen, and 0.3 mg/l for phosphorus.

EPA Grant (2.3% of Project Cost) – This is a federal grant that can be applied to any treatment components.

WQRLF Loan (53.1% of Project Cost) – This is a State of Maryland Loan for the cost of the balance of the project. Allocation Fees should predominantly pay for the debt service for this loan although some revenue may be generated from user fees if needed.

KNSG Sanitary District - Bond Indebtedness Schedule

Bond Issuer	Rate	Maturity	Original Amount	Balance[1]	Type	Funded By
1980 State of Maryland	6.100%	2010	$ 500,000.00	$ 209,457.00	Sewer Collection System	Sewer User Fees
1992 Sanitary Bonds	6.375%	2012	2,350,000.00	Re-financed[2]	Cloverfields Water	Benefit Assessment
1994 Sanitary Bonds	7.000%	2013	1,200,000.00	Re-financed[2]	Bay City Water	Benefit Assessment
1995 Refinance Bonds	4.700%	2009	625,000.00	320,000.00	Stevensville Water Plant	Water User Fees
2002 Refinance Bonds	5.000%	2013	3,385,000.00	3,220,000.00	Bay City & Cloverfields Water	Benefit Assessment
1992 Maryland Water Quality	5.090%	2013	4,282,209.00	1,926,994.00	Cloverfields Sewer	Benefit Assessment
1992 Maryland Water Quality	4.410%	2013	1,121,377.00	724,375.00	Sewer Digesters	Sewer User Fees
1994 Maryland Water Quality	3.500%	2015	3,476,961.00	2,383,742.00	Bay City Sewer	Benefit Assessment
1996 NationsBank	5.600%	2010	200,000.00	107,596.00	Stevensville WTP - 2nd Unit	Water User Fees
1995 Queenstown Bank	8.130%	2015	435,000.00	315,213.00	Cloverfields Hook-ups	Benefit Assessment
1995 Queenstown Bank	7.900%	2015	205,000.00	157,876.00	Bay City Hook-ups	Benefit Assessment
			$ 17,780,547.00	$ 9,365,253.00		

[1] As of June 30, 2004

[2] Re-financed as part of 2002 Bonds

APPENDIX I: WATER AND SEWERAGE ALLOCATION POLICY

I. Purpose

A. The Environment Article, Title 9, Subtitle 5, of the Annotated Code of Maryland, enables County Comprehensive Water and Sewerage Plans to provide for the orderly expansion of public water supply and sewer systems in a manner consistent with applicable County Comprehensive Plans. The statutory authority and regulatory requirements, as codified in the Code of Maryland Regulations 26.03.03, provide the basis for the establishment of allocation policies for water supply and sewerage services.

B. Further, the Queen Anne's County Sanitary Commission recognizes the value of such a policy and that this water and sewerage allocation policy is adopted in the best interest of the County. The Water and Sewerage Allocation Policy presented herein is designed to:

1. Provide for public knowledge and awareness regarding available capacity in public water and wastewater facilities;

2. Establish a procedure for equitable allocation of available capacity for public water and wastewater systems in such a manner as to protect the public health, safety, welfare, and water quality of the County;

3. Responsibly plan for the future growth of Queen Anne's County in accordance with the County's land use and growth management goals and objectives, as established in the Comprehensive Plan and associated ordinances;

4. Wisely manage Queen Anne's County's water supply and sewerage treatment resources and to prevent the depletion of underlying water-bearing aquifers or the over-commitment of available sewer treatment capacity;

5. To reserve 500,000 gallons per day of the pending 1 million gallon wastewater capacity expansion to begin serving the communities with public health concerns as identified in the Comprehensive Water and Sewerage Plan, this reserve is not removable without a 4/5 vote of the Queen Anne's County Sanitary Commission;

6. To reserve 200,000 gallons per day of the pending 1 million gallon wastewater capacity expansion to provide for sufficient sewer treatment capacity reservations for properties within the growth areas designated for commercial and economic growth of the county, this reserve is not removable without a 4/5 vote of the Queen Anne's County Sanitary Commission;

7. The remaining new 300,000 gallons of capacity is designated for current commitments, and for growth off Kent Island. (Note this restriction of no new residential growth on Kent Island does not apply to minor subdivisions, commercial apartments, or redevelopment.) Existing commitments are those shown within the attached Schedule A.

8. Provide for sufficient sewer treatment capacity reservations for public service uses and affordable housing projects;

9. Minimize the use of private wells in designated growth areas that are served or planned to be served with a public water supply system;

10. Establish a method by which available capacity is calculated and allocated, and to assure that adequate capacity is available over designated time periods;

11. Insure that sufficient revenue is available to make payment in a cost efficient manner for bond indebtedness resulting from the construction of public water and sewerage systems; and

12. Provide for the administrative procedures, and guidance, for the allocation of water and sewer service in a reasonable, fair, and adequate manner.

II. Applicability

A. This policy applies to all water supply and sewerage collection systems within the Kent Narrows/Stevensville/Grasonville (KN/S/G) water and wastewater service area that are owned, operated, and maintained by the Queen Anne's County Sanitary Commission.

B. The procedures of this policy are applicable to all applications for sewerage and/or water allocation, except for the following types of applications which will receive sewerage and/or water allocation administratively from the appropriate staff. Staff has the option to refer administrative allocation requests to the Sanitary Commission if deemed to be in the best interest of the County.

   1. Vacant single-family lots of record located within the S-1 sewerage and/or W-1 water service area.

   2. Expansions of existing businesses within the S-1 sewerage and/or W-1 water service area by an allocated flow of up to 1,000 gpd.

   3. Residential subdivisions within the S-1 sewerage and/or W-1 water service area consisting of five (5) or fewer dwellings.

4. Minor amendments to major residential subdivisions or other residential developments (minor being defined as 5 or fewer dwellings).

III. Allocation of Available Sewerage Capacity

A. An allocation may be made only if the necessary treatment and conveyance facilities are in-place, or under construction, or are programmed for construction and have an identified funding source, within the first two years of the six-year County Capital Improvement Plan.

B. The Sanitary Commission has determined that it is in the best interest of the citizens of Queen Anne's County that sewerage treatment allocations are targeted towards specific properties and uses over designated time periods consistent with the Comprehensive Water and Sewerage Plan. These allocation targets are beneficial to the County and assure that the County does not over-allocate its wastewater treatment resource. These allocation targets are established as part of this policy and contained in the attached Schedule A for the KN/S/G wastewater treatment plant.

C. On or about October 1 of each calendar year, the directors of the Queen Anne's County Departments of Public Works, Planning and Zoning, and the Environmental Health Division of the County Health Department may submit a recommendation to the Sanitary Commission to amend the allocation targets as shown in Schedule A. The recommendations may also provide additional data concerning the available treatment capacity for the KN/S/G system. These recommendations should be made in conformance with existing County ordinances and regulations and provide for the continued health, safety, welfare, and comfort of the citizens of Queen Anne's County. Upon receipt of these recommendations, the Sanitary Commission may determine if an amendment to this Water and Sewerage Allocation Policy and/or the Comprehensive Water and Sewerage Plan is in the best interest of the citizens of Queen Anne's County. If an amendment is warranted, the County Commissioners will conduct a public hearing on the matter as part of the County's regular Comprehensive Water and Sewerage Plan amendment cycle.

D. The allocation year shall be the calendar year. It has been decided to allocate the wastewater treatment capacity at a rate not greater than 50,000 gpd per year. The annual gallonage limitation proposed is intended to provide for wastewater treatment capacity for the next 20 years.

E. It is recognized that this policy will need to be modified to accommodate the serving of Public Health Concern areas. It is the intent to serve all the existing homes as soon as sewer service becomes available. However it is also the intent to utilize this policy as one tool to moderate the rate of build-out of the vacant lots.

F. In instances where a non-residential new development connects to public sewer, the Sanitary District may finance the allocation fee over a period not to exceed seven (7) years. An annual finance charge of seven percent (7%) will be applied to the outstanding balance of the allocation charge over the life of the loan up to the seven-year maximum. Payments towards this debt will be included in the normal utility billing. A project with commercial apartments shall be considered non-residential.

IV. Allocation of Available Water Capacity

A. An allocation shall be required if facilities are in-place and capacity is available. An allocation may be required provided that additional adequate facilities are guaranteed for construction by means of an acceptable developer surety and a Public Works Agreement.

B. Existing vacant lots of record shall be allocated capacity and shall be required to connect to the public system when development occurs on the property, provided facilities are in-place and capacity is available.

C. Existing uses within the public water service area currently served with individual systems are required to connect to the public system when the individual system fails, provided facilities are in-place and capacity is available.

D. In instances where a non-residential new developed property elects, or is required, to connect to public water, the Sanitary District may finance the allocation fee over a period not to exceed seven (7) years. An annual finance charge of seven percent (7%) will be applied to the outstanding balance of the allocation charge over the life of the loan up to the seven-year maximum. Payments towards this debt will be included in the normal utility billing.

E. In instances where an improved property of any nature elects, or is required, to connect to public water, the Sanitary District may finance the allocation fee over a period not to exceed seven (7) years. An annual finance charge of seven percent (7%) will be applied to the outstanding balance of the allocation charge over the life of the loan up to the seven-year maximum. Payments towards this debt will be included in the normal utility billing.

V. Allocation Process

A. Properties within the S-6 sewerage, and/or W-6 water, service areas (No Planned Service).

1. No allocation will be granted to S-6 and W-6 service areas. Properties in these service areas must be upgraded via a Comprehensive Water and Sewerage Plan amendment.

B. Properties within the S-5 sewerage, and/or W-5 water, service areas

1. No allocation will be granted to S-5 and W-5 service areas. Properties in these service areas must be upgraded via a Comprehensive Water and Sewerage Plan amendment.

C. Properties within the S-4 sewerage, and/or W-4 water, service areas

1. No allocation will be granted to S-4 and W-4 service areas. Properties in these service areas must be upgraded via a Comprehensive Water and Sewerage Plan amendment. Refer to Chapter 5 of the Plan for more details.

D. Properties within the S-3 sewerage, and/or W-3 water, service areas

1. No allocation will be granted to S-3 and W-3 service areas. Properties in these service areas must be upgraded via a Comprehensive Water and Sewerage Plan amendment. Refer to Chapter 5 of the Plan for more details

E. Properties within the S-1 and S-2 sewerage, and/or W-1 and W-2 water, service areas

1. An allocation shall be required for any residential, commercial, industrial, institutional, or public service project within a designated service area that requires either public water or public sewer service or both. Areas available for allocation shall be designated by a "W-1 or W-2" category for water service and an "S-1 or S-2" category for sewer service as shown in the Comprehensive Water and Sewerage Plan, and its accompanying maps.

2. The applicant shall submit an application for allocation to the Sanitary District. When applicable, the allocation application shall be submitted prior to submission of preliminary site or subdivision plans to the Department of Planning and Zoning. The standard "Water & Sewerage Allocation Application" form attached to this policy shall be used for all applications for allocation. Refer to the instructions at the end of this policy.

3. The Sanitary Commission, or their designee, is authorized and shall approve allocations for water supply and/or sewerage service in conformance with this policy, provided that all conditions subject to the applicant have been satisfied.

4. Upon approval of the allocation the applicant shall make a ten percent (10%) deposit on the total cost of the allocation within thirty (30) calendar days or prior to submission of a plan to the Department of Planning and Zoning for site plan or final subdivision review, whichever occurs first. Failure by the applicant to make the deposit within the specified timeframe will void the allocation request. For projects involving phases, the deposit amount will be based on the total demands of the entire build-out of the project. The submission of the deposit does not 'lock-in' the rate.

5. The balance of the allocation fees for each phase of the project will be due prior to unconditional site plan, or final subdivision approval, or concurrently with the execution of the Public Works Agreement, whichever occurs first (unless the financing option is available and is selected).

6. Rates to be paid for the allocation will be those in effect at the time of payment in full, or in the case of financing, the rate at the time of the execution of the Public Works Agreement.

7. Refer to the allocation application instructions attached at the end of this policy for a more detailed procedure.

VI. Time Limit on Allocation

A. After a deposit for allocation is received by the Sanitary District, the applicant will have twenty-four (24) months from that date to obtain <u>conditional</u> final site plan or subdivision approval.

B. The applicant then has three (3) months to execute a Public Works Agreement with final payment (if not financing) of the allocation necessary to support at least the first phase of the project.

C. The applicant then has eight (8) months to begin construction of the project.

D. Should the applicant be unable to meet the above timeframes, the allocation granted may be recaptured according to the provisions of Item IX of this policy. In addition, failure to begin construction within three (3) years of a Plan amendment will place the amendment and its associated allocation at risk. Refer to section 5.16.3.2 of the Plan for more information.

E. The County Commissioners may extend a map amendment or project approval only on a showing by the applicant that the failure to begin construction within three (3) years from the date of amendment approval is not the result of the inaction or delay by the applicant. Extensions of time may be granted for a period not exceeding eighteen (18) months. Refer to section 5.16.3.3 of the Plan for more information.

VII. Plan Consistency and Allocation

A. Site plan or final subdivision approval shall be generally consistent with the approved concept or sketch plan for the project and, when applicable, an Adequate Public Facilities Study. Allocation deviations may be denied if the Sanitary Commission or their designee determines that it is not consistent with the objectives of this policy or the Comprehensive Water and Sewerage Plan.

VIII. Alteration and Transfer of Allocation

A. A business allocation may be altered from a single 500-gpd allocation to two (2) 250-gpd business allocations or four (4) 125-gpd business allocations, or any combination thereof. A letter requesting the revision must be sent to the Director of Public Works with reasons given for the necessity of the alteration. No additional allocation fees will be required. Such revisions will be administered by the Department of Public Works.

B. A business allocation may be reduced from a single 500-gpd allocation to a single business 250-gpd allocation or from a single 250-gpd business allocation to a single 125-gpd business allocation, or any combination thereof. A letter requesting the revision must be sent to the Director of Public Works with reasons given for the necessity of the alteration. No refund of returned allocation will be made; however, the user fee will be appropriately reduced at the next quarterly billing. Such revisions will be administered by the Department of Public Works.

C. A single dwelling allocation may be converted to a single 250-gpd business allocation (or two 125-gpd small business allocations), or vice-versa.

D. Other alterations of allocation, other than those listed here, may be made by the Director of Public Works on a case-by-case basis.

E. Transfer of allocation is permitted within the same parcel or subdivision, or between two contiguous parcels provided the properties are titled to the same party, and provided there is a minimum 250 gpd for each use or lot after the transfer is complete

IX. Allocation Recapture Provisions

A. Allocation may be recaptured on a voluntary or involuntary basis.

1. Voluntary Relinquishment - If a Public Works Agreement was executed, but all or any part of the allocation was never utilized, a refund of the unused allocation fees paid shall be made upon request in writing to the Director of Public Works. Note that any 'refund' will be made at the rate when paid, not at the rate in effect at the time the refund is made.

2. Involuntary Relinquishment - The Queen Anne's County Sanitary Commission, for any violation of an executed Public Works Agreement, or for any failure to meet construction or policy timetables, shall be empowered to recapture the allocation. The Sanitary Commission may evaluate individual requests for extension of allocation commitment, however if no request is made to the Director of Public Works in writing prior to two weeks of the expiration of the allocation commitment, the commitment may be deemed void.

B. Allocation recaptures shall be processed administratively by the Department of Public Works:

1. When allocation is recaptured, the County shall not repay any user fees paid, or interest accrued on those fees, to the applicant.

2. When an allocation has been granted and paid, and utilized for any period of time, no refund of the allocation fee, interest or user charges will be paid.

3. When an allocation has been granted, paid but was never utilized, the Department of Public Works will make payment to the applicant in an amount equal to the actual amount paid for the allocation.

4. The next quarterly user charge will reflect the requested reduction in allocation.

Schedule A - KNSG Sewer System

Analysis Parameters/References:

1. Residential densities are based on active development proposals or were estimated as 75% of maximum permitted density consistent with historical development trends.

2. Residential demand based on an average daily flow of 200 gallons per day (gpd).

3. Commercial allocation based on an average daily flow of 0.04 gpd per square foot.

4. Comprehensive Water and Sewerage Plan (CWSP) map designations:
   a. S-1: Currently served or holds allocation.
   b. S-2: Service planned in a 1- to 3-year timeframe (2006-2009).
   c. S-3: Service planned in a 4- to 10-year timeframe (2010-2016).
   d. S-4: Service planned in a 11- to 20-year timeframe (2017-2026).
   e. S-5: Service planned beyond 20-year timeframe (+2027).
   f. S-6: No Planned Service

5. Vacant lands designated as S-5 assume a maximum theoretical density of 3.5 dwellings per acre.

6. Sewer treatment capacity target reservations for wet weather and capital projects are deducted from the current programmed treatment expansion from 2 MGD to 3 MGD. Remaining priorities are broken into three categories as outlined below:
   a. Category I - public health concern reservations.
   b. Category II - commercial development reservations.
   c. Category III - infill and active development, and projected development within Stevensville, Chester, Kent Narrows, and Grasonville growth areas.

	GPD
Capacity Remaining as of December 2005:	238,000
Programmed Capacity Expansion Available by 2007:	1,000,000
Wet Weather Reserve:	(100,000)
Capital Project Reserve:	(50,000)
Available Sewer Capacity:	**1,088,000**

KNSG Expansion from 2 MGD to 3 MGD — **1,000,000**

Category	CWSP Map Designation	Development/Property Owner	Tax Map	Parcel	Number of Lots	Floor Area (sq. ft.)	Allocation (gpd)	Total Allocation (gpd)	Estimated Available Capacity (gpd)
									1,088,000
I	S-3	Kent Island Estates - Developed Lots	70		613		122,600		
I	S-3	Kent Island Estates - Vacant Lots	70		513		102,600	225,200	862,800
I	S-3	Romancoke - Developed Lots	76		152		30,400		
I	S-3	Romancoke - Vacant Lots	76		209		41,800	72,200	790,600
I	S-3	Queen Anne Colony - Developed Lots	70		223		44,600		
I	S-3	Queen Anne Colony - Vacant Lots	70		67		13,400	58,000	732,600
I	S-3	Kentmorr - Developed Lots	70		100		20,000		
I	S-3	Kentmorr - Vacant Lots	70		3		600	20,600	712,000
I	S-3	Chesapeake Estates - Developed Lots	63		90		18,000		
I	S-3	Chesapeake Estates - Vacant Lots	63		50		10,000	28,000	684,000
I	S-3	Sunny Isle of Kent - Developed Lots	63		30		6,000		
I	S-3	Sunny Isle of Kent - Vacant Lots	63		62		12,400	18,400	665,600
I	S-3	Batts Neck (Normans) - Developed Lots	63		42		8,400		
I	S-3	Batts Neck (Normans) - Vacant Lots	63		5		1,000	9,400	656,200
I	S-3	Matapeake Estates - Developed Lots	63		40		8,000		
I	S-3	Matapeake Estates - Vacant Lots	63		0		0	8,000	648,200
I	S-3	Tower Gardens - Developed Lots	76		195		39,000		
I	S-3	Tower Gardens - Vacant Lots	76		30		6,000	45,000	603,200
I	S-3	Balance of 500,000 gpd Reserved for Septic System Areas						15,200	588,000
II		Commercial	varies			5,000,000	200,000	200,000	388,000
III		Administrative - Residential (over 20 years)	varies		400		80,000		
II		Administrative - Commercial (over 20 years)	varies			500,000	20,000	100,000	288,000
III	S-2	Four Seasons - Single Family Lots	49		950		190,000		
III	S-2	Four Seasons - Assisted Living	49		88		4,400	194,400	93,600
III	S-3	Walters Property - 63 acres	58	201	168		33,600		
		Walters Property - 61 acres	65	45			-		
		Walters Property - 17 acres	65	46			-	33,600	60,000

Other Potential Beyond 3 Mgd

Category	CWSP Map Designation	Development/Property Owner	Tax Map	Parcel	Number of Lots	Floor Area (sq. ft.)	Allocation (gpd)	Total Allocation (gpd)	Estimated Available Capacity (gpd)
									60,000
I	S-3	Marling Farms & Dominion - Developed Lots	64		510		102,000		
	S-3	Marling Farms & Dominion - Vacant Lots	64		120		24,000	126,000	(66,000)
II		Commercial	varies			362,500	14,500	14,500	(80,500)
III		Administrative - Residential (over 20 years)	varies		400		80,000		
II		Administrative - Commercial (over 20 years)	varies			500,000	20,000	100,000	(180,500)
III	S-5	Hawkins - 37 acres	48	7	130		25,900	25,900	(206,400)
III	S-5	Quinn - 22 acres	48	24, 84	77		15,400	15,400	(221,800)
III	S-5	Price - 10 acres	48	75	35		7,000	7,000	(228,800)
III	S-5	Anderson - 25 acres	58	522	88		17,500	17,500	(246,300)
III	S-5	Ewing - 90 acres	58	40	315		63,000	63,000	(309,300)
III	S-5	Davidson - 95 acres	49	9	333		66,500	66,500	(375,800)
III	S-5	Tanner - 5 acres	57	319	18		3,500	3,500	(379,300)
III	S-5	Jewell - 40 acres	57	5	140		28,000	28,000	(407,300)
III	S-5	Chester Station - 11 acres	57	495	39		7,700	7,700	(415,000)
III	S-5	Lowery - 70 acres	57	43	245		49,000	49,000	(464,000)
III	S-5	Sattelmaier - 80 acres	57	68	280		56,000	56,000	(520,000)
III	S-5	Gardener's Purchase - 11 acres	57	39	39		7,700	7,700	(527,700)

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Queen Anne's County – Sanitary District

WATER & SEWERAGE ALLOCATION APPLICATION

The undersigned hereby makes application under the provisions of the Allocation Policy for the KN/S/G Wastewater & Water Subdistrict. Fill in all applicable blanks.

APPLICANT DATA

Name: ____

Mailing Address: ____

____

Telephone: ____________________ (home) ____________________ (office)

Name of Agent/Engineer: ____________________ Phone: ____________________

PROPERTY DATA

Project Name: ____

Street Address: ______________________________Town: ______________

Tax Map: __________ Parcel: __________ Lot: __________ Other: ______________

Acreage: ____________ Zoning: ____________ Account No.: ____________

Current Master Water and Sewerage Plan Designation: W- __________ S-__________

Existing Use: ____

Existing Allocation: sewer __________ gpd water __________ gpd

PROJECT DATA

Description: ____

____

____

Application is for: sewerage __________ water __________

APPROXIMATE ALLOCATION REQUIRED

Note the following calculation will give only an approximate allocation requirement as it regards commercial uses as some allocation class' flows are rounded up while others are not.

RESIDENTIAL

USE			SEWERAGE	WATER
No. of Dwellings: ___________	x 250 gpd	=	_______ gpd	_______ gpd

COMMERCIAL FLOOR AREAS

USE				SEWERAGE	WATER
Warehouse: _______________	ft2	x 0.03 gpd/ft2	=	_______ gpd	_______ gpd
Manufacturing: ____________	ft2	x 0.03 gpd/ft2	=	_______ gpd	_______ gpd
Retail: __________________	ft2	x 0.05 gpd/ft2	=	_______ gpd	_______ gpd
Office: __________________	ft2	x 0.09 gpd/ft2	=	_______ gpd	_______ gpd
Deli: ____________________	ft2	x 0.25 gpd/ft2	=	_______ gpd	_______ gpd
Restaurant: _______________	ft2	x 0.375 gpd/ft2	=	_______ gpd	_______ gpd
Fast Food: _______________	ft2	x 0.50 gpd/ft2	=	_______ gpd	_______ gpd

OTHER COMMERCIAL

Use: _______________ x _______ gpd = ________ gpd ________ gpd

Use: _______________ x _______ gpd = ________ gpd ________ gpd

Use: _______________ x _______ gpd = ________ gpd ________ gpd

========= =========

SUBTOTAL ________ gpd ________ gpd

Less Existing Allocation ________ gpd ________ gpd

========= =========

TOTAL NEEDED ________ gpd ________ gpd

The above is true and correct to the best of my knowledge:

Signature: ____ Date: __________________

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Allocation Policy Instructions

Introduction

There are three different processes to acquire sewerage and/or water allocation from the Sanitary Commission. Process 1 is if an amendment into the County's Comprehensive Water and Sewerage Plan (Plan) is required. Refer to Section 5.16 of the Plan to determine if the project needs an amendment. Process 2 refers to projects that do not require a Plan amendment. Process 3 refers to those allocation requests that can be addressed administratively. Refer to Section II.B of this Policy to see if the allocation request is classified as administrative.

Review Process 1 – Comprehensive Water and Sewerage Plan Amendment Required

Step 1: When an applicant is interested in developing a project which requires both sewerage and/or water allocation **and** an amendment to the Comprehensive Water and Sewerage Plan, the applicant will first submit a concept site plan or subdivision sketch plan to the Department of Planning and Zoning. Note this process only applies to properties requesting a Plan amendment from S-3/W-3 to S-2/W-2. No allocation will be granted to any properties with a service area designation of S-5/W-5, S-4/W-4 or S-3/W-3. Also note those projects that are required to submit an Adequate Public Facility Study must satisfy that requirement prior to proceeding to this step.

The plans must be submitted in compliance with all pertinent sections of the Zoning Ordinance. All applicable departments will review the plans and the applicant will be presented comments. The project will then be scheduled for Staff Technical Advisory Committee (STAC) review, at which time other County and State agencies will be provided the opportunity to ask questions and discuss items which need to be addressed.

Step 2: After the concept or sketch plans have been reviewed by staff and it has been determined that the plans generally comply with all pertinent regulations and ordinances, the plan will be scheduled for review by the Planning Commission. Scheduling of review of the project by the Planning Commission shall be done in conformance with Zoning Ordinance requirements and the rules of the Planning Commission.

Upon review the Planning Commission shall either approve, approve with conditions, or deny the application for the proposed project. The Planning Commission shall base their decision on the standards of review for concept or subdivision sketch plan as outlined in the Zoning Ordinance. They will also evaluate the project in relationship to consistency with growth issues reflected in the County Comprehensive Plan. If approval is granted the applicant will continue to the next step, while those proposals denied approval would have to revise project plans as deemed necessary by the Planning Commission and resubmit at Step 1.

Step 3: Once the Planning Commission approves the concept or sketch plan, the applicant shall apply for an amendment to the Comprehensive Water and Sewerage Plan (located in Appendix III of the Plan). All fees associated with the amendment application shall be paid at the time of this submission. The project will then be placed on the next Comprehensive Water and Sewerage Plan amendment hearing scheduled. Refer to Chapter 5 of the Comprehensive Water and Sewerage Plan for more information.

Step 4: Once the Comprehensive Water and Sewerage Plan amendment is heard through the public hearing process and is approved, the applicant shall apply for sewer and/or water allocation. Once received the allocation request will be placed on the next regularly scheduled meeting of the Sanitary Commission for consideration.

If the amendment is denied, the applicant may: (1) withdraw the application; or (2) revise the proposed development and resubmit to the Planning Commission; or (3) have the application remain on file for the Sanitary Commission's reconsideration during the next scheduled hearing. If the application remains unapproved after this second hearing, it shall be deemed denied without any further action necessary.

Step 5: If sewerage and/or water allocation application is approved the applicant shall make a ten percent (10%) deposit on the total cost of the allocation within thirty (30) calendar days of County approval of the allocation. If the deposit is not paid within that timeframe, the allocation commitment will be void. For projects involving phases, the ten percent deposit will be based on the flow demands of the entire build out of the project.

Step 6: If the allocation request is granted, the applicant shall then apply for preliminary approval from the Planning Commission and proceed on through the Planning approval process in order to achieve conditional final approval. All final subdivision or site plan approvals given in accordance with this policy shall be conditioned on executing a final Public Works Agreement as prescribed in Step 8.

Step 7: After the Sanitary District receives a deposit for allocation, the applicant will have twenty-four (24) months from that date to obtain conditional final site plan or subdivision approval. Site plan or final subdivision approval must be consistent with concept or sketch plan approval. Any major increase in the project's flow from that approved for the concept or sketch plan will be evaluated in accordance with the Comprehensive Water and Sewerage Plan and may result in the loss of the sewerage and/or water commitment.

STEP 8: THE APPLICANT THEN HAS THREE (3) MONTHS TO EXECUTE A PUBLIC WORKS AGREEMENT WITH FINAL PAYMENT OF THE ALLOCATION (IF THE FINANCING OPTION IS NOT SELECTED) NECESSARY TO SUPPORT AT LEAST THE FIRST PHASE OF THE PROJECT. THE APPLICANT THEN HAS EIGHT (8) MONTHS TO BEGIN CONSTRUCTION OF THE PROJECT.

Should the applicant be unable to meet the above timeframes, the allocation granted will be recaptured according to the provisions of Item IX of this policy. In addition, failure to begin construction within thirty-six (36) months of a Plan amendment will place the amendment and its associated allocation at risk.

Review Process 2 – Comprehensive Water and Sewerage Plan Amendment NOT Required

Step 1: When an applicant is interested in developing a project which requires **only** sewerage and/or water allocation that exceeds the amount that can be issued administratively, but does **not** need an amendment to the Comprehensive Water and Sewerage Plan, the applicant will submit a plan of the development to Planning and Zoning for preliminary plan and/or subdivision approval review.

The plans must be submitted in compliance with all pertinent sections of the Zoning Ordinance. All applicable review departments will review the plans and the applicant will be presented comments. The project will then be scheduled for Staff Technical Advisory Committee (STAC) review, at which time other County and State agencies will be provided the opportunity to ask questions and discuss items which need to be addressed.

Step 2: After the preliminary plans have been reviewed by staff and it has been determined that the plans generally comply with all pertinent regulations and ordinances, the plan will be scheduled for review by the Planning Commission. Scheduling of review of the project by the Planning Commission shall be done in conformance with Zoning Ordinance requirements and the rules of the Planning Commission.

Upon review the Planning Commission shall either approve, approve with conditions, or deny the application for the proposed project. The Planning Commission shall base their decision on the standards of review for concept or subdivision sketch plan as outlined in the Zoning Ordinance. They will also evaluate the project in relationship to consistency with growth issues reflected in the County Comprehensive Plan. If approval is granted the applicant will continue to the next step, while those proposals denied approval would have to revise project plans as deemed necessary by the Planning Commission and resubmit at Step 1.

Step 3: Once the Planning Commission approves the preliminary plan, the applicant will file an allocation application request with the Department of Public Works. Once received the request will be placed on the next regularly scheduled meeting of the Sanitary Commission for consideration.

Step 4: If the allocation request is approved, the applicant will have to meet the payment details in Step 5. If the request is denied, no allocation shall be deemed granted. In this case, the applicant may: (1) withdraw the application; or (2) revise the proposed development and resubmit to the Planning Commission.

Step 5: If sewerage and/or water allocation is committed the applicant shall make a ten percent (10%) deposit on the total cost of the allocation within thirty (30) calendar days of County approval of the allocation request. If the deposit is not paid within that timeframe, the allocation commitment will be void. For projects involving phases, the ten percent deposit will be based on the flow demands of the entire build out of the project.

Step 6: After the Sanitary District receives a deposit for allocation, the applicant will have twenty-four (24) months from that date to obtain conditional final site plan or subdivision approval. Site plan or final subdivision approval must be consistent with concept or sketch plan approval. Any major increase in the project's flow from that allocated may result in the loss of the sewerage and/or water allocation. All final subdivision or site plan approvals given in accordance with this policy shall be conditioned on executing a final Public Works Agreement as prescribed in Step 7.

STEP 7: THE APPLICANT THEN HAS THREE (3) MONTHS TO EXECUTE A PUBLIC WORKS AGREEMENT WITH FINAL PAYMENT OF THE ALLOCATION (IF THE FINANCING OPTION IS NOT SELECTED) NECESSARY TO SUPPORT AT LEAST THE FIRST PHASE OF THE PROJECT. THE APPLICANT THEN HAS EIGHT (8) MONTHS TO BEGIN CONSTRUCTION OF THE PROJECT.

Should the applicant be unable to meet the above timeframes, the allocation granted will be recaptured according to the provisions of Section IX of this policy.

Review Process 3 – Administrative Allocations

Step 1: When an applicant is interested in developing a project which requires **only** sewerage and/or water allocation that does not exceed the amount that can be issued administratively (refer to Section II of this policy), the applicant will submit a plan of the development to Planning and Zoning for preliminary plan and/or subdivision approval review, (if necessary).

The plans must be submitted in compliance with all pertinent sections of the Zoning Ordinance. All applicable departments will review the plans and the applicant will be presented comments.

Step 2: After the preliminary plans have been reviewed by staff and it has been determined that the plans generally comply with all pertinent regulations and ordinances, the applicant may request the allocation to be granted administratively.

Step 3: The allocation shall be paid in full (if the financing option is not selected), concurrently with the execution of a Public Works Agreement, at the time of the request.

REVIEW PROCESS 1	REVIEW PROCESS 2
COMPREHENSIVE W&S PLAN AMENDMENT	**NO AMENDMENT REQUIRED**
1. Submit Adequate Public Facility Study	1. Submit Preliminary Plan to PC
2. Adequate Public Facility Study Approved	2. Prelim Plan Approval by PC
3. Submit Concept Plan to PC	3. Request Allocation of SC
4. Concept Plan Approval by PC	4. Allocation Granted by SC
5. Apply CWSP Amend S-3 to S-2 to SC	5. Make 10% Deposit on Allocation
6. CWSP Amendment Approval by SC	6. Apply for Final Approval to PC
7. Request Allocation of SC	7. Conditional Final Approval Granted by PC
8. Allocation Granted by SC	8. Submit Surety, Fees, etc.
9. Make 10% Deposit on Allocation	9. Submit Remaining Allocation Fee
10. Submit Preliminary Plan to PC	10. Developer Executes PWA
11. Prelim Plan Approval by PC	11. SC Executes PWA
12. Apply for Final Approval to PC	12. Plans/Plats Signed by Staff
13. Conditional Final Approval Granted by PC	13. Plans/Plats Signed by PC
14. Submit Surety, Fees, etc.	
15. Submit Remaining Allocation Fee	
16. Developer Executes PWA	
17. SC Executes PWA	
18. Plans/Plats Signed by Staff	
19. Plans/Plats Signed by PC	

Legend

PC – Planning Commission
SC – Sanitary Commission
PWA – Public Works Agreement

REVIEW PROCESS 3
ADMINISTRATIVE ALLOCATION
1. Submit Preliminary Plan to PC
2. Prelim Plan Approval by PC
3. Apply for Final Approval to PC
4. Conditional Final Approval Granted by PC
5. Request PWA from Staff
6. Submit Surety, Fees, etc.
7. Submit Allocation Fee
8. Developer Executes PWA
9. Staff Executes PWA
10. Plans/Plats Signed by Staff
11. Plans/Plats Signed by PC

Legend

PC – Planning Commission
SC – Sanitary Commission
PWA – Public Works Agreement

APPENDIX II: SCHEDULE FOR SUBMISSION OF INTERIM AMENDMENTS

Any amendments to the Comprehensive Water and Sewerage Plan that are proposed by a property owner, or a group of property owners, shall be filed with the Sanitary District, for consideration by the County Commissioners, on the dates shown below.

Comprehensive Water and Sewerage Plan Interim Amendment Schedule 2006-2007

Application Deadline	*Public Hearing Advertisement Dates*	*Public Information Meeting Dates*	*CWSP Amendment Hearing Date*
February 28, 2006	**March 10, 17, 24**	**March 14, 2006**	**March 28, 2006**
April 25, 2006	**May 5, 12, 19**	**May 9, 2006**	**May 23, 2006**
July 25, 2006	**August 4, 11, 18**	**August 8, 2006**	**August 22, 2006**
October 24, 2006	**November 10, 17, 24**	**November 14, 2006**	**November 28, 2006**
January 23, 2007	**February 9, 16, 23**	**February 13, 2007**	**February 27, 2007**
April 24, 2007	**May 4, 11, 18**	**May 8, 2007**	**May 22, 2007**
July 24, 2007	**August 10, 17, 24**	**August 14, 2007**	**August 28, 2007**
October 23, 2007	**November 9, 16, 23**	**November 13, 2007**	**November 27, 2007**

Note: The above listed dates are subject to adjustment based on County Commissioner scheduling.

APPENDIX III: APPLICATION FOR INTERIM AMENDMENT

QUEEN ANNE'S COUNTY COMPREHENSIVE WATER & SEWERAGE PLAN

Return application fee and completed application along with five (5) copies of the approved concept or sketch plan and any other required attachments to:

Chief Sanitary Engineer
Queen Anne's County Department of Public Works
310 Bateau Drive (Courier)
PO Box 10 (Mailing)
Stevensville, MD 21666-0010

Type of Amendment: __________ Water   __________ Sewer
__________ Map   __________ Project

Project Name: ____

Project Location: ____
Street   City

____
Election District   Tax Map   Parcel   Grid

Project Type: Residential __________   Number of Units __________

Non-Residential __________   Square Feet __________

Owner: __________________________________ Phone: ___________________________

Address: ____

Agent: ___________________________________ Phone: ___________________________

Address: ____

I hereby certify, to the best of my knowledge, that this Application is complete and correct. I acknowledge that an amendment's approval does not constitute a granting of sewer and/or water allocation. I further acknowledge that an amendment's approval carries a time limit that if not met, will cause the amendment to become null and void.

______________________________________   ______________________________________
Agent   Date   Owner   Date

Current Zoning: __________ Acreage: __________

Current Water Service Priority: W-_____ Requested Water Service Priority: W-_____
Current Sewer Service Priority: S-______ Requested Sewer Service Priority: S-______

Proposed Project Description*:

* Please provide a brief description of the project, including: the surrounding neighborhood, current land use, and the use(s) proposed. Attach five (5) copies of the concept plan, approved by Planning & Zoning, showing roadways, buildings, adjacent land use, and nearest central water/sewerage system.

____

____

____

____

____

Proposed Water Supply: ____
Average Project Demand: __________ GPD

Proposed Sewerage System: ____
Average Project Demand: __________ GPD

Project Status:	Estimated Date
Preliminary Design Completed	__________________
Final Design Completed	__________________
Start Construction	__________________
Complete Construction	__________________

Note: All Municipal, County, State, and/or Federal permits must be obtained prior to any construction, or excavation, as may be required by law or regulation. Failure to provide all required information may result in denial of this application.

