

Kent County Comprehensive Water & Sewerage Plan



**Prepared for:
The County Commissioners of
Kent County, Maryland**

P. Thomas Mason, President

Robert N. Jacob, Jr. Member

Ronald H. Fithian, Member

2018

**RESOLUTION 2019-06
COUNTY COMMISSIONERS OF KENT COUNTY, MARYLAND**

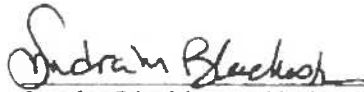
**ADOPTION OF THE 2018 UPDATE TO THE COMPREHENSIVE WATER AND
SEWERAGE PLAN**

BE IT RESOLVED by the County Commissioners of Kent County that the 2018 Update to the Comprehensive Water and Sewerage Plan is hereby updated and amended in compliance with the requirements of Environmental Article, Section 9-503 of the Annotated Code of Maryland.

BE IT FURTHER RESOLVED The County Commissioners of Kent County, Maryland do hereby adopt the 2018 Update to the Comprehensive Water and Sewerage Plan on this 18th day of June 2019.


ATTEST:

THE COUNTY COMMISSIONERS
OF KENT COUNTY, MARYLAND


Sondra Blackiston, Clerk


P. Thomas Mason, President


Ronald H. Fithian, Member


Robert N. Jacob, Jr., Member

ADOPTED: June 18, 2019

The County Commissioners of Kent County

P. THOMAS MASON
PRESIDENT
CHESTERTOWN, MD

RONALD H. FITHIAN
MEMBER
ROCK HALL, MD

ROBERT N. JACOB, JR.
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SHELLEY L. HELLER
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COUNTY ATTORNEY

NOTICE OF PUBLIC HEARING

Pursuant to the requirements of the Environmental Section, Title 9, Subtitle 5, Section 9-503 of the Annotated Code of Maryland, the County Commissioners of Kent County, Maryland will hold a public hearing on Tuesday, June 11, 2019, at 6:00 p.m., in the Commissioners' Hearing Room, R. Clayton Mitchell, Jr. Kent County Government Center, 400 High Street, Chestertown, MD 21620. The purpose of the hearing is for reviewing and receiving comments on the proposed update to the Kent County Comprehensive Water and Sewerage Plan for Kent County.

The proposed update contains amendments and revisions to the information contained in the Plan dated October 2012 and includes water and sewer service area changes for the Town of Millington, Cacaway Farms, and Bayshore Campground.

The proposed update to the Kent County Comprehensive Water and Sewerage Plan may be examined at the following locations: Department of Water and Wastewater, 709 Morgnec Road, Chestertown; County Commissioners' Office, R. Clayton Mitchell, Jr., Kent County Government Center, 400 High Street, Chestertown from 8:30 a.m. - 4:30 p.m., Monday through Friday and also at the Kent County Public Library, 408 High Street, Chestertown, Maryland.

If you require communication assistance, please contact the County Commissioners' Office at (410)778-4600 or visit Maryland Relay at www.mdrelay.org by June 7, 2019.

By Order Of:

THE COUNTY COMMISSIONERS
OF KENT COUNTY, MARYLAND



Sondra M. Blackiston
Clerk

Publish KCN 5/23/19, 5/30/19

cc: William Webb, Health Officer, Kent County Health Department
John Beskid, Director, Environmental Health, Kent County Health Department
C. J. Morales, Mayor, Town of Millington
Dawn Jacobs, Mayor, Town of Rock Hall
Michael Moulds, PE, Director of Public Works



Kent County Planning Commission

100 High Street
Chestertown, MD 21620
Phone: 410-326-7200

2 May 2019

P. Thomas Mason, President
County Commissioners of Kent County
400 High Street
Chestertown, MD 21620

Re: Draft Kent County Water and Sewer Plan Update

Dear Mr. Mason:

At its 2 May 2019 meeting, the Kent County Planning Commission reviewed the 2018 Draft Water and Sewer Plan. After some discussion and acknowledgement of the Water and Wastewater Department's coordination with the incorporated towns, the Planning Commission voted unanimously to make a favorable recommendation to the County Commissioners of Kent County regarding the Draft Plan's consistency with Kent County Comprehensive Plan.

Sincerely,
Kent County Planning Commission



Elizabeth H. Morris
Chairman

EHM/AGM/agm

CC: Mike Moulds, PE
Director of Public Works



ENGINEERING CERTIFICATION

THIS IS TO CERTIFY THAT THOSE SECTIONS OF THE KENT COUNTY
COMPREHENSIVE WATER AND SEWER PLAN COVERING ENGINEERING
ASPECTS OF WATER AND SEWER PROJECTS HAVE BEEN REVIEWED FOR
ADEQUACY BY A REGISTERED PROFESSIONAL ENGINEER LICENSED IN THE
STATE OF MARYLAND

DATE: June 4, 2019

SIGNED: 

MICHAEL S. MOULDS, PE
DIRECTOR OF PUBLIC WORKS

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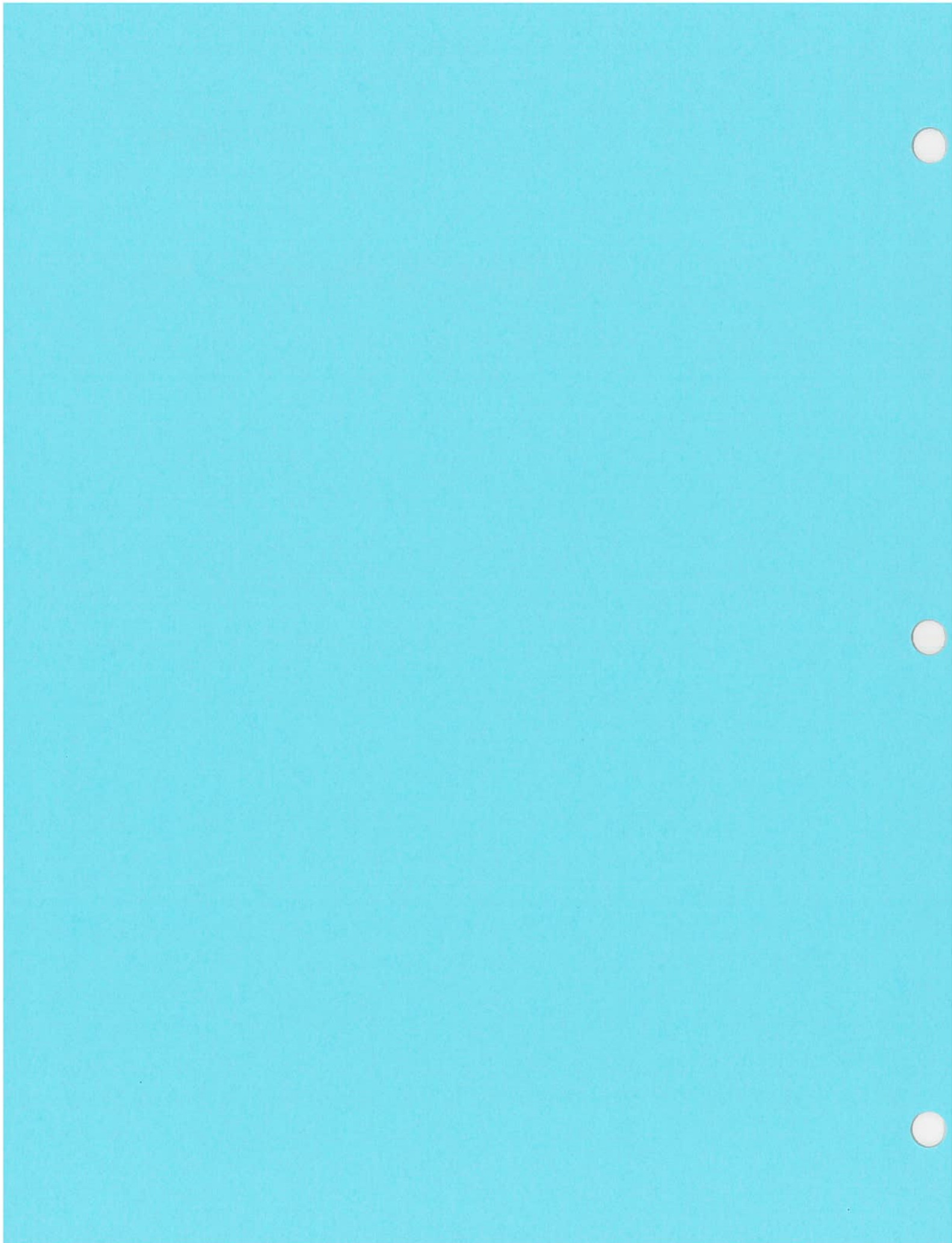
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CHAPTER 1

Goals, Organization, Policy and Procedures



1. Goals, Organization, Policy and Procedures

1.1. Goals

1.1.1. Preparation

The County Commissioners of Kent County (in accordance with the requirements of the Code of Maryland Regulations, Title 26, Subtitle, 3, Chapter 01 entitled "Planning Water Supply and Sewerage Systems") have adopted an updated and revised County Comprehensive Water and Sewerage Plan. This plan is a revision of all previous plans and incorporates all amendments and revisions as well as technical information and analyses required under Maryland House Bill 1141.

This plan shall be reviewed triennially, or at such times as deemed necessary by the Kent County Commissioners, or as may be required by the Maryland Department of the Environment (MDE). The Report of Review, showing all revisions adopted, shall be submitted to the MDE.

This plan was prepared with the cooperation and support of the Kent County Department of Public Works, the Kent County Department of Planning, Housing, and Zoning, and the Kent County Health Department. It is intended to be fully integrated with the Chesapeake and Atlantic Bays Critical Areas Program and the Kent County Comprehensive Plan and to complement them as a growth management tool. This document is expected to be a daily working guide, a long-term programmatic plan, and a tool to assist with the implementation of the Comprehensive Plan. The Kent County Comprehensive Plan is the document which directs and controls growth in the county. The Kent County Comprehensive Plan works with the town growth plans where available to achieve the common goal of smart growth. The Kent County Comprehensive Plan recognizes that it is sometimes necessary to extend water and sewer services to correct problem areas. To assure consistency with the goals of the Kent County Comprehensive Plan when extending services to problem areas, specific policies and growth management papers, developed by a committee appointed by the County Commissioners, may be developed where appropriate.

1.1.2. Planning

This updated Comprehensive Water and Sewerage Plan was written with a view to the needs of both the past and the future. This plan, in conjunction with the Kent County Comprehensive Plan and Critical Areas Program, presents solutions for existing problems and guidelines for future development. By compiling 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.

The restoration and protection of the surface and groundwater resources of the County, and the benefits of meeting the goals of the Critical Areas Program and the Water Resources Element are a natural result of a planned utilization of groundwater and a planned and controlled treatment of wastewater.

1.1.3. Goals

This plan seeks to achieve the following goals:

- a. The protection of the health, safety, and welfare of the residents of Kent County and their neighbors by promoting the development and maintenance of sanitary conditions through comprehensive planning for water and sewerage systems.

- b. The provision of adequate and appropriate water and wastewater facilities to all municipalities, public and private communities, shared facilities, industries, and individuals with due regard for future need.
- c. The preservation of prime agricultural land, while meeting the growth needs of the county.
- d. The protection and improvement of the quality of Kent County and the Chesapeake Bay and all its tributaries by reducing water quality problems caused by point and non-point sources.
- e. The adoption of such ordinances, policies, guidelines, or regulations as may be required to fulfill this plan.
- f. The timely amendment and updating of this plan as required by changing conditions, needs, or state or federal laws.

1.2. Objectives

1.2.1. Organizational Objectives

- a. The County Commissioners should fully implement this plan so as to correct the existing threats, problems and forestall future ones to protect the health and safety of citizens and visitors of the County.
- b. All central water and/or wastewater facilities in new subdivisions outside municipal jurisdictions should be designed and built to specifications approved by the Kent County Department of Public Works. All planned shared facilities should be sized, at a minimum, to provide service for the maximum development permissible by the Land Use Ordinance. If it is necessary to alleviate problem areas nearby, as identified by the Health Department, MDE, or Maryland Department of Natural Resources (DNR), the proposed facility may be required to be sized to meet both the on- and off-site needs, planned community, and problem area needs. The County will explore means to hook up failing septic systems to ENR wastewater treatment facilities in accordance with the Kent County Phase II Local Watershed Implementation Plan.

1.2.2. Land Use Objectives

- a. The protection and enhancement of existing communities will be promoted through the inclusion of new or expanded services adequate to meeting changing community needs.
- b. Development is encouraged in areas designated as growth areas in the Kent County Comprehensive Plan and with adequate available public utilities. This growth will occur in a manner that compliments and enhances each community's character and with boundaries established by coordination with the community. Please see section 1.4.6 for more information on Kent County's Denied Access Facilities Policy.
- c. New development is encouraged within existing communities designated in the Comprehensive Plans that are now served or programmed for public water and sewerage service.

1.2.3. Economic Objectives

- a. Economic development of the County will be guided to minimize costs for and maximize efficiency of public services and facilities.
- b. The program of agricultural, business, and industrial promotion will be expanded and supported by selected improvements to or limitations of public services and facilities where appropriate.