By submitting this application, applicant recognizes that the County is obligated to notify all interested parties and the public. Part of the notification process is to erect a temporary sign on the subject property. Submission of this application implies the granting of permission to erect the sign on the subject property. The address provided on this application will be used for all official notifications. It is the applicant's responsibility to notify the County of any change. **Please submit this Application and required Attachments.**

FEE SCHEDULE

The appropriate fee as indicated below shall accompany this application. This fee is non-refundable and is necessary to cover the County's direct costs of processing this application. When appropriate, the indicated flow is wastewater flow. Checks are to be made payable to "QAC Sanitary District" and must accompany this application or application will not be processed.

Average Daily Flow	**Application Fee**
0-500 gallons	$ 300
501-1,500 gallons	$ 400
1,501-4,999 gallons	$ 500
5,000-20,000 gallons	$ 600
20,001-50,000 gallons	$ 750
50,001 or more gallons	$1,000
Reapplication	$ 200

The reapplication fee only applies to projects that: 1) remain unchanged; and 2) reapply within one year of the date of the original hearing.

INSTRUCTIONS

The State requires that all public and private community, multi-use and certain industrial water and sewer facilities, both existing and proposed, be included in a County Comprehensive Water and Sewerage Plan. No construction or building permits may be issued by State or local agencies for construction of a project unless it is included in the Plan. Queen Anne's County can amend its Plan at any time to add or change the status of proposed projects. The "Application for Amendment" form provides the County Commissioners and other County agencies with the necessary information required for processing a requested amendment.

Please provide as much detailed information as possible on the amendment form. Use a separate application for each project. If any requested information is not applicable, indicate "N.A." Please include copies of any drawings available for the project. On pipeline projects include pipe size, length and design flow. For a water supply well, include the diameter, depth, name of aquifer, pump capacity, and type of treatment, if any. If the project is for a waste treatment facility, a description of size and general method of treatment will also be required. Included in either a water and/or sewer application should be average daily flow allocations.

Refer to section 5.16.3 Application and Amendment Term Limits of the 2006 Comprehensive Water and Sewerage Plan in regards to the term limits associated with an approved amendment into the Plan. Generally speaking, a project must advance to the next step in the approval process within 3 years of the amendment approval or the project will revert back to it status prior to the approved amendment.

APPENDIX IV: COUNTY-OPERATED WATER TREATMENT PLANTS

BAYSIDE WATER TREATMENT PLANT
103 Tackle Circle Drive, Chester
Constructed 1992

A. Source
   1. 2 wells – 10-inch casings – Magothy aquifer – 670 feet deep – 26.0 mg/l iron (Note: One well became inoperable in winter 2005 due to a casing failure.)

B. Maximum Available Treatment Flow (two shifts)
   1. 125 gpm x 20 hours = 150,000 gallons per day
   2. 8 backwashes x 4,500 gallons = 36,000 gallons per day
   3. Net Maximum Production = 114,000 gallons per day
   4. Production Efficiency = 75%

C. Actual Production Fiscal Year 2004
   1. Average Daily Gross Production – 71,000 gallons per day (estimated)
   2. Average Daily Net Production – 41,250 gallons per day (estimated)
   3. Average Daily Gross Production – Peak Month (Jul) – 122,832 gallons per day

D. Storage
   1. 14,000-gallon clear well **

E. Appropriation Permit – QA-85-G024(02)
   1. Daily Average/Year – 144,000 gallons per day
   2. Daily Average/Max Month – 255,000 gallons per day

F. Treatment Manufacturer and Type
   Microfloc Aquarius Model AQ-40A-floculator, tube settlers, and filter media

NOTES:

1. Bayside is designed to produce 200 gpm of drinking water. We are currently producing only 62% of that amount due to the high iron content.

2. Bayside and Queen's Landing water treatment plant serve a common distribution system.

3. ** Bayside shares a 425,000-gallon standpipe with Queen's Landing.

4. An Ion Exchange unit to enhance iron removal was installed in 2005.

BRIDGE POINTE WATER TREATMENT PLANT
9025 Bridge Point Drive, Chester
Constructed 1990

A. Source
   1. 2 wells – 6-inch casings – Magothy aquifer – 710 feet deep – 16-mg/l iron

B. Maximum Available Treatment Flow (two shifts)
   1. 150 gpm x 20 hours = 180,000 gallons per day
   1. 3 backwashes x 4,500 gallons = 13,500 gallons per day
   2. Net Maximum Production = 166,500 gallons per day
   3. Production Efficiency = 93%

C. Actual Production Fiscal Year 2004
   1. Average Daily Gross Production – 47,000 gallons per day (metered)
   2. Average Daily Net Production – 45,570 gallons per day (estimated)
   3. Average Daily Gross Production – Peak Month (Jul) – 55,027 gallons per day

D. Storage
   1. 10,000-gallon hydro pneumatic tank
   2. 7,000-gallon hydro pneumatic tank
   3. 300,000-gallon ground storage tank

E. Appropriation Permit – QA-84-G016(02)
   1. Daily Average/Year – 46,100 gallons per day
   2. Daily Average/Max Month – 76,000 gallons per day

F. Treatment Manufacturer and Type

   Refinte – Three stage pressure vessel with manganese greensand

   NOTES: 1. As of June 1999, Bridge Pointe shares a distribution system with Kent Island Village.

   2. Developer of Clayborne Woods built a 300,000 gallon ground storage tank and booster pump station that was completed in spring 2002.

   3. Added a Culligan ion exchange unit in the summer of 2003.

BUSINESS PARK WATER TREATMENT PLANT
230 Bateau Drive, Stevensville
Constructed 1986

A. Source
   1. 1 well – 12-inch casing – Monmouth Aquifer 485 feet deep – 32-mg/l iron

B. Maximum Available Treatment Flow (two shifts)
   1. 150 gpm x 20 hours = 180,000 gallons per day
   2. 20 backwashes x 4,700 gallons = 94,000 gallons per day
   3. Net Maximum Production = 86,000 gallons per day
   4. Production Efficiency = 43%

C. Actual Production Fiscal Year 2004
   1. Average Daily Gross Production – 4,000 gallons per day (metered)
   2. Average Daily Net Production – 20,194 gallons per day (metered)
   3. Average Daily Gross Production – Peak month (Nov) – 42,000 gallons/day

D. Storage
   1. 250,000-gallon elevated tower
   2. 20,000-gallon clear well

E. Appropriation Permit – QA-85-G019(03)
   1. Daily Average/Year – 170,000gpd
   2. Daily Average/Max. Month – 255,000gpd

F. Manufacturer and Type
   Microfloc Trident Model TR-105A – up-flow bead clarifier and filter media

NOTES:

1. The Business Park is designed to produce 350 gpm of drinking water. We are currently only producing 43% of that amount due to the high iron content. As it is so inefficient, it is only operated to meet summer demands.

2. Backwash pit will not hold two consecutive backwashes.

3. Stevensville, Thompson Creek and Chesapeake Bay Business Park water treatment plants serve common distribution system.

GRASONVILLE WATER TREATMENT PLANT
5439 Main Street, Grasonville
Constructed 1996

A. Source
   1. 2 wells – 10-inch casings – Magothy Aquifer – 950 feet deep – 20-ppm iron

B. Maximum Available Treatment Flow (two shifts)
   1. 140 gpm x 20 hours per week = 168,000 gallons per day
   2. 8 backwashes x 4,500 = 36,000 gallons per day
   3. Net Maximum Production = 132,000 gallons per day
   4. Production Efficiency = 78%

C. Actual Production Fiscal Year 2004
   1. Average Daily Gross Production – 43,000 gallons per day (metered)
   2. Average Daily Net Production – 32,525 gallons per day (metered)
   3. Average Daily Gross Production – Peak Month (Jul) – 51,000

D. Storage
   1. 297,000-gallon glass lined ground storage tank
   2. 10,000-gallon hydro tank

E. Appropriation Permit – QA-94-G007(01)
   1. Daily Average/Year – 342,000
   2. Daily Average/Month – 513,000

F. Treatment Type and Manufacturer
   Microfloc Aquarius Model AQ-40A – floculator, tube settlers, and filter media

NOTES:

1. The Grasonville WTP is designed to produce 200 gpm. We are currently only producing 78% of that amount due to the high iron.

2. The WTP currently operates at 40 hours a week.

3. Inadequate sewer to accommodate the backwash. A new sewer force main was constructed the summer of 1999 to alleviate the backwash problem.

4. An Ion Exchange unit to enhance iron removal was installed in 2005.

KENT ISLAND VILLAGE WATER TREATMENT PLANT
1839 Anchorage Drive, Chester
Constructed 1986

A. Source
   1. 1 well – 6-inch casing – Aquia Aquifer – 290 feet deep – 1 mg/l iron

B. Maximum Available Treatment Flow
   1. 170 gpm x 20 hours = 204,000 gallons per day
   2. 3 backwashes x 875 gallons = 2,625 gallons per day
   3. Net Maximum Production = 201,375 gallons per day
   4. Production Efficiency = 99%

C. Actual Production Fiscal Year 2004
   1. Average Daily Gross Production – 2,400 gallons per day (metered)
   2. Average Daily Net Production – 1,500 gallons per day (estimated)
   3. Average Daily Gross Production – Peak Month (Jul) – 11,400 gallons per day

D. Storage
   1. 10,000-gallon hydro pneumatic tank

E. Appropriation Permit – QA-83-G005(03)
   1. Daily Average/Year – 15,000 gpd
   2. Daily Average/Max. Month – 20,000 gpd

F. Treatment Manufacturer and Type
   Culligan – Ion Exchange

NOTES:

1. Groundwater Appropriation Permit restricts plant's treatment capacity.

2. Plant shares the distribution system with Bridge Pointe as of June 1999. Plant now acts as only a backup to Bridge Pointe.

3. Plant's water is high in sodium because of the salt used to backwash (130 ppm).

OYSTER COVE WATER TREATMENT PLANT
3232 Main Street, Grasonville
Constructed 1987

A. Source
   1. 2 wells – 6-inch casing – Aquia Aquifer – 250 feet deep – 0.2 mg/l iron

B. Maximum Available Treatment Flow (two shifts)
   1. 200 GPM x 20 hours = 240,000 gallons per day
   2. 2 backwashes x 2,100 gallons = 4,200 gallons per day
   3. Net Maximum Production = 235,800 gallons per day
   4. Production Efficiency = 98%

C. Actual Production Fiscal Year 2004
   1. Average Daily Gross Production – 76,000 gallons per day (metered)
   2. Average Daily Net Production – 69,704 gallons per day (metered)
   3. Average Daily Gross Production – Peak Month (Jul) – 117,000 gallons per day

D. Storage
   2. 20,000-gallon painted steel ground storage tank
   3. 180,000-gallon painted steel ground storage tank

E. Appropriation Permit – QA-92-G044(03)
   1. Daily Average/Year – 88,000 gallons per day
   2. Daily Average/Max. Month – 175,000 gallons per day

F. Treatment Manufacturer and Type
   Filtronics Pressure Vessel (modified to now treat Aquia)

   NOTES:
   1. WTP as designed to utilize Magothy water but can not treat the 16-mg/l iron.
   2. Site also has 2 Magothy Aquifer wells that are currently unused (GAP QA-92-G044(03).
   3. WTP fire flow pump can only deliver 500 gpm to the Oyster Cove community due to 6-inch water mains.
   4. WTP upgraded in spring 2005 with bigger discharge pumps and other improvements by Hilton Inn developer.

PROSPECT BAY WATER TREATMENT PLANT
Prospect Bay West Subdivision, Grasonville
Constructed 1975

A. Source
   1. 2 wells – 10-inch casings – Aquia Aquifer – 360 feet deep – 0.2 mg/l iron

B. Maximum Available Treatment Flow (Chlorination & C-9)
   1. 240 gpm x 24 hours = 345,600 gpd (well1)
   2. 285 gpm x 24 hours = 410,400 gpd (well 2)
   3. Capacity function of a single well pump's capacity – wells alternate

C. Actual Production Fiscal Year 2004
   1. Average Daily Production – 73,000 gallons per day
   2. Average Daily Production – Peak Month (Jul) – 126,000 gallons per day

D. Storage
   1. 300,000-gallon elevated storage tower

E. Appropriation Permit – QA-80-G013(2)
   1. Daily Average/Year – 125,000 gpd
   2. Daily Average/Max. Month – 510,000 gpd

NOTE:
1. An iron-oxide media filter manufactured by Severn Trent (Model APU- 300) went into operation in July 2004 at well house 1 and is reducing the Arsenic levels from 20 ppb to <1 ppb.
2. A back-up well was drilled in late 2005 at well house 1.
3. Well house 2 is planned to be abandoned in 2006.

QUEEN'S LANDING WATER TREATMENT PLANT
131 Queen's Landing Drive, Chester
Constructed 1984

A. Source
   1. 2 wells – 10-inch casing – Aquia Aquifer – 280 feet deep – 0.3mg/l iron

B. Maximum Available Treatment Flow
   1. 145 gpm x 20 hours = 174,000 gallons per day
   2. 2 backwashes a day x 2,030 gallons = 4,060 gallons per day
   3. Net Maximum Production = 169,940 gallons per day
   4. Production Efficiency = 98%

C. Actual Production Fiscal Year 2003
   1. Average Daily Gross Production = 32,000 gallons per day (metered)
   2. Average Daily Net Production = 29,738 gallons per day (estimated)
   3. Average Daily Gross Production – Peak Month (Aug) = 63,000 gallons per day

D. Storage
   1. 425,000-gallon standpipe (260,000 usable at minimum pressure)

E. Appropriation Permit – QA-82-G002(03)
   1. Daily average/year – 27,000 gpd
   2. Daily average/peak month – 45,000 gpd

F. Treatment Manufacturer and Type - unknown

NOTE:

1. Treatment capacity limited by Groundwater Appropriation Permit. Plant is typically run only on weekends and holidays.

2. Queen's Landing and Bayside water treatment plants serve a common distribution system.

RIVERSIDE WATER TREATMENT PLANT
206 Riverside Drive, Chester
Constructed 1991

A. Source
1. 1 well – 6-inch casing – Magothy Aquifer – 740 feet deep – 16 mg/l iron

B. Maximum Available Treatment Flow (two shifts)
1. 50 gpm x 20 hours = 60,000 gallons per day
2. 3 backwashes x 2,805 gallons = 8,415 gallons per day
3. Net Maximum Production = 51,585 gallons per day
4. Production Efficiency = 85%

C. Actual Production Fiscal Year 2004
1. Average Daily Gross Production – 5,9000 gallons per day (metered)
2. Average Daily Net Production – 4,144 gallons per day (estimated)
3. Average Daily Gross Production – Peak Month (Jul) – 8,200 gallons per day

D. Storage
1. 5,000-gallon hydro pneumatic tank

E. Appropriation Permit – QA-87-G028(02)
1. Daily average/year – 5,100 gpd
2. Daily average/month – 8,500 gpd

F. Treatment Manufacturer and Type
Kisco – three stage pressure vessel with manganese greensand

NOTES:
1. Plant performs well with its current customer base (23 EDUs).

STEVENSVILLE WATER TREATMENT PLANT
208 Church Lane, Stevensville
Constructed 1986 and 1991

A. Source
1. 2 wells – 12-inch casing – Magothy Aquifer – 775 feet deep – 31 mg/l iron
2. 1 well – 20-inch casing – Lower Patapsco Aquifer – 1600 ft deep – 9 mg/l iron

B. Maximum Available Treatment Flow (two shifts) (Patapsco)
1. 380 gpm x 20 hours = 456,000 gallons per day
2. 16 backwashes x 4500 = 72,000 gallons per day
3. Net Maximum Production = 384,000 gallons per day
4. Production Efficiency = 84%

C. Actual Production Fiscal Year 2004
1. Average Daily Gross Production – 446,000 gallons per day (metered)
2. Average Daily Net Production – 343,136 gallons per day (metered)
3. Average Daily Gross Production – Peak month (Jan) – 470,000 gallons per day

D. Storage
1. 297,000-gallon glass-lined steel ground storage tank
2. 36,000-gallon clear well

E. Appropriation Permit – QA-97-G050 (01) Patapsco
1. Daily Average/year – 750,000 gpd
2. Daily Average/month – 1,000,000 gpd

F. Treatment Manufacturer and Type

Microfloc Aquarius Model QA-40A – Floculator, tube settlers and filter media

NOTES: 1. Two Magothy wells were abandoned in fall 2004.

THOMPSON CREEK WATER TREATMENT PLANT
610 Marion Quimby Drive, Stevensville
Constructed 1988

A. Source
   1. 1 well – 6-inch casing – Aquia Aquifer – 240 feet deep – 0.3 mg/l iron

B. Maximum Available Treatment Flow (two shifts)
   1. 300 gpm x 20 hours = 360,000 gallons per day
   2. 2 backwashes x 5,520 gallons = 11,040 gallons per day
   3. Net Maximum Production = 348,960 gallons per day
   4. Production Efficiency = 97%

C. Actual Production Fiscal Year 2004
   1. Average Daily Gross Production = 111,000 gpd (metered)
   2. Average Daily Net Production = 35,962 gpd (metered)
   3. Average Daily Gross Production – Peak Month (Jul) = 190,000 gpd

D. Storage
   1. 270,000-gallon painted steel ground storage tank

E. Appropriation Permit (Magothy) – QA-70-G102(04)
   1. Daily Average/Year – 92,200 gpd
   2. Daily Average/Max. Month – 145,200 gpd

   Appropriation Permit (Aquia – emergency only) – QA-70-G002(04)
   1. Daily Average/Year - 5,000 gpd
   2. Daily Average/Max. Month – 10,000 gpd

F. Treatment Manufacturer and Type
   Micofloc Trident Model TR-105A – Up-flow bead clarifier and filter media

   NOTES:
   1. Stevensville, Thompson Creek & Chesapeake Bay Business Park water treatment plants serve combined distribution system.
   2. New Aquia well was drilled in June 1999 (emergency use only).

APPENDIX V: PARTIAL INVENTORY OF COMMUNITY WELLS

Well Name or Number	Owner's Name	Aquifer	Location and MD State Grid Coordinates (if known)	Depth (feet)	Diameter (inches)	Maximum Sustained Yield (GPM)	Pump Capacity	Remarks
	Town of Barclay	Wicomico-Calvert	Barclay	65	3	24		Fire Protection
	County Commissioners		Bryantown	397	2	25		Fire Protection
	Town of Centreville Council	Aquia Formation	Centreville 442/1066	264	4	90	500	
	Town of Centreville Council	Monmouth Formation	Centreville	450	10	692	500	
	Town of Centreville Council	Monmouth Formation	Centreville	458	10	211	500	
	Town of Queenstown	Aquic and Rancocas	Queenstown 423/1040	290	6	200		
QA-75-E5	Town of Sudlersville	Calvert Formation	#1 Well 495/1123	73	4	60		Fire Protection
QA-75-E4	Town of Sudlersville	Calvert Formation	#2 Well	74	4	60		Fire Protection
QA-73-0986	Town of Sudlersville	Calvert Formation	P2	70	4	60		Fire Protection
Well #1	County Commissioners	Aquia Formation	Prospect Bay	400	6	200		
Well #2	County Commissioners	Aquia Formation	Prospect Bay	400	6	200		
	Kent Island Village (Laskin & Curry)	Aquia Formation				50		
Well #1	Queens Landing	Aquia Formation	Chester 420/1004	260	6	115		
Well #2	Queens Landing	Aquia Formation		260	6			
	Stevens Village Utility Co.	Aquia Formation / Englishtown Formation	Stevensville 415/0990	197	10	828		
	Stevens Village Utility Co.	Aquia Formation	Stevensville 415/0995	220	6	110		
	Piney Narrows	Aquia Formation	Grasonville 415/1010	210	6	110		
	Chesapeake College		Wye Mills	426	8	39		
	Chesapeake College		Wye Mills	431	8	58		
	Aspen Institute	Aquia Formation	Carmichael 395/1038	336	4	40		
	Wye Institute	Aquia Formation	Carmichael 390/1040	366	4	30		
Kent Island Elementary School	Board of Education	Aquia Formation	Stevensville 418/996	225	4	40		
	Queen Anne County School	Aquia Formation	Stevensville	224	2	26		
	Queen Anne County Board of Education	Aquia Formation	Stevensville	155	4	30		
	Grasonville Elementary School	Aquia Formation	Grasonville 412/1031	240	4	60		
	Eastern Shore Public	Aquia Formation	Grasonville	235	2	20		

Well Name or Number	Owner's Name	Aquifer	Location and MD State Grid Coordinates (if known)	Depth (feet)	Diameter (inches)	Maximum Sustained Yield (GPM)	Pump Capacity	Remarks
	Board of Education		Sudlersville	83	4	40		
	Tri-County School Board		Queen Anne	104	4	30		
	S.D.A. School		Barclay	50	2	25		
QAC Dept of Parks & Recreation	Queen Anne Golf Club	Aquia Formation	Mattapex 393/0984	216	1	28		
	Queen Anne Golf Club	Aquia Formation	Mattapex	219	1	30		
	Queen Anne Golf Club	Aquia Formation	Mattapex	266	1	28		
	Queen Anne Golf Club	Aquia Formation	Mattapex	230	1	30		
	QAC Dept of Recreation	Aquia Formation	Stevensville 415/990	255	4	10		
	MD Military Department	Cheswold Aquifer	Queen Anne 399/1096	120	6	4		
	MD State Highway Admin.	Nanjemoy Formation	Hayden 455/1085	60	6	15		
	Queen Anne County Roads	Aquia Formation	Centreville 470/1085	345	4	70		
	Church Hill Fire Dept.	Aquia Formation	Church Hill	170	4	60		
	Community Firehouse	Aquia Formation	Stevensville	280	2	25		
	Kent Island Volunteer Fire Dept	Aquia Formation	Stevensville 418/0996	220	4	105		
	Grasonville Volunteer Fire Dept	Aquia Formation	Grasonville 411/1029	230	4	120		
	Grasonville Fire Co.	Aquia Formation	Grasonville	210	2	28		
	MD Dept of Public Improvement		Church Hill	195	6	87		
	Wilson Memorial Church		Barclay	65	3	20		
	Sudlersville Methodist Church		Sudlersville	79	3	25		
	Bethel A.M.E. Church		Church Hill 470/1085	180	2	20		
	Methodist Church	Paleocene	Church Hill	270	4	30		
	Ezion Church		Stevensville	195	2	27		
	Kent Island Methodist Church		Chester	200	3	20		
	Galilee Lutheran Church	Aquia Formation	Chester 415/1001	210	1	20		
	Church of God	Aquia Formation	Chester	220	1	20		
	Old Wye Church Corp.	Piney Point Formation	Wye Mills 404/1062	100	4	100		
	Chester Motel	Aquia Formation	Chestertown 496/1077	65	4	25		
	Duck Neck Campground	Aquia Formation	Chestertown 515/1090	15	2	4		
	Mears Point Marina	Aquia Formation	Kent Narrows 451/1010	225	2	30		

Well Name or Number	Owner's Name	Aquifer	Location and MD State Grid Coordinates (if known)	Depth (feet)	Diameter (inches)	Maximum Sustained Yield (GPM)	Pump Capacity	Remarks
	Leole Supply Co.		Millington 515/1125	120	4	60		
	C&P Telephone Co.	Aquia Formation	Sudlersville 496/1123	229	4	37		
	C&P Telephone Co.	Piney Point Formation	Wye Mills 410/1064	199	4	20		
	Gramm Highway Corp.	Aquia Formation	Chester	215	3	40		
	Tag-A-Long Trailer Co.	Paleocene	Centreville 436/1077	320	4	12		
	Kingstown Tractor Co.	Aquia Formation	Chestertown 500/1068	45	4	15		
	Hale Packing Co.	Aquia Formation	Grasonville 410/1010	200	4	70		
	United Shellfish	Aquia Formation	Grasonville 415/1010	220	4	80		
	Chesapeake Steel Inc.	Aquia Formation	Millington 519/1125	154	4	30		
	Dominion Shellfish Co.	Aquia Formation	Dominion	210	4	80		
	Carnabuci, Joseph (Seafood)	Aquia Formation	Grasonville	231	4	70		
	Thomas, W.A. (Seafood)	Aquia Formation	Kent Narrows	240	4	60		
	Harris, W.H. (Seafood)	Aquia Formation	Kent Narrows	195	3	45		
	Thompson, Herman (Seafood)	Aquia Formation	Kent Narrows	243	4	60		
	Swing, D. Thompson (Vegatable Cannery)		Price	50	8	140		
	Swing, D. Thompson Inc.		Price	55		175		
	Swing, D. Thompson Inc.		Price	202		15		
	Swing, D. Thompson Inc.		Price	55	10	110		
	Swing, D. Thompson Inc.		Price	320		100		
	Swing, D. Thompson (Vegatable Cannery)		Price 460/1095	64	13	200		
	Queen Anne Bowling Lanes	Aquia Formation	Chestertown 495/1074	126	4	50		
	Kent Manor Hotel	Aquia Formation	Stevensville	210	4	50		
	Kent Island Beaching	Aquia Formation	Stevensville	210	6	110		
	Tidewater Bank of MD	Aquia Formation	Stevensville	202	2	30		
	Sudlersville Bank	Calvert Formation	Sudlersville 495/1024	75	4	40		
	Baker, R.B. & Sons, Inc. (Concrete)	Aquia Formation	Queenstown	288	6	160		
	MD Seafood Co-Op	Aquia Formation	Kent Narrows	210	3	70		
	United Shellfish Co.	Aquia Formation	Kent Narrows 416/1014	220	4	60		
	Islander Seafood, Inc.	Aquia Formation	Kent Narrows	210	4	58		
	B&S Fisheries	Aquia Formation	Kent Narrows	220	4	95		
	Eastern Corp	Aquia Formation	Stevensville	210	2	20		

Well Name or Number	Owner's Name	Aquifer	Location and MD State Grid Coordinates (if known)	Depth (feet)	Diameter (inches)	Maximum Sustained Yield (GPM)	Pump Capacity	Remarks
	Bennington Builders, Inc.	Aquia Formation	Stevensville	220	1	20		
	Friel Canning Co.	Paleocene	Wye Mills 410/1067	210	6	200		
EE-12	Friel, S.E.W. (Canned Foods)		Wye Mills	210	6	200		
EE-18	Friel, S.E.W. (Canned Foods)		Wye Mills	210	6	200		
EE-19	Friel, S.E.W. (Canned Foods)		Wye Mills	210	5	60		
EE-20	Friel, S.E.W. (Canned Foods)	Aquia Formation	Wye Mills	210	6	200		
EE-21	Friel, S.E.W. (Canned Foods)		Wye Mills	210	6	200		
EE-22	Friel, S.E.W. (Canned Foods)		Wye Mills	440	6	200		
	Friel, S.E.W. (Canned Foods)	Aquia Formation	Queenstown 425/1040	260	6	200		
	Sudlersville Frozen Food Lockers, Inc. (Meat Packing Plant)	Calvert Formation	Sudlersville 495/1124	75	4	40		

APPENDIX VI: WATER & SEWERAGE PROBLEM AREAS

WATER PROBLEM AREAS

Kent Island

In general, the quality of water available in the formations beneath the County is good, or can be treated. However, the brackish water intrusion of the Aquia Formation may affect the entire western shore of Kent Island in the future. Problems currently exist from Matapeake to Love Point.

Two problem areas listed in the 1990 plan, Cloverfields and Bay City, have been resolved by construction of distribution lines within the community. The total project cost for just the distribution lines being $1,670,000 as bid in 1992, and $1,580,000 as bid in 1994, respectively. Note: Cloverfields had 1,022 connections and Bay City had 705.

Love Point

This small community of 90 homes is located on the northernmost tip of Kent Island, approximately 1.7 miles north of Cloverfields. It was subdivided in 1911 into 369 small parcels that have since been combined to give today's configuration. It is above a subcrop of the Aquia and is subject to the brackish water intrusion. The properties between Love Point and Cloverfields are currently zoned for lowest density development and are above the terminus of the Nanjemoy/Calvert Formation.

Love Point residents are drilling new wells into the Magothy Formation, accepting the cost of drilling and treatment. There are three possible options open to the problem area:

a. The residents of Love Point can continue to replace Aquia wells by abandoning and sealing existing wells, and drilling new wells into the Magothy Formation and treating the water as necessary.

b. The planning, design, and construction of Love Point central water supply. In order to comply with the Comprehensive Land Use Plan, it would be sized to supply only the possible development as it now exists. This would equalize the costs to the residents but involve the operation and maintenance (O&M) of yet another water system.

c. The planning, design, and construction of a water transmission line along Route 18 from Cloverfields. This would cross the low-density belt envisioned by the Comprehensive Land Use Plan. However, water availability has never been the limiting factor for development in Queen Anne's County, sewer has always been the limiting issue.

It is recommended that the first alternative is best because it is least costly to the property owners, least burdensome to the Sanitary District, and does not involve crossing areas intended to be essentially undeveloped with water service lines. As such, Love Point is not an area recommended for a community water system.

Southern Kent Island

This portion of Kent Island south of Batts Neck Road is at present only threatened by the brackish water intrusion of the Aquia. The residents are dependent on individual on-site wells that are penetrating the Aquia. Due to the fact that brackish water intrusions assume a "wedge" profile, and that there are divisions in the Aquia, no specific problems have been reported. Thus far, reports by drillers made to the Environmental Health Department have indicated that only the deepest part of the Aquia is contaminated. The Maryland Geological Survey (MGS) Report of Investigation No. 51 and No. 72 indicate that barring major changes in Aquia pumpage, it will be only a matter of time before the middle and upper level parts of the Aquia are impacted. It is recommended that a groundwater monitoring program be instituted and sustained that is designed to give the greatest possible advance warning of the onset of the intrusion.

When wells are threatened by brackish water, there will be essentially five possible solutions open to the County and the residents of this area:

a. Install and maintain in each home such treatment equipment as necessary to provide potable water. The cost of this option will fall completely on the individual homeowner.

b. Require each homeowner to abandon and seal existing wells and replace them with wells withdrawing from the Magothy Aquifer. This will require much deeper wells, approximately 500-700 feet, and treatment of iron up to 30 ppm. The cost of this option will fall completely on the individual homeowner.

c. A transmission line could be extended from Matapeake Tower along Route 8. This would be about 6 miles in length to serve Tower Gardens on the Bay.

d. Plan, design, and construct a water supply for each existing development as needed. This has the advantage of a modular approach, tailoring the facility to the need without extensive transmission lines. It has the disadvantages of multiplying the O&M requirements, and produces numerous small water systems that are unable to support each other either financially or in case of malfunction. This is not an acceptable alternative.

e. Plan, design, and construct a central water supply facility. The advantage is in having the least amount of plant-related O&M cost. The disadvantages are:

i. The facility will have to be regularly expanded,

ii. The transmission lines will cross areas not intended to be served, and

iii. The facility will possibly have to be sited relatively far from the area of initial service.

Onsite remediation is currently the preferred solution in this area.

Kingstown-Chester Harbor

This area fronts on the Chester River, straddles Maryland Route 213 opposite Chestertown and is underlain by a family of highly permeable soils. This results in septic effluents and/or fertilizers contaminating vulnerable aquifers with excessive nitrates. The latest available water quality information indicates that approximately 5-10 percent of the wells provide water with nitrate levels exceeding 10 ppm. These water supplies have been equipped with treatment systems that are capable of providing potable water. The source of nitrates will determine if other problems such as bacteria and viruses or herbicides and pesticides will be encountered. While the Environmental Health Department views this area with concern, it places a lower priority on establishing a water system than is assigned to the Kent Island subdivisions.

No community water system is being planned at this time. Onsite remediation is currently the preferred solution in this area.

SEWERAGE PROBLEM AREAS

Although there is a central system serving part of the Kent Island-Grasonville area, residents outside the service area still use individual septic tank treatment systems. Many of these systems are not operating correctly and are discharging septic effluent without adequate treatment.

In February 1989, the Director of Environmental Health of the County Health Department presented a report to the Commissioners that detailed rates of uncorrectable septic system failure for four major subdivisions on Kent Island and established the planning time frames used in this Plan to set priorities and schedules. Uncorrectable failures are those that cannot be remedied without direct groundwater penetration or a “holding tank.” The four subdivisions then being Cloverfields, Bay City, Kent Island Estates and Romancoke on the Bay. The first two priorities, Cloverfields and Bay City, have since been served with community sewer. Other areas identified, but not adjacent to the then existing service area, were the older (pre 1973) subdivisions along the Route 8 corridor with the Kent Island Estates and Romancoke subdivisions being identified as being the highest priority due to the great number of homes (±765) present.

For all of the problem areas, a range of alternatives were examined during the 1990 Master Water and Sewerage Plan. On-site, clustered or shared systems, and land disposal central systems were rejected due to site constraints of soil, surface water, or available land. A full range of collection systems were examined. In 1990, two collection systems, vacuum and small diameter gravity were bid for Cloverfields competitively and although vacuum was slightly more expensive, both the residents and county selected to go with vacuum. Vacuum was selected due to the familiarity of the existing staff with the system.

Kent Narrows/Stevensville/Grasonville Wastewater Priority Areas

The County has designated certain locations in the KN/S/G Subdistrict as wastewater priority areas. Each is located in areas of severe soil conditions, causing frequent septic tank failures. Minimum lot sizes restrict or preclude adequate on-site correction. The two primary priority areas in the 1990 plan were Cloverfields and Bay City. Both were provided with vacuum collection systems with treatment at KN/S/G. Cloverfields went on-line in January 1994. Bay City went on-line July 1995. The cost of providing this service was approximately $4,700,000 as bid in 1992, and $4,200,000 as bid in 1994, respectively. Refer to the Appendix IX for a more detailed breakdown.

Dominion and Marling Farms were two lesser priority areas noted in the 1990 plan that are adjacent to the KN/S/G Subdistrict. Dominion and Marling Farms were studied in 1984 and again in 1990 and the cost estimates were updated in this Plan.

The following sections briefly discuss sewerage facilities for both of the subdivisions listed above. It is important to recognize that this is only a preliminary study and should not be used for purposes other than planning. Actual in-depth engineering studies for each subdivision must be made for exact designs.

Dominion

Dominion is a community located between Little Creek and Crab Alley Creek on Kent Island. It extends from the southern end of Route 552 along Crab Alley Creek. Presently, there are 225 parcels, 200 of which contain single-family dwellings. The predominant soil of the area is Mattapex Silt Loam with Butlertown, Elkton, and Keyport Loams all present. Seasonally high water table and slow permeability cause septic systems severe problems. It is expected that the Environmental Health Department will continue to study and monitor the situation.

The Dominion area does not have the space for expansion, nor are the surrounding waters appropriate points of discharge, thus making a central system less than attractive. By sharing the cost of the **denied access** force main with Marling Farms, along Maryland Route 552 to the KN/S/G collection station ‘F’, connection to the central system would appear to be the most economical alternative.

The recommended construction completion date for this project is 2020.

Marling Farms

Marling Farms is a subdivision located on Kent Island that begins at the end of Route 552 and extends southward to Norman’s Point. The area contains 405 parcels, 310 of which contain single-family dwellings. The soils of the area are predominately Matapeake, with Mattapex and Othello. Unlike the well-drained Matapeake soil, the Mattapex and Othello soils exhibit a seasonally high water table and poor permeability. These conditions are listed as severe for septic tank applications due to poor permeability at high water table levels. The small lot sizes preclude adequate repair area, even where soils are good.

Preliminary studies indicate that a centralized sewer system is feasible. The basis for this stems from the inadequacy of the soils to handle septic tanks and the amount of growth the area could experience with a central system. If served, almost 100 vacant parcels would become available for the increased populations that are projected for the area. The priority of this subdivision coincides with Dominion. The Environmental Health Department will study and monitor this area, as was done in the February 1989 study.

A preliminary investigation for providing sewerage to Marling Farms indicates that pumping the sewerage to the existing KN/S/G treatment plant is the most economical alternative. As indicated above, serving the Dominion community via a **denied access** sewer main should maintain the goals of the Comprehensive Plan and Critical Area Plan.

The estimated 2020 wastewater flow is approximately 0.1 MGD.

The recommended construction completion date for this project is 2020.

Southern Kent Island Wastewater Subdistricts

This plan proposes a subdistrict be established to serve Southern Kent Island (SKI) and be operated by the Sanitary District. This total area, from Normans (a.k.a. Batts Neck) to Romancoke along MD Route 8, was identified in 1974, 1984, 1990, 1996 and again in this Plan, as an area of increasing concern. The northern boundary of the expanded service area was selected to be as consistent as possible with the Comprehensive Land Use Plan. The community of Normans (which lies north of Batts Neck Road and between old and new Route 8) was included due to its confined site. The western boundary for this subdistrict is the Chesapeake Bay, and the eastern boundary is to be Route 8 (except for Kent Island Estates and Romancoke on the Bay). Consideration is being given to serving the Tower Gardens subdivision, which would then be the southern boundary. The first area of SKI to be served is comprised of the subdivisions of Kent Island Estates and Romancoke on the Bay.

Regardless of the description above, there is no intent to encroach upon any Critical Area, Environmental Easement, Management Area or Sanctuary by this or any other new service area.

The northern limit of the SKI Subdistrict is approximately 3-1/2 miles south from the existing KN/S/G treatment plant, while the southern part of the Subdistrict is over eight miles away. A rough count of the subdivisions indicated approximately 3,000-recorded lots. At full build-out, this could produce a potential wastewater flow of approximately 0.75 MGD. This does not include flows generated by marinas, restaurants, or motels that exist or are proposed. In addition, the Comprehensive Land Use Plan seeks a zone of very low-density development across Kent Island between Batts Neck and Matapeake.

Because of the lot sizes, soil conditions, etc., on-site correction was not considered a viable alternative. As with Bay City and Cloverfields, clustered or shared systems were also rejected. There remain two major options to resolve the problem, either construct a new wastewater plant at Southern Kent Island, or expand the KN/S/G plant and pump the wastewater to it.

Gannett Fleming, Inc. had developed a concept for a central sewage treatment facility. Land disposal of the effluent was evaluated for the problem area and the SKI Subdistrict as a whole. Ultimately, land disposal could require nearly 750 acres under the most optimistic scenario just for Kent Island Estates and Romancoke if buffers are included. This alternative was therefore rejected.

The second option would eliminate the need of a new wastewater plant at Southern Kent Island but would require the expansion of the existing KN/S/G treatment plant. This would be cheaper than building a new plant in Southern Kent Island however most of the savings would be absorbed in the eight-mile long force main and pump station(s) required to transport the wastewater. The force main that would be constructed to serve this public health concern community would be a **denied access** force main.

This option of utilizing the existing KN/S/G treatment plant has both advantages and disadvantages. The primary advantage is the ability of serving other older, but significantly smaller, intervening small lot subdivisions that exist along the Route 8 corridor which also have varying degrees of septic system failure. These communities have never been mapped as problem areas in the past but have long been known to have similar problems as Kent Island Estates and Romancoke but on a much smaller scale. Another advantage is these intervening communities could share in the cost of the transmission system thereby reducing the per lot cost for sewer by approximately 10%. The communities that are now also mapped are Queen Anne Colony, Kentmorr, Chesapeake Estates, Sunny Isle of Kent, Normans, and Matapeake Estates.

The disadvantages with this option are basically the inherent negative impact with any increase in population as well as the pressure for new development along Route 8 created by the sewer force main traveling its entire length. For instance, the force main carrying the wastewater along Route 8 from Kent Island Estates and Romancoke would cross a few large parcels designated in the Comprehensive Land Use Plan as low density, primarily large agricultural properties. This causes some concern that the force main would enable new development in these low-density lands. However, as the force main would be designated as **denied access**, and much of the vacant lands are already designated Resource Conservation Areas in the Critical Area Ordinance (which limits lot sizes to 20 acres), the County should be able to resist any effort to rezone the existing lands to a higher density (dwellings per acre) unless the increase in density is already supported by the Comprehensive Land Use Plan.

The other problem is the increase in population caused by serving the existing, but unbuildable, vacant lots with sewer. While serving the existing vacant lots makes the project more affordable for existing residents, the associated increase in population occasioned by serving the currently unbuildable vacant lots aggravates two other issues always associated with residential growth; traffic and schools.

Kent Island Estates and Romancoke on the Bay

Kent Island Estates and Romancoke on the Bay are many miles from the existing treatment system and the Comprehensive Plan and Critical Areas Plan place special constraints on any proposed solution. These two subdivisions are adjacent, and located near the southern extremity of Kent Island. They share similar soil conditions and lot sizes and are the major subdivisions of the proposed Southern Kent Island (SKI) Wastewater Subdistrict. The Environmental Health Department study indicates that the first onset of septic system failures would begin in early 1990, building to a crest in the fall of 1997. At this point, approximately 450 septic systems will have uncorrectable failures without the possibility of on-site correction other than direct groundwater penetration or a “holding tank.” The Environmental Health Department has reaffirmed that this prediction has come true in that approximately 450 of the 765 septic systems serving these two communities are in fact experiencing groundwater penetration in 2004.

The increasing urgency for the correction of existing problems, especially in view of the Environmental Health Department’s 1989 analysis, imposes a 1 to 5 year planning framework, with the initial collection system to possibly be in service not later than 2010. The cost of the entire sewer system is estimated to be $32,000,000. A detailed estimate of cost is presented in Appendix VIII.

Intervening MD Route 8 Subdivisions

These communities have never been mapped as problem areas in the past but have long been known to have a similar problem as Kent Island Estates and Romancoke, but on a much smaller scale. The communities that are now also mapped are Queen Anne Colony, Kentmorr, Chesapeake Estates, Sunny Isle of Kent, Normans, and Matapeake Estates.

APPENDIX VII: NPDES INDUSTRIAL/MUNICIPAL DISCHARGE PERMITS

Name	City	Permit No.
BIG DADDY'S TEXACO	CHESTER	MDG916034
EXXON SERVICE STATION #2-5675	CHESTER	MDG916412
FRIENDLY FOOD STORE	STEVENSVILLE	MDG914996
WALJACKS	QUEEN ANNE	MDG914974
TRI-GAS & OIL CO., INC. - GRASONVILLE	GRASONVILLE	MDG344524
WISE FUEL & OIL, INC. - WYE MILLS	WYE MILLS	MDG344567
SHA - CENTREVILLE SHOP	CENTREVILLE	MD0069043
UNIVERSITY OF MARYLAND - WYE RESEARCH CENTER	QUEENSTOWN	MD0065170
S.E.W. FRIEL - QUEENSTOWN PLANT	QUEENSTOWN	MD0000035
S.E.W. FRIEL - WYE MILLS PLANT	WYE MILLS	MD0000043
CENTREVILLE WWTP	CENTREVILLE	MD0020834
CHESAPEAKE COLLEGE	WYE MILLS	MD0024384
CHURCH HILL WWTP	CHURCH HILL	MD0050016
EASTERN PRE-RELEASE UNIT WWTP	CHURCH HILL	MD0023876
MILLINGTON WWTP	MILLINGTON	MD0020435
QUEENSTOWN WWTP	QUEENSTOWN	MD0023370
SUDLERSVILLE WWTP	SUDLERSVILLE	MD0020559
KENT NARROWS/STEVENSVILLE/GRASONVILLE WWTP	STEVENSVILLE	MD0023485
C & D CONCRETE - QUEENSTOWN	QUEENSTOWN	MDG499788
R. B. BAKER & SONS, INC. - PATCHETT'S PIT	QUEENSTOWN	MDG499864

DAVID A. BRAMBLE, INC. - MCCLYMENT'S PIT	QUEENSTOWN	MDG499882
DAVID A. BRAMBLE, INC. - DUDLEY PIT	WYE MILLS	MDG499886
STRONGS BAY SEAFOOD, INC.	CHESTER	MDG528905
CAMP WRIGHT	STEVENSVILLE	MDG766019
KENNERSLEY POINT MARINA, INC.	CHURCH HILL	MDG766020
BAY BRIDGE MARINA	STEVENSVILLE	MDG766031
KENTMORR HARBOR MARINA	STEVENSVILLE	MDG766045
MEARS POINT MARINA	GRASONVILLE	MDG766096
BAYSIDE MARINA	CHESTER	MDG766098
KENT ISLAND YACHT CLUB	CHESTER	MDG766102
OYSTER COVE	GRASONVILLE	MDG766120
QUEEN'S LANDING	CHESTER	MDG766121
PINEY NARROWS YACHT HAVEN	CHESTER	MDG766156
ASPEN INSTITUTE - RIVER HOUSE	QUEENSTOWN	MDG766158
ASPEN INSTITUTE - WYE WOODS	QUEENSTOWN	MDG766159
ASPEN INSTITUTE - HOUGHTON HOUSE	QUEENSTOWN	MDG766160
BAYVIEW CONDOMINIUMS	GRASONVILLE	MDG766257
PROSPECT BAY COUNTRY CLUB POOL	GRASONVILLE	MDG766429
CHESAPEAKE COLLEGE	WYE MILLS	MDG766648
HOLIDAY INN EXPRESS - GRASONVILLE	GRASONVILLE	MDG766740
THOMPSON CREEK TOWNHOMES	STEVENSVILLE	MDG766789
HUNTERS OAK GOLF & COUNTRY CLUB	QUEENSTOWN	MDG766923
CAMP PECOMETH	CENTREVILLE	MDG766940

APPENDIX VIII: KENT ISLAND ESTATES/ROMANCOKE SEWER COST ESTIMATE (2004 DOLLARS)

Revised Cost Opinion - January 2006					
	1. Used Buchart Horn cost estimate to adjust sewer transmission system.				
	2. Increase other costs by 25%				
Kent Island Estates & Romancoke - assumes		***1487***	dwellings at build-out		**(vacants served)**
			SEWER Collection - Vacuum		
vacuum station	1	each	$1,500,000		$1,500,000
3 inch vacuum main	14,870	linear feet	$30		$446,100
4 inch vacuum main	30,000	linear feet	$35		$1,050,000
6 inch vacuum main	25,000	linear feet	$45		$1,125,000
8 inch vacuum main	10,000	linear feet	$55		$550,000
10 inch vacuum main	5,000	linear feet	$65		$325,000
4 inch gravity w/ clean outs	29,740	linear feet	$50		$1,487,000
valve pits	372	each	$6,000		$2,230,500
4 inch valves	100	each	$450		$45,000
6 inch valves	75	each	$550		$41,250
8 inch valves	50	each	$800		$40,000
10 inch valves	10	each	$1,500		$15,000
cont select	25,000	cubic yards	$25		$625,000
cont excavation	5,000	cubic yards	$35		$175,000
road restore	1	each	$1,000,000		$1,000,000
			Sewer Collection Subtotal		$10,654,850
				eng@10%	$1,065,485
				insp@10%	$1,065,485
				cont@10%	$1,065,485
				mobil@5%	$532,743
				inflate@25%	$2,663,713
					===============
				Subtotal	**$17,047,760**

			SEWER - Transmission			
pump station		3	each	$750,000		$2,250,000
12 inch force main		35,000	linear feet	$50		$1,750,000
real estate		2.0	acre	$100,000		$200,000
			Sewer Transmission Subtotal			$4,200,000
					eng@10%	$420,000
					insp@10%	$420,000
					cont@10%	$420,000
					mobil@5%	$210,000
					inflate@50%	$2,100,000
						===============
					Subtotal	**$7,770,000**
			SEWER - Treatment			
Sewer Alocation at 2006 rates		1,487	dwellings	$4,900.00	**Subtotal**	**$7,286,300**
						===============
				SEWER TOTAL COST		**$32,104,060**

APPENDIX IX: BAY CITY & CLOVERFIELDS ACTUAL COSTS

CLOVERFIELDS (1992 BID)	SEWER	WATER
Design	$ 272,000	$ 40,000
Inspection	276,000	71,000
Construction	3,746,000	1,670,000
Administration	96,000	5,000
Financial	292,000	155,000
	$4,682,000	1,941,000

BAY CITY (1994 BID)		
Design	$ 174,000	$ 20,000
Inspection	163,000	50,000
Construction	3,706,000	1,848,000
Administration	13,000	156,000
Financial	127,000	186,000
	$ 4,183,000	$ 2,260,000

APPENDIX X: SUMMARY OF COMPLETED WATER PLAN AMENDMENTS

Amendments Under Development

The following are recently amended projects by private developers. A project's amendment is only valid for three (3) years following the amendment's hearing date. The date of amendment is shown in parenthesis.

Village at Benton's Crossing – Phase 2 (July 21, 1999) – Tax Map 56, Parcel 324

The site is currently vacant and contains approximately 12 acres zoned Urban Commercial (UC).

The proposal is to extend the water service area in order to service a 19,000 square foot commercial "strip mall." Water flows are estimated to be approximately 2000 gpd and the Stevensville water treatment plant will provide service.

Hunter's Oak Golf & Country Club (January 18, 2000) **–** Tax Map 59, Parcels 12 & 37

This site consists of approximately 448 acres and is zoned a mixture of Countryside and Agricultural by the Queen Anne's County Zoning Ordinance. The site is currently a mixture of agricultural and woods although an 18-hole golf course has been recently completed. The proposal is to construct an on-site water system to ultimately service two 18-hole golf courses, a country club facility containing a small restaurant, meeting rooms, a 120 seat tavern, a pro shop, and other buildings typically associated with a golf course club. The system's capacity is estimated to be 15,755 gallons per day. Water service will be provided by an individual well into the Aquia Aquifer.

North Brook Subdivision (January 18, 2000) **–** Tax Map 36, Parcel 11

The site consists of approximately 197 acres and is zoned R-1 by the Town of Centreville's Zoning Ordinance. The site is currently an open field. The proposal is to create approximately 422 residential lots with a first phase of 56 lots. Flows to be generated are estimated to be 105,500 gallons per day. Water service will be provided by the Town of Centreville's water distribution and treatment system.

The amendment must meet the following conditions:

1. Future phase approval will be conditioned on the availability and adequacy of sewer and water capacity within the Town and an amendment into the Comprehensive Water and Sewerage Plan is in on way a commitment for future service for future phases.

2. All requirements for the annexation of the property into Town limits will be met prior to the phase 1 final approval.

Four Seasons at Kent Island (May 23, 2000) – Tax Map 49, Parcels 7, 8, 11, 24 – Tax Map 57, Parcels 1, 8, 347, 532

The site consists of approximately 560 acres and is zoned a combination of Stevensville Master Planned Development (SMPD) (392 acres), Chester Master Planned Development (CMPD)(162 acres) and Suburban Commercial (SC)(6 acres) by the Queen Anne's County Zoning Ordinance. The site is currently an open field. The current proposal is to allow for the creation of an approximately 930 single-family, 420 multi-family, age restricted community, with a community center and recreation area. Also proposed is an 88 bed assisted living facility. Flows to be allocated for the entire project are estimated to be 356,300 gallons per day. The project is to be phased with the first phase consisting of 400 age restricted dwellings and a clubhouse with an anticipated allocated flow of 110,000 gallons per day.

The development will require extensive off-site sanitary improvements, as detailed below, and is conditionally approved as follows:

Water Condition 1: The following off-site improvements will be required.

Phase 1: Prior to the 1st certificate of occupancy, the following water improvements:

a. New 1500 gpm well into the Lower Patapsco aquifer at the Business Park.

b. Upgrade Business Park water treatment plant to produce approximately 325 gpm (while currently rated at 350 gpm, iron only allows less than 100 gpm)

c. New 500,000 elevated storage tank.

d. New 12 inch main to connect Stevensville system to the Chester system along or adjacent to, the Cross Island Trail

Phase 2: Prior to 401st certificate of occupancy, the following water improvements:

a. New 1500 gpm backup well into Lower Patapsco aquifer at Business Park.

b. New 750 gpm water treatment plant adjacent to Business Park

Water Condition 2: Sureties for all off-site improvements will be required prior to final approval of phase 1.

Water Condition 3: Any change in use other than that proposed will require a re-amendment into the plan.

Greenwood Subdivision (July 18, 2000) – Tax Map 65, Parcel 54

The side consists of approximately 90 acres and is zoned Grasonville Planned Residential Neighborhood (GPRN) by the Queen Anne's County Zoning Ordinance. The property is located on Grasonville Cemetery Road. The site is currently vacant woodland. The proposal is to develop a 120 lot residential subdivision. The anticipated water flows are 30,000 gallons per day. The property was previously amended into the plan as a 42-lot subdivision named "Sunrise Assisted Living Subdivision" (Amendment 96-7) so is already designated "W-1." This amendment is required due to the substantial change in flows proposed. Water service will be provided by the Grasonville distribution system.

Terrapin Grove Elderly Housing (March 20, 2001) – Tax Map 48, Parcel 126

The site consists of approximately 20 acres and is zoned a combination of Suburban Estate (SE) and Stevensville Master Plan Development (SMPD) by the Queen Anne's County Zoning Ordinance. The property is located on MD Route 18 (Love Point Road) on the site of the existing Percy Thomas Senior Center. The proposal is to create 85 rental apartments for the elderly. The anticipated water flows are 8,500 gallons per day. Water service will be provided by the Stevensville distribution system.

Park Center Complex (March 20, 2001) – Tax Map 48, Parcel 130, Lots 19 through 21 and 23

The site consists of approximately 40 acres within the Chesapeake Bay Business Park and is zoned Suburban Industrial (SI) by the Queen Anne's County Zoning Ordinance. The property is located on MD Route 18 (Love Point Road) in Stevensville. The site is currently vacant. The proposal is to create 260,945 square foot of industrial space. The anticipated water flows are 20,400 gallons per day. Water service will be provided by the Stevensville distribution system.

Ellendale Subdivision (March 20, 2001) – Tax Map 56, Parcel 20

The site consists of approximately 90 acres and is zoned Stevensville Master Plan Development (SMPD) by the Queen Anne's County Zoning Ordinance. The property is located on MD Route 18 (Romancoke Road), southeast of its intersection with US Rt 50/301, immediately south of the K-Mart shopping center. The site is currently a farm with a single-family dwelling and associated out buildings. The proposal is to create 285 dwellings of which 106 will be single-family lots ad 179 will be town homes. The anticipated water flows are 71,250 gallons per day. Water service will be provided by the Stevensville distribution system.

This amendment will take effect once the following conditions have been fulfilled:

Condition 1: That the Growth Allocation Petition pending before the Critical Area Commission and the County Commissioners is approved including the satisfaction of the six items listed in the January 15, 2002 letter from the County Commissioners to the Critical Area Commission.

Condition 2: The successful submittal of all materials necessary to satisfy the Interim Adequate Public Facilities Ordinance including an acceptable sewer allocation disbursement schedule.

Condition 3: Approval of this amendment by the Maryland Department of the Environment.

Condition 4: Successful negotiation and execution of a Public Works Agreement.

Narrows Point Condos (July 24, 2001) – Tax Map 57, Parcel 104 and part of Parcel 71

The site consists of approximately 15 acres and is zoned Kent Narrows Waterfront Village Center (WVC) by the Queen Anne's County Zoning Ordinance. The property is located on Kent Narrows Way North, immediately east of Mears Point Marina. Parcel 104 is currently improved with a single-family dwelling. Parcel 71 is part of the lands currently owned by Mears Point Marina that will be subdivided and granted to the developer, Narrows Point LLC. This portion of parcel 71 is currently vacant with the only improvement being a private driveway to parcel 104. The proposal is to create 38 condominiums. The anticipated water flows are 9,500 gallons per day. Water service is to be provided by the Oyster Cove distribution system.

Grasonville Station Commercial Subdivision (July 24, 2001) – Tax Map 58A, Parcel 58

The site consists of approximately 14 acres and is zoned Urban Commercial by the Queen Anne's County Zoning Ordinance – Grasonville Community Plan. The property is located on the southwest quadrant of the intersection of US Route 50/301 and the Chester River Beach Road overpass. The site is currently under construction to become a commercial subdivision and is currently served with sewer. The amendment is to extend the water service area. The minimum flow would be 3,250 gallons per day however actual flows will probably be much higher but are currently unknown as they will be a function of the as yet undetermined use. Water service is proposed to be provided by the Grasonville distribution system.

Rt. 8 School & Park Complex (January 22, 2002) – Tax Map 56, Parcels 35, 36, 49, 51, 183, 222 & 224

The site consists of approximately 64 acres and is zoned Estate (E) and Neighborhood Conservation (NC-2 and NC-20) by the Queen Anne's County Zoning Ordinance. The properties are located on the east side of Romancoke Road (MD Route 8) and extend from Mowbray Park to Davidson Drive. Parcel 35 is the existing Mowbray Park and contains approximately 13 acres and is included as part of the proposal. The other parcels formerly constituted the Davidson farm and produce stand, a single-family home, as well as other adjacent agricultural lands which when combined contain approximately 51 acres. The proposal is to service the existing park and to construct a 68,400 square foot elementary school. A middle school is also planned to be constructed on the 51-acre site within 5 years. The average anticipated water and wastewater flows for the park would be 125 gallons per day. The average anticipated water and wastewater flows for the elementary school would be 4,500 gallons per day. This amendment request is to change the 1996 Plan's Water service designation from "No Planned Service" to "W-1" for these seven parcels. Water service is proposed to be provided by the Stevensville distribution system.

The Sonata Club of Centreville (March 26, 2002) – Tax Map 44, Part of Parcel 42

Parcel 42 consists of approximately 232 acres in total and has been annexed into the Town in its entirety. Parcel 42 is located on the east side of MD Route 213, north of Taylor Mill Road and is zoned R-1 by the Centreville Zoning Ordinance. The portion of parcel 42 currently under consideration consists of approximately 184 acres and is the portion between the two main tributaries of the Mill Stream. The proposal is to construct 390 active adult single-family and multi-family homes. The site will also include a clubhouse facility. The average anticipated water flows for the community would be 98,500 gallons per day. Water service is to be provided by an extension of a water main along MD Route 213 from the vicinity of the new shopping center.

Condition 1: Phase 1 will not exceed 100 units and any subsequent phases will be predicated on the expansion of capacity of the Town of Centreville's wastewater treatment plant, unless the Town agrees otherwise.

Condition 2: Consistency with all provisions of the Annexation Agreement and the successful negotiation and execution of a Public Works Agreement or other form of agreement, with the Town of Centreville detailing any necessary off-site upgrades, fees, and any other requirements the Town may typically have.

Condition 3: Approval of this amendment by the Maryland Department of the Environment.

Gibson's Grant Subdivision (March 26, 2002) – Tax Map 57, Parcel 45

The site consists of approximately 139 acres. The lands are zoned Chester Master Planned Development (MPD) by the Chester Community Plan portion of the Queen Anne's County Zoning Ordinance. The property is located north of US 50/301 and west of Piney Creek Road. The proposal is to construct 750 mixed residential units as well as approximately 10,000 square feet of commercial floor area. The average anticipated water flows for the community would be 187,600 gallons per day.

Condition 1: Phase 1 will not exceed 240 units and any subsequent phases will be predicated on the expansion of capacity of the KN/S/G wastewater treatment plant. The owner of the property must sign a legally binding agreement acknowledging that no development beyond phase 1 will be permitted unless and until the expansion of the wastewater treatment plant and waiving any right to additional capacity of sewer until said expansion.

Condition 2: Successful negotiation and execution of a Public Works Agreement to include at a minimum the following off-site improvements and milestones (unless modified within the Public Works Agreement) and such other terms, agreements, and conditions as may be appropriate:

Prior to the issuance of the 1st building permit:

1. Construct water treatment capacity necessary to serve the development at the site of the new Four Seasons water treatment plant.

2. Construct a 16-inch water main from the Four Seasons water tower to the Gibson's Grant site.

Prior to the issuance of the 241st building permit:

1. Construct a 12-inch water main along Castle Marina Road to connect the north Chester water system to the south Chester water system.

Condition 3: Approval of this amendment by the Maryland Department of the Environment.

Safeway Supermarket Project (November 19, 2002) (Tax Map 57 Parcel 43)

The parcel contains approximately 10 acres in total and is located on Main Street in Chester immediately to the east of the existing Kent Towne Market shopping center. The property is zoned Town Center (TC). The proposal is to construct a 57,476 square foot Safeway supermarket, 6,000 square feet of ancillary retail space, and a gas station. The average anticipated water flow for the property would be 4,563 gallons per day. Water service is to be provided by the Bridgepointe water system.

The Tides Condominium Project (January 21, 2003) (Tax Map 57 Parcel 444)

The parcel contains approximately 3 acres in total and is located on Piney Narrows Road in the Kent Narrows west area, immediately adjacent to the intersection of Piney Narrows Road and Swan Cove Lane. The property is zoned Waterfront Village Center (WVC). The proposal is to construct 15 residential condominiums. The average anticipated water flow for the property would be 3,750 gallons per day. Water service is to be provided by the Oyster Cove water system via a sub aqueous water main to be directionally drilled under Kent Narrows.

Grasonville Church of God (March 25, 2003) (Tax Map 58A Parcel 720)

The parcel contains approximately 10 acres in total but the majority of this area is a pond. The property is located on Hess Road in Grasonville. The property is zoned Urban Commercial

(UC). The proposal is to construct an approximately 8,000 square foot church. The average anticipated water flow for the property would be 500 gallons per day. Water service is to be provided by the Grasonville water system.

Hilton Garden Inn (July 22, 2003) (Tax Map 57 Parcels 341 thru 345)

The combined acreage of the five parcels is approximately 3.2 acres. The property is located on the southeast corner of the intersection of Main Street and Wells Cove Road. The property is zoned Waterfront Village Center (WVC). The proposal is to construct a 90-room hotel with 16 transient boat slips, 4000 square feet of retail floor area and 4000 square feet of office floor area. The average anticipated wastewater flow for the properties would be 5365 gallons per day. The Oyster Cove water treatment plant will provide water service.

Tall Pines (November 18, 2003) (Tax Map 58 Parcel 305)

The parcel is approximately 8 acres in size. The parcel is located on Grasonville Cemetery Road in Grasonville across from the Greenwood Subdivision. The property is zoned Neighborhood Conservation – 20,000 ft2 lot minimum with mobile home option (NC20T). The proposal is to construct 14 single-family homes. The average anticipated water flows for the property would be 3,500 gallons per day. Water service is to be provided by the Grasonville water system.

Offshore Performance (July 20, 2004**)** (Tax Map 58A – Parcels 35 & 739)

The parcel's land area combined is approximately 1.8 acres in size. The parcel is located near the intersection of Hess Road and US Rt 50/301 in Grasonville. The property is currently improved with one single-family dwelling and one duplex dwelling all of which are to be razed. The property is zoned Urban Commercial (UC). The proposal is to extend water service to the property to allow for the construction of a new boat dealership. The average anticipated water flows for the property would be 750 gallons per day. Water service is to be provided by the Grasonville water treatment plant.

Bridge Office Center (September 28, 2004) (Tax Map 48, Parcel 130, Lots 14)

The site consists of approximately 17 acres within the Chesapeake Bay Business Park and is zoned Suburban Industrial (SI) by the Queen Anne's County Zoning Ordinance. The property is located on MD Rt 18 (Love Point Road) in Stevensville. The site is currently vacant. The proposal is to create 114,320 square foot of office space. The anticipated average daily water flows are 10,300 gallons per day. Water service will be provided by the Stevensville distribution system.

Foxxtown Senior Apartments & Senior Center (March 22, 2004) (Tax Map 12A, Parcel 50)

This site consists of approximately 7 acres and is zoned Town Traditional Apartments (TTA) by the Sudlersville Zoning Ordinance. The property is located on MD Rt 313 (Church Street) in Sudlersville. The site is currently vacant. The proposal is to create 40 senior housing units with an attached senior center that will be County owned and operated. The anticipated average daily water and wastewater flows are 4,250 gallons per day for the project.

The project is to be served with a new water treatment facility that will be owned and operated by the Town. It is the intent to also immediately serve the adjacent elementary school as well as to have the treatment facility to be expandable to eventually serve the entire Town.

DNR Marine Basin at Matapeake (March 22, 2004) (Tax Map 56, Parcels 174 & 178)

This site is approximately 3 acres and is zoned Suburban Industrial (SI) by the Queen Anne's County Zoning Ordinance. The property is located off of MD Rt 8 (Romancoke Road) south of Stevensville at 303/306 Marine Academy Lane. The site is improved with the Department of Natural Resources Marine Police Academy and its support facilities. The proposal is to extend public water to the site from the Matapeake water tower. The anticipated average daily water flow is 1,750 gallons per day for the project. Water service will be provided by the existing capacity of the Stevensville water system.

The Pond at Church Hill (March 22, 2004) (Tax Map 17, Parcel 71 & 110)

This site consists of approximately 7 acres and is zoned Low Density Residential Single Family (R-SF) by the Church Hill Zoning Ordinance. The property is located off of MD Rt 300 (Sudlersville Road) in Church Hill. The site is currently vacant. The proposal is to create 43 age restricted senior housing units (100 gallons per day per unit). The anticipated average daily water and wastewater flows are 4,300 gallons per day for the project. The project is to be served with a new privately owned and operated water treatment facility.

Kent Island Crossing Shopping Center (January 10, 2006) (Tax Map 57, Parcel 374 & Part of Parcel 8)

This site consists of approximately 15 acres and is zoned Town Center by the Chester Community Plan. The property is located off of the Piney Creek Service Road in Chester. The site is currently a single-family residence. The proposal is to create a shopping center consisting of a supermarket, 14,400 ft2 of retail space, a 5,525 ft2 restaurant, and a gas station. The anticipated average daily water flow is 7,042 gallons per day for the project. The project is to be served with water by the Bayside/Queens Landing water system.

Matapeake Ferry Terminal Building (January 10, 2006) (Tax Map 56, Parcel 293)

This site is approximately 3 acres and is zoned Suburban Industrial (SI) by the Queen Anne's County Zoning Ordinance. The property is located off of MD Rt 8 (Romancoke Road) south of Stevensville at 303/306 Marine Academy Lane. The site is improved with the historic Bay Ferry Terminal building which is to be renovated by the County as a recreational facility. The proposal is to extend public water to the site from the Matapeake water tower. The anticipated average daily water flow is 500 gallons per day for the project. Water service will be provided by the existing capacity of the Stevensville water system.

Matapeake Maritime Center (January 10, 2006) **(**Tax Map 56, Parcel 221)

This is the former site the Chesapeake Bay hydraulic model and has a land area of approximately 56 acres. The property is located on Romancoke Road just north of Marine Academy Drive and is zoned Suburban Industrial (SI). The proposal is construct five buildings within the footprint of the former Bay Model to accommodate various boating industry trades. The first phase of the project is anticipated to employ 50 people with subsequent phases of up to 200 people. The proposal is to extend a pressure sewer line to connect to the existing public vacuum sewer. The anticipated average daily wastewater flow is 600 gallons per day for phase 1 of the project. Sewer service is to be provided by Collection Station 'R'.

Anne Arundel Medical Center (February 14, 2006) (Tax Map 57, Part of Parcel 8)

This site consists of approximately 4 acres and is to be shared with the new Kent Island Volunteer Fire Department. The site is zoned Town Center by the Chester Community Plan. The property is located off of the Piney Creek Service Road in Chester. The site is currently vacant agricultural land. The proposal is to create a 55,000 ft2 medical center. The anticipated average daily water flow is 4,950 gallons per day for the project. The project is to be served with water by the Bayside/Queens Landing water system.

Kent Island Volunteer Fire Department (February 14, 2006) (Tax Map 57, Part of Parcel 8)

This site consists of approximately 4 acres and is to be shared with the new Anne Arundel Medical Center. The site is zoned Town Center by the Chester Community Plan. The property is located off of the Piney Creek Service Road in Chester. The site is currently vacant agricultural land. The proposal is to create a firehouse. The anticipated average daily water flow is 250 gallons per day for the project. The project is to be served with water by the Bayside/Queens Landing water system.

APPENDIX XI: SUMMARY OF COMPLETED SEWERAGE PLAN AMENDMENTS

Amendments Under Development

The following are recently amended projects by private developers. A project's amendment is only valid for three (3) years following the amendment's hearing date. The date of amendment is shown in parenthesis.

Hunter's Oak Golf & Country Club (January 18, 2000) – Tax Map 59, Parcels 12 & 37

This site consists of approximately 448 acres and is zoned a mixture of Countryside and Agricultural by the Queen Anne's County Zoning Ordinance. The site is currently a mixture of agricultural and woods although an 18-hole golf course has been recently completed. The proposal is to construct an on-site water system to ultimately service two 18-hole golf courses, a country club facility containing a small restaurant, meeting rooms, a 120 seat tavern, a pro shop, and other buildings typically associated with a golf course club. The system's capacity is estimated to be 15,755 gallons per day. Sewer service will be provided by a septic system possibly with some form of drip irrigation, meeting the following three conditions:

1. The sewage system will be required to provide secondary treatment.
2. An operations and maintenance manual will need to be developed and the system will need to be maintained by a competent contractor.
3. A groundwater discharge permit will be required from MDE.

North Brook Subdivision (January 18, 2000) – Tax Map 36, Parcel 11

The site consists of approximately 197 acres and is zoned R-1 by the Town of Centreville's Zoning Ordinance. The site is currently an open field. The proposal is to create approximately 422 residential lots with a first phase of 56 lots. Flows to be generated are estimated to be 105,500 gallons per day. Sewer service will be provided by the Town of Centreville's wastewater collection and treatment system.

The amendment must meet the following three conditions:

1. The property owners being served will solely maintain the grinder pumps serving each lot.
2. Future phase approval will be conditioned on the availability and adequacy of sewer and water capacity within the Town and an amendment into the

Comprehensive Water and Sewerage Plan is in on way a commitment for future service for future phases.

3. All requirements for the annexation of the property into Town limits will be met prior to the phase 1 final approval.

Four Seasons at Kent Island (May 23, 2000) (Tax Map 49, Parcels 7, 8, 11, 24 - Tax Map 57, Parcels 1, 8, 347, 532)

The site consists of approximately 560 acres and is zoned a combination of Stevensville Master Planned Development (SMPD) (392 acres), Chester Master Planned Development (CMPD)(162 acres) and Suburban Commercial (SC) (6 acres) by the Queen Anne County Zoning Ordinance. The site is currently an open field. The current proposal is to allow for the creation of an approximately 831 single family, and 216 multi-family, age restricted community, with a community center and recreation area. Also proposed are 300 rental apartments, 156 garden condominiums, an 88 bed assisted living facility, and a 95,000 square foot commercial center. Flows to be allocated for the entire project are estimated to be 424,050 gallons per day. The project is to be phased with the first phase consisting of 400 age restricted dwellings and a clubhouse with an anticipated allocated flow of 110,000 gallons per day.

The development will require extensive off-site sanitary improvements, as detailed below, and is conditionally approved as follows:

Condition Sewer 1: The approval of the full project is predicated on the KN/S/G wastewater treatment plant being expanded to at least 3 million gallons per day. Only the first phase can be accommodated without the expansion.

Condition Sewer 2: The following off-site improvements will be required.

Phase 1:

a. Permanent vacuum collection station (sized to accommodate adjacent properties)

b. New 12,400 foot of 12 inch force main along, or adjacent to, the Cross Island Trail

Condition Sewer 3: Sureties for all off-site improvements, as well as the permanent vacuum collection station will be required prior to final approval of phase 1.

Condition Sewer 4: Any change in use other than that proposed will require a re-amendment into the plan.

Greenwood Subdivision (July 18, 2000) (Tax Map 65, Parcel 54)

The site consists of approximately 90 acres and is zoned Grasonville Planned Residential Neighborhood (GPRN) by the Queen Anne's County Zoning Ordinance. The property is located on Grasonville Cemetery Road. The site is currently vacant woodland. The proposal is to develop a 120 lot residential subdivision. The anticipated water flows are 30,000 gallons per day. Water service will be provided by the Grasonville distribution system.

Terrapin Grove Senior Housing (March 20, 2001) (Tax Map 48, Parcel 126)

The site consists of approximately 20 acres and is zoned a combination of Suburban Estate (SE) and Stevensville Master Plan Development (SMPD) by the Queen Anne's County Zoning Ordinance. The property is located on MD Rt 18 (Love Point Road) on the site of the existing Percy Thomas Senior Center. The proposal is to create 85 rental apartments for the elderly. The anticipated wastewater flows are 8,500 gallons per day. The adjacent Chesapeake Bay Business Park's pump station 5 will provide sewer service.

Park Center Complex (March 20, 2001)(Tax Map 48, Parcel 130, Lots 19 through 21 and 23)

The site consists of approximately 40 acres within the Chesapeake Bay Business Park and is zoned Suburban Industrial (SI) by the Queen Anne's County Zoning Ordinance. The property is located on MD Rt 18 (Love Point Road) in Stevensville. The site is currently vacant. The proposal is to create 260,945 square foot of industrial space. The anticipated wastewater flows are 20,400 gallons per day. Sewer service will be provided by the Chesapeake Bay Business Park's pump station 5.

Ellendale Subdivision (March 20, 2001)(Tax Map 56, Parcel 20)

The site consists of approximately 90 acres and is zoned Stevensville Master Plan Development (SMPD) by the Queen Anne's County Zoning Ordinance. The property is located on MD Rt 8 (Romancoke Road), southeast of its intersection with US Rt 50/301, immediately south of the K-Mart shopping center. The site is currently a farm with a single-family dwelling and associated out buildings. The proposal is to create 285 dwellings of which 106 will be single-family lots and 179 will be town homes. The anticipated sewer flows are 71,250 gallons per day. A new vacuum collection station that is to be constructed by the developer will provide sewer service.

This amendment will take effect once the following conditions have been fulfilled:

Condition 1: That the Growth Allocation Petition pending before the Critical Area Commission and the County Commissioners is approved including the satisfaction of the six items listed in the January 15, 2002 letter from the County Commissioners to the Critical Area Commission.

Condition 2: The successful submittal of all materials necessary to satisfy the Interim Adequate Public Facilities Ordinance including an acceptable sewer allocation disbursement schedule.

Condition 3: Approval of this amendment by the Maryland Department of the Environment.

Condition 4: Successful negotiation and execution of a Public Works Agreement.

Narrows Point Condominiums (July 24, 2001) (Tax Map 57, Parcel 104 and part of Parcel 71)

The site consists of approximately 15 acres and is zoned Kent Narrows Waterfront Village Center (WVC) by the Queen Anne's County Zoning Ordinance. The property is located on Kent Narrows Way North, immediately east of Mears Point Marina. Parcel 104 is currently improved with a single-family dwelling. Parcel 71 is part of the lands currently owned by Mears Point Marina that will be subdivided and granted to the developer, Narrows Point LLC. This portion of parcel 71 is currently vacant with the only improvement being a private driveway to parcel 104. The proposal is to create 38 condominiums. The anticipated wastewater flows are 9,500 gallons per day. Sewer service is to be provided by Collection Station 'H'.

Rt. 8 School & Park Complex (January 22, 2002) (Tax Map 56, Parcels 35, 36, 49, 51, 183, 222, & 224))

The site consists of approximately 64 acres and is zoned Estate (E) and Neighborhood Conservation (NC-2 and NC-20) by the Queen Anne's County Zoning Ordinance. The properties are located on the east side of Romancoke Road (MD Rt 8) and extend from Mowbray Park to Davidson Drive. Parcel 35 is the existing Mowbray Park and contains approximately 13 acres and is included as part of the proposal. The other parcels formerly constituted the Davidson farm and produce stand, a single family home, as well as other adjacent agricultural lands which when combined contain approximately 51 acres. The proposal is to service the existing park and to construct a 68,400 square foot elementary school. A middle school is also planned to be constructed on the 51-acre site within 5 years. The average anticipated water and wastewater flows for the park would be 125 gallons per day. The average anticipated water and wastewater flows for the elementary school would be 4,500 gallons per day. This amendment request is to change the 1996 Plan’s Sewer service designation from ‘No Planned Service’ to ‘S-1’ for these seven parcels. Sewer service is proposed to be provided by Collection Station ‘R’.

The Sonata Club of Centreville (March 26, 2002) (Tax Map 44, Part of Parcel 42)

Parcel 42 consists of approximately 232 acres in total and has been annexed into the Town in its entirety. Parcel 42 is located on the east side of MD Rt 213, north of Taylor Mill Road and is zoned R-1 by the Centreville Zoning Ordinance. The portion of parcel 42 currently under consideration consists of approximately 184 acres and is the portion between the two main tributaries of the Mill Stream. The proposal is to construct 390 active adult single-family, and multi-family, homes. The site will also include a clubhouse facility. The average anticipated wastewater flows for the community would be 98,500 gallons per day. Sewer service is to be provided by a new system of gravity sewer mains that will convey the wastewater to a new pump station located within the community. The wastewater will then be pumped to the nearest gravity manhole on MD Rt 213 after which it will flow by gravity until reaching Centreville’s south pump station.

Condition 1: Phase 1 will not exceed 100 units and any subsequent phases will be predicated on the expansion of capacity of the Town of Centreville’s wastewater treatment plant, unless the Town agrees otherwise.

Condition 2: Consistency with all provisions of the Annexation Agreement and the successful negotiation and execution of a Public Works Agreement, or other form of agreement, with the Town of Centreville detailing any necessary off-site upgrades, fees, and any other requirements the Town may typically have.