1.2.4. Environmental Objectives

- a. Public capital improvement projects and private developments are to be designed and constructed in a way that mitigates harmful environmental effects.
- b. Best available technologies (BAT) are to be promoted and used to improve wastewater treatment, protect the water supply, and reduce the impacts of failing septic systems.
- c. The use of BAT methods of on-site treatment and disposal of wastewater in existing problem areas is recommended, when practical. The use of these systems outside planned sewer service areas may be considered on a case-by-case basis to solve problems but not to encourage development on previously undeveloped parcels. The County must have the ability to review designs and monitor performance.
- d. Nutrient load reductions through upgrades to onsite sewage disposal systems and system hook ups to ENR wastewater treatment facilities will be implemented as outlined in the County Phase II Local Watershed Implementation Plan.
- e. The conservation of water supply is encouraged and is enforced through compliance with the Maryland Water Conservation Plumbing Fixtures Act and the Water Resources Element as articulated in the Kent County Comprehensive Plan, including but not limited to encouragement of retrofitting, public education, qualified management, and other measures.

1.3. Organization

A functional table of organization is included at the end of this Chapter as Table 1-1.

1.3.1. Kent County Commissioners

The Kent County Commissioners have the general power to do all such things as they may deem necessary in order to assure the good government of the county, to protect and preserve the county's rights, property, and privileges, to preserve peace and good order, to secure persons and property from danger and destruction, and to protect the health, comfort, and convenience of the citizens of the county.

The Kent County Commissioners have the authority to establish, construct, locate, maintain, operate, protect, preserve, repair, replace, extend, or enlarge any water supply, water supply system, water main, sewer, sewer system, sewage disposal plant or field, reservoir, dam, water purification or filtration plant, tank or pumping station and all other facilities, appurtenances and adjuncts that may be required to fulfill their duties.

1.3.2. Kent County Department of Public Works

The Kent County Sanitary District was renamed the Kent County Department of Water and Wastewater Services (KCDWWS) in 2000 and is now a division of the Kent County Department of Public Works under the jurisdiction and control of the Kent County Commissioners.

1.3.3. Kent County Health Department

The Kent County Health Department is a unit of The State of Maryland Department Of Health and Mental Hygiene, partially funded by the county and responsible for local implementation of programs of The State of Maryland Departments of Health and Mental Hygiene, Environment, and Natural Resources, as well as the administration of local ordinances.

1.3.4. Kent County Planning Commission

The Kent County Planning Commission and its staff, the Kent County Department of Planning, Housing, and Zoning, serve the present and future residents of Kent County by conducting immediate and long-range planning; developing, implementing, and enforcing new and existing programs and regulations; and by providing technical assistance to citizens and other agencies.

1.4. Policies, Regulations, and Guidelines

1.4.1. Shared (Sanitary) Facilities for Water & Wastewater

Wherever sanitary facilities serve or are proposed to serve more than one single-family unit or equivalent dwelling unit, a shared sanitary facility shall be required to be established in accordance with the provisions of Code of Public Laws for Kent County Chapter 161, Article II. The provisions of Chapter 161, Article III shall apply throughout Kent County, but shall not apply within the corporate limits of any municipality located in Kent County.

All shared facilities having water treatment capacities of 5,000 gpd or more, or wastewater treatment capacities of 5,000 gpd or more, shall need to be authorized by the Kent County Department of Public Works via an amendment to this plan. These facilities will also require a permit by MDE. By decision of the Kent County Commissioners, it shall be operated and maintained by the Kent County Department of Public Works or its authorized agent. It shall be the policy of Kent County to encourage the integration of two or more proposed shared systems shared facilities into a single system.

In the event that a shared sanitary facility is taken over by the County Commissioners pursuant to Kent County Code Chapter 161, Article I, it shall be operated as a sanitary service area, and the developer, all property owners, and facility users shall be liable for all duly-levied charges, fees, assessments and costs.

Any shared sanitary facility serving or designed to serve fewer than 20 single-family units or equivalent dwelling units producing or designed to produce less than 5,000 gallons per day (gpd) of effluent or water shall be considered a limited shared sanitary facility.

1.4.2. Water Supply General Guidelines

1.4.2.1. Projects Requiring Water Treatment Facilities

Any proposed project located within an existing service area, being designated as "**Existing Service**" on the service area maps, must connect to the water system regardless of the size of the project. If the project requires additional water mains, storage, plant capacity or improved treatment. It shall be the responsibility of the developer to bear the cost of those improvements required for the proposed project.

Any proposed project located within the area designated as "**Planned Service**" on the service area maps shall be required to extend the existing water system consistent with the Comprehensive Water and Sewerage Plan should any one of the following conditions apply:

- a. The Kent County Planning Commission requires that the project be connected to a shared water system, or
- b. The nature of the project, subdivision, or its environs are such that the absence of a shared water system may compromise water quality and/or the public health, as determined by the Kent County Health Department or the Maryland Department of the Environment (MDE).

Note that the Town of Millington also includes "**Planned Service- 3-5/6 years**" and "**Planned Service- 6/7-10 years**" sub-designations.

Any proposed project located outside an "**Existing Service**" or "**Planned Service**" area on the service area maps shall be required to provide shared water facilities consistent with the Comprehensive Water and Sewerage Plan should any one of the following conditions apply:

- a. The Kent County Planning Commission requires that the project be served by a shared water system, or
- b. The nature of the project, subdivision, or its environs are such that the absence of a shared water system may compromise water quality and/or the public health, as determined by the Kent County Health Department or the Maryland Department of the Environment (MDE).

1.4.2.2. Water Facilities Design Guidelines

When connection to, or expansion and/or construction of, a shared water system is required, the design and construction shall be in accordance with MDE standards, the Kent County Local Phase II Watershed Implementation Plan initiative, Code of Public Local Laws of Kent County Chapter 161, and specifications of the Kent County Department of Public Works. The Kent County Department of Public Works shall evaluate the suitability of the proposed shared water system and shared facility based upon projected demand and the character of the anticipated service area. General guidelines for typical shared water systems are as follows:

- a. Residential Systems are to assume an average usage of 300 gpd/dwelling. All other users are to determine their average flow or usages from satisfactory technical papers accepted by the County as representative.
- b. Where systems are required and have flows in excess of 5,000 gpd but not more than 30,000 gpd, facilities shall consist of two wells located on at least one lot, that lot or any additional

lot being at least 10,000 square feet per lot, chlorination disinfection, 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 and fire flow demands.

- c. Where systems are required and have flows in excess of 30,000 gpd, facilities shall consist of not less than two well supplies each on a lot of at least 10,000 square feet, chlorination disinfection, and other necessary treatment facilities as required by the raw water analysis to meet potable water standards. Adequate elevated gravity storage and distribution lines shall be provided to satisfy instantaneous demand and fire flow demands.
- d. When economically feasible or required by the Kent County Planning Commission, fire flow shall be provided with a residual pressure of 20 psi as measured at the critical discharge point (typically the hydrant farthest from the storage system or the hydrant with the maximum elevation) during peak hour demand. Projects in the 5,000 gpd to 10,000 gpd range shall be required to deliver not less than 1,000 gpm for 2 hours; projects in excess of 10,000 gpd shall be required to deliver 1,000 gpm for 4 hours unless approved otherwise.

The above general guidelines are minimum standards for typical systems. Additional requirements may be applied where appropriate.

MDE requires the following on all private residential water systems:

MDE requirements for all privately owned public drinking water systems are set forth in COMAR Title 26 Subtitle 03 (Water Supply, Sewerage, Solid Waste, and Pollution Control Planning and Funding) and Subtitle 04 (Regulation of Water Supply, Sewage Disposal and Solid Waste). The following list of minimum requirements is not all-inclusive:

- a. The project must be described and shown in the County Comprehensive Water and Sewerage Plan.
- b. A surface or groundwater appropriation permit must be obtained from the Maryland Department of Environment, Water Supply Program.
- c. A well construction permit must be obtained from the MDE via the Kent County 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 shall 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 State construction permit has been issued, there are additional requirements which must be met prior to actual operation of the new system:

- a. All County permits must be obtained, and all inspections performed, as may be required by the Approving Authorities.
- b. 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.
- c. Plans must be made for compliance with the monitoring and reporting requirements of COMAR 26.04.01 in advance of start-up.

1.4.3. Wastewater Treatment General Guidelines

1.4.3.1. Projects Requiring Treatment Facilities

Any proposed project located within an existing service area, being designated as "**Existing Service**" on the service area maps, must connect to the sewage treatment system regardless of the size of the project. If the project requires additional sewer mains, pump stations, plant capacity, so on, it shall be the responsibility of the developer to bear the cost of those improvements required for his project.

Any proposed project located within the area designated "**Planned Service**" on the service area maps shall be required to extend the existing sewage treatment system consistent with the Comprehensive Water and Sewerage Plan should any one of the following conditions apply:

- a. The Kent County Planning Commission requires that the project be connected to an existing sewage treatment system, or
- b. The nature of the project, subdivision, or its environs is such that the absence of a wastewater system may compromise water quality and/or the public health, as determined by the Kent County Health Department or the Maryland Department of the Environment (MDE) and found consistent with the State and local planning directives by the Maryland Department of Planning and Kent County Planning Commission.

Note that the Town of Millington also includes "**Planned Service- 3-5/6 years**" and "**Planned Service- 6/7-10 years**" sub-designations.

Any proposed project located outside an "**Existing Service**" or "**Planned Service**" area on the service area maps shall be required to provide wastewater facilities consistent with the Comprehensive Water and Sewerage Plan should any one of the following conditions apply:

- a. The Kent County Planning Commission requires that the project be served by a wastewater system;
- b. The nature of the project, subdivision, or its environs is such that the absence of a wastewater system may compromise water quality and/or the public health, as determined by the Kent County Health Department or the Maryland Department of the Environment (MDE) and

found consistent with the State and local planning directives by the Maryland Department of Planning and Kent County Planning Commission; or

- c. The Kent County Local Phase II Watershed Implementation Plan initiatives promote that the project be served by a wastewater system.

1.4.3.2. Wastewater Facilities Design Guidelines

When connection to, or expansion and/or construction of, a wastewater system is required, the design and construction shall be in accordance with MDE standards, Code of Public Local Laws of Kent County Chapter 161, and specifications of the Kent County Department of Public Works. The Kent County Department of Public Works shall evaluate the suitability of the proposed wastewater system based upon flow generated and the character of the anticipated service area. Land application of wastewater effluent may be permitted and is encouraged where possible, per MDE guidelines for the design, operation and maintenance of land treatment of wastewater.

General guidelines for typical wastewater systems are as follows:

- a. Residential systems are to assume average usage of 250 gpd/dwelling. All other uses are to determine their average flow or usages from acceptable technical papers accepted by the County as representative.
- b. All systems generating in excess of 5,000 gpd shall consist of a conveyance and treatment system acceptable to the Kent County Department of Public Works with discharge of the effluent in accordance with all state and local requirements.
- c. The above general guidelines are minimum standards for typical systems. Wastewater characteristics, flow surges, nutrient reduction initiatives, reliability, compatibility with existing facilities, operability, cost effectiveness and other factors may necessitate additional requirements. BAT 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.

MDE requirements for wastewater systems are set forth in COMAR Title 26 Subtitle 03 (Water Supply, Sewerage, Solid Waste, and Pollution Control Planning and Funding) and Subtitle 04 (Regulation of Water Supply, Sewage Disposal and Solid Waste).

1.4.4. General Policy on Water and Wastewater Facilities

Within existing or planned service areas, it is desirable to provide and utilize central water and/or wastewater facilities.

Outside the limits of proposed service areas, individual wells and individual disposal systems may be permitted. The burden of proof of feasibility and design shall rest on the developer. The developer shall submit such information, in a form specified by the Health Department, as may be required to review the application.

Individual on-site wastewater disposal systems (OSDS) have an average design life of 12-15 years with proper design, construction, and maintenance. The actual disposal portion (drain fields, seepage beds, nitrogen removing components) is the portion of the OSDS that limits the design life. Routine pumping

and maintenance reduces, but does not eliminate, non-point nutrient pollution. Even if properly maintained, these systems are a source of nutrient pollution to both ground and surface waters. If a shared sewage disposal system is not available within a 12 to 15 year time span, then adequate correction areas must be provided. This Plan can provide some guidance on the chronological distance to sewerage, and, thus the potential number of "corrections" required. The potential occupancy of the dwelling and the soil and groundwater conditions determine the area required for the system. The area to be reserved is determined by the number of corrections times the area necessary for one system.

Within and outside of proposed service areas, cluster-type and/or shared systems of an interim or a permanent nature may be permitted for the correction of existing problems in compliance with COMAR and County Ordinances, Plans, Policies, and Guidelines, as determined by the Approving Authorities.

Holding tanks and pump out systems are not acceptable means of long term wastewater management.