Condition 3: Approval of this amendment by the Maryland Department of the Environment.

Gibson's Grant Subdivision (March 26, 2002) (Tax Map 57, Parcel 45)

The site consists of approximately 139 acres. The lands are zoned Chester Master Planned Development (CMPD) by the Chester Community Plan portion of the Queen Anne's County Zoning Ordinance. The property is located north of US 50/301 and west of Piney Creek Road. The proposal is to construct 750 mixed residential units as well as approximately 10,000 square feet of commercial floor area. The average anticipated wastewater flows for the community would be 187,600 gallons per day. Sewer treatment will be provided predominately by the to be expanded Kent Island wastewater treatment plant.

> **Condition 1**: Phase 1 will not exceed 240 units and any subsequent phases will be predicated on the expansion of capacity of the KN/S/G wastewater treatment plant. The owner of the property must sign a legally binding agreement acknowledging that no development beyond phase 1 will be permitted unless and until the expansion of the wastewater treatment plant and waiving any right to additional capacity of sewer until said expansion.
>
> **Condition 2**: Successful negotiation and execution of a Public Works Agreement to include at a minimum the following off-site improvements and milestones (unless modified within the Public Works Agreement) and such other terms, agreements, and conditions as may be appropriate:
>
> Prior to the issuance of the 1st building permit:
>
> 1. Construct a gravity collection station to service their property.
> 2. Construct a sewer force main from the new collection station to the KN/S/G wastewater treatment plant.
> 3. Approval of this amendment by the Maryland Department of the Environment.

Safeway Supermarket Project (November 19, 2002) (Tax Map 57 Parcel 43)

The parcel contains approximately 10 acres in total and is located on Main Street in Chester immediately to the east of the existing Kent Towne Market shopping center. The property is zoned Town Center (TC). The proposal is to construct a 57,476 square foot Safeway supermarket, 6,000 square feet of ancillary retail space, and a gas station.

The average anticipated wastewater flow for the property would be 4,563 gallons per day This amendment request is to change the 1996 Plan's Sewer service designation from 'No Planned

Service' to 'S-1' for this parcel. Sewer service is to be provided by Collection Station 'G'.

Cedar Road in Benton's Pleasure Subdivision (June 17, 2003) (Tax Map 57 Parcel 378 Lot 51A)

This is an existing, vacant, lot of record. The lot is approximately 0.54 acres in size. The lot is located on, and south of, Cedar Road. The property is zoned Neighborhood Conservation 20,000 foot minimum lot size (NC-20). The proposal is to extend sewer service to this lot. The average anticipated wastewater flow for the property would be 250 gallons per day. Sewer service is to be provided by Collection Station 'D'.

Cedar Road in Benton's Pleasure Subdivision (June 17, 2003) (Tax Map 57 Parcel 378 Lots A and B)

These exist as vacant lots of record. Each lot is approximately 0.84 acres in size. The lots are located on, and south of, Cedar Road. The property is zoned Neighborhood Conservation 20,000 foot minimum lot size (NC-20). The proposal is to extend sewer service to these lots. The average anticipated wastewater flow for the two properties would be 500 gallons per day. Sewer service is to be provided by Collection Station 'D'.

Cedar Road in Benton's Pleasure Subdivision (July 22, 2003) (Tax Map 57 Parcel 378 Lot 49A and 50A)

These are existing, vacant, lots of record. Each lot is approximately 0.54 acres in size. The lots are located on, and south of, Cedar Road. The property is zoned Neighborhood Conservation 20,000 foot minimum lot size (NC-20). The proposal is to extend sewer service to this lot. The average anticipated wastewater flow for the property would be 500 gallons per day. Sewer service is to be provided by Collection Station 'D'.

Hilton Garden Inn (July 22, 2003) (Tax Map 57 Parcels 341 thru 345)

The combined acreage of the five parcels is approximately 3.2 acres. The property is located on the southeast corner of the intersection of Main Street and Wells Cove Road. The property is zoned Waterfront Village Center (WVC). The proposal is to construct a 90-room hotel with 16 transient boat slips, 4000 square feet of retail floor area and 4000 square feet of office floor area. The average anticipated wastewater flow for the properties would be 5365 gallons per day. Sewer service is to be provided by Collection Station 'H'.

Pollard Property (June 8, 2004**)** (Tax Map 48 – Parcel 74)

The parcel is approximately 0.11 acres in size. The parcel is located near the intersection of MD Rt 8 and MD Rt 18 north of Stevensville and south of, and adjacent to, the Kent Island High School. The property is currently improved with a burnt-out cottage. The property is zoned Suburban Estate (SE). The proposal is to extend sewer service to the property to allow for the construction of a new home. The average anticipated sewer flows for the property would be 250 gallons per day. Sewer service is to be provided by a privately maintained grinder pump system connecting the property to the Collection Station 'A'.

Laster Property (June 8, 2004**)** (Tax Map 57 – Parcel 378 – Lots 69, 70, 71)

These are existing lots of record. A home straddles lots 70 and 71 while lot 69 is vacant. Each lot is approximately 0.5 acres in size. The lots are located on, and north of, Cedar Road in Chester. The properties are zoned Neighborhood Conservation 20,000 foot minimum lot size (NC-20). The proposal is to extend sewer service to these lots. The average anticipated wastewater flow for the properties would be 500 gallons per day. Sewer service is to be provided by Collection Station 'D'.

Porter Property (June 8, 2004**)** (Tax Map 57 – Parcel 378 – Lots 19 and 20)

These are existing lots of record. A home is located on lot 20 while lot 19 is vacant. Each lot is approximately 0.6 acres in size. The lots are located on Benton's Pleasure Road in Chester. The properties are zoned Neighborhood Conservation 20,000 foot minimum lot size (NC-20). The proposal is to extend sewer service to these lots. The average anticipated wastewater flow for the properties would be 500 gallons per day. Sewer service is to be provided by Collection Station 'D'.

Bridge Office Center (September 28, 2004**)** (Tax Map 48, Parcel 130, Lots 14)

The site consists of approximately 17 acres within the Chesapeake Bay Business Park and is zoned Suburban Industrial (SI) by the Queen Anne's County Zoning Ordinance. The property is located on MD Rt 18 (Love Point Road) in Stevensville. The site is currently vacant. The proposal is to create 114,320 square foot of office space. The anticipated average daily wastewater flows are 10,300 gallons per day. Sewer service will be provided by the Chesapeake Bay Business Park's pump station 5.

Armin Property (March 22, 2005) (Tax Map 58, Parcel 650)

The site consists of approximately ½ acre and is zoned Grasonville Planned Residential Neighborhood (GPRN) District by the Queen Anne's County Zoning Ordinance. The property is located off of Canal Street immediately adjacent to the Chester River Beach subdivision in Grasonville. The proposal is to extend public sewer to the site from Canal Street to service a single-family dwelling. The anticipated average daily sewer flow is 250 gallons per day for the project. Sewer service will be provided by KN/S/G collection station 'L'.

Church Hill Hunt Subdivision (March 22, 2005) (Tax Map 23, Parcel 123 & 151)

The site consists of approximately 88 acres recently annexed and is zoned Low Density Residential Single Family (R-SF) by the Church Hill Zoning Ordinance. The property is located east of Main Street on the vacant lands between Walnut Street and Cemetery Lane. The site is currently vacant. The proposal is to create 80 single-family homes (dwellings at 200 gallons per day). The anticipated average daily water and wastewater flows are 16,000 gallons per day for the project. The water needs for the project are to be served with individual wells. Sewer service will be provided by existing capacity within the Town of Church Hill's treatment plant.

Kent Island Crossing Shopping Center (January 10, 2006) (Tax Map 57, Parcel 374 & Part of Parcel 8)

This site consists of approximately 15 acres and is zoned Town Center by the Chester Community Plan. The property is located off of the Piney Creek Service Road in Chester. The site is currently a single-family residence. The proposal is to create a shopping center consisting of a supermarket, 14,400 ft2 of retail space, a 5,525 ft2 restaurant, and a gas station. The anticipated average daily water flow is 7,042 gallons per day for the project. The project is to be served with water by Collection Station 'U'.

DNR Marine Basin at Matapeake (January 10, 2006) (Tax Map 56, Parcels 174 & 178)

This site is approximately 3 acres and is zoned Suburban Industrial (SI) by the Queen Anne's County Zoning Ordinance. The property is located off of MD Rt 8 (Romancoke Road) south of Stevensville at 303/306 Marine Academy Lane. The site is improved with the Department of Natural Resources Marine Police Academy and its support facilities. The proposal is to extend a pressure sewer line to connect to the existing public vacuum sewer. The anticipated average daily wastewater flow is 1,750 gallons per day for the project. Sewer service will be provided by Collection Station 'R'.

Matapeake Ferry Terminal Building (January 10, 2006) (Tax Map 56, Parcel 293)

This site is approximately 3 acres and is zoned Suburban Industrial (SI) by the Queen Anne's County Zoning Ordinance. The property is located off of MD Rt 8 (Romancoke Road) south of Stevensville at 303/306 Marine Academy Lane. The site is improved with the historic Bay Ferry Terminal building which is to be renovated by the County as a recreational facility. The proposal is to extend a pressure sewer line to connect to the existing public vacuum sewer. The anticipated average daily wastewater flow is 500 gallons per day for the project. Sewer service is to be provided by Collection Station 'R'.

Matapeake Maritime Center (January 10, 2006) **(**Tax Map 56, Parcel 221)

This is the former site the Chesapeake Bay hydraulic model and has a land area of approximately 56 acres. The property is located on Romancoke Road just north of Marine Academy Drive and is zoned Suburban Industrial (SI). The proposal is construct five buildings within the footprint of the former Bay Model to accommodate various boating industry trades. The first phase of the project is anticipated to employ 50 people with subsequent phases of up to 200 people. The proposal is to extend a pressure sewer line to connect to the existing public vacuum sewer. The anticipated average daily wastewater flow is 600 gallons per day for phase 1 of the project. Sewer service is to be provided by Collection Station 'R'.

Anne Arundel Medical Center (February 14, 2006) (Tax Map 57, Part of Parcel 8)

This site consists of approximately 4 acres and is to be shared with the new Kent Island Volunteer Fire Department. The site is zoned Town Center by the Chester Community Plan. The property is located off of the Piney Creek Service Road in Chester. The site is currently vacant agricultural land. The proposal is to create a 55,000 ft2 medical center. The anticipated average daily water flow is 4,950 gallons per day for the project. The project is to be served with sewer either by Collection System 'C' or 'U'.

Kent Island Volunteer Fire Department (February 14, 2006) (Tax Map 57, Part of Parcel 8)

This site consists of approximately 4 acres and is to be shared with the new Anne Arundel Medical Center. The site is zoned Town Center by the Chester Community Plan. The property is located off of the Piney Creek Service Road in Chester. The site is currently vacant agricultural land. The proposal is to create a firehouse. The anticipated average daily water flow is 250 gallons per day for the project. The project is to be served with sewer either by Collection System 'C' or 'U'.

APPENDIX XII: SUMMARY OF COMPLETED AND CONSTRUCTED AMENDMENT PROJECTS

Project Name	System	Use	Avg Flow GPD
3B Management Property	KN/S/G	Residential	250
Allen's Auto Service Property	KN/S/G	Commercial	625
Anchorage Subdivision	KN/S/G	Residential	11,500
Bay County Moose Lodge	Private	Commercial	7,500
Bayside Marina	KN/S/G	Residential	63,500
Beach Harbor	KN/S/G	Camp	16,230
Bridge Office Center	KN/S/G	Industrial	20,600
Bridge Pointe	KN/S/G	Residential	22,000
Bryce, Inc.	KN/S/G	Commercial	500
Cedar Road – Benton's Pleasure	KN/S/G	Residential	2,500
Center Park Apartments	Centreville	Residential	10,400
Chesapeake Bay Business Park	KN/S/G	Industrial	158,000
Chesapeake Motel & Restaurant	KN/S/G	Commercial	7,500
Chesapeake Outlet Village	Queenstown	Commercial	15,000
Chester Station LTD	KN/S/G	Commercial	5,000
Christ Church	KN/S/G	Commercial	0
Clayborne Woods Subdivision	KN/S/G	Residential	30,000
Cox Creek Landing Subdivision	KN/S/G	Residential	13,050
Edward Sealing Property	KN/S/G	Commercial	500
Fair Prospect Farm Subdivision	KN/S/G	Residential	3,500
Fisher Manor Housing	KN/S/G	Residential	6,250
Fox Run Condominiums	KN/S/G	Residential	7,000
Friel (Queenstown)	Private	Commercial	133,000
Friel (Wye Mills)	Private	Commercial	150,000
Grasonville Station Comm. Subd.	KN/S/G	Commercial	2,250
Greenwood Subdivision	KN/S/G	Residential	30,000
Homeport Subdivision	KN/S/G	Residential	3,750
Hunter's Oak Golf & Cntry Club	Private	Commercial	15,755
Island View Marina	Private	Marina	1,080
Johnson-Schulz Subdivision	KN/S/G	Residential	1,250
Kent Island Village	KN/S/G	Residential	9,500
Kent Island Senior	KN/S/G	Institution	500
Kent Landing Plaza	KN/S/G	Commercial	8,375
Kent Towne Market	KN/S/G	Residential	37,235
Kentmorr Marina	Private	Marina	1,000
Kirwan's Landing	KN/S/G	Residential	11,500
Lee G. Bell Property	KN/S/G	Commercial	750
Mallard Run Subdivision	KN/S/G	Residential	20,000
Maryland National Guard	Private	Institution	7,000

Project Name	System	Use	Avg Flow GPD
Narrows Point Condominiums	KN/S/G	Residential	9,500
Oyster Cove	KN/S/G	Residential	95,500
Park Center Complex	KN/S/G	Industrial	20,400
Pier One	KN/S/G	Commercial	31,144
Pine Springs	Private	Mobile Home Pk	20,000
Pointe Subdivision	KN/S/G	Residential	750
Queen Anne's Circle Apts	Centreville	Residential	6,800
Queen Anne's Animal Control	Queenstown	Institution	500
Queen Anne's County Jail	Centreville	Institution	6,375
Queenstown Harbor	Queenstown	Residential	8,750
Queenstown Harbor Golf	Private	Commercial	5,000
Riverside Housing	KN/S/G	Residential	5,750
Rossi Property	KN/S/G	Residential	500
Route 8 School & Park Complex	KN/S/G	Institutional	4,500
Safe Harbor Presb. Church & Subd	KN/S/G	Commercial	1,750
Seaboard Builders Subdivision	KN/S/G	Residential	3,250
Sequoia Subdivision	KN/S/G	Residential	2,500
Stevensville Village	KN/S/G	Residential	7,500
Terrapin Grove Senior Housing	KN/S/G	Institutional	8,500
Thompson Creek Colony	KN/S/G	Residential	5,880
Thompson Creek Commons	KN/S/G	Residential	12,600
Thompson Creek Condominiums	KN/S/G	Residential	7,500
Thompson Creek Mall	KN/S/G	Commercial	22,394
Thompson Creek Office Park	KN/S/G	Commercial	18,260
Thompson Creek Town Homes	KN/S/G	Residential	16,380
Waterman's Court	KN/S/G	Residential	4,500
Weatherbee (see Wharton Subdivision below)			
Wharton Subdivision	Centreville	Residential	7,500
Winchester Subdivision	KN/S/G	Residential	11,500
Woods Subdivision	KN/S/G	Residential	18,500
Wye Realty	KN/S/G	Commercial	3,000

APPENDIX XIII: WATER DEVELOPMENT PRIORITY

Project Name	FY	Location	Description	Total	State	Local	Private
CBBP WTP Upgrade	2007	Bateau Drive, Stevensville	Increase from 100 gpm to 300 gpm	$400,000			$400,000
CBBP Patapsco Well	2007	Bateau Drive, Stevensville	1500 gpm well	$540,000			$540,000
Four Seasons Water Tower	2007	Piney Creek Service Road	500,000 gallon tower	$1,050,000			$1,050,000
Stevensville to North Chester Main	2007	Cross Island Trail	12 inch water main	$365,000			$365,000
Gibson's Grant Water Main	2007	Piney Creek Road, Chester	16 inch water main	$500,000			$500,000
North Chester to South Chester Main	2007	Castle Marina Road, Chester	12 inch water main	$300,000			$300,000
Terrapin Park WTP	2011	Terrapin Park, Stevensville	1500 gpm ultra-filtration	$6,500,000		$2,500,000	$4,000,000
Terrapin Patapsco Well	2011	Terrapin Park, Stevensville	1500 gpm well (backup to CBBP)	$550,000			$550,000
Grasonville to Kent Narrows Main	2009	Main Street, Grasonville	12 inch water main	$800,000			$800,000
South Chester to Riverside Main	2012	Cox Neck Road, Chester	8 inch water main	$550,000		$550,000	
Grasonville WTP Expansion	2010	Grasonville Elementary School	Add 400 gpm treatment	$700,000		$700,000	
Kent Narrows Tower	2009	Main Street, Grasonville	250,000 gallon tower	$750,000		$750,000	
			TOTAL	**$13,005,000**	**$0**	**$4,500,000**	**$8,505,000**

APPENDIX XIV: SEWER DEVELOPMENT PRIORITY

Project Name	FY	Location	Description	Total	State	Local	Private
KN/S/G WWTP Expansion w/ BNR	2005	Bateau Drive, Stevensville	Increase from 2Mgd to 3 Mgd	33,000,000	11,000,000	22,000,000	
Collection Station “U”	2007	Castle Marina Road, Chester	Construct New Collection Station	1,900,000			1,900,000
Collection Station “V”	2007	Piney Creek Road, Chester	Construct New Collection Station	1,600,000			1,600,000
Collection Station “X”	2007	Romancoke Road, Stevensville	Construct New Collection Station	1,600,000			1,600,000
Southern Kent Island Service	2008	Romancoke Road, Stevensville	Serve Failing Septic Tanks Areas	32,000,000		32,000,000	
			TOTAL	**70,100,000**	**11,000,000**	**54,000,000**	**5,100,000**

APPENDIX XV: PROJECTED WATER SUPPLY DEMANDS AND PLANNED CAPACITY

	2000						2005						
Service Area	**Population**			**GPCD**	**Capacity (gpd)**		**Population**			**GPCD**	**Capacity (gpd)**	
	Total	Served	Unserved		Current	Planned	Total	Served	Unserved		Current	Planned
Stevensville	6,425	6,000	425	75	875,000	750,000	7,068	6,750	318	75	1,625,000	250,000
Chester	4,650	2,550	2,100	75	700,000	500,000	5,115	2,869	2,246	75	1,200,000	500,000
Kent Narrows	990	650	340	75	225,000	0	1,089	731	358	75	225,000	0
Grasonville	4,225	1,475	2,750	75	485,000	0	4,648	1,659	2,988	75	485,000	0
KN/S/G Total	**16,290**	**10,675**	**5,615**		**2,285,000**	**1,250,000**	**17,919**	**12,009**	**5,910**		**3,535,000**	**750,000**
Queenstown			0	75					0	75		
Centreville			0	75					0	75		
TOTAL	16,290	10,675	5,615		2,285,000	1,250,000	17,919	12,009	5,910		3,535,000	750,000

NOTES: GPCD = Gallons Per Capita Per Day
gpd = Gallons Per Day
Populations assumes 2.6 capita per household
Commercial Flows assume 250 Gallons Per Day = one dwelling unit
Assumes 10% population growth in 5 years

Service Area	Population 2015			GPCD	Capacity (gpd)		Population 2020			GPCD	Capacity (gpd)	
	Total	Served	Unserved		Current	Planned	Total	Served	Unserved		Current	Planned
Stevensville	8,481	8,269	212	75	1,875,000	250,00	10,177	10,129	48	75	2,125,000	0
Chester	6,138	3,514	2,624	75	1,700,000	500,000	7,366	5,271	2,094	75	2,200,000	0
Kent Narrows	1,307	896	411	75	225,000	0	1,568	1,254	314	75	225,000	0
Grasonville	5,577	2,033	3,544	75	485,000	250,000	6,692	3,456	3,237	75	735,000	0
KN/S/G Total	**21,503**	**14,711**	**6,791**		**4,285,000**	**1,000,000**	**25,803**	**20,110**	**5,693**		**5,285,000**	**0**
Queenstown			0	75					0	75		
Centreville			0	75					0	75		
TOTAL	21,503	14,711	6,791		4,285,000	1,000,000	25,803	20,110	5,693		5,285,000	0

NOTES: GPCD = Gallons Per Capita Per Day
gpd = Gallons Per Day
Population assumes 2.6 capita per household
Commercial Flows assume 250 Gallons Per Day = one dwelling unit
Assumes 10% population growth in 5 years

APPENDIX XVI: PROJECTED SEWER SUPPLY DEMANDS AND PLANNED CAPACITY

	2000						2005					
Service Area	**Population**			**GPCD**	**Capacity (gpd)**		**Population**			**GPCD**	**Capacity (gpd)**	
	Total	Served	Unserved		Current	Planned	Total	Served	Unserved		Current	Planned
Stevensville	6,600	6,500	100	75			7,260	7,260	0	75		
Chester	4,700	4,650	50	75			5,170	5,170	0	75		
Kent Narrows	990	990	0	75			1,089	1,089	0	75		
Grasonville	4,500	4,225	275	75			4,950	4,825	125	75		
KN/S/G Total	**16,790**	**16,365**	**425**		**2,000,000**	**1,000,000**	**18,469**	**18,344**	**125**		**3,000,000**	**0**
Queenstown			0	75	85,000	0			0	75	85,000	715,000
Centreville			0	75	375,000	125,000			0	75	500,000	0
Church Hill			0	75	80,000	0				75	80,000	0
Sudlersville			0	75	90,000	0				75	90,000	0
TOTAL	**16,790**	**16,365**	**425**		**2,630,000**	**1,125,000**	**18,469**	**18,344**	**125**		**3,755,000**	**715,000**

NOTES: GPCD = Gallons Per Capita Per Day gpd = Gallons Per Day
Population assumes 2.6 capita per household
Commercial Flows assume 250 Gallons Per Day = one dwelling unit
Assumes 10% population growth in 5 years

Service Area	Population			2015 GPCD	Capacity (gpd)		Population			2025 GPCD	Capacity (gpd)	
	Total	Served	Unserved		Current	Planned	Total	Served	Unserved		Current	Planned
Stevensville	7,920	7,920	-	75			9,504	9,504	-	75		
Chester	5,640	5,640	-	75			6,768	6,768	-	75		
Kent Narrows	1,188	1,188	-	75			1,426	1,426	-	75		
Grasonville	5,400	5,400	-	75			6,480	6,480	-	75		
KN/S/G Total	**20,148**	**20,148**			**3,000,000**	**1,000,000**	**24,178**	**24,178**			**4,000,000**	
Queenstown				75	800,000					75	800,000	
Centreville				75	500,000	500,000				75	1,000,000	
Church Hill					80,000						80,000	
Sudlersville					90,000						90,000	
TOTAL	**20,148**	**20,148**	**0**		**4,470,000**	**1,500,000**	**24,178**	**24,178**			**5,970,000**	

NOTES: GPCD = Gallons Per Capita Per Day gpd = Gallons Per Day

Population assumes 2.6 capita per household
Commercial Flows assume 250 Gallons Per Day = one dwelling unit
Assumes 10% population growth in 5 years

QUEEN ANNE'S COUNTY

GROUNDWATER PROTECTION REPORT

Prepared by

John E. Nickerson

1989

Updated

1995

QUEEN ANNE'S COUNTY GROUNDWATER PROTECTION REPORT

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TABLES

ILLUSTRATIONS

Appendix

SUPPORT AND DATA USED IN PREPARING REPORT

This report has utilized groundwater reports and maps by the U.S. Geological Survey, Maryland Geological Survey, Soil Conservation Service, and other hydrogeologic reports. Selected water well logs from completion inspections, soil evaluation test records, and water sampling results were reviewed and information incorporated where appropriate. Also, the Groundwater Protection Reports of Caroline County, Talbot County, and Wicomico County were utilized for guidance and modeling comparisons.

Valuable assistance was received from the Department of Environment's Division of Residential Sanitation. In particular, appreciation is expressed to Jane Gottfredson, Larry Nutter, and E. Wayne Asplen.

DEFINITIONS

A. The following terms have the meanings indicated.

B. Terms Defined.

(1) "Approving Authority" means the Secretary of the Department of Environment or the secretary's designee.

(2) "Aquifer" means any formation of soil, sand, rock, gravel, limestone, sandstone, or other material, or any crevice from which underground water is or may be produced.

(3) "Confined Aquifer" means an aquifer bounded above and below by beds of distinctly lower permeability than that of the aquifer itself and which contains groundwater under pressure greater than that of the atmosphere. This term is synonymous with the term "artesian aquifer".

(4) "Groundwater" means underground water in a zone of saturation.

(5) "K-Sat Rate" means a saturated hydraulic conductivity rate as determined by the approving authority and measured in a field test.

(6) "Parcel" means a plot of ground mapped by the State's Assessment Taxation Office as a parcel. If a subdivision of record, recorded at the assessment office has no officially assigned parcel number,

the said subdivision boundary limits shall be considered a parcel's boundary limits for sake of clarity.

(7) "Percolation Rate" means the rate recorded by a percolation test method.

(8) "Permeability" means the capability of a rock, aquifer, or confining bed to transmit water or air.

(9) "Shared Facility" means a water or sewerage system which serves more than one lot of land or more than one user on a single lot of land with water or sewerage systems located on the individual lots or on parcels owned in common by the users or the controlling authority.

(10) "Subdivision" means the division or changing of a lot or parcel's boundary lines so as to create one or more additional lots or parcels. If the lot or parcel lines are altered to increase the size whereby no additional lots or parcels are created; then it will not be considered subdivision for purposes of this definition.

(11) "Unit" means an assigned wastewater flow quantity equal to 400 gallons of wastewater/day. This includes, but is not limited to, all uses such as residential, commercial, institutional, governmental, office, business, etc. For residential purposes, each dwelling unit will be considered a minimum of one unit.

(12) "Unconfined Aquifer" means a aquifer not bounded above by a bed of distinctly lower permeability than that of the aquifer itself and containing groundwater under pressure approximately equal to that of the atmosphere. This term is synonymous with the term "water table aquifer".

(13) "Unconsolidated material" means uncemented soil and sediment material having not more than 70 percent coarse fragments (greater than 2mm) by volume.

(14) "Well" means any hole made in the ground to explore for groundwater, to obtain or monitor groundwater, or to inject water into any underground formation from which ground water may be produced.

C. Regulations Referenced

(1) Comar 26.04.01 means those Regulations Governing Quality of Drinking Water in Maryland.

(2) Comar 26.04.02 means those Regulations Governing Sewage Disposal and Certain Water Systems for Homes and other Establishments in the Counties of Maryland Where a Public Sewage System is Not available.

(3) Comar 26.04.03 means those Regulations Governing Water Supply and Sewerage Systems in the Subdivision of land in Maryland.

(4) Comar 26.04.04 means those Regulations Governing Well Construction.

(5) Comar 26.04.05 means those Regulations Governing Shared Facilities

MISSION AND GOALS

On November 18, 1985, the State of Maryland adopted revised regulations governing "Sewage Disposal Systems For Homes and Other Establishments in the Counties of Maryland Where A Public Sewage System is not Available." Specifically, the regulations were rewritten to clarify and make provision for management strategies which would promote techniques to limit the degradation of the groundwater and surface water resources by on-site sewage systems.

For the most part, on-site waste disposal systems (particularly residential sites) provide limited primary treatment of wastes and the ground is used as a filter to remove microbes, viruses, chemicals, and other material. Thus, the degree of treatment available to clean-up wastes from a given source is very dependent upon soil conditions. <u>The revised regulations state that four feet of unsaturated soil is generally recognized as the thickness of filtering material needed to minimize un-desirable wastewater characteristics reaching the groundwater.</u>

This thickness of four feet is very difficult to maintain in most of the land area in Queen Anne's County on a year-round basis due to the fluctuating nature of a seasonal water table. In order to address mechanisms whereby variance to this four feet requirement may be utilized, the regulations have allowed opportunity for each county to prepare a protection report which will delineate areas where less than four feet of unsaturated soil may be permitted.

The potential for groundwater pollution is dependent upon both the volume of sewage discharged (i.e., effluent loading) and the density of systems discharging (e.g., one per acre versus four per acre), as well as soil thickness, physical and chemical characteristics. These features will vary for different areas. This report shall establish design and construction requirements and effluent loading limits to help minimize degradation of our groundwater resources. Modifications to this report will be made as needed when technology or data resources dictate said changes.

The goals of the groundwater protection reporting effort are as follows:

(1) Determine soil conditions and the infiltration and permeability capacities to handle wastewater. Catalog specific areas, set field test minimums for percolation rates and soil texture characteristics.

(2) Identify density and loading methods of existing waste disposal systems. Project future density and load capacities for given catalogued areas.

(3) Consider land-use and other sources of potential pollution.

(4) Review aquifer water characteristics.

(5) Identify available aquifers and evaluate existing and future use.

(6) Set specific well construction and well siting criteria for catalogued areas.

(7) Incorporate the final plan into the County Master Water and Sewer Plan as required by regulation.

In conclusion, strategies will be outlined for each major management area and for each catalogued area within the major management areas which will give direction for actual field implementation.

OBJECTIVES

The groundwater protection report has two primary objectives. One is to assess the available groundwater resources, describing the aquifers' physical and water quality characteristics and to review past sewage disposal and well construction practices. The second is to develop specific management strategies for protecting surficial or confined groundwater.

The highest degree of protection is required where the unconfined aquifer is utilized as a water supply . This area of Queen Anne's County will be referred to as Management Area A. A lesser degree of protection is required for areas of the county where the unconfined aquifer has been routinely penetrated with sewage effluent and where it is not utilized as a water supply. This area of Queen Anne's County will be referred to as Management Area B.

The major concern in Management Area B is not necessarily protecting this specific aquifer, but instituting control and management strategies which will give a high degree of protection against contaminating deeper, underlying confined aquifers. This can happen either through improper well grouting or if the unconfined aquifer leaks into or readily acts as a significant recharge source for the underlying confined aquifer. Indiscriminate loading of wastewater directly into the unconfined aquifer is not wise from a public health protection standpoint. However, the degree of protection may not need to be as restrictive as where people are drinking the shallow unconfined aquifer water.

MANAGEMENT AREAS

For the purpose of this report, Queen Anne's County has been divided into two "Management Areas". (See Figure 1)

Management Area B

This area consists of the Bennett Point Peninsula-Grasonville area and Kent Island (excluding the Love Point Area.) The eastern boundary is the Wye River and the western boundary is the Chesapeake Bay.

Management Area A

This area consists of the remainder of Queen Anne's County including Love Point on Kent Island.

Maps showing the Management Areas and their boundaries are on the following pages. (11, 12, 13)

Figure 1

Map Showing Management

Areas For

Queen Anne's County

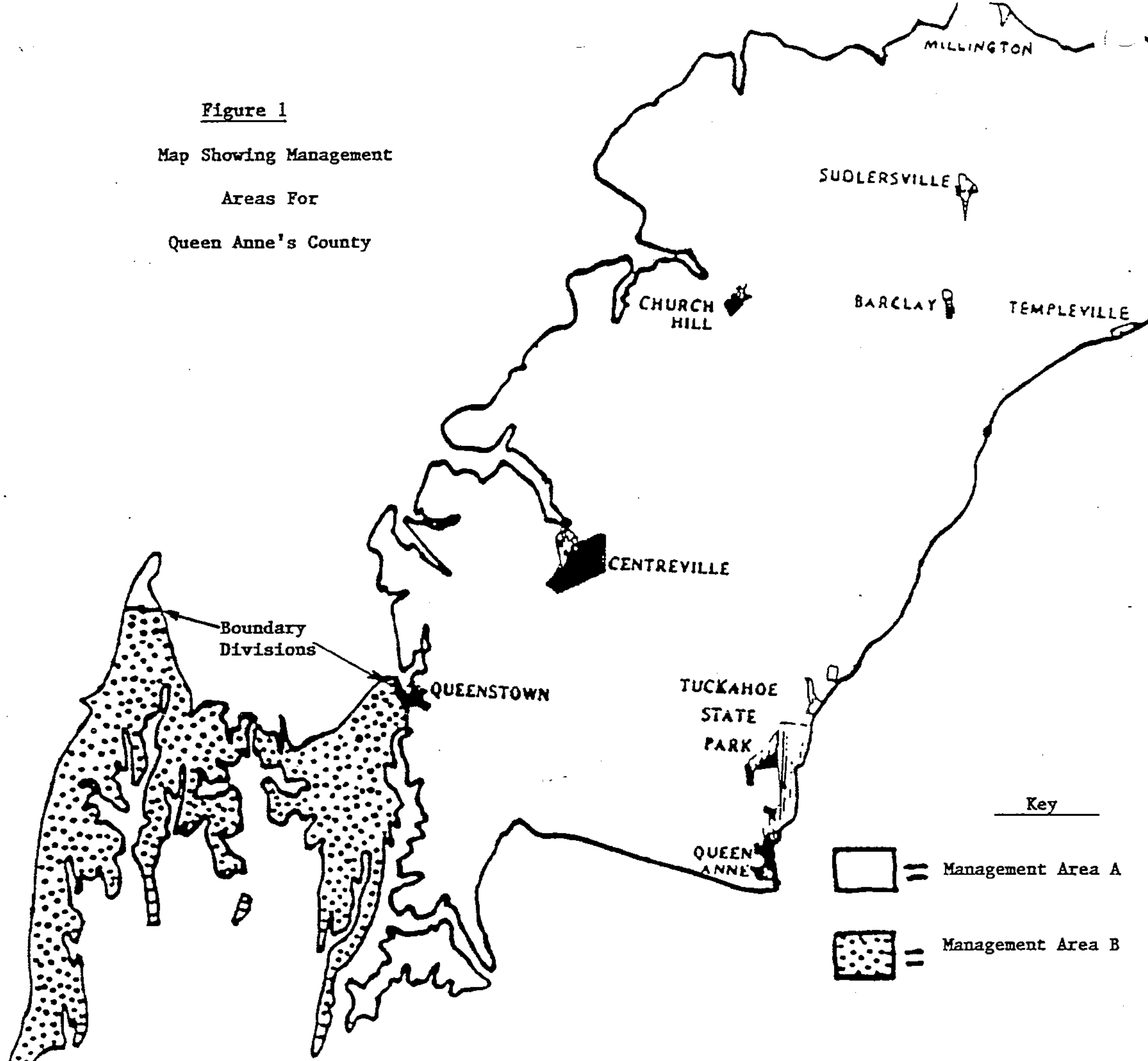


Figure 1A

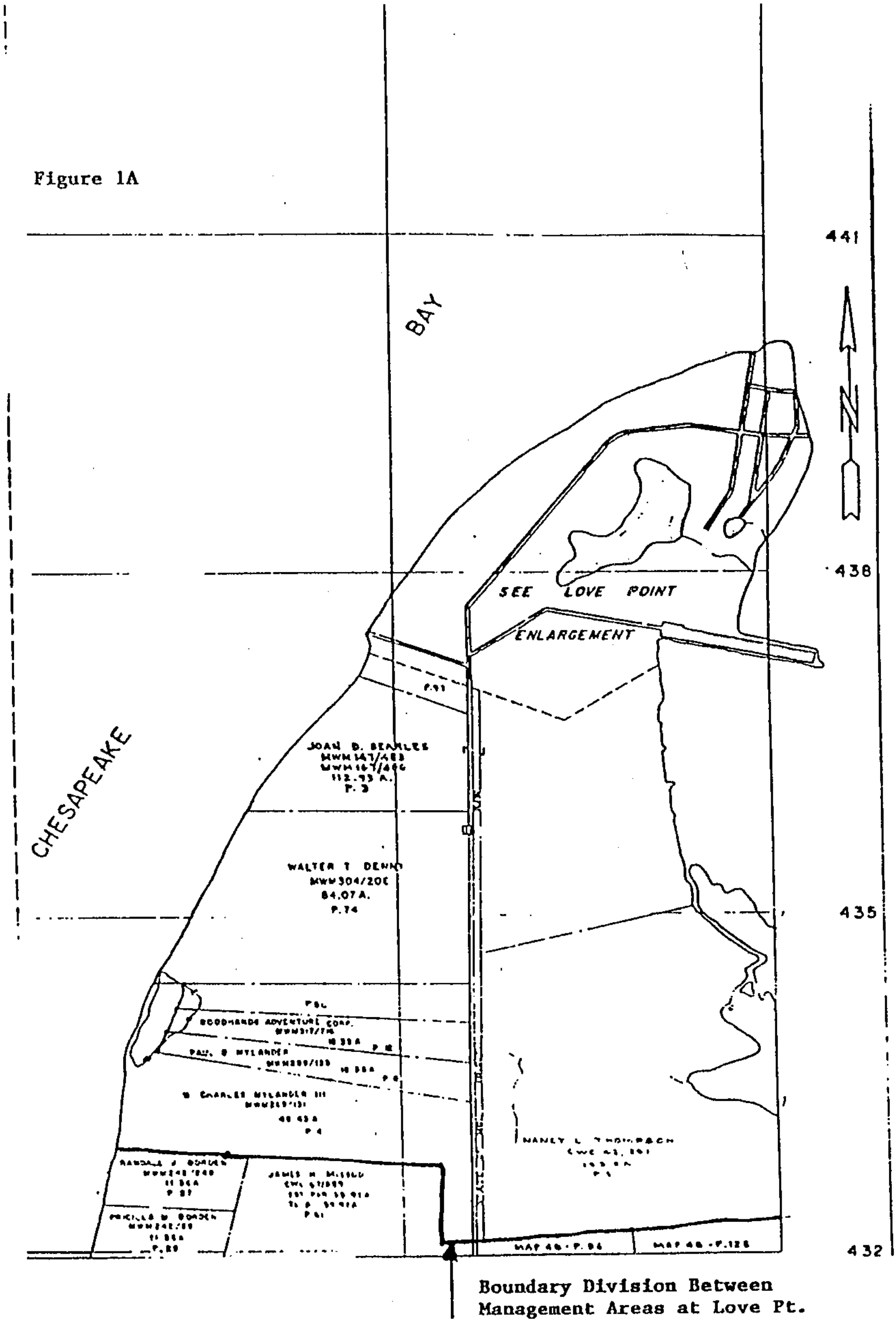
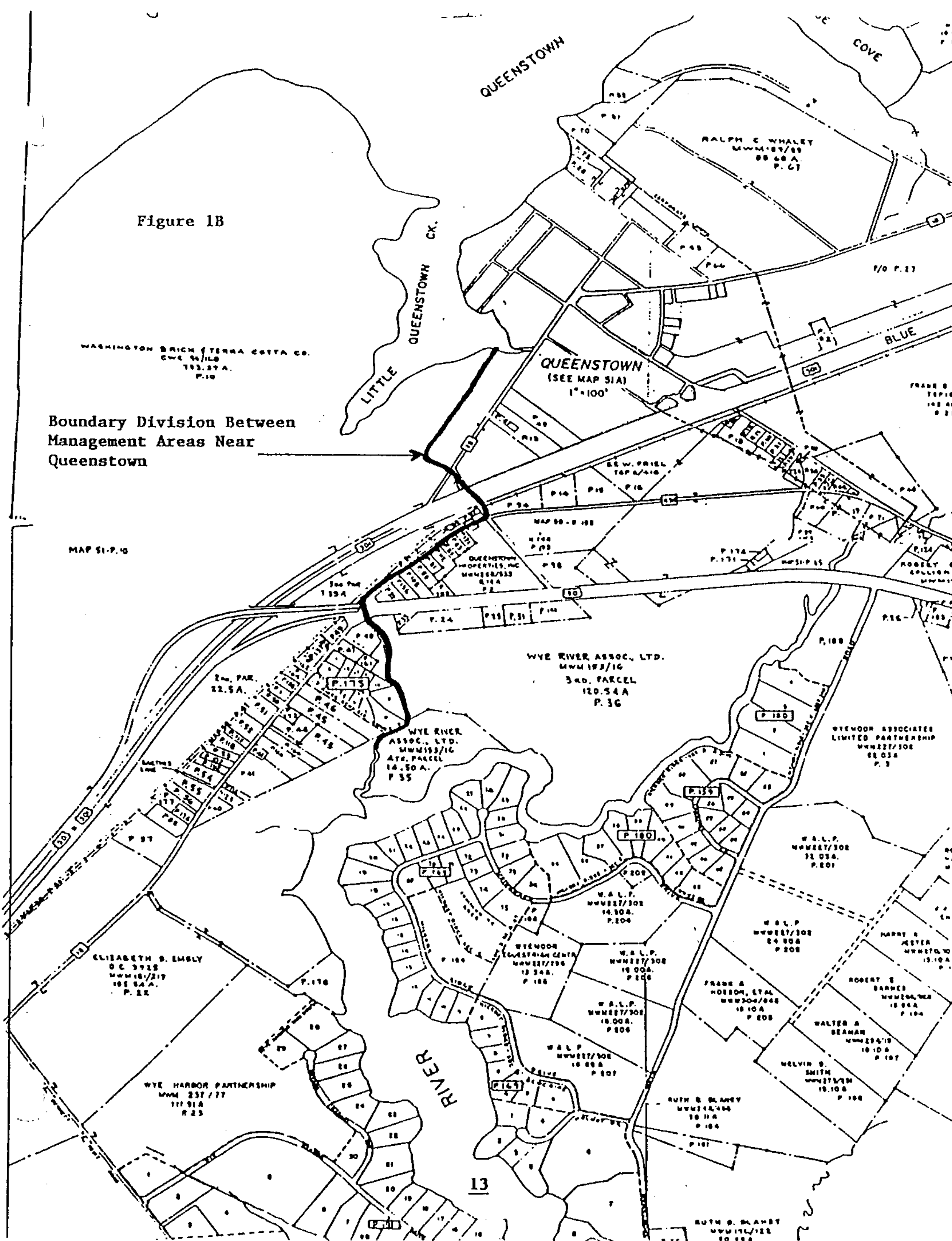

441
BAY
N
SEE LOVE POINT
ENLARGEMENT
438
CHESAPEAKE
JOAN D. SEARLES
WALTER T. DENNY
84.07 A.
P.74
435
432
Boundary Division Between
Management Areas at Love Pt.