1.4.5. Individual Water Supply and Sewerage Systems

The installation of individual water supply or individual sewerage systems shall be subject to the following requirements:

- a. An individual water supply or individual sewerage system may not be permitted to be installed where an adequate water or wastewater facility is available, unless otherwise specified herein as a denied access line. If an existing water or sewerage facility is inadequate or is not available, an individual water and sewerage system may be used as set forth below.
- b. Individual water supply and sewerage systems may be permitted to be installed in any portion of the County, except where otherwise prohibited, where shared systems will be programmed for construction with the Planned Service time frames, provided that:
 - i. Such systems are adjudged by the local Health Department to be adequate, safe, and in compliance with pertinent State and local regulations, including minimum lot ownership as set forth in COMAR 26.03.01 (Regulations for Planning Water Supply and Sewerage Systems) and Health and Land Use Ordinances of the County.
 - ii. Permits for such systems shall bear a notice regarding the interim nature of the permit and state that connection to a future system shall be made when such system becomes available.
 - iii. When such systems are used, provisions shall be made by the property owner whenever possible to locate such systems so as to permit connection to the public facilities in a most economical and convenient manner.
 - iv. The developer shall be required to discontinue using the system and to connect to the programmed public facilities, under the conditions and within the time frame specified by the County, when any public water main or sanitary sewer is complete and ready for the delivery of water or the reception of wastewater. The developer shall ensure that all property owners within the subdivision are informed that a connection to the public system is required at such time as it becomes available.
- c. Individual water supply or sewerage systems may be permitted to be installed in any portion of the County where shared systems are not planned. Such installations shall be governed by

MDE as established in COMAR 26.04.02, 26.04.03 and 26.04.04 as minimum requirements, and such requirements as the County Commissioners may from time to time impose.

- d. Chesapeake Bay Nitrogen Reduction Act of 2009 (Maryland Senate Bill 554), effective October 1, 2009, specifies that new construction or replacement OSDS within Chesapeake and Atlantic Coastal Bays Critical Areas of the Chesapeake Bay or its tributaries (1,000 feet or otherwise identified by the Kent County Zoning Maps) use nitrogen removing technology. Nitrogen removing technology refers to the best available technology for the removal of nitrogen. Limited funding from the Department of the Environment is available to assist with implementation of the technology. New OSDS are not permitted within the minimum 100 or 200 foot Buffer or Stream Protection Corridor unless a variance is granted.
- e. The Private Wastewater Treatment Act of 2009 (Maryland House Bill 1105 enacted on October 1, 2009) prohibits a person from installing privately-owned individual sewerage systems that serve a single lot and discharge to the surface waters of Maryland. The only exception, subject to MDE's approval, is that a person may install an individual sewerage system for use if an existing on-site sewage disposal system fails and cannot be repaired or replaced by any other means.
- f. Wells serving a single property are to be of nominal diameter for the first 200 feet in length; 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.

1.4.6. Denied Access Facilities (Formerly Denied Access Lines or Restricted Access Lines)

- A. "Denied Access" water and sewerage service lines are water or sewer service lines which pass through lands located outside of the 10-year service areas as delineated in the locally-adopted, State-approved County Water and Sewerage Plan. These lines may be used only when studies have documented that all other reasonable options have been ruled infeasible for technical, financial, or other sound cause. This policy may be applied to service lines and appurtenances used only for the following circumstances:
 1. To provide service connections to a limited number of parcels with documented failed individual systems. Denied access lines must be clearly identified on parcel based-maps adopted within this document and described in the text of the County Water and Sewer Plan. Parcels that are permitted to connect to these lines must meet all of the requirements in Paragraph B below; or
 2. To provide a connection to an existing shared sanitary facility.
- B. Connection of any property or parcel to a "Denied Access" line is prohibited unless all of the following is demonstrated:
 1. The allocation is for an improved legal lot of record that existed prior to the County adoption of the denied access line in the Water and Sewer Plan, and the local health department has certified that the septic system is failing and cannot be corrected on site; or the connection is to an unimproved lot of record that can demonstrate it is buildable by passing on-site well and septic requirements;

2. The served properties are contiguous to the right-of-way containing the service main;
3. There is adequate capacity in the treatment and conveyance system to serve the new area or the County has allocation available from the municipality; and
4. There shall be only one allocation granted per lot, except that additional allocations may be granted if there are multiple authorized uses existing on the lot as of the date of the installation of the line, such as an apartment, small business, second home, so on.

1.4.7. Flow Reduction Program

Substantial reductions in the operation 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 in lands located outside of shared service areas shall be strongly encouraged. This policy is adopted County-wide to conserve groundwater resources and reduce groundwater withdrawal to the minimum possible consistent with growth. COMAR 26.03.01.07 establishes the requirement that the County Water and Sewerage Plan comply with the Maryland Water Conservation Plumbing Fixtures Act (MWCPPFA).

The Water Conservation Fixtures regulations established in COMAR 26.17.06.04A (8) requires that applicants for annual average appropriations of 10,000 gpd or greater must certify on a form that water-conserving fixtures will conform to the Maryland Plumbing Code's water conservation technology regulation.

1.4.8. 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.

All developers of new marinas shall be required to provide adequate water and wastewater facilities as set forth by the MDE and Department of Natural Resources (DNR). The following minimum guidelines shall be used:

- a. Pump-out facilities are required at service areas of marinas for the removal of the contents of wastewater holding tanks and recirculating toilets. Any marina consisting of 10 or more slips shall have a pump-out facility. The pump-out facility shall discharge to an approved shared facility or to an approved shared wastewater system facility. Water service shall be available at each pump-out facility, slip, or mooring.
- b. When designing facilities, an average flow of 30 gallons per vessel per day should be used as the basis for estimating the water demand, and an average flow of 10 gallons per vessel per day per slip for wastewater generation.
- c. All water and wastewater facilities serving marinas shall be constructed in accordance with requirements of the Kent County Department of Public Works and MDE and DNR standards.

- d. Any expansion of existing marinas shall require the construction of a pump-out facility if one is not readily available.

1.4.9. Guidelines for the Construction of Wastewater Facilities

1.4.9.1. General

All new wastewater facilities constructed in Kent County shall be subject to the following requirements:

- a. 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 percent of the total design flow to that unit operation.
- b. Multiple units of final and chemical sedimentation basins, trickling filters, filtration units, activated carbon columns, and other flow-sensitive components designated by the Kent County Department of Public Works 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 75 percent of the total design flow to that unit operation.
- c. 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.
- d. An alarm system shall be provided at the wastewater treatment facilities. The alarm system shall monitor disinfection, 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 central location (as designated by the Kent County Department of Public Works) where competent personnel are available 24 hours per day will be required.
- e. 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.
- f. State law requires any treatment plant discharging into shellfish waters to have a 24-hour emergency holding basin to receive bypass flows during plant failures. Each holding basin must be capable of recycling the flow back through the plant upon correction of the failure.

1.4.9.2. Pump Stations

At least two pumps shall be provided at each pump station. When two units are provided, each shall have the capability to handle the maximum flow or a minimum of 2.5 times the average design flow in accordance with the current MDE design guidelines. 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 maximum flow or a minimum of 2.5 times the average design flow.

An auxiliary power generator sufficient to operate enough pumps to deliver the maximum 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.

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 central location (as designated by the Kent County Department of Public Works) where competent personnel are available 24 hours per day will be required.

1.4.10. Guidelines for the Construction of Wastewater Facilities in Special Flood Hazard Areas

The location of wastewater facilities within special flood hazard areas shall be avoided whenever possible. However, where it is necessary that wastewater facilities be constructed within special flood hazard areas, these facilities will be subject to the following requirements and so noted in the County Hazard Mitigation Plan:

Treatment Facilities

- a. All operational components of the treatment facilities shall be located at an elevation which 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. The treatment facilities shall be designed to be able to resume operations within 24 hours after 100 year flood waters recede.

Pump Stations

- a. Entrance tubes for all pump stations shall extend above the 100-year flood level (at flood protection elevation). 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-proofed.

Collection System

- a. In any gravity collection system, a water tight manhole cover shall be provided for any manhole top installed 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, vents extending above the 100-year flood level shall be provided at each manhole.

1.4.11. Regulation of Lot Size

All proposed new lots shall meet the minimum area requirements of the Zoning District in which they are located, and any other applicable local laws, ordinances, or regulations of Kent County, the Health Department, or MDE, whichever are more stringent.

1.4.12. Service Area Mapping Definitions

This section defines the service area map designations as discussed in this chapter and shown on the maps in Chapters 3 and 4.

- a. Service areas designated as “**Existing Service**” currently have sewerage and/or water service as evidenced by an active customer account (i.e., the property is being billed for the service). These are either existing improved properties, existing vacant lands within the service area, or properties that are under or pending construction.
- b. Service areas designated as “**Planned Service**” are properties that meet one of the following descriptions:
 - i. Properties with a known or proposed development that was recently amended into the Comprehensive Water and Sewerage Plan. Advancement to “Existing Service” is automatic once the development satisfies all conditions imposed on the development during the development review process.
 - ii. Properties intended to be served.
- c. Areas with no service designations are “**No Planned Service**” areas.
- d. Public Health Concern Areas have been given a “Problem Area” designation to show the County Commissioner’s commitment to resolve the concern.

Please refer to Appendix 1-A for a description of water and sewerage priorities. Please refer to Appendix 1-B for the Sewer Allocation Policy.

Based on actual treatment plant flow and nutrient loading data reported to the Maryland Department of the Environment (MDE) and the recommendations of the Kent County Department of Public Works, Health Department, and Planning Commission, sewerage allocation target reservations for public health projects, public service needs, commercial development, or wet-weather reserve may be adjusted per the Water and Sewerage Allocation Policy.

1.4.13. Recapturing Unused Water and Sewer Allocations

The County Commissioners of Kent County may issue allocations to a specific project for water and/or sewer service; however, the commitment will remain valid only if the original conditions of the Allocation Agreement remain unchanged. The applicant cannot propose changing the project without risking the allocation. Allocations are considered to be granted when a Public Works Agreement (PWA) has been executed between the County Commissioners and the developer/owner. The Allocation Agreement is located in Appendix 1-G.

The Allocation(s) granted hereunder will remain valid only if the original conditions of the PWA remain unchanged. The Owner cannot propose changing the project without risking the loss of allocation(s). Allocations(s) are considered to be granted when an Agreement has been executed between the

Commissioners and the Developer/Owner. Allocations for projects requiring approval from the Planning Commission shall not be granted until such time that the Planning Commission has given a favorable concept review.

The Allocation(s) fee must be paid on execution of the Allocation Agreement; thereafter, the Developer/Owner will be assessed the minimum quarterly charges for vacant lots established by the Commissioners until the earlier of connection of the project to Kent County water and /or sewer lines or two (2) years from the date of this Agreement. Developer/Owner shall be charged the full quarterly charges for the improvements on the property unless, additional arrangements are specified.

The Owner will be responsible for the installation of any water or sewer appurtenances necessary for service to the property, for obtaining all necessary permits, and for the payment to the Commissioners of all associated inspection fees.

1.5. Recommended Action Items

Future water and sewer planning will be improved by undertaking programs which are in concert with the technical information and analyses under Maryland House Bill 1141 and the corresponding Water Resources Element (WRE). Action items herein also incorporate best management practices identified in the County Phase II Local Watershed Implementation Plan. This section identifies those recommended actions to be considered under future programs and budgets by Kent County departments.

1.5.1. On-Site Sewage Disposal Systems

The Local Phase II WIP identifies the following Onsite Sewage Disposal System (OSDS) upgrade goals:

- a. Overall approximately 104 (county) properties with failing septic systems have been connected to either ENR or ENR capable WWTPs in Kent County. Of the 104 systems, 37 have been connected to WWTPs. It should be noted that all connections are subject to funding and consistency with Priority Funding Area requirements.
- b. One hundred percent of new OSDS installed will include enhanced denitrification technology in accordance with the most recently-adopted MDE standards.
- c. Existing septic systems will need to be upgraded to improve nitrogen removal per the recommended 5-year implementation schedule for the State of Maryland:

OSDS Upgrades:

- Progress (current): 1,380
- 2-year goal (2012-2014): 550
- 5-year goal (2012-2017): 3500

Effective July 1, 2012, a \$60 annual fee is collected from each home serviced by an on-site system (this fee has been increased from \$30 which was established by the Bay Restoration Fund in 2005). The total estimated program income is \$25.2 million per year. Sixty percent of these funds will be used for septic system upgrades and the remaining 40 percent for the cover crop program (cover crops are a part of the Agricultural Element of Maryland's Bay Restoration Fund (BRF) and Watershed Implementation Plan initiatives.) Priority funding from the BRF is given to failing septic systems in County-mapped Critical Areas.

The OSDS Element of Maryland's Tributary Strategy recommends that local governments:

- Require long-term maintenance contracts prior to approval of advanced OSDS.
- Implement local policy and code changes to encourage or require maintenance or upgrade of on-site disposal systems.
- Consider applying for funding on behalf of landowners in a block-grant approach.
- Require nutrient offset projects for subdivisions built using individual septic tanks.
- Comply with Senate Bill 554 and use nitrogen removing technology in new OSDSs located in the critical area.