Figure 1B



QUEENSTOWN
COVE
LITTLE QUEENSTOWN CK.
QUEENSTOWN
(SEE MAP 51A)
1"=100'
BLUE
Boundary Division Between Management Areas Near Queenstown
WYE RIVER ASSOC., LTD.
3RD. PARCEL
120.54 A
P. 36
RIVER

GENERAL HYDROLOGY AND GEOLOGY IN QUEEN ANNE'S COUNTY

Understanding the simple processes of the hydrologic cycle is necessary in addressing any groundwater protection management strategies. The general hydrologic cycle begins by water falling from the atmosphere as precipitation (snow, rain, etc). Much of this water (50%) is absorbed by vegetation, (trees, grass, etc.) and through evapo-transpiration is returned to the atmosphere. The remaining water is approximately divided equally into 25% running off into creeks, streams, rivers, bays, etc. and the other 25% infiltrating into the ground. These percentages obviously vary according to the intensity of the precipitation over a time frame. Once the water infiltrates into the ground (soil surface) it moves laterally and downward according to given soil properties such as texture, compaction, and soil structure.

Geographically, Queen Anne's County is centered in the Atlantic Coastal Plain. Sediments deposited millions of years ago by ancient rivers and ancient seas underly the thin soil surface layer. These underlying stratified sediments are varying thicknesses of clays, silts, sands and gravels. Other than the zone of aeration the sediment formations contain water, which can be extracted for use by drilling wells into the strata which have high porosity (open space between soil particles) and high permeability (passages that connect the spaces between the soil particles). These strata are usually the sands and gravels and are called aquifers. The clay and silt strata also have high porosities, but have very low permeabilities. Therefore, it is difficult to extract water from such formations and they are commonly called aquicludes.

The ability of the groundwater to accumulate within an aquifer depends upon the geologic formation's characteristics and the recharging or replenishing sources. Obviously, the different aquifers have varying water-bearing capabilities and differ in terms of water quality. Some contain water with high concentrations of dissolved salts, minerals and other biological contaminants. In addition, the yield and amount of salt-mineral content can be stratified within the aquifer itself at a given location or it can vary at different locations on the map. <u>For this reason managing such a resource may require different strategies at different locations even within the same County's boundaries.</u>

There are two distinct types of aquifers. One is called the water table aquifer which is at atmospheric pressure. The other type is called a confined aquifer. Both types require recharge and the pattern of recharge is different for each. A confined aquifer well is usually referred to as a "deep well" and a well in the unconfined formation is called a "shallow well".

Where there are alternating layers of sand or gravel and clay or silt, water may enter the sand or gravel layer from an outcrop area. The outcrop area is defined as the interface zone of the sand or gravel which is exposed at the land surface and thus subject to direct recharge from rainwater or surface waters such as streams or rivers. Some of these outcrop areas exist along river banks. As this recharge water seeps downward and laterally through the sand-gravel layer, it becomes confined between an overlying clay-silt formation and an underlying clay-silt formation.

This type of confined water-bearing formation is referred to as a confined aquifer. In addition to receiving recharge from the outcrop area, there may also be vertical leakage where water seeps through overlying or underlying formations. Water moves along a gradient from higher to lower pressure.

The upper part of the soil surface usually has air pockets (pore spaces) and is a zone of aeration through which the water passes. Eventually, the water reaches a soil zone in which the void spaces in the soil are saturated or full of water. This zone is called the zone of saturation and the top level of this zone is called the water table. The water table level from ground surface fluctuates according to precipitation levels and seasonal effects, (vegetation dormancy, etc.). The actual groundwater table usually mirrors the land surface or topography.

Clay strata are relatively impermeable to letting water freely pass through them. Where these formations are near the land surface the precipitation (rainwater) can penetrate readily only to a shallow depth. The water can move only very slowly vertically downward and thus accumulates and forms a zone of saturation overlying these clay formations. The accumulation tends to shape itself similar to the surrounding topography and is called the water-table aquifer or the unconfined aquifer. In Management Area A (Figure 1-Excluding Love Point) of Queen

Anne's, the unconfined formation is called the Columbia aquifer. It is sometimes referred to as the Wicomico or Pensauken formation. In Management Area B (Figure 1), the unconfined aquifer is called the Kent Island or Talbot formation.

The dynamics of fluctuation in the water table can vary significantly from area to area, depending upon flow patterns, relief areas to nearby streams, rivers, etc. and the soil's internal drainage characteristics. A very desirable drainage condition for on-site waste disposal is to have a site which provides enough thickness of unsaturated soil to properly attenuate sewage effluent prior to reaching the water table and to have a soil which self-drains at a rate to avoid ponding or mounding of the filtered wastewater upon the zone of saturation.

Shallow wells (water-table aquifer) are more susceptible to drought and surficial contaminants . For this reason, the Environmental Health Section of Queen Anne's has an internal policy which discourages the installation of shallow wells as a new drinking water source. When installed they must be located a minimum of 100 feet from any known sources of potential contamination and preferably up-gradient in the flow pattern in relation to the point or source of potential contamination. Property owners of existing shallow wells which show nitrate-nitrogen levels exceeding 10.0 ppm are encouraged to replace them with a confined aquifer well.

A well drilled into a confined aquifer which has an internal pressure sufficient to cause the water to rise in the well above the overlying confining (clay) formation is called an artesian well. This type of aquifer is less likely to become biologically contaminated and is more resistant to drought conditions than the unconfined or water table aquifer.

Most wells in Queen Anne's County are drilled in the nearest confined aquifer to the land surface. The Aquia aquifer is the predominant nearest confined formation throughout both Management Area A and Management Area B. Because of salt-water intrusion restrictions on further appropriations of water from the Aquia aquifer are being implemented in Management Area B (See Figure 2-1). Therefore, one of the next nearest high yielding formations, the Magothy Aquifer, is becoming a primary water source for Management Area B. Recently, some well drillers have utilized the Monmouth-Matawan aquifers (where available) as a water source in Management Area B. These Aquifers may become a very important water source as more drilling information becomes available. The iron levels are significantly lower than that of the Magothy Aquifer, and they are nearer the land surface.

Although the Groundwater Protection Strategies will focus on wells and on-site septic systems, an additional area of concern to which both are related are the surface waters. Ideally, a side benefit would be to protect these waters from sources of direct or indirect contamination as they are not only a valuable natural resource but sometimes serve as partial recharge sites to underground water.

THE AQUIFER SYSTEM IN QUEEN ANNE'S COUNTY
(SEE TABLE 2-1 FOR KENT ISLAND CROSS-SECTION)

GENERAL HYDROGEOLOGIC FRAMEWORK

Queen Anne's County has several aquifers that serve as existing and potential future groundwater resources. The following is a list of the principal aquifers utilized for drinking water sources. The upper part of the Potomac Group is a potential future source.

(1) Columbia Group (Plio-Pleistocene)

(2) Chesapeake Group (Miocene)

(3) Aquia Formation (Paleocene-Eocene)

(4) Monmouth-Matawan aquifers (Upper Cretaceous)

(5) Piney Point Formation (Eocene)

(6) Magothy Formation (Upper Cretaceous)

(7) Potomac Group (Lower Cretaceous)

A. Raritan-Patapsco Formation

B. Patuxent Formation

Each will be discussed separately in terms of known qualities or drawbacks and descriptive characteristics.

1. COLUMBIA GROUP (PLIO-PLEISTOCENE)

This aquifer is the shallow well formation and is composed mainly of gravels and sands deposited by ancient rivers. Plio-Pleistocene age sediments exist in a broad belt from Queen Anne's County to Worcester County. For Queen Anne's County, the western edge wedges out near Queenstown and this boundary follows south towards Easton approximately parallel to Rt. 50. Users in Queen Anne's are located primarily in the north-northeastern section of the county. Here the wells are sufficiently distant from brackish estuaries so that the threat of salt-water intrusion is minimal when pumping occurs.

The water is acid because of direct rainwater recharge and has low alkalinity which allows the water to be very corrosive on metal plumbing. Where well-drained soils exist over the formation, nitrates typically range in concentrations from 2-16 ppm. (mg/liter). The area of highest nitrate levels is a strip of Galestown-Downer loamy sand soils from Kingstown to Millington which intermixes with the Calvert Formation. Other small pockets of well-drained soils throughout the County occasionally show nitrate levels exceeding 10.0 ppm. The water is soft and has varying iron levels throughout the formation.

Wells tapping the Columbia usually provide ample yield for domestic use and are occasionally utilized as irrigation wells for farming. The major drawback is their susceptibility to pollution.

2. CHESAPEAKE GROUP (MIOCENE)

This group is part of the Miocene series and includes the Choptank and Calvert Formations as aquifers in Queen Anne's County. Both are composed of gray fine-to medium-textured quartzose sand, often containing fossil shells. The Choptank aquifer exists in the south-southeastern section of the county and receives very little use. It is considered a minor source and of little importance.

The Calvert aquifer is utilized more, especially in a small band along the Chester River where it intermixes with the Columbia Formation. The wells penetrating the Calvert probably receive most of their recharge from the overlying Pleistocene deposits. Screening the fine sands can be a problem when pumping is heavy and filtering treatment is needed in some cases.

On Kent Island, the Calvert Formation acts as an aquiclude overlying the Aquia Formation. It also occurs as in-fill in paleochannnels penetrating the Nanjemoy formation aquiclude.

3. AQUIA GREENSAND FORMATION (PALEOCENE-EOCENE)

The Aquia Formation is part of the Paleocene-Eocene series deposited in an old sea environment. It is extensively used and currently serves as the most important artesian aquifer for Queen Anne's County. The towns of Centreville and Queenstown and the majority of the existing wells in the fourth and fifth election districts penetrate the Aquia.

The aquifer, often called the "Aquia Greensand," gets its name from the greenish-brown cast of the sands which are colored by the green minerals glauconite and goethite. The formation sediments consist of fine-to coarse-grained, green to brown sand interstratified with grayish-green silts and clays and indurated, calcite-cemented sands and fossil beds.

On the Eastern Shore, outcropping of the Aquia is somewhat poor, occurring mainly in stream valleys. It is buried beneath a Pleistocene veneer and it is thought that most recharge to the formation occurs indirectly from the Pleistocene pervious sediments. Subcropping transverses Kent and Cecil Counties and occurs beneath the Talbot and Kent Island formation at Love Point. In addition, a paleochannel in the bottom of the Chesapeake Bay along the western edge of Kent Island hydraulically connects with the formation.

Considering the estaurine subcropping locations, there exists a potential for saltwater intrusion where pumping gradients provide favorable conditions. This has occurred at Love Point and at Bay City on Kent Island. A saltwater intrusion study by the Department of Natural Resources, Maryland Geological

Survey and the U.S. Geological Survey was conducted in 1984 and a report was published modeling the problem and offering recommended management strategies for consideration. The Department of Natural Resources has already implemented one management action by limiting future Groundwater Appropriation Permits in specific areas of the Eastern Shore (See Figure 2-1 Gannett Fleming).

In general, the Aquia's water quality is good (excluding areas affected by salt-water intrusion) and requires little or no treatment. Therefore, it remains a very desirable groundwater resource to be properly managed and protected. According to the saltwater study, the major recharge for Kent Island and in the Grasonville-Bennett Point Area occurs from the unconfined Talbot or Kent Island Formation. To provide long-term protection of the Aquia, indiscriminate discharge of wastes into the unconfined formation must be discouraged. Fortunately, the sand beds of the Aquia Formation are thickest beneath southern Queen Anne's County and northern Talbot County. This provides dilution, however intense "pocket area" loading of waste in overlying formations creates higher potentials for contamination via deteriorated well casings, poor casing grouting, or leaky confining beds. Management strategies addressing these "Pocket Areas" of intense development will be presented within the context of the overall Groundwater Protection Report for Queen Anne's County.

4. MONMOUTH-MATAWAN AQUIFERS (UPPER CRETACEOUS)

Some geologic reports lump these two aquifers as a single unit. In various locations this is probably accurate. However, the Matawan acts as a aquiclude underlying the Monmouth in many cases. Both formations are aquicludes in some instances; in these locations they separate the Aquia aquifer from the Magothy aquifer. In Queen Anne's County, the principal water bearing areas of the formation occur in the northern and northwestern section of the county. The town of Centreville has one well in the Monmouth, but most of the town's water is pumped from an Aquia aquifer well. Pondtown and Crumpton have several wells in these formations.

Like the Aquia, the Monmouth is deposited in an ancient marine environment. Its sediments consist of dark greenish gray to reddish brown, fine to occasionally coarse quartzose sand. Its recharge areas extend from Price George's County to New Castle County, Delaware with predominant exposures occurring along the Sassafras River-C & D Canal area. The Monmouth aquifer has the highest potential of the two aquifers and is more high yielding where sandy facies are thick, such as the "Pondtown Area".

The water quality can be high in iron content, especially nearer the outcrop areas. Treatment is usually necessary for domestic use.

5. PINEY POINT FORMATION (EOCENE)

The Piney Point aquifer is one of the most important water bearing formations in the Delmarva Coastal Plain. It's use in Queen Anne's County is limited because it only exists in the southern and southeastern section of the County. It does not outcrop, but is truncated in the subsurface edging above the fine-textured Nanjemoy formation around Carmichael and overlain unconformably by the basal beds of the Calvert Formation. Piney Point sediments,like those of the Aquia, are deposited in a marine environment and consist of olive-green to greenish-gray quartz sand slightly to moderately glauconitic.

Because the Piney Point does not outcrop, recharge occurs either from the overlying Calvert Formation or the underlying Aquia aquifer via the leaky Nanjemoy Formation. This recharge doesn't pass directly through an acid soil zone, but through subsurface shell deposits. Therefore, the water quality has an alkaline pH range of 7.5-8.5, and usually has very low dissolved iron levels (less than .3 ppm). The water can be moderately hard to hard and may need treatment for softening. Users prefer the Piney Point aquifer where available because of its low iron levels. It is a minor aquifer in Queen Anne's County only because it underlies only a small section of the county.

6. MAGOTHY FORMATION (UPPER CRETACEOUS)

Since appropriation use restrictions on the Aquia aquifer have been implemented, the Magothy aquifer has become the primary water source for new uses on Kent Island and in the fifth election district of Queen Anne's county. The aquifer is high yielding in certain areas of the county but has the undesirable characteristic of very excessive iron levels (10-20 ppm) on Kent Island. Extensive water treatment is required to provide usable water. In the northern end of Queen Anne's, the Magothy is utilized by a small number of users, including Pine Springs Mobile Home Park (80 trailers) at Crumpton. The aquifer is not as high yielding here, but the iron levels are much lower (less than .3 ppm), making the water source more desirable over the Monmouth Formation which has a high iron content.

The Magothy sediments are light gray to white, "Sugary" medium-to coarse-grained quartzose sand and fine gravel. Dark gray silts and clays are interbedded with the sands. The formation is underlain by Patapsco clays and becomes increasingly clayey as it grades texturally into the overlying Matawan Formation (a fine-grained aquiclude). The base of the Magothy sediments are where the coarse sands and gravels occur and this is usually the desirable well screening location.

In conclusion, the Magothy will become an increasingly important groundwater resource for Queen Anne's County. (In particular, for the fourth and fifth election districts). However, pumpage will have to be monitored as there exists a potential for salt-water intrusion near subcrop areas underlying the Chesapeake Bay and its tributaries.

7. POTOMAC GROUP (LOWER CRETACEOUS)

A. Raritan-Patapsco Formation

This Formation is a multiaquifer unit and for the purposes of this report, the Raritan Formation is undivided from the Patapsco Formation. They are interconnected and consist of interbedded silt and clay, fine-to medium- grained quartzose sand with minor amounts of gravel. The sediments were deposited in ancient rivers and swamps over a 100 million years ago. The Formation outcrops as a broad band extending from Prince George's County northeastward to Cecil County.

In Queen Anne's County, this formation has not been utilized as a water supply due to the fact the overlying Magothy and Aquia aquifers are shallower, less costly to drill and have provided water needs and demands to date. However, upon considering the salt-water intrusion problem with the Aquia and the corresponding appropriation restrictions, the Raritan-Patapsco Formation may prove to be an important future (potential) water source for the county.

There are three known wells in Queen Anne's County which have penetrated the Raritan-Patapsco Formation. One is a monitoring well for the Maryland Geological Survey at Kingstown. Another is the well drilled for a proposed duck hatchery near the town of Queen Anne. And the other well is on a farm on Cox Neck

Rd. owned by the Department of Natural Resources. This well passed through the Patapsco and penetrated the Patuxent Formation.

Water quality shows acidic conditions (pH=5.0-7.1) and excessive iron levels (4.5-30 ppm) at Kingstown. The upper part of the Formation contains fresh water, however, the lower parts are brackish, possibly entering the recharge areas of the outcrop belt. Because the Formation lacks fossil shell debris, the water is normally soft and the upper part has dissolved solids within recommended limits. The lower brackish parts contain higher levels of dissolved solids and would have limitations as a water source without extensive treatment.

B. Patuxent Formation (Lower Cretaceous)

Like the Patapsco Formation the Patuxent Formation is a multi-aquifer unit, consisting of several water-bearing sands of varying thickness and permeability. It is separated from the Raritan-Patapsco by a clay aquiclude. The sands of the Patuxent are white or light gray to orange-brown and are usually of a coarser texture than the Patapsco.

The Formation is the basal part of the Potomac Group and lies on Precambrian crystalline basement rocks. It outcrops adjacent to the crystalline Piedmont rocks in an irregular belt that has poor exposure in Cecil County, although it extends over a large area.

The only known well penetrating the Patuxent in Queen Anne's County was drilled on a farm owned by the Department of Natural Resources on Cox Neck Road. There is also a well in Chestertown

(Kent County) which shows brackish water and the general consensus is that the formation becomes increasingly saline downgradient.

Upon considering these brackish conditions and the fact that the formation is very deep under Queen Anne's County, the Patuxent must be considered a reserve ground-water source for Queen Anne's County.

EXISTING WATER USE AND MANAGEMENT STRATEGY DEVELOPMENT FOR WATER SUPPLY PROTECTION

Management Area B

Water is one of our most precious resources. In Queen Anne's County, nearly all our piped water comes from underground sources. Some irrigation is done from ponds and streams, but all known drinking water sources are from wells penetrating the underground aquifers. There are no surface reservoirs in the county.

In Management Area B, the principal aquifers utilized for water supply are the Aquia and Magothy. The Monmouth-Matawan Aquifers appear to have some potential, according to recent well logs. The Monmouth Matawan formations lie between the Aquia and Magothy. There is very little data in Management Area B about the Monmouth-Matawan Aquifers, simply because there have been very few wells screened in these formations. Recent water samples indicate significantly less iron in the Monmouth-Matawan formation than that of the Magothy. Therefore, it would appear that these formations may become a desirable future water source for Management Area B. The Potomac Group, which includes the Patapsco and Patuxent aquifers, is available, but rarely penetrated since it is very deep and Aquia and Magothy wells are more economically feasible.

Of principal concern is the Aquia aquifer showing salt-water intrusion at different degrees and locations, especially at Love Point and along the western edge of Kent Island. The water Resources Administration of the Department of Natural Resources along with the Maryland Geological Survey team conducted a study of this problem funded in part by the Queen Anne's County Commissioners. Their findings indicated increasing salt-water intrusion into the Aquia aquifer as the current pumpage reduces pressure within the aquifer itself. For this reason, the Water Resources Administration imposed a moratorium on Groundwater Appropriation Permits from the Aquia aquifer on Kent Island and restrictions of 1000 gallons or less for the Bennett Point-Grasonville Area. The aquifer still serves as the primary source of water supply for individual residences, especially within the "older subdivisions" of record in Management Area B. Due to the appropriations moratorium, the Magothy aquifer has become one of the primary future water sources, (see Figure 2-1 Gannett Fleming).

The Aquia is utilized in many nearby areas which may cause further salt-water intrusion. St. Michaels and the Town of Easton in Talbot County are primary examples of major users. The water quality of the Aquia, other than where salt-water intrusion is occurring, is very good; in fact, it is often suitable for domestic use with little or no treatment. For this reason, it still remains a very desirable water source to be managed and protected.

The Magothy aquifer is currently being used more and more on Kent Island. It appears to provide ample yield at this time, but one major drawback is the very excessive iron levels. Iron levels range from approximately 12-20 ppm which is nearly 40-60 times the recommended limit. Iron is not considered a health hazard, but aesthetically it presents a considerable nuisance at these levels. Therefore, treatment is imperative and very costly. Complaints arise frequently from those sources where either "Public" (e.g., Restaurants) use occurs and is not closely monitored for adequate treatment. Maintaining the proper degree of treatment continues to be a challenge with the iron present on Kent Island.

The question might be raised as to the potential use for water supply of the shallow unconfined aquifer on Kent Island, commonly called the Kent Island (Talbot) formation. This aquifer does appear to be high yielding in some areas; however, opinions vary as to how much saline water would encroach from the surrounding estuary if extensive pumping were conducted within the formation. Of more important consideration is the fact that this aquifer has been routinely penetrated either directly or indirectly with wastewater, particularly household wastes. In addition, there exists suspended silt and clay particles which cause objectionable turbidity when heavily pumped. Therefore, no wells will be permitted to "tap" this aquifer as a potable water supply other than at Love Point.

The remaining portion of Management Area B is referred to as the Bennett Point-Grasonville "Area". This "Area" also has occasionally experienced penetration of the unconfined aquifer with wastewater. Hence, confined aquifer wells will be required as a water source. The wells in this "Area" currently utilize the Aquia aquifer as the primary water source. During the summer months, the static water level in the Aquia drops such that shallow or jet pump well water systems lose their pumping ability. These shallow or jet pump systems are being replaced with 4-inch well casings and submersible pump systems.

At this time, aquifer yield appears adequate to sustain use. However, the submersible pumps have been set deeper than was common earlier. As more development occurs, the static water level of the aquifer (directly related to aquifer pressure) will require close monitoring to determine if existing and future use can be maintained to supply adequate yield. <u>In addition, lowering of static water levels is of very significant health concern. Downward vertical gradients may be created which can allow the introduction of surficial contamination via poor well grouting or deteriorating casings. In many instances, these well casings pass through the unconfined aquifer where sewage wastes are being directly discharged. The assumption that all these wells are grouted properly into soils of a confining quality or nature is just that--an assumption. Densely populated pocket areas, especially on Kent Island, contain literally hundreds of wells passing through the unconfined aquifer where sewage wastes have been directly discharged with very little or no soil treatment zone. Most of these well casings are only 50-60 feet from the sewage discharge areas.</u>

<u>One major management strategy presented in this report will be to require all newly installed wells in Management Area B (See Figure 1) to be a minimum of 100 feet from any source of pollution where less than (2) two feet of unsaturated soil is provided as a filter for sewage wastes. In addition, the well casings must be grouted a minimum of (5) five feet into the lower confining bed which underlines the waste disposal stratum.</u>

<u>The salt-water intrusion study concluded the shallow unconfined aquifer acts as a significant recharge source for the Aquia. Therefore, the practice of allowing the shallow water table to be directly penetrated with sewage wastes will no longer be viewed as a viable management tool. This practice poses too</u>

many unknowns to assume that dilution will be a cure-all in preventing contamination of our water resources.

Management Area A

The rest of the County (See Figure 1) including Love Point) is referred to as Management Area A. This area of Queen Anne's County is still relatively rural in nature, with some small towns. Most new development is served by individual water supplies consisting of wells obtaining water from three principal aquifers. These aquifers are the Aquia, the Magothy, and the shallow water table aquifer (i.e., Columbia). To a lesser extent, the Monmouth aquifer and the Piney Point aquifer serve as water sources. Also, the southeastern section of the County, around the Town of Queen Anne, has a small number of wells penetrating the Calvert aquifer.

Again, the Aquia aquifer serves as the predominant and most extensively utilized aquifer for water supplies in Management Area A.

At the northern tip area of Kent Island around Love Point, the Aquia is hydraulically connected with the unconfined aquifer formation. Thus, there is no overlying confining bed and the Aquia and Kent Island (Talbot) formation intermix. This area of Love Point requires an extremely cautious approach to any waste disposal. Maximizing the soil filtering capacity and setting very restrictive management strategies is necessary to prevent any new sources of contamination. A minimum of (4) four feet of unsaturated filtering material will be required for any future waste disposal proposals.

The Columbia (water table) Aquifer provides water to shallow wells in sporadic locations throughout the north-northeastern section of the county. These wells give varying yields, but are usually very cheap to install and provide soft water requiring little treatment. The water is very acidic and especially corrosive on copper pipes. Leaching of lead from solder joints and brass fixtures is a significant health concern.

The Aquia also subcrops and intermixes with the Columbia aquifer around the Chester River "Area" of Kingstown. This "Area" contains mostly sandy loam-loamy sand soil textures. Therefore, again a minimum of (4) four feet of unsaturated filtering material will be required for any waste disposal proposals in the Kingstown "Area of Management Area A.

The remaining areas in Management Area A will utilize varying thicknesses of filtering materials according to textures and load ratings. In no instance, will less than (2) two feet of unsaturated filtering material be utilized as a treatment zone for sewage wastes. In all cases, treatment zones will be maximized to the extent that is possible.

TYPES OF SEPTIC SYSTEMS IN THE COUNTY

Queen Anne's County has utilized several types of septic systems over the years. In general, a system consists of one or two septic tanks, a distribution box, and drainfields feeding from the distribution box. The actual drainfields are installed in trenches which vary in depth from the shallow type (2-3 feet deep) to the deeper trench type (12-14 feet deep). The trench bottom usually penetrates approximately one foot into the sandy textured permeable stratum. Because permeable stratum depths vary, the overall trench depth must vary likewise to fit specific soil conditions. This is the reason why trench depths vary from 2-14 deep.

The drainfield distribution line is four-inch diameter perforated PVC pipe in ten-foot lengths and is usually laid in the trenches from 6-30 inches below ground level. The average drain tile setting is 18-24 inches. Underneath the drain tile is crushed stone, gravel or slag, which is used to fill the trenches and cover the pipe with a minimum of 2 inches of material. Straw or untreated building paper is then laid over the fill material and trench spoil is added to reach the desired final grade.

Occasionally, seepage pits (where the permeable is deeper than 5 feet) or seepage beds (where the permeable stratum is closer than 5 feet to ground surface) are utilized as the drainage mechanism. Pits and beds are used in particular where the waste disposal area is small or of insufficient size to permit the standard trench disposal pits have also been used where the permeable stratum is greater than 14 feet in depth. This practice of "deep pits" is being strongly discouraged and will be utilized in the future only as a last resort method of disposal. Trench length and sizing of the seepage pit or bed is determined by the permeability of the soil and the amount of wastewater a given use generates. For residential purposes, systems (including the septic tank) are sized according to house size, number of bedrooms, and the percolation test. Other uses are sized according to wastewater flow as estimated from similar uses elsewhere.

Normally the effluent from the septic tank flows by gravity to the distribution area. Lift pumps are used when gravity flow will not meet the tile line or seepage bed line elevation requirements or the pit cover entrance setting. This elevation shortfall can be caused by topographical differences, distance between septic tank and distribution area, or the requirement to dispose of effluent above the seasonal high water table. At times, a combination of the above factors requires the effluent to be pumped.

More recently (particularly since 1989) the Environmental Health Division of Queen Anne's County has added additional alternative systems and practices for on-site waste disposal and treatment. Examples are:

(1) Sand-filled trenches

(2) Elevated sand-lined trenches

(3) Recirculating sand filters for pre-treatment.

(4) Sand mounds

(5) Low pressure dosing as a method of delivering the wastewater evenly over the entire drainfield.

(6) Top-seam two compartment septic tanks to enhance pre-treatment and to reduce surface water infiltration.

(7) Drip irrigation.

(8) Dosing chambers, flow meters, and strong recommendations to install low water use fixtures.

Where lot sizes permit, homeowners are encouraged to dispose of gray water, specifically laundry wastes, into a separate septic system. Also, garbage disposal units are strongly discouraged as is backwashing water treatment units into the septic systems.

Finally, owners of septic systems will be encouraged to avoid pouring solvents, herbicides, pesticides and unknown chemicals "down the drain." Some chemicals such as organics (hydrocarbons) can contaminate groundwater with very low concentrations. These chemicals give objectionable odor and taste to the water and some may be carcinogenic. Other homeowner advice that will be strongly stressed involves routine maintenance of their waste disposal system. This includes regular "pump-outs" of the septic tank and proper yard grading to prevent surface ponding of rainwater within the waste disposal area.

GROUNDWATER PENETRATION, SOIL TREATMENT ZONE AND WASTE LOADING CONSIDERATIONS

Many areas of the Maryland Coastal Plain province have seasonally high water table depths that prohibit the provision of a 4-foot treatment zone of unsaturated soil material below the sewage disposal trenches or pits on a year-round basis. Therefore, current state-of-the-art technology has allowed waste to be discharged where less than 4 feet exists.

Previous regulations allowed Talbot, Dorchester, Wicomico, Somerset, and Worcester Counties to discharge septic-tank effluent directly into shallow aquifers under the following conditions:

(1) Areas of utilization should be confined to those portions of each county where surface soil formations consists of a thick layer of impermeable clay underlain with extensive deposits of water-bearing sand.

(2) A minimum separation distance of 150 feet should be maintained between any individual water supply and sewage disposal facilities.

(3) Maximum density of housing in these areas should not exceed 160 residences per square mile.

(4) Systems are to be empirically sized based on county experience.

(5) Wells for potable water supply utilizing shallow aquifers may not be permitted if on-site systems discharge directly to groundwater.

The above practice is known as groundwater penetration. The neck, peninsula, and island sections of the above referenced counties routinely permitted such practice. Queen Anne's County has similar soil conditions on its neck, island and peninsula areas. Though not included within the regulation, Queen Anne's routinely allowed groundwater penetration especially in "older subdivisions" platted on Kent Island. Actual written variances were granted by the former office of Environmental Programs, currently the Department of Environment, on a case-by-case basis. In addition, groundwater penetration occurred without specific variance to repair or remodel failing on-site systems, when no conventional alternative was available.

This practice of disposing of sewage effluent into surficial groundwater has not created any known contamination of potable water supplies in Management Area B (See figure 1) of Queen Anne's County. However, extensive monitoring and studying of the impact of said practice on groundwater or surface waters, has not been conducted.

Penetration of groundwater with sewage waste has been strongly discouraged and prohibited in most of the area of Queen Anne's County defined as Management Area A. This practice has usually only been permitted to repair or remodel failing on-site systems. In the northern end of Management Area A, shallow wells are permitted and utilized as a water supply. Thus, a high degree of protection of groundwater from any source of contamination is imperative.

In general, nature has provided soil as a filter to protect underground water sources. However, they are vulnerable to contamination by man's actions, especially the unconfined or shallow-well aquifers. Once groundwater contamination occurs, it is not easily reversed and a valuable resource may be lost. This report will address well siting and grouting along with sewage waste disposal practices as an activity which must be closely and properly managed to help maintain potable water sources. Specifically, waste disposal practices requiring a minimum of 2 feet of unsaturated soil material of a specific texture range will give a high degree of attenuation of primary septic tank effluent. Studies in various areas of the United States have shown significant removal of bacteria and viruses occur when effluent loading rates are limited and soil textures contain fines to allow proper filtration. The two most important management strategies are not allowing direct penetration of wastes without any filtration into a very coarse texture stratum or directly into the seasonal high water table. If either of these two conditions occur, the public health and pollution risks rise, especially concerning virus movement. The lateral movement of viruses can be significant where direct penetration into the water table occurs. Groundwater flow patterns and short-circuited recharge patterns, typical of a shallow water table aquifer, ultimately influence the disposal pattern.

Two other waste products considered in pollution control work are phosphates and nitrates. Phosphates are generally "tied up" in the soil and move very short distances vertically. They can be a significant problem when allowed to be directly discharged into surface waters or leached into nearby streams, creeks, estuarine headwaters, etc. Algae growth is promoted by phosphates, which lowers oxygen levels and leads to a myraid of problems with the affected water body.

The most important ion of documented public health significance is the nitrate ion. Nitrates are a known cause of methemoglobinemia in infants, commonly called "blue babies" disease and some by-products of nitrates are nitrosamines which are strong carcinogens. The nitrate ion is negatively charged and soil particles contain mostly negative charge. Therefore, the nitrate ion is repelled. Once nitrates or other nitrogen products get past the "root zone" of plant life, they will leach downward and laterally. If they move directly into the water table, they usually remain in the ammonium state because they have not had time to be oxidized to the nitrate state. If they move down under aerated (oxygen present) conditions, the oxidized state of nitrogen (i. e., nitrate) is reached.

In many instances where you have well-drained to excessively drained soils, you will find elevated nitrate nitrogen levels. Conversely, where you have poorly drained soils and saturated soil conditions, the nitrate form is usually not prevalent; the ammonium forms have not had time or conditions to be oxidized.

Groundwater protection management strategies regarding nitrate must address two key points. One is to maximize uptake of nitrogen compounds within the root zone. This uptake is related to soil textures, soil structure, plant type, and effluent loading. In general, the easiest management tools consists of controlling plantings, loading rates and the proper timing of both. The loading rate is the second key management tool. Once the nitrate ion form has reached the shallow water table aquifer, the main management strategy is to depend upon dilution properties of the given aquifer to maintain the nitrate level below the known health risk level of 10.0 ppm. Loading rates are control mechanisms most easily employed in regulation. The higher the loading rate, the more pressure to push nitrate in a downward direction (see figure 2 and figure 3). In some instances, natural sources of nitrogen and farming practices promote levels of nitrates above 10.0 ppm.

For purposes of this report, we will focus on managing sources of nitrate through regulatory restraints. Natural sources and unregulated farm practices will be taken into account, but enforcement controls will not be proposed for "clean-up" activities. Where levels above 10.0 ppm already occur, deep wells or appropriate treatment will be required for water supplies.

<u>In conclusion, management strategies will be developed which assure protection of the shallow groundwater in Management Area A. Also, certain restraints will be implemented in Management Area B, due to the unknown impact groundwater penetration with sewage has on the underlying confined aquifer and the nearby estauries.</u> Queen Anne's County is somewhat unique in that nearly 70 percent of its populace is served by on-site waste disposal. Therefore, a cautious approach to any further degradation of groundwater by septic systems will be implemented.

FINAL MANAGEMENT STRATEGIES

Management Area A (Shown in Figure 1)

In Management Area A of Queen Anne's County, a two to three-foot thick treatment zone measured during the wet season (February to April) has been required on newly developed property. A reduced treatment zone, with occasional direct groundwater penetration occurs usually only during the wet season and there exists some unsaturated treatment during the remainder of the year.

The "deep pits" are the one method whereby the treatment zone is probably saturated nearly year round. This method will not be allowed in the future for new development.