To be able to undertake consideration and implementation of the County Phase II WIP, (it is recommended that) Kent County will undertake an OSDS Survey to document OSDS locations, conditions, and predicted life assessments. This document is intended to inform decision-making and consideration of county policy and code changes.

1.5.2. Capacity Management Plans

Capacity Management Plans may be prepared for any public water supply or wastewater system. MDE provides guidance and worksheets for these plans. They are required by MDE for water and wastewater plants operating at 80 percent design capacity. They are recommended for all plants and service areas for analyses required for development of the Water Resources Element (WRE) of the County Comprehensive Plan. They are useful for water and sewerage planning and appropriations. Please see Chapters 3 and 4 for more detail on Water Supply and Wastewater Capacity Management Plans.

Kent County will investigate the drafting of Capacity Management Plans as a key strategy of the Local Phase II Watershed Implementation Plan and as part of the development of the basis of design for future infrastructure capital projects. Results of this analysis will become the basis for amendments to this plan.

These Capacity Management Plans for water and wastewater may be used for decisions supporting or limiting new allocations or connections to shared systems. In the case of water systems, these plans may be used to provide the basis for drought management plans for Kent County water systems; thereby achieving a goal identified in the County Hazard Mitigation Plan.

1.5.3. Wellhead Protection and Aquifer Recharge Areas

Kent County is pursuing development of a Source Water Protection ordinance that includes wellhead protection standards in its Land Use Ordinance to manage ground water supply sources. Wellhead protection may be required around all public and shared water supply wells.

Any new development (residential or commercial) within Wellhead Protection Areas (WHPAs) should be seweraged to protect the groundwater against microbiological contaminants, excessive nitrates, and chemicals from household wastes.

Kent County and local communities may work together with MDE's Water Supply Program to protect public water supplies in any of the following ways:

- The County may request MDE's Water Supply Program to assist in defining previously-undefined WHPAs.
- Inventory existing sources and potential sources of contamination in the WHPAs.

- MDE's Water Supply Program can provide communities with lists of regulated activities within their WHPAs. Communities can then conduct their own search for additional potential contaminant sources, such as abandoned wells or unregulated waste disposal sites.
- Assess local planning, zoning, and health ordinances to ensure that the types of activities that can occur in a WHPA are effectively managed.
- Purchase land or conservation easements within WHPAs with zero interest loans available through MDE.
- Encourage commercial and industrial facilities to monitor ground water quality on their own properties to detect pollution before it reaches the public supply well.
- Encourage potential polluters to adopt best management practices.
- Educate citizens about their water supply.

Kent County will use regional approaches, with MDE, the State of Maryland Geological Survey, and adjacent counties, to manage and protect the groundwater resources of Kent County.

1.5.4. Sanitary Surveys

There are several communities (detailed in sections 3.6 and 4.7) which have very small lots containing both wells and OSDs. In the past Kent County Commissioners have requested that the Kent County Health Department perform an investigation and evaluation of these areas due to concerns about water quality issues and potential failing OSDs. One possible method of investigation is a sanitary survey.

The Kent County Health Department may conduct a sanitary survey upon request of the Kent County Commissioners and/or the communities affected. A sanitary survey is a formal evaluation of the water quality issues and/or the sewage disposal systems associated with a community or area. The Kent County Health Department may conduct its evaluation to determine health related affects associated with water and wastewater in a particular area. The results of these sanitary surveys can be used by the Department of Public Works services to prioritize manpower, resources, and funding to correct problem areas if feasible.

1.6. Procedures

1.6.1. Triennial Update Procedures for the Comprehensive Water and Sewerage Plan

COMAR Title 26 Subtitle 03 Chapter 01 (Planning Water Supply and Sewerage Systems) 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 Kent County and its incorporated municipalities shall be reviewed and updated triennially. For this purpose, requests for proposed changes should be sent to the Planning Commission, Municipal and County agencies, and incorporated towns each update year so that a draft update can be prepared for a public informational meeting. Municipal and County agencies will be furnished copies of the draft changes for comment. A draft of the plan will be sent to MDE for the 60 day clearing house review then a public hearing with the County Commissioners will be held. Notice of the public hearing shall be advertised in a newspaper of general circulation at least 15 days prior to the proposal hearing. Following the public hearing, the County Commissioners shall take appropriate action.

Following 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, the Plan shall be considered approved by the State.

The County Commissioners may amend the Plan by inserting, altering, or deleting as required. Amendments require public hearings and notice of the time and place of the public hearing along with a summary of the amendment to the plan must be published once a week for two successive weeks beginning at least fourteen days before the public hearing.

1.6.2. Amendments to The Comprehensive Water and Sewerage Plan

COMAR Title 26 Subtitle 03 Chapter 01 (Planning Water Supply and Sewerage Systems) requires the governing body of the 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. In any instance of amendment, revision, or update to the Kent County Water and Sewer Plan in its entirety, each action shall require a statement of certification of consistency with the County's Comprehensive Plan by the Kent County Department of Planning, Housing, and Zoning (Art 9-506 (a.1.ii)). This certification should indicate specific Comprehensive Plan references to assist in the MDE approval process.

Amendments to the Kent County Comprehensive Water and Sewerage Plan shall be considered on a quarterly basis at a minimum. If a party desires that the Comprehensive Water and Sewerage Plan be amended to include its proposed project, the party shall submit an application, in a form specified by the county, to the County Commissioners with a copy to the Kent County Department of Public Works. It must be made clear that an Amendment to the County's Comprehensive Water and Sewerage Plan does not obligate the County to enter into an Allocation Agreement.

This section is intended to serve as a guide for applicants and the Approving Authority. By clarifying the appropriate subjects for Amendment, this should reduce unnecessary applications and review workload for the County Commissioners and involved agencies. This plan also functions as an inventory document for the public and several state and local 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 project should contact the Kent County Department of Public Works in advance.

1.6.2.1. Amendment Required

- Any proposed individual, shared facility water supply system having a capacity equal to or greater than a 5,000 gpd average or any proposed individual, shared facility sewerage system having a capacity equal to or greater than a 5,000 gpd average.
- Any proposed 5,000 gpd average capacity or greater modification, expansion, or upgrade to any existing shared facility, whether currently included in this Plan or not.
- Any new or amended residential subdivision, or business facility, within or in close proximity to a planned service area which would exceed 5,000 gpd.
- Any change to the status of a denied access line.

1.6.2.2. No Amendment Required

- Any new or amended residential subdivision, or business facility, within an existing service area with less than a 5,000 gpd average capacity.
- Facility intended strictly for agricultural irrigation or aquacultural supply or make-up water. Other permits may be required.
- Shared water and/or sewage disposal systems serving two households, for the sole purpose of abating or preventing existing health problems. Health Department review and approval is required. The Health Department will provide an inventory of shared systems for inclusion in this Plan during triennial reviews to assist in planning relief.

1.6.2.3. Administrative Amendments

- The Director of the Kent County Department of Public Works may amend or correct minor omissions or errors of fact administratively. In addition to omissions and errors, the following requests may be amended administratively. Such changes brought to the attention of the County Commissioners but do not require the full amendment procedure provided in 1.6.2.1 above.
- Any new or amended residential subdivision, or business facility, within a planned service area shown on the service area maps which would not exceed 5,000 gpd.
- Correction of existing problems, generating less than 5,000 gpd., outside of, but in close proximity, to an existing service area provided the following conditions are met:
 1. Adequate capacity exists in the collection, distribution and/or treatment facilities as determined by the Kent County Department of Public Works; and
 2. There is an existing dwelling or structure currently occupied on the property and the Kent County Health Department certifies in writing that there is an existing health problem; and
 3. A Public Works Agreement (PWA) is executed between the owner and County Commissioners restricting the service to the existing dwelling or structure only and limiting the size of the service connection to the existing use only.

1.6.2.4. Amendment Review Process

STEP 1: When a developer is interested in developing a project which requires sewer and/or water allocation, he will first submit a concept plan to the Kent County Department of Planning, Housing, and Zoning. The Kent County Department of Planning, Housing and Zoning will then conduct a concept plan review that will review at a conceptual level, the feasibility, design, and environmental characteristics of the proposal based on the standards set forth in the Ordinance and the Comprehensive Plan with the understanding that additional technical engineering, design material, survey work, and other subdivision documents will be submitted for review at later steps in the subdivision review process. The plans will then be scheduled for Technical Advisory Committee (TAC) review, at which time other County and State agencies will be provided the opportunity to ask questions, make comments and require revisions to the plans.

- STEP 2: After the concept plans have been reviewed by the TAC, the plans will be scheduled for a concept plan review by the Planning Commission. Scheduling of review of the project by the Planning Commission shall be done in conformance with Land Use Ordinance requirements and the rules of the Planning Commission.
- Upon review, the Planning Commission shall provide comments on the concept plan. The Planning Commission shall base their decision on the standards of review for concept plan as outlined in the Land Use Ordinance.
- STEP 3: The applicant for the project will submit a request to the Department of Water and Wastewater to determine if water and sewer capacity is adequate to serve the proposed project.
- STEP 4: Preliminary Plan as currently drafted
- STEP 5: Preliminary Plan as currently drafted with the following addition: The Planning Commission will review the project for compliance with the Land Use Ordinance and Comprehensive Plan and its feasibility, environmental, and design characteristics based on a specific project that compiles the requirements for a preliminary plan. At this stage, the applicant must demonstrate adequate provisions for water supply and sewage disposal, proposed methods for fire protection, preliminary stormwater management and Forest Conservation Plans.
- STEP 6: Projects which involve an average flow of 5,000 gpd, or more, must be included in the Comprehensive Water and Sewerage Plan prior to proceeding to Step 7. These projects will be submitted to MDE and MDP for consistency review comments.
- STEP 7: Application for water and/or sewer allocation is made to the Kent County Department of Public Works. The application shall be accompanied by: (1) a copy of the concept plan; (2) a letter from the Planning Commission with comments; (3) and any other pertinent information or documentation as deemed necessary by the Kent County Department of Public Works.
- STEP 8: Submit preliminary plan to the TAC.
- STEP 9: After approval of preliminary plan by TAC, submit the preliminary plan to the Planning Commission for review and approval.
- STEP 10: After receiving preliminary approval from the Planning Commission, the applicant shall then proceed with all final site and/or subdivision plans for submission and approval by TAC.
- STEP 11: The applicant shall enter into a Public Works Agreement (PWA) with the County Commissioners in a form prescribed by the Kent County Department of Public Works prior to final site plan approval. The PWA shall include at the least: (1) a reference to the approved plan; (2) a specific time frame in which all approvals shall be completed and construction shall have begun. Allocation fees are to be submitted at the time of execution of the PWA by the County Commissioners.
- STEP 12: Submit final site plan/subdivision plat to the Planning Commission for review and approval.

1.6.3. Guidelines for Amendments within Incorporated Towns

The Kent County Water and Sewer Plan serves as the Water and Sewer Plan for each incorporated town in the County. Therefore, each town must amend the plan according to the requirements of Sections 1.6.2.2 for projects that require a permit from MDE such as:

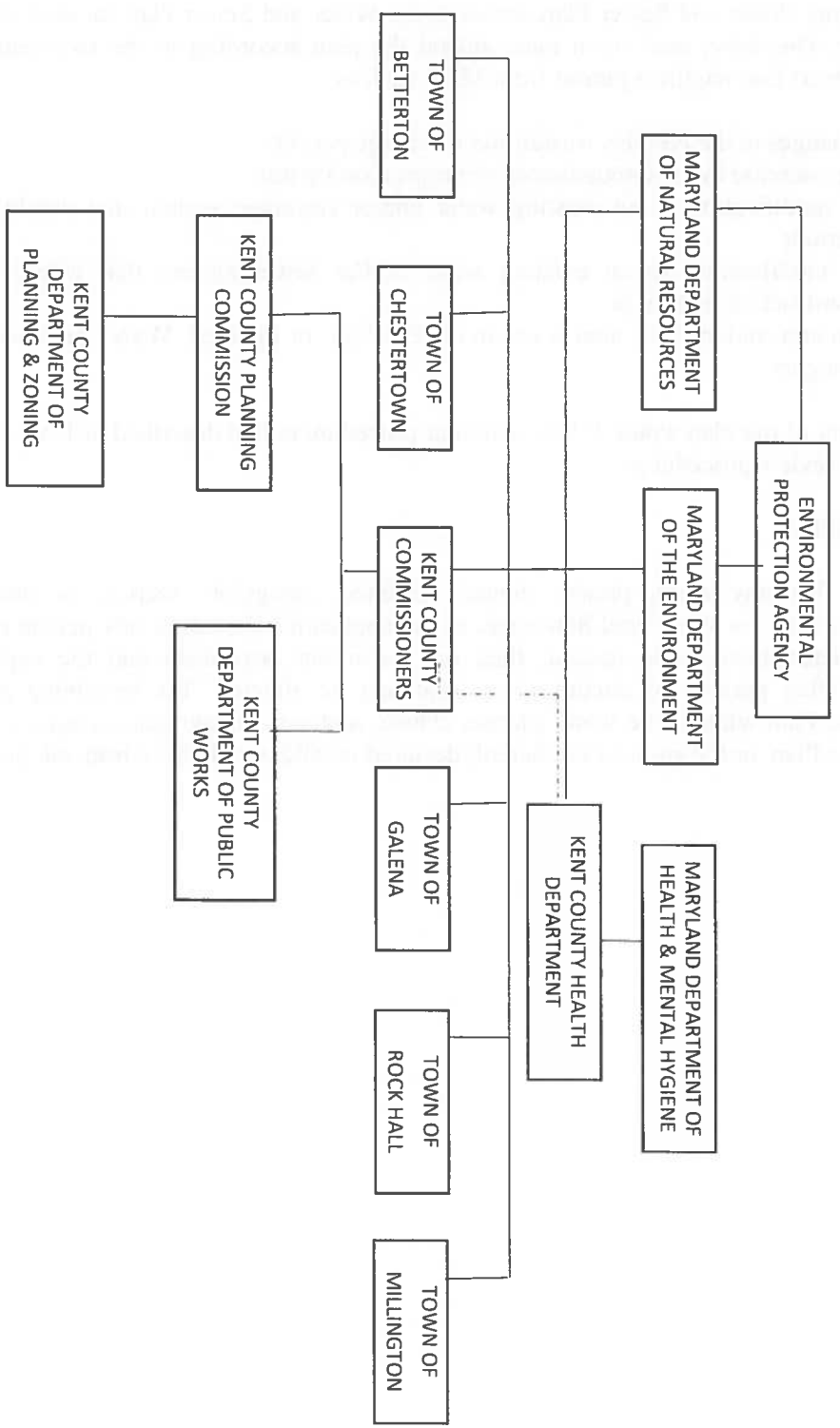
- Changes to the NPDES wastewater discharge permit;
- An increase in the Groundwater Appropriation Permit;
- A modification to an existing water and/or sewerage system that would require a MDE Permit;
- A modification to an existing water and/or sewer system that would require a MDE construction permit; or
- An annexation if the area is not in the Existing or Planned **Water or Sewer** service timing category.

Any amendment of the Plan would follow a similar procedure to that described in 1.6.2.4 adjusted to each town's project review procedures.

1.6.4. Severability

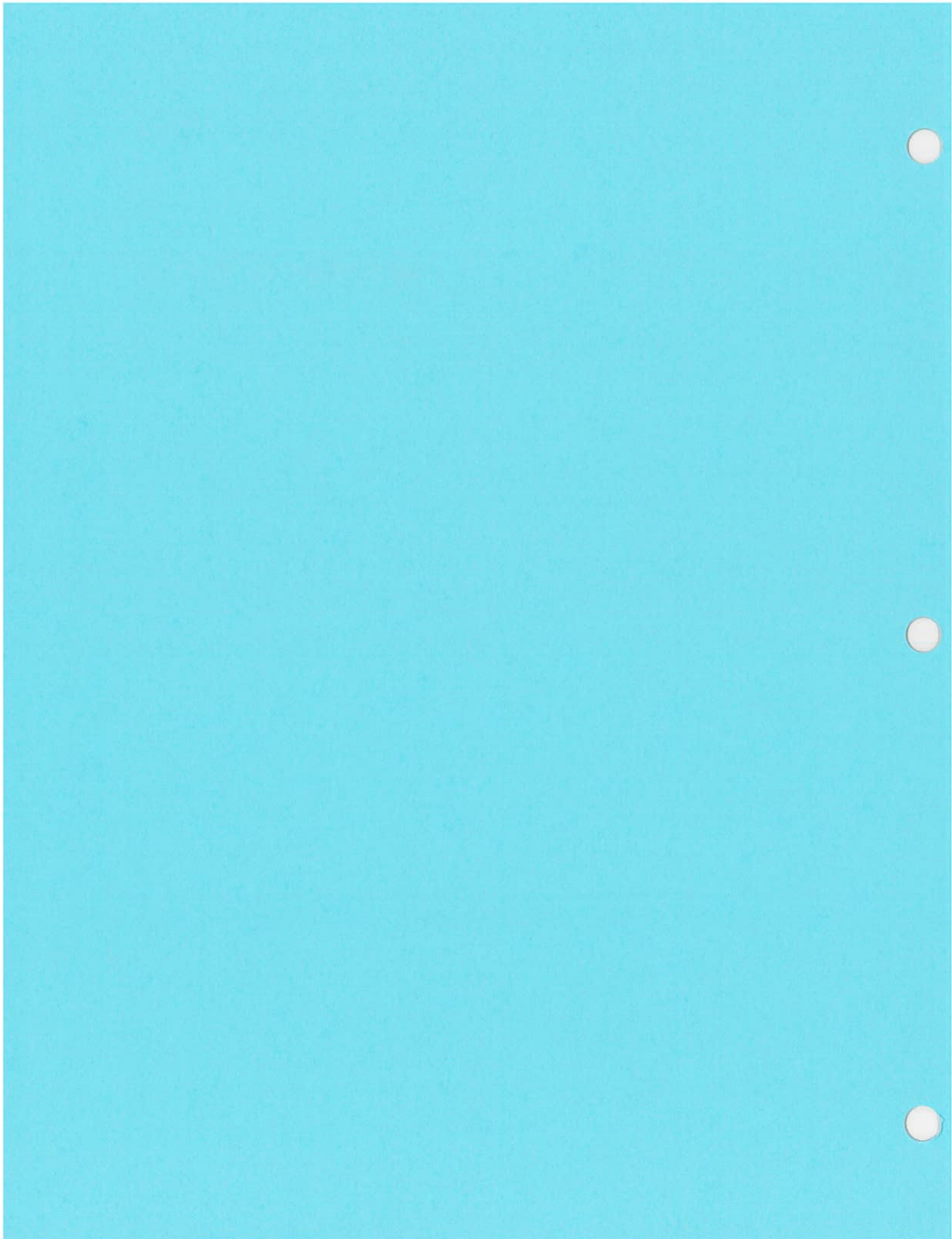
In the event that any word, phrase, clause, sentence, paragraph, section, or part in or of this Comprehensive Plan for Water and Sewerage, or the application thereof to any person or circumstances, is judicially determined to be invalid, then the remaining provisions and the application of such provisions to other persons or circumstances shall not be affected. The remaining provisions of the Comprehensive Plan without the word, phrase, clause, sentence, paragraph, section or part in or of the Comprehensive Plan, or the application thereof, declared invalid, would have been adopted and approved.

**TABLE 1-1
 KENT COUNTY
 WATER & SEWERAGE FACILITIES
 TABLE OF ORGANIZATION**



CHAPTER 2

Background and Planning



2. Background and Planning

2.1. Physical

Kent County is located on the northern portion of the Delmarva Peninsula on the eastern side of the Chesapeake Bay, across the Bay from Baltimore. The County is bordered on the north by the Sassafras River, which separates it from Cecil County. The western border is formed by the Chesapeake Bay. The Chester River defines the southern boundary separating the County from Queen Anne's County. The State of Delaware forms the eastern boundary. Thematic maps showing the topography, watersheds, soils, land use and zoning are shown in Figures 2-1 to 2-5. The information in Section 2.1.4 is primarily obtained from the Soil Survey of Kent County conducted by the US Department of Agriculture.

2.1.1. Climate

The climate in Kent County is typical of other water adjacent communities in the Mid Atlantic. The average daily temperature in winter is 35 degrees F, and the average daily temperature in the summer is 75 degrees. The total average precipitation is 44 inches, of this 23 inches or 50 percent falls April through September. The average seasonal snowfall is 17 inches. The average humidity during mid afternoon is 50 percent and 80 percent at dawn.

2.1.2. Topography

The highest relief in Kent County is approximately 100 feet above sea level at Still Pond Neck, the lowest sections are the tidal marshes which are at or just above sea level. The average elevation is between 50 and 70 feet. The southern and western parts of the county have lower topography that ranges from 15 to 50 feet (see Figure 2-1 for more detail).

2.1.3. Watersheds

The county has 268 miles of tidal shoreline and numerous streams and ponds. Kent County consists of 6 watersheds, as defined by the MDE 6-digit code which are tributaries to the Chesapeake Bay. These watersheds are the Sassafras River, Upper, Middle and Lower Chester River, Still Pond-Fairlee and Langford Watersheds. The county is bordered on its western side by the Chesapeake Bay. Figure 2-2 shows the location of the watersheds. See Chapter 5 for more information.

2.1.4. Soils

Kent County is entirely within the Atlantic Coastal Plain in three physiographic regions. These regions, ranging from youngest to oldest, are: (1) alluvial deposits on flood plains and tidal marshes; (2) Talbot plain, which is at just above sea level to about 45 feet above sea level; and (3) the Wicomico plain, which is at an elevation of 45 to more than 100 feet above sea level. The drainage of Kent County is generally good. Most of the drainage is directly into streams by overland flow. Some water moves to streams more slowly by underground flow. Underground drainage is through the coarse textured sediments, which underlie most of the soils of the county. A few areas of the county however have little or no surface drainage and slow subsurface drainage. The largest of these areas are near Golts, west of Massey along U.S. Route 301, and in the areas between Tolchester and McCleans Corner. The County also contains scattered local depressions and pot holes, called "Delmarva Bays," that lack drainage outlets and where all drainage is provided by underground flow. These are the most common in eastern part but are scattered throughout the county.

A map of the soils in Kent County can be seen in Figure 2-3. The soils in Kent County include but are not limited to:

- Matapeake-Sassafras association – Nearly level to strongly sloping, well drained soils formed in silty and loamy materials.
- Mattapex-Matapeake-Butlertown association – Dominantly nearly level to moderately sloping, moderately well drained and well drained soils formed in silty materials.
- Sassafras-Galestown-Fort Mott association – Nearly level to steep, well drained and somewhat excessively drained soils formed in sandy and loamy materials.
- Sassafras-Bibb-Colts Neck association – Nearly level to steep, well drained and somewhat excessively drained soils formed in sandy and loamy materials.
- Woodstown-Fallingston-Sassafras association – Nearly level to strongly sloping, poorly drained to well drained soils formed by in loamy materials.
- Mattapex-Othello association – Nearly level to moderately sloping, moderately well drained and poorly drained soils formed in silty materials.
- Elkton-Keyport-Mattapex Variant association – Dominantly nearly level to moderately sloping, moderately well drained and poorly drained soils formed in clayey and silty materials.
- Westbrook-Kingsland-Ipswich association – Level, very poorly drained marsh soils formed in organic and mineral materials.

2.1.5. Land Use

Agriculture is the primary land use in Kent County; 65 percent of the land is in agriculture, and forests and wetlands account for 26 percent (MDP Land Use, 2010). There are concentrations of developed residential lands in and around the towns of Chestertown and Rock Hall and other municipalities. A map of the land use in Kent County can be seen in Figure 2-4.

2.1.6. Zoning

The zoning map can be seen in Figure 2-5. Refer to the Kent County Comprehensive Plan for more detailed zoning information.

2.1.7. Aquifers

Groundwater is the sole source for domestic water supply in the County and there have not been any reported water supply problems. These layers dip to the southeast and thus are generally deeper in the eastern part of the County and shallower in the northwestern portion.

Water-bearing sands are in the Raritan-Patapsco Formation. The top of the formation is just about at sea level in the northwestern part of the County, 350 feet below sea level near Chestertown, and 700 feet below sea level near Millington. The low pH and iron in the water, however, caps the use of this aquifer. The Magothy Formation, another extensive water-bearing formation, is near sea level in the northwest,

250 feet below sea level at Chestertown, and 500 feet below sea level at Millington. Its water is also acidic in places and has a high iron content.

The Aquia Greensand is a major aquifer on the Eastern Shore of Maryland. The water is generally of good quality and in many localities is usable with little or no treatment. However, local treatment for iron removal is sometimes necessary. In recent years this aquifer has become a source of water for supplemental irrigation on the Eastern Shore. Yields range up to 1,300 gpm. The recharge area runs from Rock Hall to Galena and is covered by younger sediments. At Chestertown the top of the Aquia is approximately at sea level.

The Pliocene and Pleistocene Deposits in the County contain water that sometimes need iron removal and deacidification. The range in depth of these deposits is from 50 feet below sea level to 50 feet above sea level.

2.2. Population

There are two major concentrations of population in Kent County, the Towns of Rock Hall and Chestertown. The Town of Rock Hall represents approximately 6 percent of the total county population whereas the Town of Chestertown represents over 26 percent of the total. Table 2-1 Shows the population history of Kent County over the past 50 years and future population projections by MDP. The 2010 Census reported that the population in the County was 20,197 and the MDP population projection for 2030 is 22,600 and 2040 is 23,490 which is the furthest projection currently made by MDP. Using an estimated current 2018 population of 21,080 the net increase in population based on trends over the next 30 years to a 2048 population of 24,194 is 3,114 persons or 1,246 Equivalent dwelling units (EDU's).