There are several areas within Management Area A where 4 feet of unsaturated soil treatment can be maintained year round. This has been utilized routinely where the permeable stratum is a loamy sand-sand texture.

Requiring sewage disposal strategies which maximize effluent treatment by the unsaturated permeable stratum in Management Area A, should provide the degree of protection desired for existing and potential water supplies using the shallow unconfined aquifers in this "Area". <u>Table I outlines the criteria which are necessary and appropriate for each given set of conditions. Actual field site and soil evaluations will determine which restrictions apply for a given proposal. The minimum four-foot soil treatment zone will be reduced only when finer textures or</u>

<u>specific design criteria provide the desired effluent renovations of the wastewater characteristics.</u>

Wastewater properties such as suspended solids, organic matter, microorganisms, detergents, and phosphorus are filtered by an unsaturated permeable soil treatment zone which is thick (four feet or greater); or contains enough silt and clay properties to provide the same degree of treatment as a thicker more permeable stratum containing loamy sand-sand.

Also, density and loadings must be established to prevent excessive contaminant build-up. In particular, nitrogen pollution (nitrates) can be controlled through this mechanism by requiring minimum lot sizes and unit densities. Nitrates have several sources other than septic systems such as fertilizer, animal wastes (manure) and rainfall. As stated earlier, this report will address only septic wastewater.

Nitrate levels above 10 ppm exceed the safe drinking water standards and may cause methemoglobinemia in infants. Hence, it is imperative that strategies be implemented to maintain nitrogen dilution whereby nitrate levels will remain at or below 10 ppm. Restrictions to avoid further concentration increases will be implemented.

Construction practices whereby the sewage disposal trenches are installed as shallow as possible, help maximize the soil treatment zone. Above grade fill may be utilized where appropriate. Also, the configuration and slope of the water table must be considered in estimating directions and rates of flow once wastes are discharged. Flat regions tend to dispense fairly evenly in all directions, while sloping or contoured areas may concentrate the spread of waste in one direction.

Excessive effluent loading causes a mounding effect and increases the pollution potential for the water table aquifer. This may cause a migration of more concentrated wastes toward the unconfined aquifer discharge point (streams or rivers). If a nearby water well is pumping from the unconfined aquifer a gradient may be created which will cause the wastewater to converge toward the pumping center (well screen) (See figure 2 and figure 3 for illustrations). Clustered shared facility proposals will receive close scrutiny due to the fact that the wastewater disposal is concentrated in a given area.

Management Area B

In Management Area B of Queen Anne's County a treatment zone of 2-3 feet has been utilized on most of the recent developments. In fact since 1986, emphasis has been toward not recommending routine variance to this treatment zone, unless large lot sizes were proposed.

The most specific problem of treatment exists in the "older subdivisions of record which contain literally thousands of extremely small lots (5000-15,000 sq. ft.) and surface and subsurface drainage is poor to very poor. Most of the well-drained to moderately drained lots have already been built upon. The waste disposal systems in these older subdivisions have routinely directly penetrated groundwater with sewage effluent. The degree of treatment even during the non wet season is very little. In addition, the number of dwelling units per square mile has significantly exceeded 160 residences. Therefore, there exists a current heavy sewage loading on the surficial groundwater aquifer.

Ultimately some type of public sewer service will be needed for many of these older subdivisions. The Queen Anne's County Sanitary District's Sewage Treatment Plant helped alleviate some problem areas, especially in the Grasonville-Stevensville Rt. 50 corridor area. As more and more septic systems fail, there will be increased pressure to service these older densely developed subdivisions with public sewerage.

These older subdivisions represent the greatest danger to contamination of deeper confined aquifers because of the high density of disposal systems and high sewage loadings over the area.

The soil characteristics on much of the land area include poor drainage and very slowly permeable upper confining silt loams and clay loams of the Othello and Elkton series respectively. Under these silty and clay loams lies the Kent Island (Talbot) Formation which consists of water bearing sands. These sands range from fine silty sands to coarse sands.

Although these sands are water bearing, there are areas where they are unsaturated especially during the non wet season. Sewage wastes have been routinely allowed to penetrate these waterbearing sands. Underneath these sands exists a confining bed which separates the unconfined Kent Island (Talbot) Formation from the Aquia aquifer. This confining bed ranges in thickness, but in general is thicker to the south, especially on Kent Island and completely wedges out at Love Point. Hence, at Love Point the unconfined aquifer (Kent Island Formation) and the Aquia aquifer are in direct contact.

The confining bed which lies under the Kent Island (Talbot) formation (Unconfined aquifer) other than where it doesn't exist at Love Point, is being relied upon to protect the underlying Aquia aquifer from contamination. In addition, properly grouted wells must be assured such that the unconfined waters don't leak directly around casings into the Aquia.

Some leakage through the overlying confining bed of the Aquia does occur. Exactly how much hasn't been conclusively proved. This confining bed does provide filtering, even though it is saturated. To date, there is no known contamination entering wells drawing from the Aquia (Excluding salt-water intrusion from the Chesapeake Bay). If the static water level of the Aquia continues to drop with corresponding reduced pressure within the aquifer itself, then recharge gradients will become more significant, particularly if the recharge source has contamination, such as salt-water or chemicals.

Given the above, direct penetration with wastewater for new development and parcels or lots of record will no longer be a management strategy for on-site waste disposal. It may be permitted as a last resort to correct existing problems or repair failing systems. Every effort to maximize the soil treatment zone will be made and the thickest treatment zone possible will be utilized given reasonable indication of satisfactory hydraulic performance.

In general, a minimum two-foot zone of unsaturated permeable material will be utilized for treatment. Approximately nine months of the year the water table will have lowered by its normal seasonal fluctuations such that three to four feet or more of saturated material will exist.

Minimum lot sizes are required to provide contamination dilution and filtration to limit degradation of the ground water and nearby stream or estuarine areas, (see Appendices B and C for nitrogen dilution calculations) larger lots than the minimum, may be required at the discretion of the approving authority where conditions warrant such action.

All water wells in Management Area B shall obtain their water source from a confined aquifer (currently the Aquia and Magothy aquifers are utilized). These wells must be grouted through the unconfined aquifer stratum and a minimum of 5 feet into the underlying confining bed. A minimum separation distance of 100 feet will be required between wells and sewage disposal systems and the reserve or replacement areas which utilize less than 2 feet of unsaturated soil treatment zone.

In conclusion, Table II outlines the criteria which will be implemented for each given category or proposal. Once again, actual field soil and site evaluations will determine which restrictions apply.

CATEGORIES OF STRATEGIES

FOR

MANAGEMENT AREAS

Description

The following categories are a management tool for the development community and the approving authority which outlines options for on-site waste disposal for each stated Management Area. This section specifically sets the on-site waste disposal criteria, density loadings, well type and siting criteria, soil and testing criteria and lot sizes.

CATEGORY I (Management Area A and Area B)

This category addresses existing uses or proposed change of uses which do not significantly alter the wastewater flow or current use. The following is stated:

(1) The best possible known and financially available techniques of wastewater disposal are to be implemented for additions, repairs, replacement, or provision of sanitary facilities.

(2) Any altered, added, or change of use which significantly alters the existing wastewater flow shall be evaluated under the applicable category as though it were a raw land proposal.

CATEGORY II (Management Area A and Area B)

This category applies to those lots or parcels of record and those proposed to be subdivided for building purposes that meet the requirements as specified within COMAR 26.04.02 and COMAR 26.04.03 without variances to the soil treatment zone. All parcels and lots within the service area of the Queen Anne's County Sanitary District's Sewage Treatment Plants must meet this category's requirement if on-site waste disposal is proposed. This service area includes Prospect Bay and the Kent Island-Grasonville Corridor. The County Master Water and Sewer plan delineates this service area. Also, Love Point must meet the conditions in this category.

CATEGORY III (Management Area B Only)

This category applies to parcels or lots of record whereby no subdivision of ground is proposed for building purposes and the following minimum standards exist.

(1) No known unconfined water wells within 500 feet of parcel's boundary lines.

(2) Unit density of no greater than 1 unit per acre within parcel's boundary limits.

(3) Seasonal high ground water table is no closer than 3.5 feet from ground surface at time of test.

(4) Permeable stratum shall be minimum of 2 feet thick and have at least 2 feet above seasonal high water table.

(5) All wells will obtain water source from confined aquifer.

(6) Minimum lot or parcel size shall be 15,000 square feet/unit.

(7) Percolation rate not slower than 1 inch drop in 30 minutes or 1 inch drop in 60 minutes for alternative systems.

(8) Minimum 7500 square feet of acceptable waste disposal area is required for each unit.

CATEGORY IV (Management Area B Only)

This category applies to existing parcels or lots of record proposed to be subdivided for building purposes and the following minimum conditions exist:

(1) No known unconfined aquifer wells within 500 feet of parcel's boundary limits.

(2) Unit density of no greater than 1 unit per 2 acres within parcel's or existing subdivision boundary limits.

(3) Seasonal high water table no closer than 3.5 feet from ground surface at time of test.

(4) Permeable stratum shall be minimum of two feet thick with at least 2 feet of this stratum above the seasonal water table.

(5) All wells will obtain water source from confined aquifer.

(6) Lot size shall be minimum 1 acre/unit.

(7) Percolation rate not slower than 1 inch drop in 30 minutes.

(8) Minimum of 10,000 square feet of acceptable waste

disposal area is required for each unit.

CATEGORY V (Management Area A Only)

This category applies to existing lots or parcels of record and those proposed to be subdivided for building purposes and the following minimum standards exist:

(1) No known unconfined aquifer wells within 100 feet of proposed waste disposal area.

(2) Seasonal high ground water table no closer than 3.5 feet from ground surface at the time of test.

(3) Permeable stratum must be a minimum of two feet thick with at least 2 feet of this stratum above the high seasonal water table.

(4) Unit density of no greater than 1 unit per 4 acres within parcel's boundary limits.

(5) Minimum lot or parcel size shall be 2 acre/unit.

(6) Percolation rates shall be no faster than 1 inch drop in 2 minutes.

(7) Percolation rates shall be no slower than 1 inch drop in 30 minutes or 1 inch drop in 60 minutes for alternative systems.

(8) Minimum of 10,000 square feet of acceptable waste disposal area/unit for those lots or parcels being subdivided.

(9) Minimum of 7,500 square feet of acceptable waste disposal area/unit for lots or parcels of record.

CATEGORY VI (Management Area A Only)

This category applies to existing parcels or lots of record and those proposed to be subdivided for building purposes and the following minimum conditions are met:

(1) No known unconfined aquifer wells within 100 feet of proposed waste disposal area.

(2) Seasonal high ground water table no closer than 3.5 feet from ground at time of test.

(3) Permeable stratum shall be minimum of two feet thick with at least 2 feet of this stratum above the high seasonal water table.

(4) Unit density of no greater than 1 unit per 3 acres within parcel's boundary limits.

(5) Minimum lot size shall be 1.5 acre/unit.

(6) Percolation rates shall be no faster than 1 inch drop in 5 minutes.

(7) Percolation rates shall be no slower than 1 inch drop in 30 minutes or 1 inch drop in 60 minutes for alternative systems.

(8) Minimum of 10,000 square feet of acceptable waste disposal area/unit for these lots or parcels being subdivided.

(9) Minimum of 7,500 square feet of acceptable waste disposal area/unit for lots or parcels of record.

CATEGORY VII (Management Area A Only)

This category applies to existing parcels or lots of record and those proposed to be subdivided for building purposes and the following minimum standards exist:

(1) No known unconfined aquifer wells within 100 feet of

the proposed waste disposal area.

(2) Seasonal high groundwater table no closer than 3.5 feet from ground surface at time of test.

(3) Permeable stratum shall be a minimum of two feet thick with at least 2 feet of this stratum above the high seasonal water table.

(4) Unit density of no greater than 1 unit per 2 acre within parcel's boundary limits.

(5) Minimum lot size shall be 1.25 acres/unit.

(6) Percolation rate shall be no faster than 1 inch drop in 10 minutes.

(7) Percolation rate shall be no slower than 1 inch drop in 30 minutes or 1 inch drop in 60 minutes for alternative systems.

(8) Minimum of 10,000 sq. ft. of acceptable waste disposal area/unit for these lots or parcels being subdivided.

(9) Minimum of 7,500 square feet of acceptable waste disposal area/unit for lots or parcels of record.

CATEGORY VIII (Management Area A Only)

This category applies to existing parcels or lots of record and those proposed to be subdivided for building purposes and the following minimum conditions exist:

(1) No known unconfined aquifer wells within 100 feet of the proposed waste disposal area.

(2) Seasonal high ground water table no closer than 4.5 feet from ground surface at time of test.

(3) Permeable stratum shall be a minimum of 2 feet thick

and at least 3 feet above the high seasonal water table.

(4) Unit density of no greater than 1 unit per 2 acres within parcel's boundary limits.

(5) Minimum lot size shall be 1.5 acres/unit.

(6) Percolation rate shall be no faster than 1 inch drop in 2 minutes.

(7) Percolation rate shall be no slower than 1 inch drop in 30 minutes or 1 inch drop in 60 minutes for alternative systems.

(8) Minimum of 10,000 square feet of acceptable waste disposal area/unit for those lots or parcels being subdivided.

(9) Minimum of 7,500 square feet of acceptable waste disposal area/unit for lots or parcels of record.

CATEGORY IX (Management Area A Only)

This category applies to existing parcels of lots of record and those proposed to be subdivided for building purposes and the following minimum conditions exist:

(1) No known unconfined aquifer wells within 100 feet of proposed waste disposal area.

(2) Seasonal high ground water table no closer than 4.5 feet from ground surface at time of test.

(3) Permeable stratum shall be a minimum of 2 feet thick and at least 3 feet above the high seasonal water table.

(4) Unit density of no greater than 1 unit per 1.5 acres

within parcel's boundary limits.

(5) Minimum lot size shall be 1.25 acres/unit.

(6) Percolation rate shall be no faster than 1 inch drop in 5 minutes.

(7) Percolation rate shall be no slower than 1 inch drop in 30 minutes or 1 inch drop in 60 minutes for alternative systems.

(8) Minimum of 10,000 square feet of acceptable waste area/unit for those lots or parcels being subdivided.

(9) Minimum of 7,500 square feet of acceptable waste disposal area/unit for lots or parcels of record.

CATEGORY X (Management Area A Only)

This category applies to existing parcels or lots of record and those proposed to be subdivided for building purposes and the following minimum conditions exist:

(1) No known unconfined aquifer wells within 100 feet of proposed water disposal area.

(2) Seasonal high ground water table no closer than 4.5 feet from ground surface at time of test.

(3) Permeable stratum shall be a minimum of 2 feet thick and at least 3 feet above the high seasonal water table.

(4) Unit density of no greater than 1 unit per 1 acre within parcel's boundary limits.

(5) Minimum lot size shall be 1 acre/unit.

(6) Percolation rate shall be no faster than 1 inch drop in 10 minutes.

(7) Percolation rate shall not be slower than 1 inch drop in 30 minutes or 1 inch drop in 60 minutes for alternative systems.

(8) Minimum of 10,000 square feet of acceptable waste disposal area/unit for those lots or parcels being subdivided.

(9) Minimum of 7,500 square feet of acceptable waste disposal area/unit for lots or parcels of record.

CATEGORY XI (Management Area A Only)

This category addresses shared facilities generating less than 5,000 gpd and the following minimum standards are required:

(1) The applicable category for parcels or lots of record and those proposed to be subdivided will apply on a unit assigned basis for the proposed shared facility's flow.

(2) Actual lot size may vary according to zoning and the proposed water supply.

(3) All applicable requirements within the appropriate category will apply.

(4) Minimum of 10,000 square feet of acceptable waste disposal area/unit.

(5) Other requirements may be imposed by the "Controlling Authority" (Queen Anne's County Department of Public Works).

CATEGORY XII (Management Area B Only)

This category addresses shared facilities generating less than 5,000 gpd and the following minimum standards are required:

(1) No known unconfined aquifer wells within 500 feet of the proposed waste disposal area.

(2) Unit density of no greater than 1 unit per 2 acres within parcel or existing subdivision boundary limits.

(3) Seasonal high water table no closer than 4.5 feet from existing ground surface at time of test.

(4) Permeable stratum shall be a minimum of three feet thick and have at least 3 feet above the seasonal high water table.

(5) All wells will obtain water source from a confined aquifer.

(6) Lot sizes may vary according to zoning and the proposed water supply.

(7) Percolation rate not slower than 1 inch drop in 30 minutes.

(8) Minimum of 10,000 square feet of acceptable waste disposal area is required for each unit.

(9) Other requirements may be imposed by the "controlling authority" (Queen Anne's County Dept. of Public Works).

CATEGORY XIII (Management Area A and Area B)

This category addresses all multi-use or shared facility projects proposed to be served by on-site waste disposal systems and generating 5000 gpd or more maximum daily flow.

(1) The waste disposal system shall maintain a minimum of four (4) feet of unsaturated, unconsolidated soil material to attenuate the wastewater.

(2) A Shared Facility Agreement must be adopted and

incorporated in the County Master Water and Sewer Plan and show any variance to criteria (1).

(3) Minimum of 10,000 square feet of acceptable waste disposal area is required for each unit.

OTHER REQUIREMENTS AND CONSIDERATIONS

A. Construction Requirements

1. Two compartment septic tanks, two septic tanks in series or a combination of both will be required on all installations.
2. Other specifications such as low pressure dosing for distribution, sand-lined trenches, or split systems may be required at the discretion of the Approving Authority.
3. House sizes may be limited where lot sizes or designated waste disposal areas are inadequate in the opinion of the Approving Authority for the size house proposed. Additions to existing dwellings shall be evaluated on a case by case basis. In general, all additions exceeding one additional bedroom or exceeding 500 square feet of additional living space shall be treated as raw land proposals. Each 500 square feet of living space, not designated as a bedroom shall be considered a bedroom equivalent.
4. Additional design criteria for wastewater generators greater than two units (800 gallons/day) or wastewater not typical of domestic users will be as specified by the Approving Authority.
5. Specified time frames for installation of a waste disposal system may be required at the discretion of the Approving Authority.

B. A hydrogeologic study and wastewater system design criteria may be required at the discretion of the Approving Authority for proposals greater than 5 units (2000 gallons/day). The study and design criteria shall show proof the proposal will not contaminate the groundwater. (See Appendix A for Hydrogeologic Guidelines)

Table I

Queen Anne's County Groundwater Protection Report
Management Strategies for Management Area "A" (See Note 3)

Treatment Zone Thickness Beneath Bottom of Sewage Disposal Excavation	Water Table From Ground Surface at Time of Test	Soil Texture and Testing Rate Criteria	Minimum Lot or Parcel Size/Unit See Note (2)	Maximum Unit Density Within Parcel's Boundary Limits See Note (2)	Subdivision of Land Permitted See Note (1)	Waste Disposal Methods	Water Supply Requirements: Aquifer Type	Water Supply Requirements: Minimum Separation Distance of Wells From SDS/SRA	Water Supply Requirements: Minimum Grouting Depth
≥ 4 feet	≥ 5.5 feet	All textures Percolation Test	As specified in COMAR 26.04.02 or COMAR 26.04.03	N/A	Yes	Conventional Trench, etc.	Un-confined confined	100 feet 50 feet	Top of Screen COMAR 26.04.04 reqts
≥ 4 feet	≥ 2 feet	All textures Infiltrometer Test	" "	N/A	Yes	Sand Mound	" "	100 feet 50 feet	" "
< 4 feet	≥ 4.5 feet	Sandy loam or Finer Perc Rate 10-30 min	1 acre	1 unit/1 acre	"	Conventional or Sand-filled Trenches	" "	" "	" "
< 4 feet	≥ 4.5 feet	Loamy Sand-Sandy loam Perc Rate 5-10 min	1.25 acre	1 unit/1.5 acres	"	"	" "	" "	" "
≥ 3 feet	≥ 4.5 feet	Sand-Loamy Sand Perc Rate 2-5 min.	1.5 acre	1 unit/2 acres	"	"	" "	" "	" "
< 3 feet	≥ 3.5 feet	Sandy loam-Finer Perc Rate 10-30 min.	1.25 acre	1 unit/2 acres	"	"	" "	" "	" "
< 3 feet	≥ 3.5 feet	Loamy Sand-Sandy loam Perc Rate 5-10 min.	1.5 acre	1 unit/3 acres	"	"	" "	" "	" "
≥ 2 feet	≥ 3.5 feet	Sand-Loamy Sand Perc Rate 2-5 min.	2.0 acre	1 unit/4 acres	"	"	" "	" "	" "

Notes:

(1) Changing lot or parcel lines to increase size whereby no additional lots or parcels are created, will not be considered subdivision of land for definition purposes.

(2) "Unit" means a quantitative assigned measurement which will relate to a given proposal's wastewater flow. That is each 400 gallons of wastewater/day is defined as a unit. This includes, but is not limited to, all uses such as residential, commercial, institutional, governmental, office, business, etc. For residential purposes each dwelling unit will be considered a minimum of one unit.

(3) "Love Point" must meet all the conditions specified in the category of ≥ 4 feet for waste treatment.

(4) Sand-filled trenches may be utilized in lieu of stone, but are not to replace minimum soil treatment zone.

Table II

Queen Anne's County Groundwater Protection Report
Management Strategies for Management Area "B" (See Note 3)

Treatment Zone Thickness Beneath Bottom of Sewage Disposal Excavation	Water Table From Ground Surface At Time of Test	Soil Texture and Testing Rate Criteria	Minimum Lot or Parcel Size/Unit See Note (2)	Maximum Unit Density Within Parcel's Boundary Limits See Note (2)	Subdivision of Land Permitted See Note (1)	Waste Disposal Methods	Water Supply Requirements: Aquifer Type	Water Supply Requirements: Minimum Separation Distance of Wells From SDS/SRA	Water Supply Requirements: Minimum Grouting Depth
≥ 4 feet	≥5.5feet	All Textures Percolation Test	As specified in COMAR 26.04.02 or COMAR26.04.03	N/A	Yes	Conventional Trench, etc.	Confined	50 feet	Through disposal stratum and 5' into lower confining layer
	≥2 feet	All Textures Infiltrometer Test	"	N/A	Yes	Sand Mound	"	50 feet	"
< 4 feet ≥ 2 feet	≥3.5feet	All Textures Perc Test	1 acre	1 unit/2 acre	Yes	Conventional or Sand-filled Trench	"	50 feet	"
		All Textures Percolation Test	15,000 sq. feet	1 unit/1 acre	No	"	"	"	"
≥4 feet	≥5.5feet	All Textures Percolation Test	As specified in COMAR 26.04.02, 26.04.03 or COMAR 26.04.05	N/A	Shared Facilities	Conventional or Sand-filled Trench	Confined	50 feet	"
<4 feet ≥3feet	≥4.5feet	All Textures Percolation Test	Determined by Zoning or 26.04.03 or Comar 26.04.05	1 unit/2 acres	Shared Facilities	"	"	"	"

Notes: (1) Changing lot or parcel lines to increase size whereby no additional lots or parcels are created, will not be considered subdivision of land for definition purposes.

(2) "Unit" means a quantitative assigned measurement which will relate to a given proposal's wastewater flow, that is, each 400 gallons of wastewater/day is defined as a unit. This includes, but is not limited to, all users such as residential, commercial, institutional, governmental, office, business, etc. For residential purposes each dwelling unit will be considered a minimum of one unit.

(3) The "Public Sewer Service Area" within Management Area B must meet the ≥ 4 feet criteria for all proposed interim systems. In addition, the area shown as Love Point must meet the ≥4 feet criteria.

(4) Sand-filled trenches may be utilized in lieu of stone, but are not to replace minimum soil treatment zone.

TABLE 2-1

HYDROGEOLOGICAL SUMMARY

HYDROGEOLOGIC UNIT	STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH FROM SURFACE	DOMINANT LITHOLOGIC CHARACTER	WATER BEARING PROPERTIES
UNCONFINED AQUIFER	KENT ISLAND AND TALBOT FORMATIONS (Undifferentiated)	20 - 80	0 - 80	Silt, sand, clay, some pockets of coarse sand and gravel, tan, grey, orange.	Functions as a supply for recharge to the Aquia aquifer.
PALEOCHANNEL	PALEOCHANNEL	0 - 115	0 - 115	Sand, silt, clay, gravel, extremely variable.	Functions as a conduit or functions as an aquitard
UPPER CONFINING BED	CALVERT FORMATION	0 - 135	80 - 250	Clay, silty, with some lenses of sand; gray.	Functions as a leaky confining bed.
	NANJEMOY FORMATION	0 - 165	80 - 300	Sand, silt, clay; green to gray; glauconitic.	Generally functions as a leaky confining bed
	EARLY EOCENE SAND	0 - 90		Sand, fine to medium, green to gray; quartz with abundant glauconite; layers of calcite - cemented sandstone; abundant shell materisl.	
AQUIA AQUIFER	AQUIA FORMATION	0 - 110	80 - 405	Sand, fine to medium, green to gray; quartz with abundant glauconite, layers of calcite - cemented sandstone, abundant shell matrisl	The primary source of water in the Kent Island area; Brackish in some areas.
	HORNERSTOWN SAND	55 - 90		Sand, fine to medium, with clay matrix, dark green, quartz with abundant glauconite	
LOWER CONFINING BED	BRIGHT SEAT FORMATION	15 - 30	370 - 400	Clay, sandy; dark gray and yellow, glauconitic.	Functions as a confining bed
	MATAWAN AND SEVERN FMS (Undifferentiated)	60 - 65	400 - 465	Clay, sandy, dark gray and green, abundant glauconite	Functions as a non - leaky confining bed in the Kent Island area
MAGOTHY AQUIFER	MAGOTHY FORMATION	120	465 - 605	Sand, medium to course, clay, white to gray non - glauconitic	A potential major source of water High iron content
POTOMAC GROUP AQUIFERS AND CONFINING BEDS	POTOMAC GROUP	2000	605 - 2605	Sand, silt and clay, interbedded, red, white, gray	Not considered a source of water, generally. The upper Patapsco Formation is a potential source
	CRYSTALLINE ROCKS (BASEMENT)	------		Variable types of crystalline rock.	Not considered a source of water.

Table III

Geologic Formations and Their Water-bearing Properties in Cecil, Kent, and Queen Annes Counties

System	Series	Group	Formation	Thickness (range in feet)	Lithology	Water-bearing properties
Quaternary	Recent		—	0-10	Silt and sandy loam soil; tidal marshes and beach sand.	Unimportant as a source of ground water. A few wells in sands near estuaries.
Quaternary	Pleistocene	Columbia	Talbot Wicomico Sunderland	0-20 20-80 0-20	Sand and gravel, clay, and sandy clay, lenticular, cross-bedded, and variable. Fluvial and marine in origin.	Wicomico formation is the most widely used aquifer in the area. Talbot and Sunderland formations are not important aquifers. Water of good chemical character obtained from dug or driven wells.
Tertiary	Pliocene (?)		Brandywine and Bryn Mawr gravels	0-20 0-20	Coarse sand and gravel. Fluvial in origin.	Unimportant as a source of ground water. Occurs as isolated patches on hilltops.
Tertiary	Miocene		Choptank	Unknown	Sand, silt, and shell layers in counties to the south. Possibly present only in southeastern Queen Annes County	Only a fair aquifer in Caroline and Talbot Counties.
Tertiary	Miocene		Calvert	15-165	Chiefly sandy clay and shell beds. Much blue clay reported in well logs. Marine in origin.	Not an important aquifer in the area. Water-bearing mainly in southeast Queen Annes County.
Tertiary	Eocene	Pamunkey	Piney Point	Unknown	Not recognized in wells in the area. May be present in subsurface in south and southeast Queen Annes County.	An excellent aquifer in counties to the south and in southern Maryland.
Tertiary	Eocene	Pamunkey	Nanjemoy	0-100	Chiefly gray and brown clay in wells on Kent Island. At Grasonville, chiefly greensand. Marine in origin.	An aquiclude in vicinity of Kent Island, but may be water-bearing at Grasonville and eastward in Queen Annes County.
Tertiary	Eocene	Pamunkey	Aquia greensand	60-230	Brown, silty greensand in Kent County and northern Queen Annes County. Greensand alternating with thin hard lime-cemented beds in southern Queen Annes County. Marine in origin.	The most important source of ground water in Queen Annes County. Several hundred wells yield from it on Kent Island and at Queenstown and Grasonville. Also public supply wells at Chestertown in Kent County.
Tertiary	Paleocene		Brightseat	—	Not recognized in the area. May be present in subsurface in southern and southeastern Queen Annes County.	Not regarded as an aquifer.
Cretaceous	Upper Cretaceous		Monmouth	80-100	Brown glauconitic sand and sandy clay; iron-bearing. Marine in origin.	An important water-bearing formation in Kent County. Water tastes of iron. Probably an aquiclude in southern Queen Annes County.
Cretaceous	Upper Cretaceous		Matawan	50-65	Dark gray, micaceous, glauconitic sand and silty sand. Marine in origin.	An important water-bearing formation in Kent County. Probably an aquiclude in southern Queen Annes County. Water commonly tastes of iron.
Cretaceous	Upper Cretaceous		Magothy	0-80	Dark gray carbonaceous clay and white sand. Estuarine (?) and continental in origin.	An important potential source of water in Kent and Queen Annes Counties. Water tastes of iron in many localities.
Cretaceous	Upper Cretaceous		Raritan	0-237	Chiefly fine sand and sandy clay. Lenticular and cross-bedded. Non-marine in origin.	Used chiefly in Cecil and Kent Counties, but an important potential source of water in all three counties. Water commonly tastes of iron.
Cretaceous	Upper Cretaceous	Potomac	Patapsco	130-1,100	Chiefly pink and mottled clay; also sandy clay, fine sand, and some coarse sand or gravel; lenticular and cross-bedded. Non-marine in origin	Used chiefly in Cecil County, but an important potential source of ground water in Kent and Queen Annes County.
Cretaceous	Lower Cretaceous	Potomac	Patuxent	125-500	Chiefly light-colored clay, sandy clay, and fine sand; some coarse sand or gravel, lenticular, and crossbedded Non-marine in origin.	Few wells tap this formation. Water generally tastes of iron. Salt water reported at Chestertown
Precambrian and Paleozoic (?)			Crystalline rocks	Indefinite depth	Igneous and metamorphic rocks: granodiorite, gabbro, metadacite, serpentine, chloritic and mica schist.	Important source of domestic supply in northern Cecil County. Most wells less than 150 feet deep. Chemical character generally satisfactory.

SOURCE OF TABLE

Bulletin 21

The water resources of Cecil, Kent and Queen Anne's County

Table IV

Generalized subsurface stratigraphy of southeastern Queen Anne's County

ERA	SYSTEM	SERIES	STAGE	GROUP	GEOLOGIC UNIT	LITHOLOGIC CHARACTERISTICS	HYDRO-STRATIGRAPHY	APPROXIMATE THICKNESS (FT.) IN WELL
CENOZOIC	QUATERNARY and TERTIARY	PLEISTOCENE and PLIOCENE (?)	—	COLUMBIA	NOT ASSIGNED	Gravel and sand, composed of poorly sorted, iron-stained quartz, heavily weathered; trace feldspar and layers of orange and gray, tough clay.	Water table aquifer	20
	TERTIARY	MIOCENE	LOWER TO MIDDLE	CHESAPEAKE	CHOPTANK and CALVERT FORMATIONS (Undifferentiated)	Sand and clay, gray, light green and brown, silty to fine grained, quartzose, slightly micaceous, weathered shell beds, moderate calcite cementation, and very low grade brown diatomite.	Chiefly a confining layer but may include minor aquifer (Cheswold)	260
		EOCENE	LOWER TO MIDDLE	PAMUNKEY	PINEY POINT FORMATION	Sand, quartzose, fine to very coarse grained, iron-stained, moderately glauconitic; limonite and/or goethite(?) pellets occasionally very abundant, foraminifera, several silty clay layers, light grayish-green.	Piney Point aquifer generally confined to upper 15 to 20 feet of Formation	120
					NANJEMOY FORMATION	Silty clay, minor percentage of sand, light to dark grayish-green, heavily glauconitic, dark green to black, calcite granules and foraminifera.	Confining layer	160
		PALEOCENE	UPPER		AQUIA FORMATION	Sand, quartzose, iron-stained, moderately glauconitic, medium to very coarse grained, frequent goethite(?) and/or limonite pellets and sandstone, calcite-cemented, fine grained quartz and black, glauconite, forming hard layers interstratified with softer calcareous silt; abundant foraminifera.	Chiefly an aquifer, but lower half contains cemented beds that act as confining layers	190
			LOWER		BRIGHTSEAT and HORNERSTOWN FMS. (UNDIFFERENTIATED)	Clay and sand, dark gray to black, fine grained quartz; glauconitic.	Confining layer	40
MESOZOIC	CRETACEOUS	UPPER	MAESTRICHTIAN	MONMOUTH GROUP		Sand, dark greenish-gray, quartzose, iron-stained, fine to coarse grained, moderately glauconitic, occasional goethite(?) pellets and clay, light gray to dark greenish-gray with glauconite and quartz silt, slightly calcareous.	Aquifer to about 65 feet thick	140
			CAMPANIAN	MATAWAN GROUP		Clay, silty, dark gray to black, quartzose and glauconitic, micaceous, moderately carbonaceous, lignitic, occasional coarse quartz grains.	Chiefly a confining layer but may include a minor aquifer	150
			SANTONIAN	—	MAGOTHY FORMATION	Sand, quartzose, medium to coarse quartz grains, white and gray, some iron-staining and dark micaceous-lignitic clays.	Aquifer may be 25 to 50 feet thick	100
		LOWER	ALBIAN TO CENOMANIAN (?)	POTOMAC	PATAPSCO FORMATION	Sand, light gray and rose, fine to coarse grained, well sorted, dominantly quartzose, slightly micaceous, lignite, pyrite, occasional weak sideritic(?) cementation; interstratified with clay, mottled (shades of red, brown, gray), tough, lignitic.	Inter-stratified aquifers and confining beds	Not fully penetrated

Source: Table I - Open File Report No. 87-02-3

Summary of Hydrogeologic Data From A Test Well Drilled in Tuckahoe State Park Queen Anne's County, Maryland

Table V

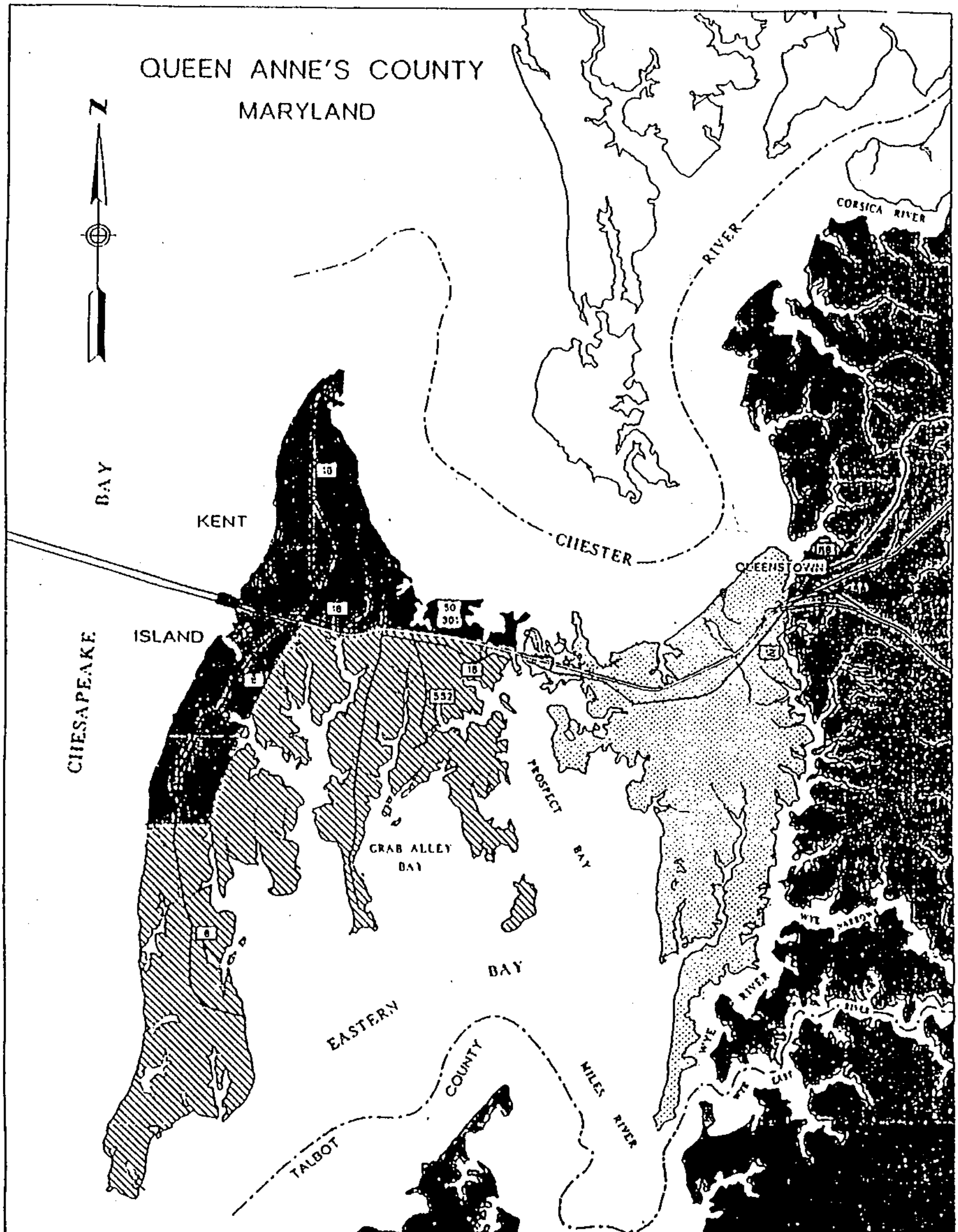
—Generalized description of the geologic units occurring in the upper Chesapeake Bay area.