2.3. Planning

2.3.1. Water Resources Element Overview

The 2018 Water and Sewer Plan Update complies with the regulations set forth by the Maryland Department of the Environment (MDE) as outlined in Title 26 subtitle 03 Chapter 01 Planning Water Supply and Sewerage Systems. This Water and Sewer Plan update will also supply the information necessary to comply with the *Land Use Article of the Annotated Code of Maryland* §1-410 which specifies that County Comprehensive Plans must contain a Water Resources Element (WRE) linking planning and growth decisions to scientific resource management and be consistent with the Kent County Comprehensive Plan.

The five incorporated towns in Kent County all offer public water and sewer service to residents and businesses within their boundaries and, in most cases, to residents in limited, designated areas outside their corporate limits. The Kent County Department of Public Works owns and operates all water and wastewater systems (including transmission and collection infrastructure) in the County's unincorporated service areas and entered into inter-municipal agreements with the Towns of Chestertown, Galena, Millington, and Rock Hall to serve areas in the County with failing septic systems.

Each of the five municipalities in the County incorporated the initial Water Resources Elements into their comprehensive plans and each municipality updates their respective WRE as they update their comprehensive plans. These plans link future town growth with the capacity of water and sewer resources to serve it. The County and the municipalities recognize the critical need to coordinate their efforts addressing water resources; therefore, this County Water Resources Element provides to the greatest degree possible, the data necessary to link water resources, growth, and land use for the County and for

the towns to comply with the state's water resource planning mandates. Also, policies addressing unincorporated portions of the County are listed in this element, while water resources policies for the incorporated municipalities are set forth in each town's Comprehensive Plan and its own Water Resources Element.

The WRE was developed in response to Enhanced Nutrient Removal (ENR) Strategy for the Chesapeake Bay. The WRE was designed to examine the combined nutrient loading of point and non-point sources and provide guidance for future land use and development decisions. Under the WRE, comprehensive plans must evaluate the capacity of the water and wastewater treatment plants under present conditions and projected 2048 conditions. The water plants will be evaluated based on hydraulic capacity; wastewater treatment plants will be evaluated based on hydraulic capacity and nutrient caps established by the ENR Strategy. The ENR Strategy is the specific WWTP strategy established by the Maryland's Chesapeake Bay Statewide Tributary Strategy Implementation Plan. The nitrogen and phosphorus non-point loadings under current and projected 2020 conditions were also examined and are detailed in Chapter 5.

2.3.2. Water Plant Analysis

The main source of municipal and private water supply in Kent County is groundwater drawn from the Aquia Greensand Aquifer. The water supply analysis is based solely on the yield performance of the wells in the region. Where data is available, demand was compared to capacity. Well tests were performed at four of the water treatment plants: Betterton, Kennedyville, Millington and Worton. Results of the water analysis are shown in Table 2-2. As shown in Table 2-2, these plants have adequate supply to meet their demand. Engineering judgment suggests that the rest of the water treatment plants in Kent County will have adequate supply. The Chestertown water system consists of 6 wells in the Aquia formation and 2 wells in the Magothy formation. MDE required cleanup for two leaking underground storage tanks in the late 1980s; since that time, treatment has been in use for oil recovery and MDE monitors the Chestertown water system annually for VOCs. The water service areas currently have no planned extensions and demand is not expected to increase significantly. Based on a projected 2048 population increase of 1,246 EDU's there is a sufficient number (2,074) of EDU's County wide in available water supply capacity. No water supply problems are anticipated in the 2048 planning horizon.

Decades of increased pumping have caused groundwater levels in parts of the Maryland Coastal Plain to decline. Continued decline could affect the long term sustainability of this resource in Coastal Plain communities and the agricultural industry of the Eastern Shore. Based on a recommendation from the Advisory Committee on the Management and Protection of the State's Water Resources, the Maryland and U.S. Geological Survey in 2007 developed a Science Plan for a Comprehensive Regional Assessment of the Atlantic Coastal Plain Aquifer System. The study area encompasses all of the Maryland and Delaware Coastal Plain as well as portions of Virginia. Information from the Assessment will provide the basis of allocation ground water in the Coastal Plain in the future. Information from this effort will be incorporated in the future Water and Sewer Plan Upgrades as it becomes available.

2.3.3. Wastewater Treatment Plant Analysis

2.3.3.1. Purpose of Wastewater Treatment Plant Analysis

The purpose of the Wastewater Treatment Plant (WWTP) Analysis is to examine the available capacity of each WWTP and evaluate the potential for growth. The available capacity is evaluated based on flows

information necessary to concentrate growth in areas served by WWTPs with available capacity and develop capital programs and allocate funds to WWTPs in need of upgrades.

2.3.3.2. Procedure of Wastewater Treatment Plant Analysis

The first step in the WWTP analysis was to identify the nutrient caps established by MDE. The caps are given in lbs/year and will not increase despite increases in flow; this is defined as the Nutrient Cap for the WWTP. To establish caps, WWTPs are divided into two categories, major and minor WWTPs. Major WWTPs have a design capacity of at least 0.5 MGD and minor WWTPs have a design flow capacity of less the 0.5 MGD. Rock Hall was re-classified as a minor plant on January 30th, 2009 by MDE. The caps for the major WWTPs are based on the design capacity and discharge concentrations of 4 mg/liter of nitrogen and 0.3 mg/liter of phosphorus. The caps for the minor WWTPs are based on the projected 2020 flow and discharge concentrations of 18 mg/liter of nitrogen and 3 mg/liter of phosphorus. If a minor WWTP is expanded, the caps cannot exceed 6,100 lbs/year of nitrogen and 457 lbs/year of phosphorus. In the analysis it was assumed that plants in the process of being upgraded or required to upgrade will be designed to operate at ENR levels of 3 mg/liter of nitrogen and 0.3 mg/liter of phosphorus to try to meet the WIP Goals.

The second step in the analysis was to establish the current discharge loading of nutrients from each WWTP. The loading rates were determined from best available data on flows and discharge concentrations. Flow data was obtained from the 2015- 2017 Discharge Monitoring Reports (DMRs) and information provided by the towns. The DMRs were used to determine the concentrations for the Rock Hall, Tolchester, Worton, Betterton and Kennedyville WWTPs. Chestertown and Galena are assumed to be operating at ENR. Chestertown is considered a major WWTP and its ENR nutrient caps are based on design flow and discharge nitrogen concentrations of 3 mg/liter and 0.3 mg/liter of Phosphorus.

The future discharge loading rates were estimated by predicting the future flow and using the ENR Strategy concentrations for the major WWTPs and best available current concentrations for minor WWTPs. The future flows were determined either from information in the Town's Comprehensive Plans or based on historical growth.

The next step was to evaluate if a capacity surplus or deficit is projected. First, the hydraulic capacity was compared to the hydraulic demand under present and projected future conditions. To conduct the nutrient analysis, the cap was compared to the load under present and projected future conditions. The capacity surplus or deficit was converted to equivalent dwelling units to identify growth potential. The analysis (hydraulic, nitrogen, phosphorus) that allowed for the least amount of growth was identified as the limiting factor.

2.3.3.3. Results of Wastewater Treatment Plant Analysis

The results of The WWTP analysis are shown in Tables 2-3 through 2-5. There is adequate hydraulic capacity for all WWTPs under current conditions, as shown in Table 2-3. Subsequently 250 gpd/ Equivalent Dwelling Unit (EDU) is used to calculate an estimate of available connections. Rock Hall, Galena, Worton, Tolchester, Kennedyville and Betterton have adequate capacity for their projected future growth. Chestertown and Millington are expected to use all of their available hydraulic capacity for infill growth and growth in Designated Municipal Growth Areas.

County population growth to 2048 will result in an additional 1,246 EDU's assuming all new home construction is tied to public sewer

The Town of Millington has capacity to provide infill development in the Town. The Town recently revised their Comprehensive Plan to propose an annexation plan to incorporate the area around the Route 301 interchange to encourage economic development as a result of transportation improvements being constructed by DelDOT and MDOT to provide an alternative transportation route to I-95 (See Figure 4-5). The plan estimates 470,697 gpd of water and sewer capacity would be needed for build out of the annexation areas which would necessitate additional capacity to be constructed.

The Galena and Betterton WWTP's completed expansion and conversion to an ENR facility in 2017 and 2018 to provide for future development in the Towns and an extension of service by the County to the Georgetown area.

Tables 2-4 and 2-5 show the results of the nitrogen and phosphorus analysis. The results show, that under current conditions all plants are meeting their nutrient caps for both nitrogen and phosphorus and have potential room for growth.

Under projected 2048 conditions, all plants are projected to meet nutrient caps. The County benefits from the upgrading of the Chestertown, Worton, Kennedyville, Tolchester, Galena and Betterton plants to achieve BNR or meet ENR treatment levels and meet nutrient caps.

Table 2-6 identifies the limiting factor (Hydraulic, Nitrogen or Phosphorus) associated with each WWTP for future growth beyond their current capacity. Assuming the Chestertown WWTP plant capacity is limited to 900,000 gpd using all existing available hydraulic capacity of 708 EDU's and the net decrease in available EDU's, there would be a County wide total of 2,240 EDU's of projected capacity used for the 2048 conditions.

Table 2-7 provides a County wide Nutrient Loading Summary.

Table 2-1 Population

Census	1950	1960	1970	1980	1990	2000	2010
Kent County, unincorporated areas	8,719	9,845	10,422	10,642	11,160	11,801	12,036
Betterton	314	328	327	356	360	361	345
Chestertown	3,143	3,602	3,476	3,300	4,005	4,665	5,252
Galena	359	299	361	374	324	463	612
Millington	356	334	435	512	409	371	642
Rock Hall	786	1,073	1,125	1,511	1,584	1,536	1,310
Total	13,677	15,481	16,146	16,695	17,842	19,197	20,197
Projections	2015	2018	2020	2025	2030	2035	2040
Kent County	20,600	21,080	21,400	22,100	22,600	23,050	23,490
							2048
							24,194

Projections to 2040 prepared by the Maryland Department of Planning, July 2014

No MDP projection to 2050

30 Year Estimate based on interpolation of data to make a projection.

Table 2-2 Water Supply Evaluation

Water Supply Plant	Permitted Flow (GPD)	Permit No.	Current Demand (GPD)	Year	Available Capacity*
Chestertown	975,000	K.E1970G004-05	709,000*	2015	242,000
		K.E1992G011-02			
Rock Hall	230,000	K.E1971G004	168,000	2017	62,000
Galena	90,000	K.E1971G003-07	45,907	2017	44,093
Betterton	50,000	KE1979G002	30,000	2017	20,000
Millington	137,000	K.E2003G001-01	72,374	2017	52,363
Kennedyville	51,800	K.E1967G008-06	17,000	2017	34,800
Worton-Butlertown	125,000	KE1979G105-03	61,000	2017	64,000
Fairlee	146,000	K.E1979G104-03	43,000	2017	103,000
Total County	1,804,800		437,281		622,256

* Based on Well Production

Equivalent available capacity is 2,074 EDU's @ 300 gpd/EDU.

It is noted that in order to evaluate water supplies (from a water source perspective), well production capacity should be evaluated with the largest source removed from service. If necessary, a separate water source analysis may be included in the next Plan Update.

In accordance with Environment Article 9-507(a)(4), MDE hereby modifies portions of the Kent County 2018 Water and Sewer Plan as shown (highlighted). Plan Modification Effective September 27, 2019

Table 2-3- Hydraulic Capacity

General Information		Existing Conditions			2048 Conditions			
Name of Plant	Design Capacity (gpd)	Flow (gpd)	Year	Surplus/Deficit (gpd)	Available EDU Capacity	Flow (gpd)	Surplus/Deficit (gpd)	Available EDU Capacity
Major Plants								
Chesterdown WWTP ³	900,000	723,000	2013-2015	177,000	708	1,025,000	-125,000	-500
Minor Plants								
Rock Hall WWTP	505,000	255,000	2015-2017	250,000	1,000	307,000	198,000	792
Galena WWTP ⁴	110,000	34,000	2017	76,000	304	101,000	9,000	36
Milington WWTP	140,000	61,500	2017	78,500	314	140,000	0	0
Worton WWTP	250,000	67,000	2015-2017	183,000	732	228,500	21,500	86
Tolchester WWTP	265,000	59,000	2015-2017	206,000	824	83,034	181,966	728
Kennedyville WWTP	60,000	12,000	2015-2017	48,000	192	24,837	35,163	141
Belterton WWTP	146,000	20,000	2015-2017	126,000	504	25,000	121,000	484

708
208
268
314
646
96
51
20

2,311

1 Each Equivalent Dwelling Unit was assumed to discharge 250 gpd.
 2 Documentation of Source Information can be seen in Appendix 2-D.
 3 Existing and 2030 conditions from Town's 2009 Comp plan . Plant has a design capacity of 1,500,000 gpd.
 4 Galena plant ENR expansion completed in 2018 Future conditions include 20,000 gpd from Georgetown County sewer extension.

Table 2-4- Nitrogen Load Capacity

General Conditions		Existing Conditions			2048 Conditions			
Name of Plant	Limit (lb/year)	Load (lb/year)	Year	Surplus/Deficit (lb/year)	Available EDU Capacity	Load (lb/year)	Surplus/Deficit (lb/year)	Available EDU Capacity
Major Plants								
Chester town WWTP ¹	18,273	6,603	2013-2015	11,670	5,112	9,361	8,912	3,904
Minor Plants								
Rock Hill WWTP	15,615	4,902	2015-2017	10,713	1,203	10,934	4,681	526
Galena WWTP	1,339	310	2017	1,029	450	922	417	182
Millington WWTP	3,342	1,142	2017	2,200	474	1,279	2,063	904
Worton WWTP ⁵	3,631	296	2015-2017	3,335	1,511	1,009	2,622	1,188
Tolchester WWTP	5,584	1,401	2015-2017	4,183	705	1,972	3,612	609
Kennedyville WWTP	1,399	132	2015-2017	1,267	463	272	1,127	411
Betterton WWTP	1,224	183	2015-2017	1,041	456	228	996	436

- 1 Limits were established from MDE worksheet, Appendix 2B.
- 2 Conditions assume Chester town is operating at ENR levels. 2030 Chester town flow calculation taken from Town Comp plan.
- 3 EDU analysis is an attempt to quantify the nutrient loading analysis in non technical terms. It is not intended to be a finite planning tool.
- 4 EDU analysis is based on the most current available DMRs, if plant performance changes so will the number of available EDUs.
- 5 Worton uses a spray irrigation Outfall 6 months of the year and 1/2 of the current and future flow will be used in the nutrient calculations

$$AvailableEDUs = \frac{Cap - Load}{C \times 8.34 \times 365 \times 250} \times 1,000,000$$

Table 2-5 - Phosphorus Load Capacity

General Information			Existing Conditions			2048 Conditions			
Name of Plant	Limit (lb/year)	Maximum Limit if Plant Expands (lb/year)	Year	Load (lb/year)	Surplus/Deficit (lb/year)	Available EDU Capacity	Load (lb/year)	Surplus/Deficit (lb/year)	Available EDU Capacity
Major Plants									
Chestertown WWTP ²	1,371	1,371	2013-2015	660	711	3,113	936	435	1,905
Minor Plants WWTP									
Rock Hall WWTP	461	461	2015-2017	279	182	663	280	181	791
Galena WWTP ⁵	101	101	2017	31	70	306	92	9	38
Millington WWTP	457	457	2017	187	270	355	128	329	1,442
Worton WWTP ⁵	457	457	2015-2017	21	436	2,726	73	384	2,403
Tolchester WWTP	931	457	2015-2017	48	883	4,295	68	389	1,892
Kennedyville WWTP	233	233	2015-2017	20	213	499	42	191	447
Betterton WWTP	204	204	2015-2017	18	186	814	23	181	794

- 1 Limits were established from MDE worksheet, Appendix 2B.
- 2 Conditions assume Chestertown is operating at ENR levels. 2030 Chestertown flow calculation taken from Town Comp plan .
- 3 EDU analysis is an attempt to quantify the nutrient loading analysis in non technical terms. It is not intended to be a finite planning tool.
- 4 EDU analysis is based on the most current available DMRs, if plant performance changes so will the number of available EDUs.
- 5 Worton uses a spray irrigation Outfall 6 months of the year and 1/2 of the current and future flow will be used in the nutrient calculations

$$AvailableEDUs = \frac{Cap - Load}{C \times 8.34 \times 365 \times 250} \times 1,000,000$$

Table 2-6 Limiting Factor Based on Equivalent Dwelling Unit (EDUs)

Name of Plant	Existing Conditions			2048 Conditions	
	Available EDUs	Year	Limiting Factor	Available EDUs	Limiting Factor
Major Plants					
Chestertown WWTP ¹	708	2015	Hydraulic	-500	Hydraulic
Minor Plants WWTP					
Rock Hall WWTP	663	2017	Phosphorus	526	Nitrogen
Galena WWTP ⁶	304	2017	Hydraulic	36	Hydraulic
Millington WWTP	314	2017	Hydraulic	0	Hydraulic
Worton WWTP ⁵	732	2017	Hydraulic	86	Hydraulic
Tolchester WWTP	705	2017	Nitrogen	609	Nitrogen
Kennedyville WWTP	192	2017	Hydraulic	141	Hydraulic
Betterton WWTP ^{4,6}	456	2017	Nitrogen	436	Nitrogen

708

137

268

314

646

96

51

20

2,240

1 Existing and 2048 Conditions Assume Chestertown is operating at ENR levels.

2 EDU analysis is an attempt to quantify the nutrient loading analysis in non-technical terms. It is not intended to be a finite planning tool.

3 EDU analysis is based on the most current DMRs, if plant performance changes so will the number of available EDUs.

4 Betterton's ENR upgrade to be completed in 2018.

5 Worton uses a spray irrigation Outfall 6 months of the year and 1/2 of the current and future flow will be used in the nutrient calculations

6 2048 Conditions assume Galena and Betterton are operating at ENR levels.

Table 2-7 Nutrient Loading Summary

	Caps (lbs/year)		Existing Conditions (lbs/year)		2048 Conditions (lbs/year)	
	Nitrogen	Phosphorus	Nitrogen	Phosphorus	Nitrogen	Phosphorus
Major Plants						
Chesterdown WWTP ¹	18,273	1,371	6,603	660	9,361	936
Minor Plants WWTP						
Rock Hall WWTP	15,615	461	9,082	279	10,934	280
Galena WWTP	1,339	101	310	31	922	92
Millington WWTP ⁴	3,342	457	1,142	187	1,279	128
Worton WWTP ³	3,631	457	296	21	1,009	73
Tolchester WWTP	4,827	931	1,401	48	1,972	68
Kennedyville WWTP	1,399	233	132	20	272	42
Betterton WWTP	1,224	204	183	18	228	23
County Wide Cap	49,650	4,215	19,148	1,267	25,976	1,643
County Wide Surplus(+)/Deficit(-)			30,502	2,948	23,674	2,572
County Plant Cap²	9,857	1,621	1,828	90	3,252	184
County Plant Surplus(+)/Deficit(-)			8,029	1,531	6,605	1,437

1 Existing and 2048 Conditions Assume Chesterdown is operating at ENR levels.

2 County Plant Cap includes Worton, Tolchester and Kennedyville.

3 Kent County has upgraded the Worton plant to 250,000 gpd with a spray irrigation outfall, 1/2 flow is used for nutrient loading

4 Does not include proposed annexation plan which would require expansion of plant.

CHAPTER 3

Water



3. Water

3.1. General Information

This chapter inventories municipal, county and shared water treatment and water distribution facilities along with any authorized systems under development. Problem areas are discussed with alternative solutions and recommendations.

In 2008, it was estimated that approximately one half of the Kent County's population depends on individual wells. The remaining population is served by either a municipal, county, private or shared facility.

Most of the larger problem areas occur in subdivisions approved prior to regulations controlling OSDs. Some of these areas are not targeted for growth by the Kent County Comprehensive Plan; and correction of the water problems without promoting growth is a difficult task. Most problem areas in Kent County must be investigated on an area-by-area basis. Resolutions to each of these problems will be derived from a balance of planning, engineering and economics.

3.2. Ground Water Sources and Appropriations

3.2.1. Hydrogeology of Kent County

Kent County obtains approximately 94 percent of its water supply from groundwater sources. In a 1982 report published by the Water Resources Administration, Kent County's groundwater usage was 3.13 MGD versus 0.20 MGD of surface water use. Surface water is used for irrigation and livestock watering only. All water used for domestic consumption is obtained from groundwater sources.

There are no reported groundwater supply problems in Kent County and the groundwater is of good quality but with a high iron content in some areas. There are four aquifers that supply nearly all groundwater in Kent County: the Aquia, Monmouth, Magothy and Raritan-Patapsco Formations. Section 3.2.3 discusses planned aquifer studies.

Many homes are reported to have old, shallow hand dug or driven wells. Most new wells are drilled to depths ranging from 60 feet to over 200 feet. Groundwater potential is substantial, and quality is generally good although water from some aquifers may be hard or high in iron content necessitating iron removal systems for satisfactory domestic use.

USGS groundwater level readings have been taken at 1,760 sites within Kent County. A list of sites with greater than ten readings taken is included in Appendix 3-A.

3.2.2. Source Water Assessments and Wellhead Protection

Source water assessments summarize well information, hydrogeology, delineations, and water quality data. They examine wellhead protection areas (WHPAs), address potential sources of contamination, and analyze susceptibility of the water sources. The following source water assessments have been prepared on groundwater in Kent County:

- a. Source Water Assessment for the Fairlee Water System in Kent County, Maryland (MDE, May 2001)

- b. Source Water Assessment for the Kennedyville Water System in Kent County, Maryland (MDE, July 2001)
- c. Source Water Assessment for the Worton Water Supply in Kent County, Maryland (MDE, July 2001)
- d. Source Water Assessment for the Town of Betterton in Kent County, Maryland (MDE, July 2001)
- e. Source Water Assessment for the Edesville Water System in Kent County, Maryland (MDE, July 2001)
- f. Source Water Assessment for the Town of Chestertown in Kent County, Maryland (MDE, December 2003)
- g. Source Water Assessment for the Town of Galena in Kent County, Maryland (MDE, July 2001)
- h. Source Water Assessment for the Town of Rock Hall in Kent County, Maryland (MDE, February 2000)

Table 3-1. Source Water Assessment Report Data

Wellhead Protection Area	Source from Confined Aquifer?	WHPA determined to be susceptible to contaminants?	Specific Recommendations <i>(see below for general recommendations included in all reports)</i>
Fairlee	yes	no	--
Millington	**	**	**
Kennedyville	yes	no	Raw water bacteriological sampling for Well No.2 should be considered.--
Worton	no* (old shallow wells) / yes (new deeper wells)	old shallow wells: yes – volatile organic compounds* / new deeper wells – not part of 2001 assessment	Ensure that any new development within the WHPA is limited and sewered to protect the ground water against microbiological contaminants, excessive nitrates and chemicals from household wastes.
Betterton	no	yes, Susceptible to land use activities in the wellhead protection area	Continued routine monitoring
Edesville	yes	no	--
Chestertown	No (six wells Nos. 2-7 supply from Aquia aquifer)/ Yes (new deeper well No.1)	Yes Volatile organic compounds, radionuclides, nitrates	Continued monitoring, wellhead protection ordinance and easements.
Galena	yes	no	--
Rock Hall	yes	no	--

* Two (2) deeper wells have replaced four (4) shallower wells on which source water assessment was based. The two (2) new wells are in a confined aquifer. **A water source assessment was also conducted for the Millington area. Details of this assessment will be included in the next Plan update.

Figures of the WHPA delineations from these reports are included in Appendix 3-B.

General recommendations for all the Source Water Assessments include:

- Continue monitoring water quality.
- Institute wellhead protection strategies and monitor land uses in wellhead protection area.
- Work with the County Department of Health to ensure that there are no unused wells within the WHPAs. An improperly abandoned well can be a potential source of contamination to the aquifer.
- Use the State's Model Wellhead Protection Ordinance. (See Appendix 1-C)

Wellhead Protection is a strategy designed to protect public drinking water supplies by managing the land surface around a well where activities may affect the quality of the water. The State of Maryland's wellhead protection program provides technical assistance, information, and funding to local governments, to help them protect their water supplies. The Water Supply Program Source Protection and Administration Division of the MDE have a model ordinance available as a tool for local governments to use to protect local water supplies. Note that the model ordinance was last updated in 2007 and needs to be updated to reference any legislative changes. The State recognizes that due to unique conditions within different local jurisdictions, additional or fewer safeguards may be needed than those proposed in the model.

The Town of Galena has a wellhead protection program, refer to Section 3.5.3. No other jurisdictions in Kent County have wellhead protection programs.

The County Health Department has policies and programs regarding on-site sewage disposal systems (OSDS) and the protection of groundwater where public sewer is not available. It is a Kent County requirement to permit on-site sewage disposal systems for new construction only where an unsaturated soil treatment zone of four (4) feet or greater can be maintained below the drain field. Sand mound treatment systems may be utilized to obtain the four-foot treatment zone.

3.2.3. Aquifer Studies

The USGS and Maryland DNR in cooperation with the Maryland Geological Survey and the Maryland Department of the Environment have developed a Science Plan for a Comprehensive Regional Assessment of the Atlantic Coastal Plain Aquifer System in Maryland (Aquifer Assessment Plan). The Aquifer Assessment Plan addresses the Coastal Plain area which includes most of Southern Maryland, nearly all the Eastern Shore (including all of Kent County), all of Delaware south of Wilmington, and the northeast corner of Virginia.

The Aquifer Assessment Plan will address significant declines in water levels and water-quality problems in parts of the aquifer system that may be exacerbated by increased withdrawals. Unstressed groundwater-flow systems are controlled by the geometry of the aquifer system and the head differences between the recharge zones and the discharge zones. Over time extensive pumping in several of the confined aquifers in southern Maryland has lowered the potentiometric surface (the level to which water would rise in a tightly cased well) to as much as 200 feet below sea level. A potentiometric-surface map, which indicates the extent to which this has occurred, is in Appendix 3-C. The cones of depression extend over relatively large areas where the natural flow directions of the aquifers have been redirected towards these pumping centers. Note Kent County's location at the edge of the Aquia aquifer's depression cone in the map in Appendix 3-C.