SYSTEM	SERIES	GROUP	FORMATION	THICKNESS (range in feet)	LITHOLOGY	WATER-BEARING PROPERTIES
QUATERNARY	HOLOCENE		-	0-10	Silt and sandy loam soil; tidal marshes and beach sand.	Unimportant as a source of ground water. A few wells in sands near estuaries.
QUATERNARY	PLEISTO-CENE		Unconsolidated deposits	0-90	Sand and gravel, clay, and sandy clay, lenticular, cross-bedded, and variable. Fluvial and marine in origin.	The water-table aquifer throughout most of upper Eastern Shore.
TERTIARY	MIOCENE	Chesapeake	Choptank	Unknown	Sand, silt, and shell layers in counties to the south. Possibly present only in southeastern Queen Annes County.	Only a fair aquifer in Caroline and Talbot Counties.
TERTIARY	MIOCENE	Chesapeake	Calvert	15-165	Chiefly sandy clay and shell beds. Much blue clay reported in well logs. Marine in origin.	Not an important aquifer in the area. Water-bearing mainly in southeastern Queen Annes County.
TERTIARY	EOCENE	Pamunkey	Piney Point	Unknown	Not recognized in wells in the area. May be present in subsurface in southern and southeastern Queen Annes County.	An excellent aquifer in counties to the south and in southern Maryland.
TERTIARY	EOCENE	Pamunkey	Nanjemoy	0-100	Chiefly gray and brown clay in wells on Kent Island. At Grasonville, chiefly greensand. Marine in origin.	Leaky confining layer in vicinity of Kent Island, but may be water-bearing at Grasonville and eastward in Queen Annes County.
TERTIARY	? PALEOCENE	Pamunkey	Aquia	60-230	Brown, silty greensand in Kent County and northern Queen Annes County. Greensand alternating with thin hard lime-cemented beds in southern Queen Annes County. Marine in origin.	The most important source of ground water in Queen Annes County. Several hundred wells tap it on Kent Island and at Queenstown and Grasonville. Also public-supply wells at Chestertown in Kent County.
TERTIARY	PALEOCENE	Pamunkey	Hornerstown	Unknown	Subsurface distribution uncertain; chiefly a sand.	Not regarded as a major aquifer.
CRETACEOUS	UPPER CRETACEOUS		Monmouth	60-100	Brown, glauconitic sand and sandy clay; iron-stained. Marine in origin.	An important water-bearing formation in Kent County. Water tastes of iron. Probably a leaky confining layer in southern Queen Annes County.
CRETACEOUS	UPPER CRETACEOUS		Matawan	50-80	Dark gray, micaceous, glauconitic sand and silty sand. Marine in origin.	Chiefly a leaky confining layer in parts of Kent and Queen Annes Counties. Where thin sands occur, water may be irony.
CRETACEOUS	UPPER CRETACEOUS		Magothy	0-80	Dark gray, carbonaceous clay and white sand. Contains pyrite and lignite. Estuarine (?) and continental in origin.	An important potential source of water in Kent and Queen Annes Counties. Water tastes of iron in many localities. Used at Cecilton. In places, combines with Patapsco sand to function as one aquifer.
CRETACEOUS	? LOWER CRETACEOUS	Potomac	Patapsco Arundel Patuxent	0-1,800	Unconsolidated sand, clay, and sandy clay. Clays commonly red, brown, light and dark gray, purple, white, and yellow. Contains lignite, pyrite, siderite and hematite, or limonite concretions.	An important source of water in Cecil and parts of Kent County. Water commonly high in iron. Degree of salinity increases with depth. As much as 1,800 mg/L total dissolved solids at Stillpond and Fairlee, Kent County.

1/ Modified from Overbeck and Slaughter (1958, table 10).

Source of Table V

Hydrogeology of the Upper Chesapeake Bay Area, Maryla
Report of Investigations No. 39, Page 8



LEGEND

NO NEW AQUIA AQUIFER WATER APPROPRIATIONS 2-88

NO NEW AQUIA AQUIFER WATER APPROPRIATIONS 8-88

NO NEW AQUIA AQUIFER WATER APPROPRIATIONS OVER 1,000 GPD

LARGE AQUIA AQUIFER APPROPRIATION APPLICATIONS CHECKED FOR POTENTIAL CONTRIBUTION TO SALT WATER INTRUSION

MAP SCALE

1:100,000

1 0 1 2 3 4 MILES

FIGURE 2-1

WATER RESOURCES ADMINISTRATION
AQUIA WITHDRAWAL POLICY

Figure 2

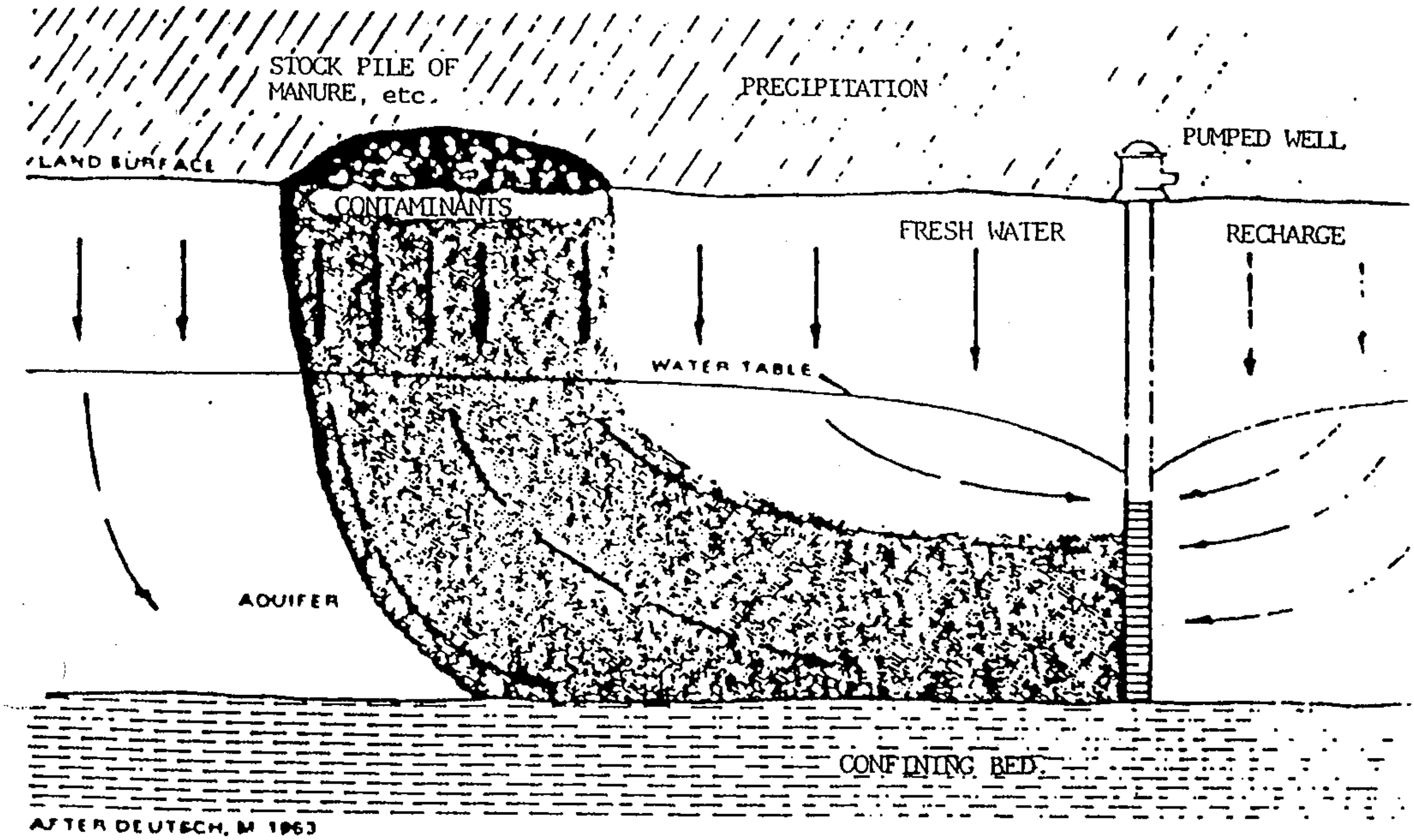


Figure 3

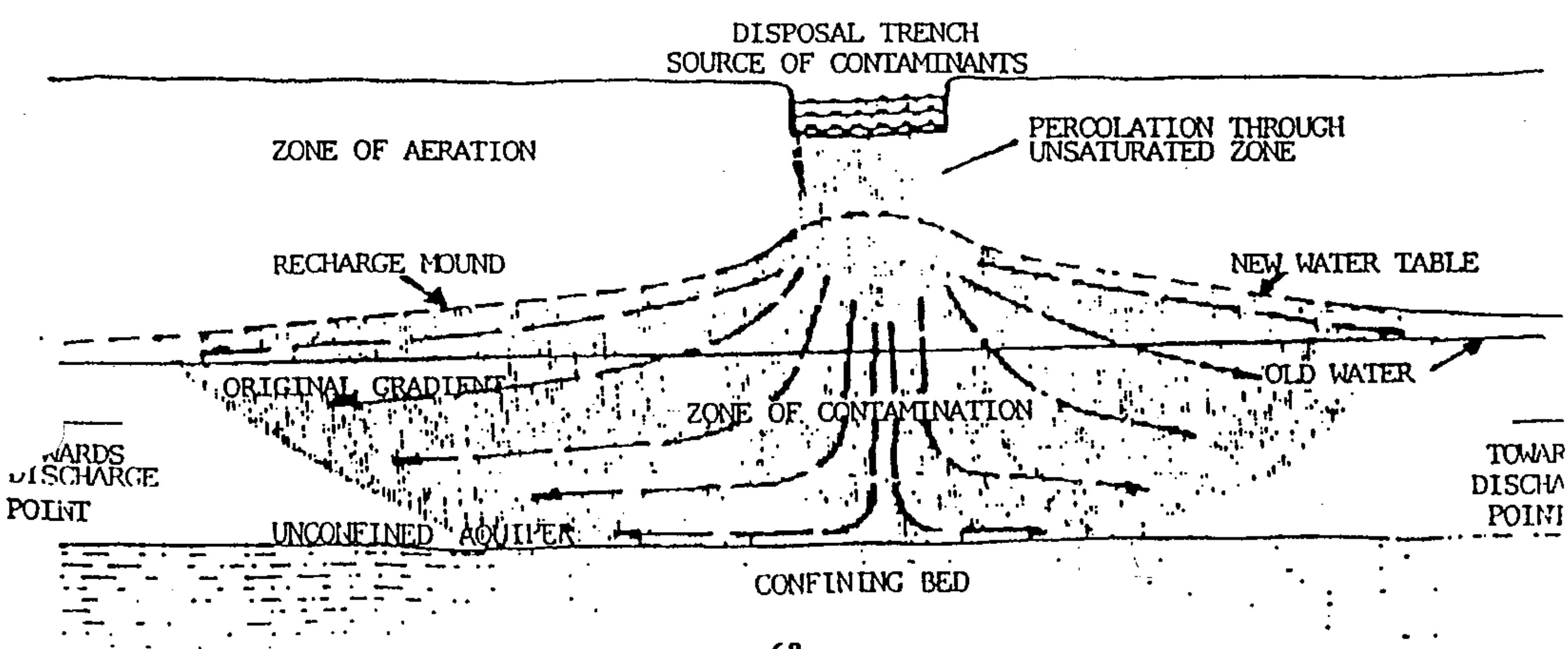
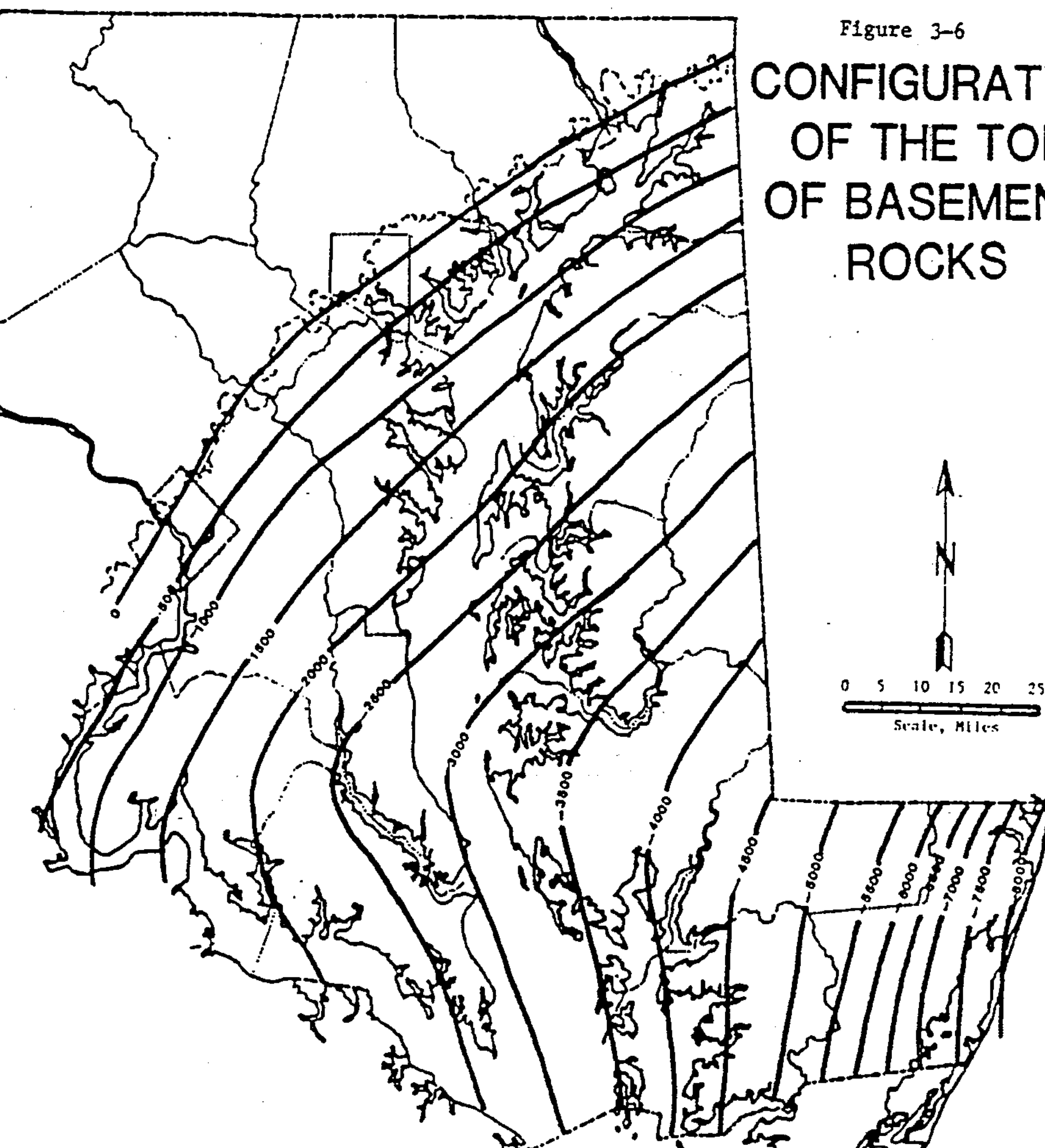


Figure 3-6

CONFIGURATION OF THE TOP OF BASEMENT ROCKS



Configuration of the Top of the Basement Rocks* in Feet from Mean Sea Level

(Hansen, 1978)

Bedrock Contour

Fall Line

* The top of the basement may also be considered to be the bottom of the Patuxent Formation under much of the Maryland Coastal Plain.

Figure 3-7

PATUXENT FORMATION

DEPTH TO TOP OF FORMATION

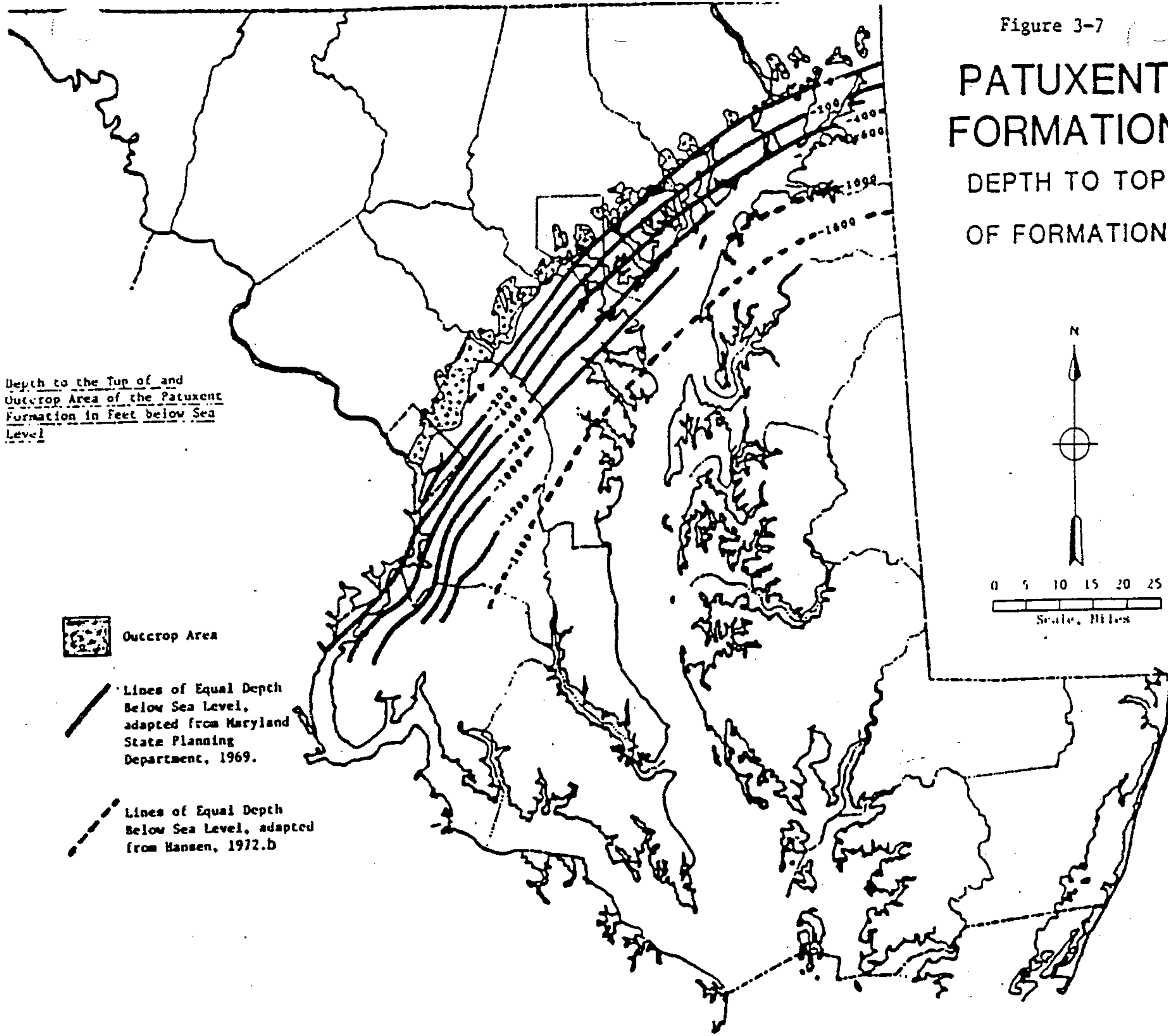
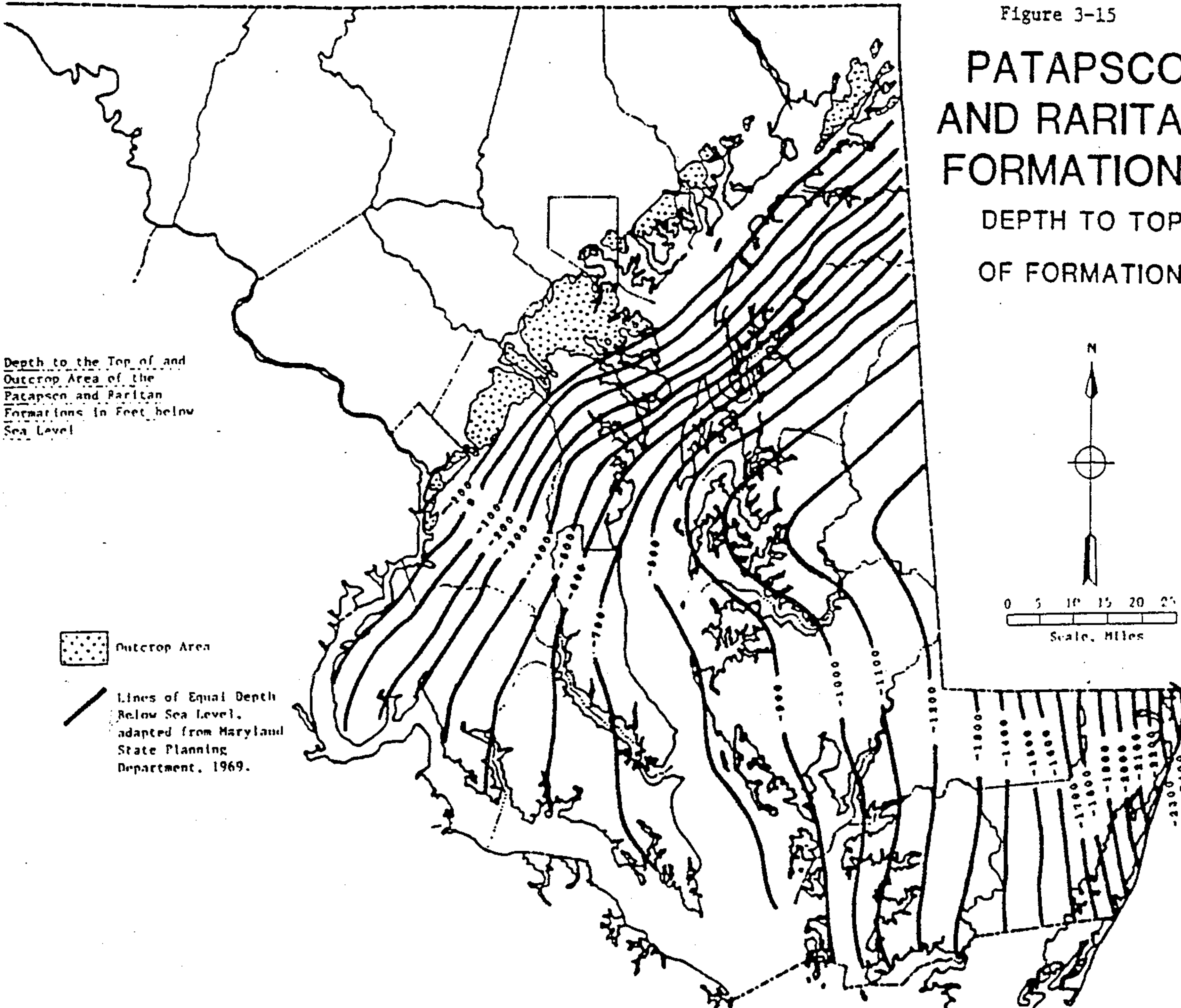


Figure 3-15

PATAPSCO AND RARITAN FORMATIONS

DEPTH TO TOP OF FORMATION



Depth to the Top of and Outcrop Area of the Patapsco and Raritan Formations in Feet below Sea Level

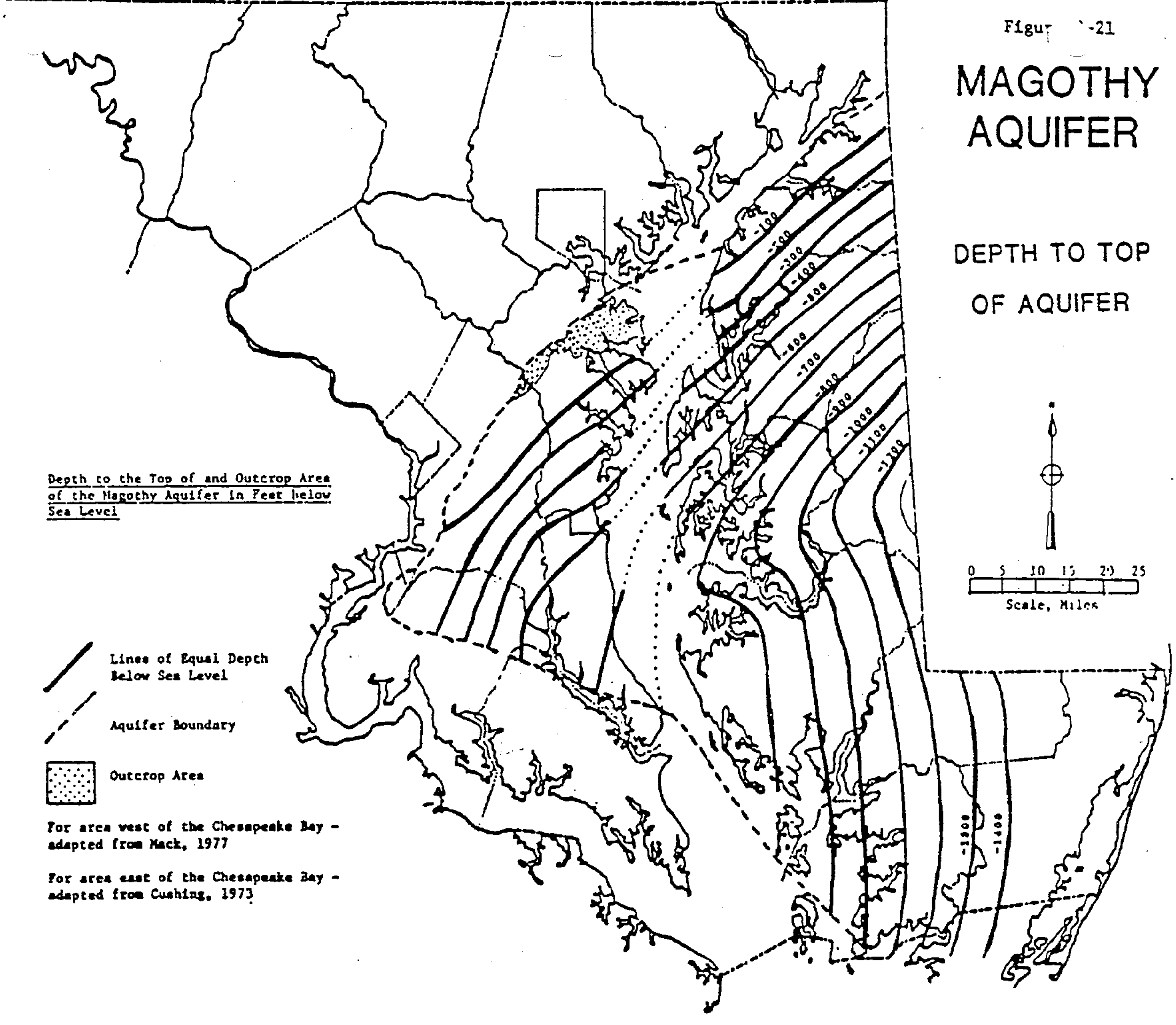
Outcrop Area

Lines of Equal Depth Below Sea Level, adapted from Maryland State Planning Department, 1969.

Figur `-21

MAGOTHY AQUIFER

DEPTH TO TOP OF AQUIFER



Depth to the Top of and Outcrop Area of the Magothy Aquifer in Feet below Sea Level

Lines of Equal Depth Below Sea Level

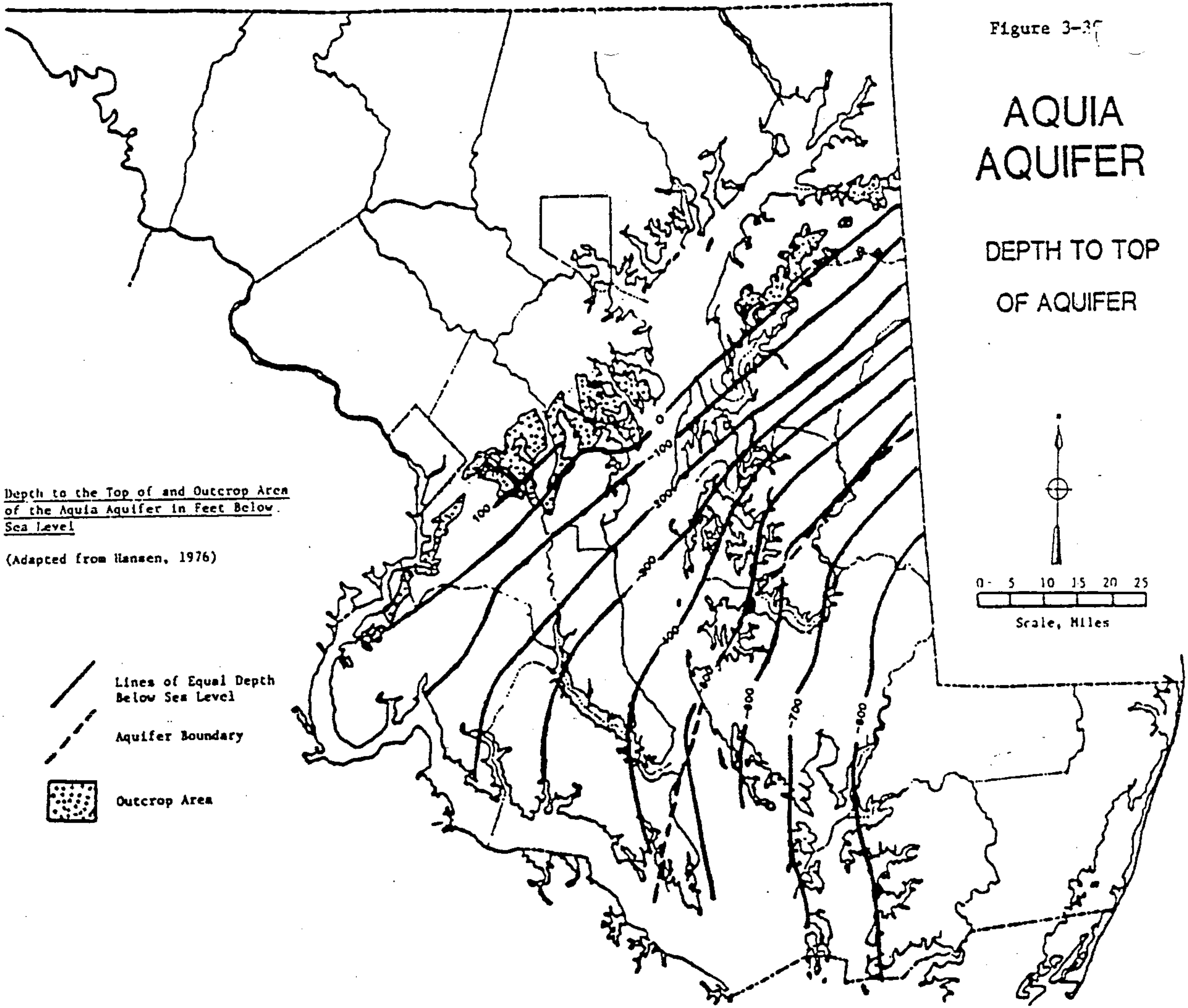
Aquifer Boundary

Outcrop Area

For area west of the Chesapeake Bay - adapted from Mack, 1977

For area east of the Chesapeake Bay - adapted from Cushing, 1973

Figure 3-3



AQUIA AQUIFER
DEPTH TO TOP OF AQUIFER
0 - 5 10 15 20 25
Scale, Miles
0
100
100
200
300
400
600
700
800
Depth to the Top of and Outcrop Area of the Aquia Aquifer in Feet Below Sea Level
(Adapted from Hansen, 1976)
Lines of Equal Depth Below Sea Level
Aquifer Boundary
Outcrop Area

Figure 3-40

PINEY POINT AQUIFER

DEPTH TO TOP OF AQUIFER

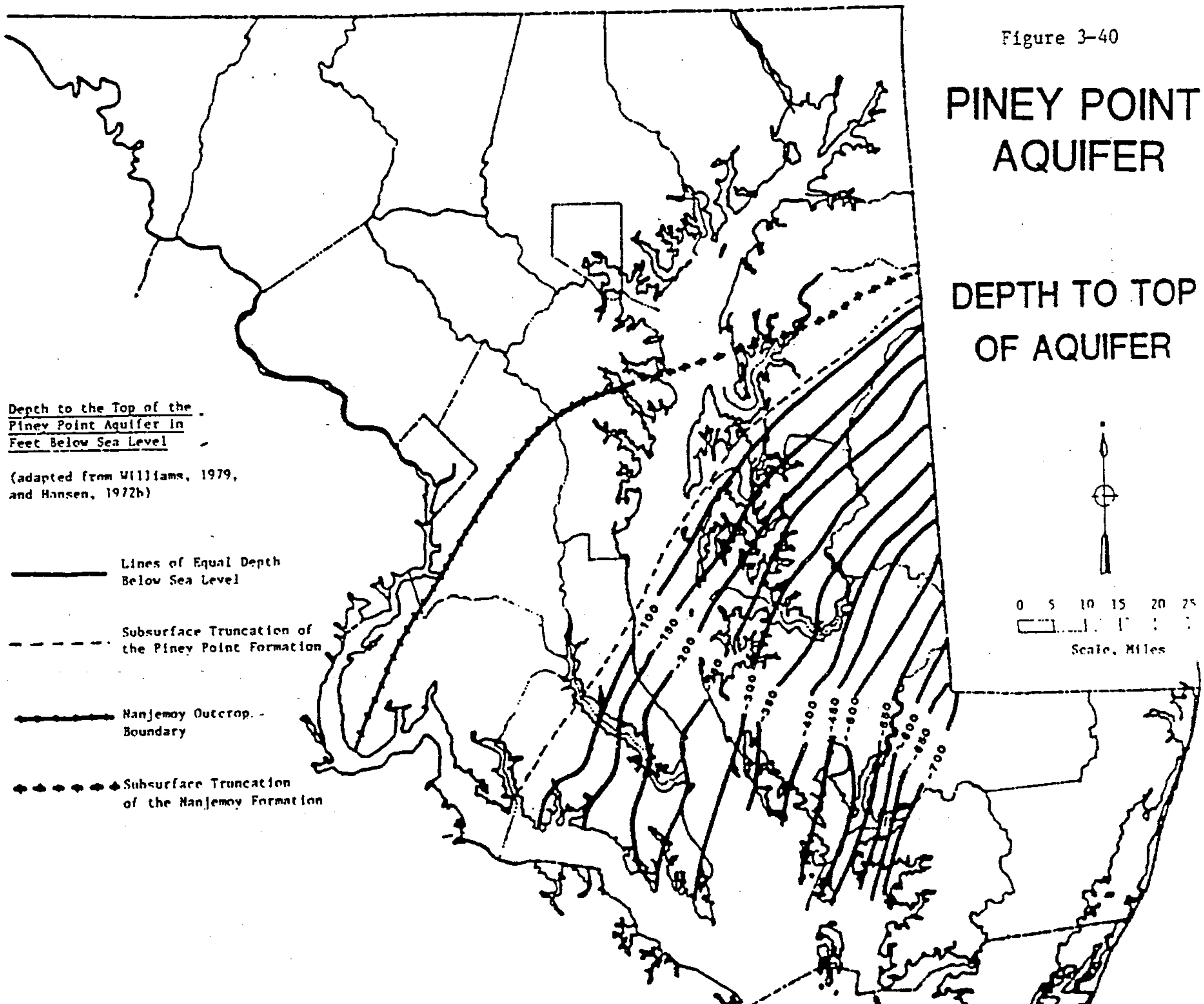
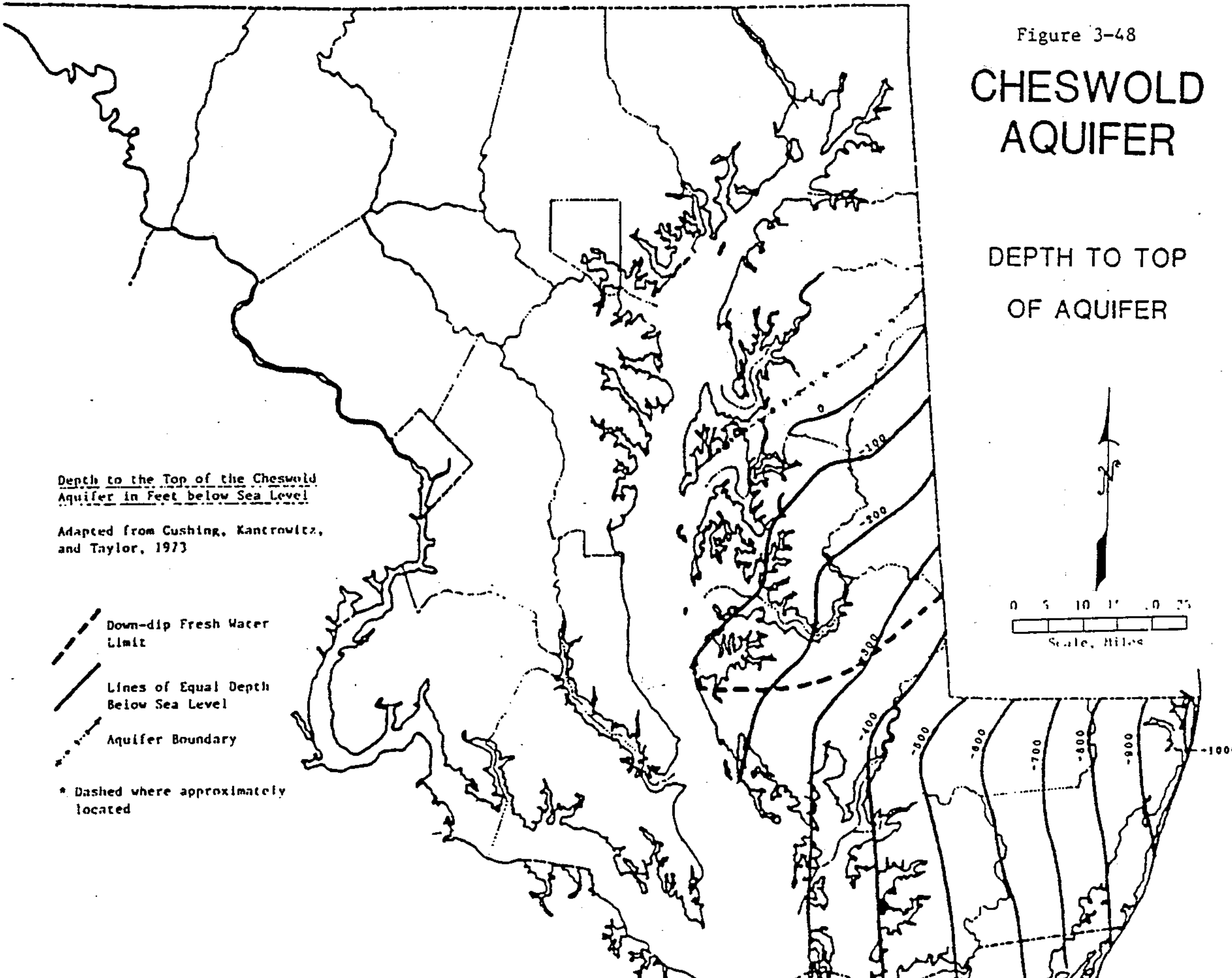


Figure 3-48

CHESWOLD AQUIFER

DEPTH TO TOP OF AQUIFER



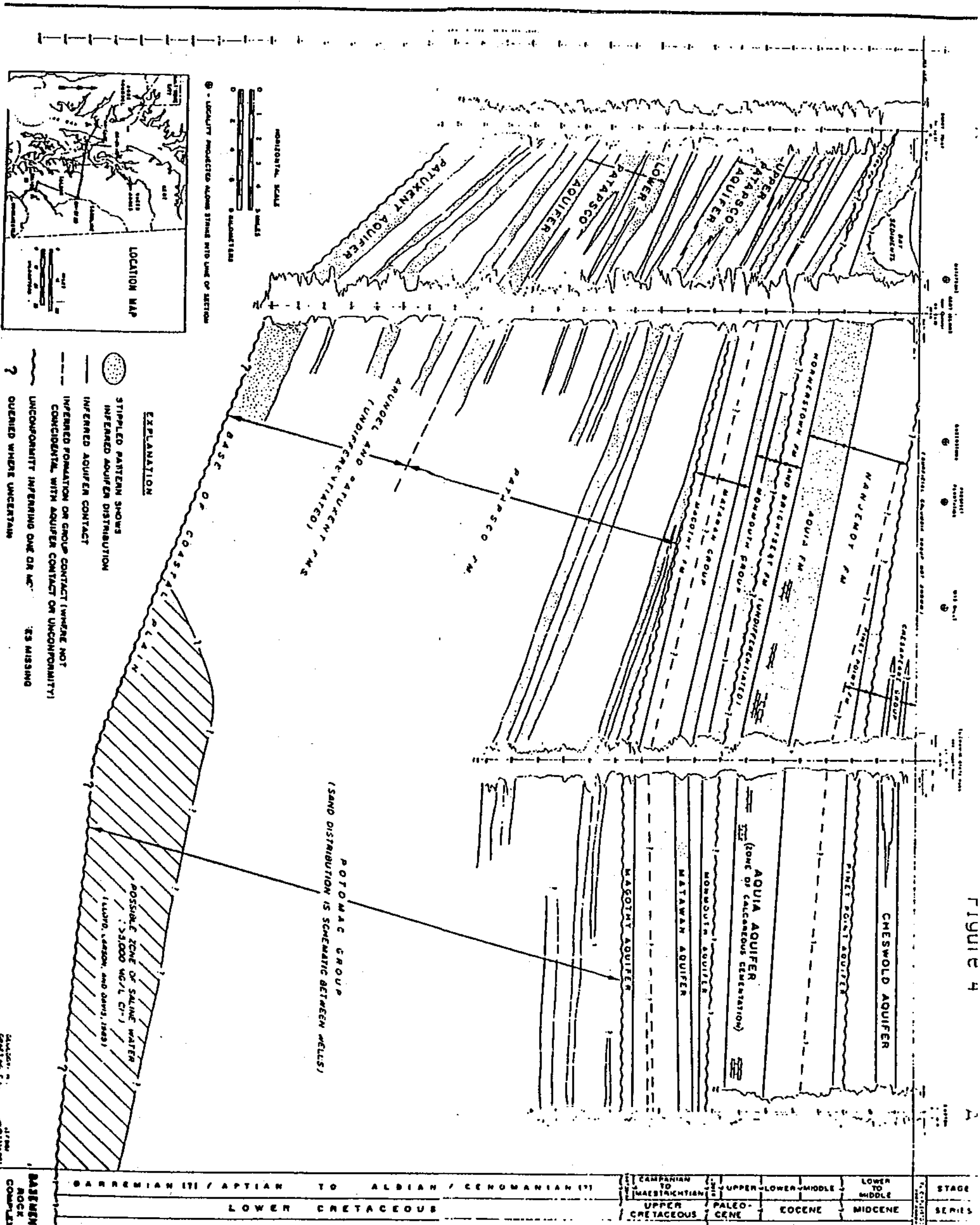


Figure 4
CHESWOLD AQUIFER
PINEY POINT AQUIFER
AQUIA AQUIFER
(ZONE OF CALCAREOUS CEMENTATION)
MONMOUTH AQUIFER
MATAWAN AQUIFER
MAGOTHY AQUIFER
POTOMAC GROUP
(SAND DISTRIBUTION IS SCHEMATIC BETWEEN WELLS)
POSSIBLE ZONE OF SALINE WATER
(>5,000 MG/L Cl-)
(LLOYD, LARSON, AND DAVIS, 1985)
NANJEMOY FM
AQUIA FM
HORNERSTOWN FM
AND BRIGHTSEAT FM (UNDIFFERENTIATED)
MONMOUTH GROUP
MATAWAN GROUP
MAGOTHY FM
PATAPSCO FM
ARUNDEL AND PATUXENT FMS
(UNDIFFERENTIATED)
BASE OF COASTAL PLAIN
CHESAPEAKE GROUP
PINEY POINT FM
BAY SEDIMENTS
UPPER PATAPSCO AQUIFER
LOWER PATAPSCO AQUIFER
PATUXENT AQUIFER
EXPLANATION
STIPPLED PATTERN SHOWS INFERRED AQUIFER DISTRIBUTION
INFERRED AQUIFER CONTACT
INFERRED FORMATION OR GROUP CONTACT (WHERE NOT COINCIDENTAL WITH AQUIFER CONTACT OR UNCONFORMITY)
UNCONFORMITY INFERRING ONE OR MORE ZONES MISSING
QUERIED WHERE UNCERTAIN
LOCATION MAP
HORIZONTAL SCALE
STAGE
SERIES
SYSTEM
LOWER TO MIDDLE
MIDDLE
LOWER
UPPER
CAMPANIAN TO MAESTRICHTIAN
BARREMIAN (?) / APTIAN TO ALBIAN / CENOMANIAN (?)
MIOCENE
EOCENE
PALEOCENE
UPPER CRETACEOUS
LOWER CRETACEOUS
TERTIARY
CRETACEOUS
BASEMENT ROCK COMPLEX

Figure 5

Source:

The Columbia Aquifer of the Eastern Shore Of Maryland

Part 1: Hydrogeology

Report of Investigations No. 40 Page 6 & 7

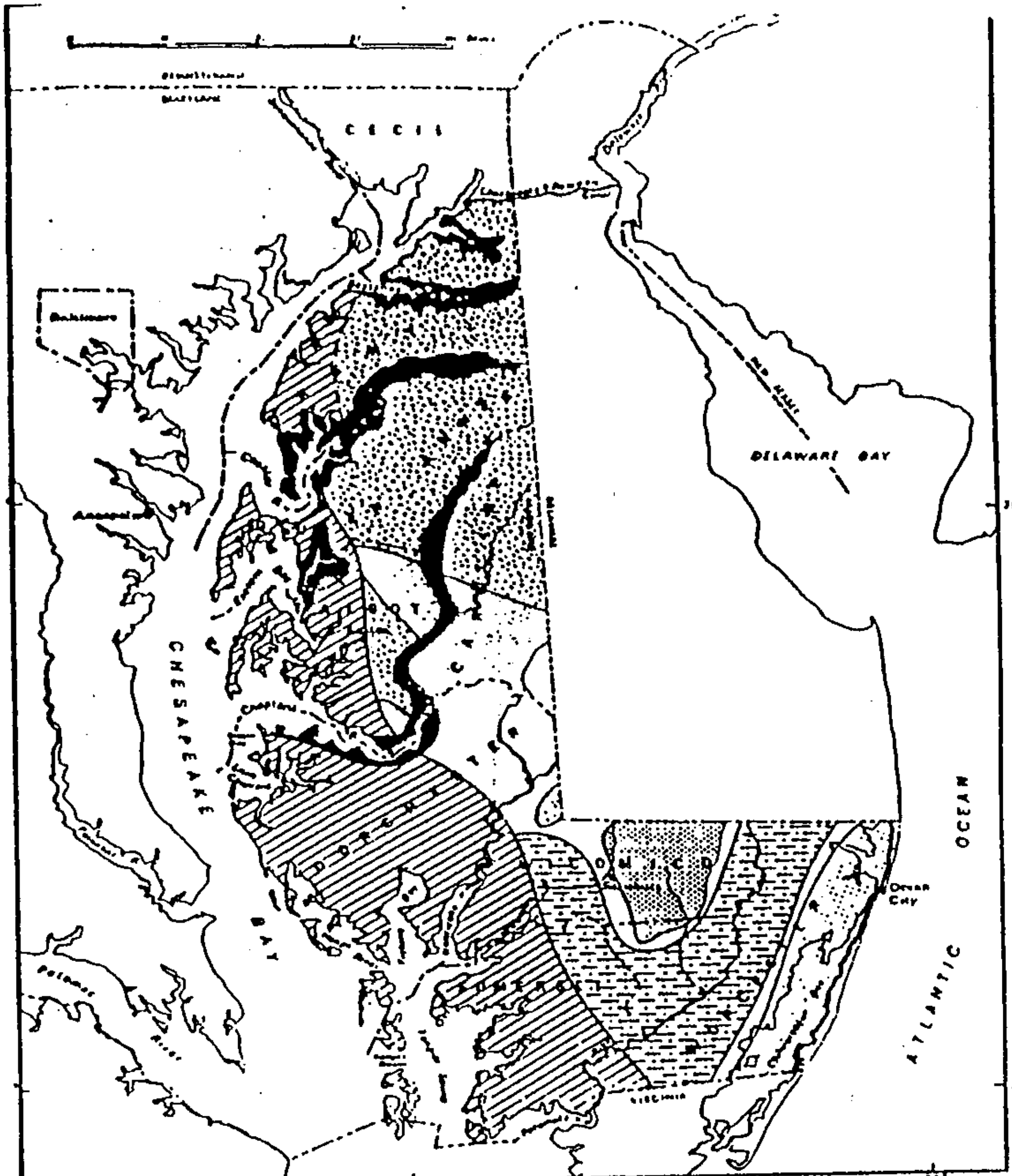
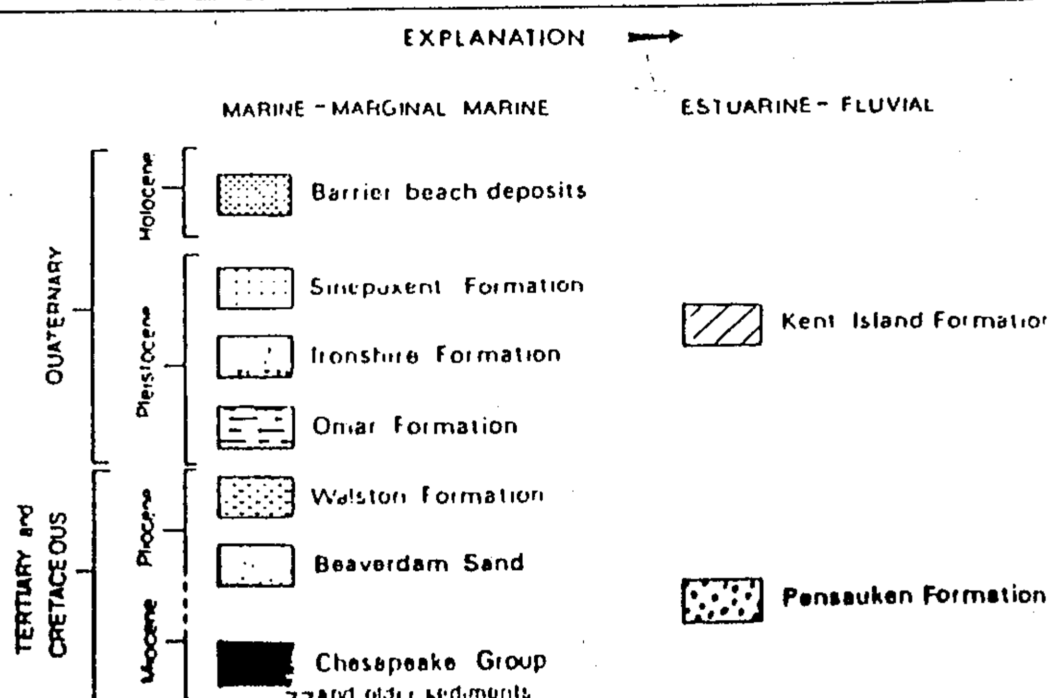


Figure 2. — Generalized geology of the Maryland part of the Delmarva Peninsula (Adapted from Owens and Denny, 1978; and Owens and Minard, 1979)



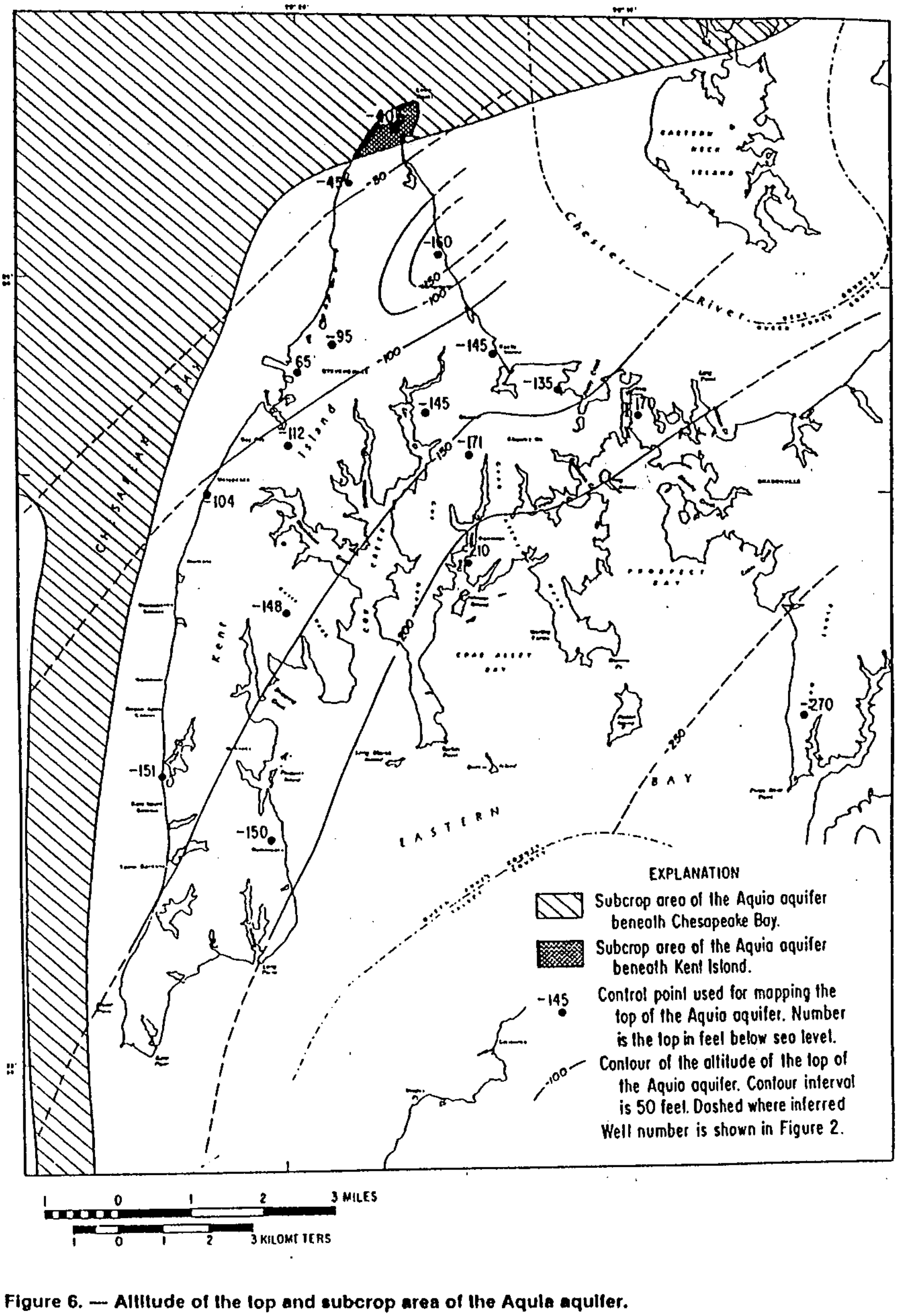
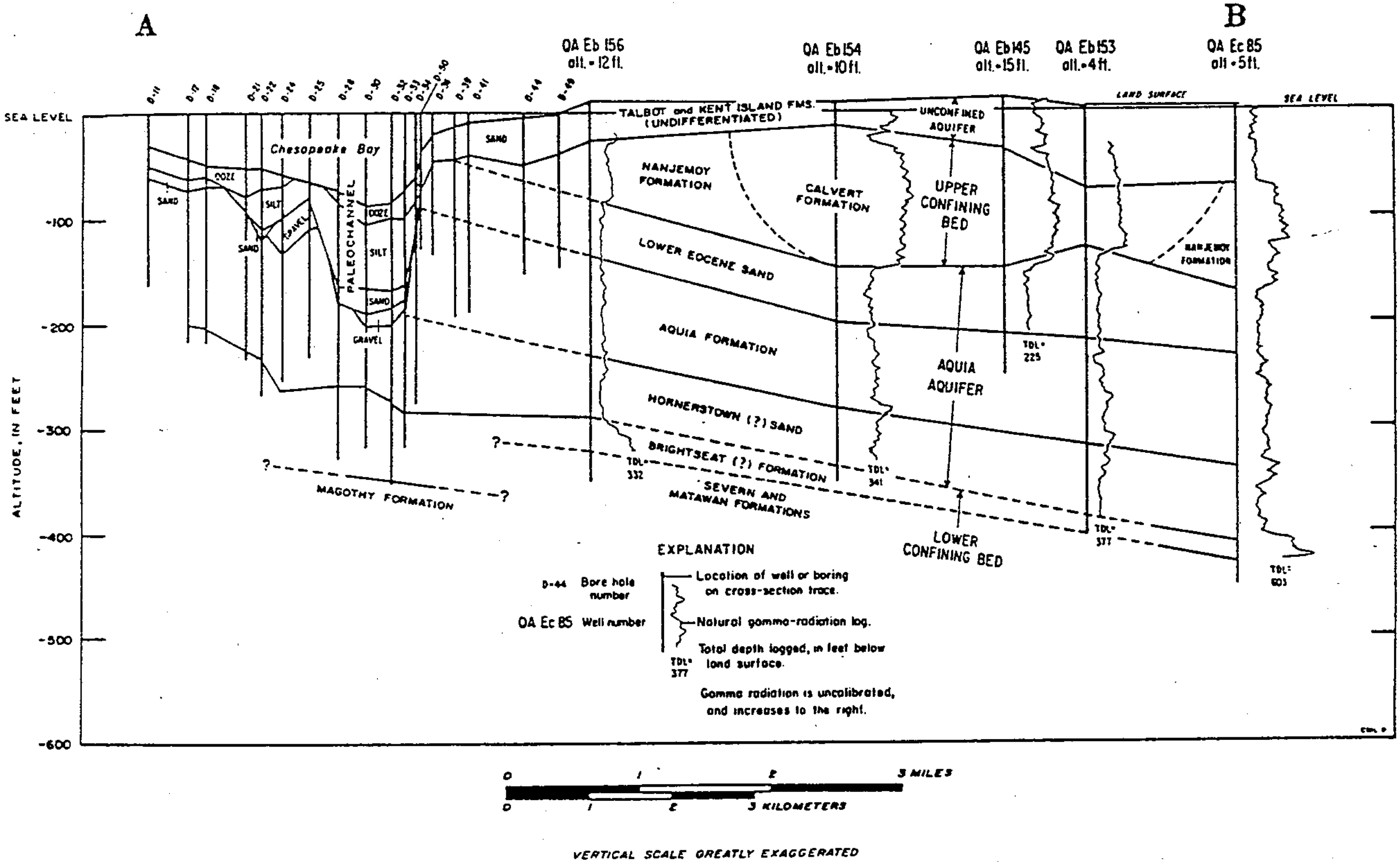


Figure 6. — Altitude of the top and subcrop area of the Aquia aquifer.

Figure 7



— Hydrogeologic section A-B showing major hydrogeologic units in the Kent Island area based on gamma logs and test borings.

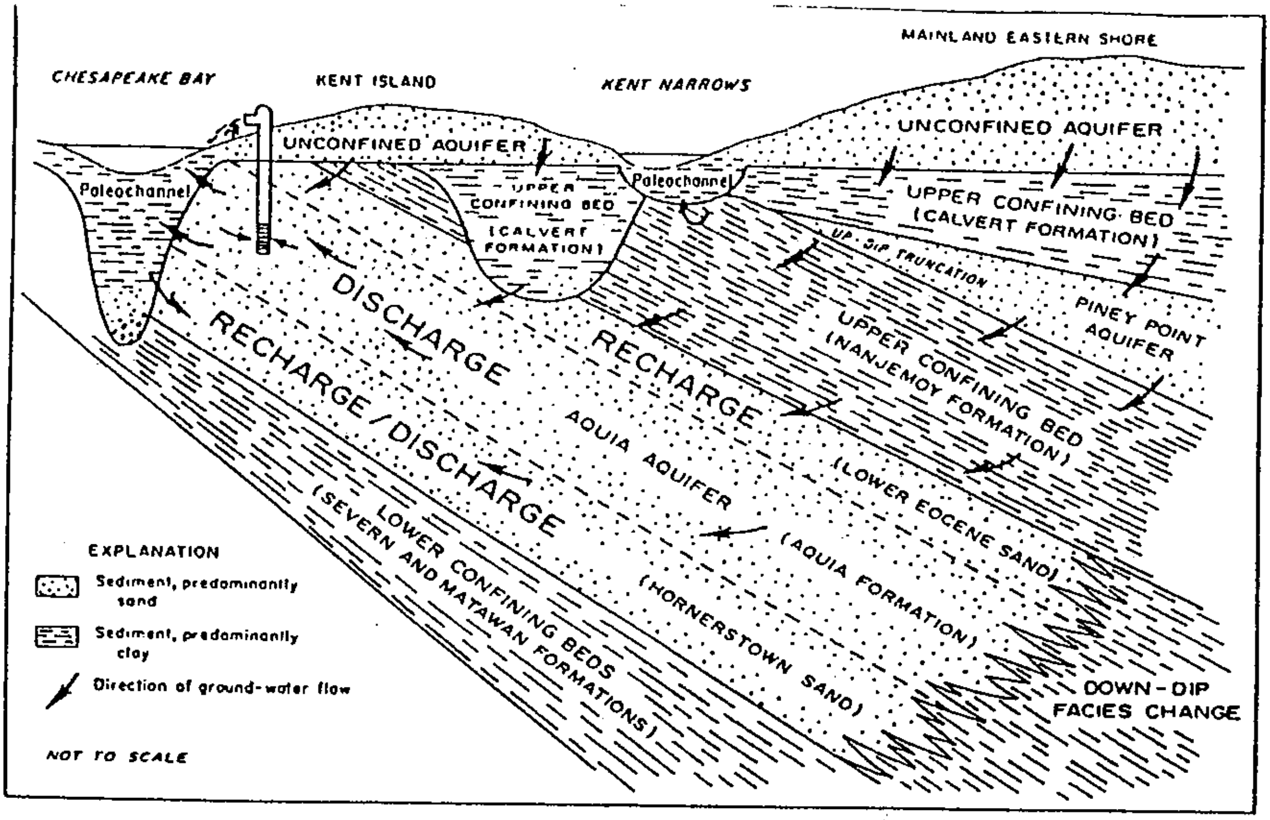


Figure 8 — Conceptual model of the flow system in the Aquia aquifer.

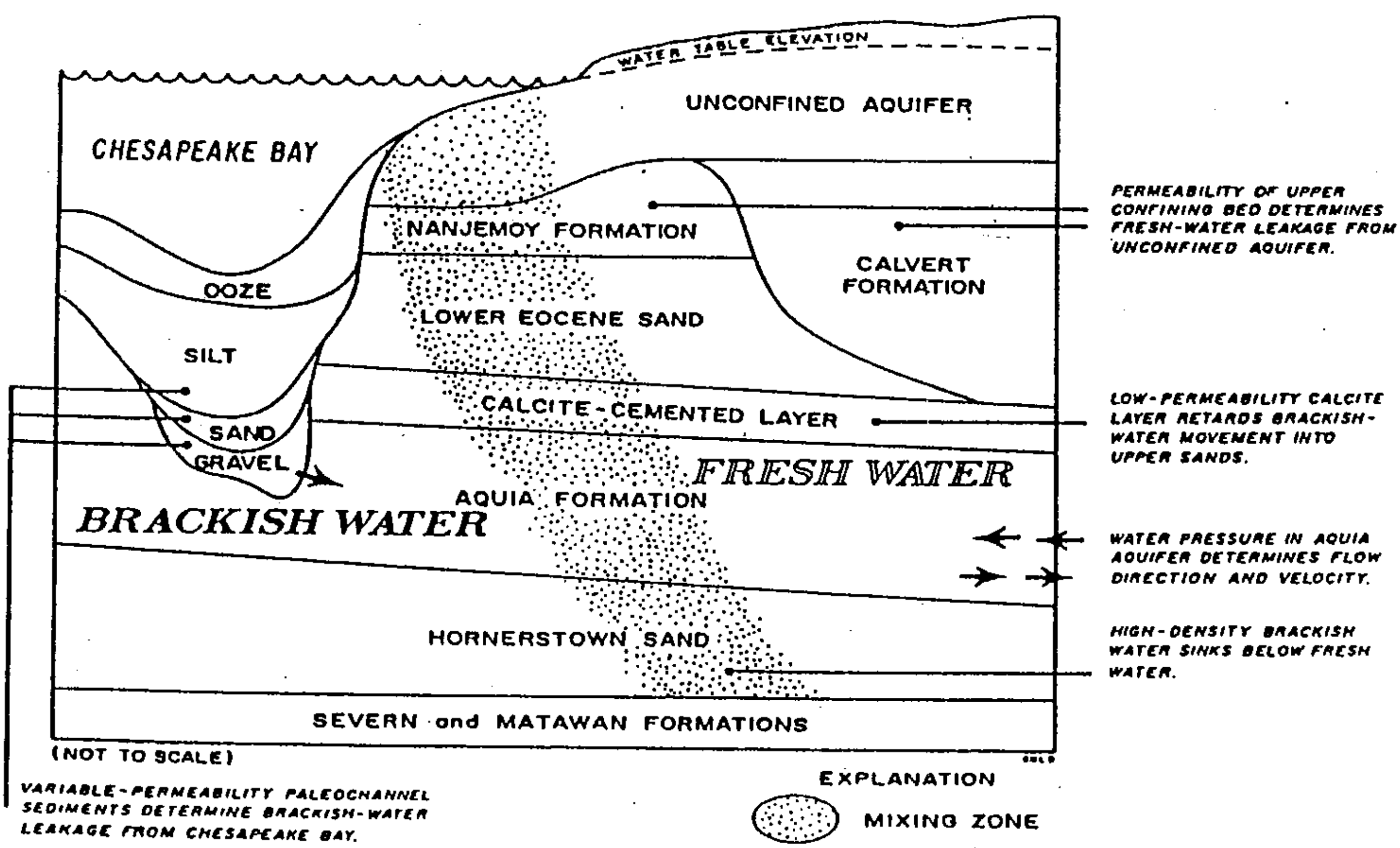


Figure 9 — Hydrogeologic controls on the distribution and movement of brackish water in the Aquia aquifer system.

Appendix A

HYDROGEOLOGIC GUIDELINES

I. Introduction

A. Purpose of Study
B. Project Proposal

1. Project Description
2. Proposed Water Supply
3. Proposed Wastewater Disposal
4. Estimated Wastewater Design Flows

II. Site Description

A. Location

B. Topography and Surface Drainage

C. Soils

D. Geology

E. Groundwater

1. Aquifers
2. Well Inventory

III. Subsurface Investigation

A. Soil Map

1. Detailed Map and Legend
2. Soil Profile Descriptions

Test Pits
Auger Holes

B. Geologic Framework

1. Areal Extent and Thickness of Substratum Sands

2. Hydraulic Conductivity Measurements - estimated wastewater flows ≥10,000 gpd require pumping tests with observation wells; number and duration of tests to be proposed by consultant based on hydrogeologic framework.

3. Areal Extent, Thickness, Nature, and Continuity of Confining layer(s) available to protect existing/potential water supply aquifers from impact of proposed sewage disposal where maximum sewage treatment will not be provided (e.g., direct penetration of groundwater

Appendix B

Nitrogen Loading Calculations

Method #1: Cornell Nitrogen Balance

$$W = \frac{(4.43)\ (C) + a(P-ET) - cP}{(y-a) - y\ (d + n)}$$

where:

W = wastewater loading (acre/acre-year)
C = removal of nitrogen is crop (lb/acre-year) = 0
a = allowable N concentration in percolatate (mg/l) = 10
P = precipitation (acre-inch/acre-year infiltration = 15
ET= potential Evapotranspiration (ac-in/ac-yr) = 0
c = concentration of N in precipitation (mg/l) = .5
y = concentration of N in wastewater (mg/l) = 60
d = fraction of N denitrified (% x 10^{-2}) = 0
n = fraction of N volatilitzed as ammonia (% x 10^{-2} = 0

$$W = \frac{(4.43)\ (0) + 10(15-0) - (.5)(15)}{(60-10) - 60\ (0)}$$

$$= \frac{0 + 150 - 7.5}{50-0} = \frac{142.5}{50} = 2.85 \text{ acre-inch/ac-yr.}$$

Home WW generation 450 gpd 164,250 gals/year
27,150 gallons/acre-inch = 6.05 acre-inch/ac-yr.
2.85 acre-inch/ acceptable loading

= 2.12 acres home required to maintain
acceptabled N loadings to groundwater

Appendix C

Nitrogen Loading Calculations

Method #2: Douglas - Trela Nutrient Dilution Model

$$DWQ = \frac{I\ (CL)}{640\ (R)(CE(QE)P}$$

where:

DWQ = development density based on H_2O quality for septic systems (DU/acre)

*I = infiltration to ground water recharge (mgd/mi^2) = .7141

CL = pollutant concentration limit (mg/l) = 10

640 = conversion factor (acres/mi^2)

R = pollutant renovation factor (decimal fraction) = .9(Case 1) and .7(Case 2)

CE = pollutant concentration in septic effluent (mg/l) = 60

QE = septic effluent generation (gpcd) 450 gpd

P = unit occupation (persons/DU)

*15"/yr. x 27,150 g/acre-inch = 407,250 gallons/acre/yr. = .407250 mgy/ac. x 640 ac/mi^2 = 260.64 mgy/mi^2 365 = .7141 mgd/mi^2 .

$$\frac{(.7141 \times 10^6}{60\ (.9)\ \ (60)\ \ (450)} = \frac{7141}{15.552}$$

Case #1 (loamy sand)'

.5 Du/Acre (2.18 ac/DU) — 2 acres/DU

Case #2 (sandy loam)

$$\frac{(.7141 \times 10^6)\ \ (10)}{640\ (.7)(60)(450)} = \frac{(7.141)}{12.096}$$

= .6 DU/Acre = 1.7 Ac/DU

APPENDIX D

Maryland Department of Natural Resources

Water Resources Administration
Tawes State Office Building
Annapolis, Maryland 21401
Telephone: (301) 974-3675

William Donald Schaefer
Governor

Torrey C. Brown, M.D.
Secretary

Catherine P. Stevenson
Director

KENT ISLAND WATER MANAGEMENT STRATEGY

No new water appropriations will be approved for the Aquia aquifer beneath Kent Island. For the portion of Queen Anne's County east of Kent Narrows and west of Queenstown Creek and the Wye River, no new water appropriations over 1,000 gpd will be approved from the Aquia aquifer.

For the area east of the Wye River and including substantial portions of Queen Anne's and Talbot counties and the Easton and St. Michaels areas as indicated below, large Aquia aquifer appropriation requests will be strictly scrutinized with respect to their potential for contribution to the saltwater intrusion problem. This area is described as follows:

Beginning in the Chester River immediately north of the mouth of Queenstown Creek, the boundary of this area proceeds clockwise in the following manner: up the Chester River to the Corsica River, then up the Corsica River and Yellow Bank Stream to the Centreville town limits, then easterly, southerly, and westerly along the Town limits to MD Route 213, such that all of Centreville is within this area. From Centreville, it continues south along MD Route 213 to the junction with US Route 50. It then follows US Route 50 south to its bridge across Peachblossom Creek, south of Easton. After following Peachblossom Creek west to its confluence with the Tred Avon River, it proceeds southwestward into the Chesapeake Bay, and turns northward, west of Tilghman Island. Trending northeastward, it enters Eastern Bay, and enters the Wye River just west of the Wye Institute. It continues northward along the Wye River, then crosses U.S. Route 50 immediately west of Queenstown, and follows Queenstown Creek back to the Chester River.

Applicants proposing projects which have an adverse impact on the Aquia aquifer will be required to revise the application to mitigate the impact.

References

Andreasen, David C. and Harry J. Hansen, 1987, Summary of Hydrogeologic Data From a Test Well (1725 Ft.) Drilled in Tuckahoe State Park, Queen Anne's County, Maryland , Maryland Geological Survey, Open File Report No. 87-02-3, Plate 1, 4p.

Backman, Joseph L., 1984 The Columbia Aquifer of The Eastern Shore of Maryland, Part 1: Hydrogeology, Maryland Geological Survey, Report of Investigations No. 40, p. 6 & 7.

Drummond, David D., 1988, Hydrogeology, Brackish-Water Occurrence and Simulation of Flow And Brackish-Water Movement In The Aquia Aquifer In The Kent Island Area, Maryland, Maryland Geological Survey, Report of Investigations No. 51, p. 1-92.

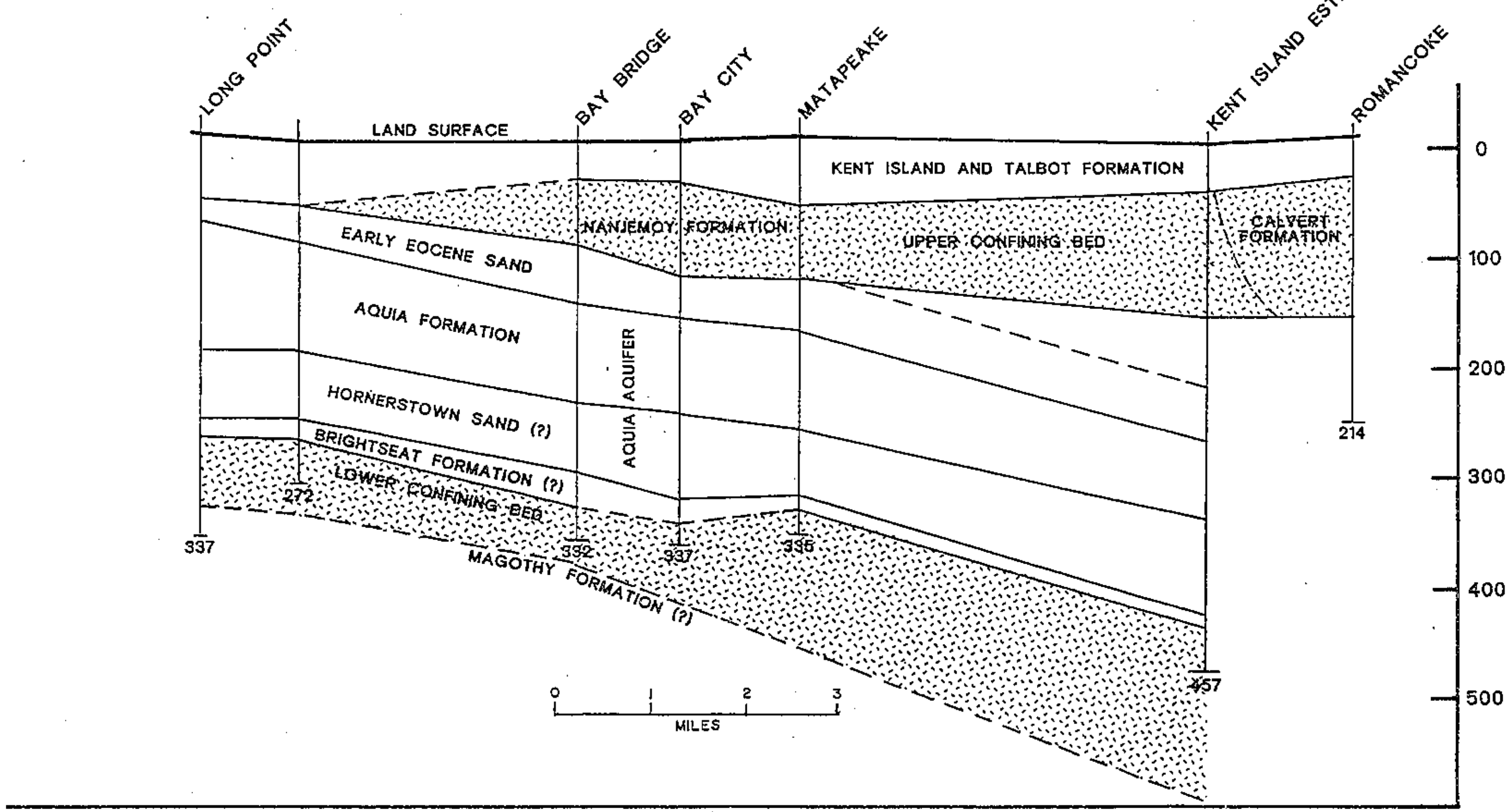
Hansen, Harry J., 1972, A User's Guide For The Artesian Aquifers of The Maryland Coastal Plain, Part Two: Aquifer Characteristics, Maryland Geological Survey, p. 19-117.

Mandle, Richard J. and Edmond G. Otton, 1984, Hydrogeology of the Upper Chesapeake Bay Area, Maryland with Emphasis on Aquifers in the Potomac Group, Maryland Geological Survey, Report of Investigations No. 39, p. 8.

Overbeck, Robert M. and Turbit H. Slaughter, 1958, The Water Resources of Cecil, Kent and Queen Anne's County: Maryland Department of Geology, Mines, and Water Resources, Bulletin 21, p. 23-96.

Water Supply Division, Maryland Department of Natural Resources, 1982, The Quantity and Natural Quality of Groundwater in Maryland, p. 45,46,57,66,78,91,105.

KENT ISLAND
GEOLOGICAL CROSS SECTION



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BALTIMORE, MARYLAND