The agencies preparing the assessment recognize that it will produce tools and information that can be used by resource managers and planners. When the assessment is completed, Kent County will incorporate applicable parts of the assessment in the Comprehensive Water and Sewerage Plan.

3.2.4. Groundwater Appropriation Permits

Projections for safe groundwater withdrawal in Kent County are based on a hydraulic model used by MDE. Rates and quantity of proposed withdrawal are designed to use the most productive portions of the aquifers and avoid saltwater intrusion. MDE issues groundwater appropriations permits by aquifer with limits on annual average day and maximum monthly withdrawal rates. For this reason, multiple permits may be required at a single production facility depending on the number of aquifers being utilized.

3.2.5 Water Conservation

The County Code of Public Laws Chapters 73.192 are consistent with the current International Building Code (IBC) Standard (current version 2015). IBC plumbing code provides standards for the use of water conservation fixtures in new construction and sale of fixtures. The Code is enforced by the Kent County Department of Planning, Housing and Zoning which issues building permits, coordinates inspections and issues Occupancy permits for new construction and renovations.

3.3. Future Demand Projections

Existing water supply demands reported in this Plan were provided by the operating agency (County or Municipality).

Subsequent Comprehensive Water and Sewerage Plans may reference Water Supply Capacity Management Plans (WSCMPs). WSCMPs review the operational records of water systems for five years to determine:

- Water usage per capita and connection;
- Capacity of water systems considering the most limiting factors during drought;
- An estimation of the potential additional water demand from approved but undeveloped subdivisions and building permits;
- An estimation of the excess water system capacity available for allocation to new growth;
- One process to track and control the allocation of new connections to the water supply system.

The 15-page Worksheets and Summary, that may be used to develop WSCMPs for any water supply system, are included in Appendix 3-D of this Water and Sewerage Plan. Refer to MDE's Guidance Document on WSCMPs to complete these worksheets for a water supply system.

Kent County uses a system to track and account for the potential water demand generated by the approval of record plats and building permits. This tracking system is not as detailed as the one outlined in the WSCMP Guidance.

Future demand projections for a water supply system in Kent County calculated by any means would be included in Appendix 3-E of this Water and Sewerage Plan. Existing water usage will need to be estimated from existing well data and records and established from the USGS, Maryland Geological Survey, MDE and DNR. Findings shall be incorporated into this Plan.

The 2018 Water and Sewerage Plan includes future Countywide demand projections for 2048, based on projected population for 2048. The 2048 projections are included in Chapter 2 of this Water and

Sewerage Plan, which discusses planning in relation to the Water Resources Element. These projections shall be refined as more comprehensive methods to estimate future demand for each water supply system are employed.

3.4. Drinking Water Standards

3.4.1. Water Quality Monitoring

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

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

Monitoring and testing the public water supply is a continual effort for Kent County. The EPA in conjunction with state and local agencies and institutions continually evaluate the primary drinking water standards to promote human health and safety. The EPA issues new water quality rules periodically, requiring the County's monitoring and testing efforts to continually evolve. The EPA's National Primary and Secondary Drinking Water Standards can be found at <http://www.epa.gov/safewater/contaminants/>

3.5. Water Supply Systems

The following pages describe the various water systems in Kent County.

Where municipal water supply systems provide water to service areas owned and operated by the Kent County Department of Public Works, intermunicipal agreements between towns and the Kent County exist for the supply of water to the Kent County service area. Intermunicipal agreements are included in Appendix 1-E of this document.

The table below lists Kent County's water treatment plants.

Table 3-2. Kent County Water Treatment Plants

Water Treatment Plant	Average Daily Flow (gpd)		Average Daily Flow (MGD)	
	Permitted	Current Demand	Permitted	Current Demand
Chestertown	975,000	709,000	0.975	0.709
Rock Hall	230,000	168,000	0.230	0.168
Galena	90,000	45,907	0.090	0.046
Betterton	50,000	30,000	0.050	0.030
Millington	137,000	72,374	0.137	0.072
Kennedyville	51,800	17,000	0.052	0.017
Worton-Butlertown	125,000	61,000	0.125	0.061
Fairlee	146,000	43,000	0.146	0.043

3.5.1. Chestertown

The incorporated Town of Chestertown owns and operates a water supply system. The Chestertown Water Treatment Plant serves Chestertown within the town limits and an area outside of the town limits on MD. Route. 291. A map of the service areas is included at the end of this chapter.

Table 3.5.1 in Appendix 3-F describes the water system supply sources, service area, flows, storage, treatment and distribution system. The water system is permitted for an average daily flow of 975,000 gpd and a maximum daily average of 1,300,000 gpd during the month of highest use. Average daily flow and maximum daily average flow during the month of highest use for 2015 were 713,000 gpd and 1,100,000 gpd, respectively. The Chestertown water service area includes approximately 2,100 connections (EDUs).

System History and Upgrades:

The town upgraded its water supply system with a second, deep water well in the Magothy formation, a second treatment facility with green sand filters, a cover for the storage reservoir and an additional covered reservoir.

In 2016, the Town of Chestertown annexed 79.67 acres of vacant land to the northeast of Chestertown located along Washington Avenue and Scheeler Road. Lands identified on Tax Map 37 to include Parcels 10, 486, 172 (Lot 1), and 20, as well as a 1.02-acre unidentified parcel/right of way are included in the planned Town service area.

In 1999, the town replaced the water system aerators.

In 1997, the town revised the Town Charter to its original language prohibiting out of town water extensions without annexation.

The Annual Drinking Water Quality Report for 2016 is included in Appendix 3-G.

3.5.2. Rock Hall

The incorporated Town of Rock Hall owns and operates a water supply system. The Rock Hall water treatment plant serves the Rock Hall and Gratitude area, and the Edesville and Wesley Chapel Corridor County service areas. A map of the service areas is included at the end of this chapter. The service area has been corrected to include existing service to the Haven Harbor South marina (former Sailing Emporium). There are 8 EDU's associated with this development at this time¹

Table 3.5.2 in Appendix 3-F describes the water supply system sources, service area, flows, storage, treatment and distribution system. The water system is permitted for an average daily flow of 230,000 gpd with a maximum daily average of 300,000 gpd during the month of highest use. The highest average daily flow for 2017 was 168,000 gpd.

The Rock Hall water service area includes 1,183 connections (EDUs).

The Annual Drinking Water Quality Report for 2017 is included in Appendix 3-G.

System History and Upgrades: In 2008, the town extended an 8-inch diameter water main to provide service to the County's Edesville area.

1. MDE Text Modification 9/2019

In 2016, the Town of Rock Hall upgraded its water treatment plant. The upgrade included a new clarifier, new generator and a new chemical pumps. In 2017, a replacement well was drilled for Rock Hall.

3.5.2.1. Edesville Water Service Area

The Kent County Department of Public Works owns and operates the Edesville water supply service area, which is supplied water by the Town of Rock Hall water supply system. A map of the service area is included at the end of this chapter.

The Edesville water service area includes 98 connections (EDUs) and approximately 245 persons.

The Annual Drinking Water Quality Report for 2017 is included in Appendix 3-G.

System History and Upgrades:

In 2008, the Edesville service area was connected to the Town of Rock Hall water system via an 8-inch diameter water main. A new 100,000-gallon elevated water storage tank was constructed in the County's Edesville Park to provide increased fire flow in Edesville.

Prior to the connection to Rock Hall, the Edesville water supply was obtained from one well located in the Magothy Formation. Storage was provided by a 30,000-gallon tank. Treatment processes included aeration, iron and manganese removal, by means of chemical addition, flocculation and sedimentation with pre- and post-chlorination. The old Edesville water supply well is currently being used by the Maryland Geologic Survey only as a monitoring and sampling point.

In 2010 an 8" water main and fire hydrants were installed along Lovers Lane to serve 11 lots which were declared to have /had failing septic systems.

3.5.2.2. Wesley Chapel Corridor Water Service Area

The Kent County Department of Public Works owns and operates the Wesley Chapel Corridor service area, which is supplied water by the Town of Rock Hall. A map of the service area is included at the end of this chapter.

The Wesley Chapel Corridor water service area includes 2 connections (EDUs) and approximately 5 persons.

System History and Upgrades: The County reached an agreement with the town to extend the line from its termination point and connect it to the Edesville System. Construction was completed in 2006.

3.5.3. Galena

The incorporated Town of Galena owns and operates a water supply system that serves the town and a small area outside the town limits. A map of the service area is included at the end of this chapter.

Table 3.5.3 in Appendix 3-F describes the water supply system sources, service area, flows, storage, treatment and distribution system. The water system is permitted for an average daily flow of 90,000 gpd with a maximum average daily flow of 120,000 gpd during the month of highest use. Average daily flow

and average daily flow during the month of highest use for 2014 were 45,907 gpd and 51,307 gpd respectively.

Water Appropriation and Use Permit effective date 8/5/2015 and expiration date 7/31/2027. Daily average of use of 90,000 gpd on a yearly basis with a daily average use of 120,000 gpd for the month of maximum use.

The Galena water service area includes 372 connections (EDU).

System History and Upgrades:

In June 2003, new facilities were completed including a new 100,000-gallon elevated storage tank, installation of a 250 gpm well, two well houses, replacement of two thirds of existing water mains and services, and installation of replacement water meters for all users.

The Annual Drinking Water Quality Report for 2017 is included in Appendix 3-G.

3.5.4. Betterton

The incorporated Town of Betterton owns and operates a water supply system that serves the town and residents outside of the town. A map of the service area is included at the end of this chapter.

Table 3.5.4 in Appendix 3-F describes the water supply system sources, service area, flows, storage, treatment and distribution system. The water system is permitted for an average daily flow of 50,000 gpd with a maximum daily average flow of 60,000 gpd during the month of highest use. Average daily flow during 2017 was 30,000.

The Betterton water service area includes 285 connections (330 EDUs).

System History and Upgrades:

The town installed a dry hydrant to provide additional fire flow.

In March 2004, the tower was inspected and found to be in good condition.

In 1992, the storage tank tower (constructed in 1969) was inspected, sand blasted and recoated inside and out.

In 1991, the two 8-inch diameter wells (constructed in 1969) were cleaned, redeveloped and had new submersible pumps installed.

In 1989, all existing water meters were replaced with electronic reading meters.

In 1987, the two 8-inch diameter wells were tested and found to be providing 80 to 90 gallons per minute.

Any new large-scale development may necessitate major upgrading of the system to provide adequate fire protection. The cost of upgrading the system and providing additional storage will be borne by the developer(s).

In 2010, both well pumps were pulled and new submersible pumps, column pipes and wires installed.

In February 2011, the water tower was inspected, and the findings indicated that the town should consider having the tower rehabilitated in the next three years.

In 2011, the town contracted with the engineering firm Davis Bowen and Friedel for an engineering study for upgrades to the Water Treatment Plant due to the age of the plant.

The Annual Drinking Water Quality Report for 2017 is included in Appendix 3-G.

3.5.5. Millington

Maryland Environmental Services (MES) operates a water supply system that serves the Town of Millington and areas outside the town limits. The facilities (plant, wells, distribution system, etc.) within the Millington town limits are owned by the Town of Millington. The distribution system outside the town limits is owned and operated by the Kent County Department of Public Works. A map of the service area is included at the end of this chapter.

The water system is permitted for an average daily flow of 137,000 gpd with a maximum average daily flow of 160,000 gpd during the month of highest use. Average daily flow and maximum average daily flow during the month of highest use for 2017 were 84,637 gpd and 161,423 gpd respectively. Higher usage periodically is experienced due to water main leaks.

Table 3.5.5 in Appendix 3-F describes the water supply system sources, service area, flows, storage, treatment and distribution system. The Annual Drinking Water Quality Report for 2017 for the Millington Water System is included in Appendix 3-G.

The Millington water service area includes 281 connections (EDUs).

System History and Upgrades:

In July 2008, operations were transferred from the Kent County Department of Water and Wastewater Services to MES. The agreement between the Town of Millington and Kent County is included in Appendix 1-E.

Between 2005 and 2006, the Millington water supply system was built. It includes three (3) wells, a treatment plant and distribution system. This was a joint venture between the Town of Millington and the Kent County Department of Water and Wastewater Services. The County took the lead on the project, but the Town of Millington is the Owner of the Water Plant and Town distribution system. The County owns and operates the distribution system outside of the Town limits.

Future Growth Planning

The Town has recently updated its Comprehensive Plan to include an expanded annexation plan to include the area between the Town Corporate limits and the Route 301/MD291 interchange as well as future annexation of property north of Millington Road. The proposed annexation plan is intended to provide for the extension of Town public services including water and sewer service to promote area economic development. This is as a result of transportation improvements being constructed by DelDOT and MDOT to provide an alternative route for I-95 traffic in the Maryland corridor. Improved access to nearby metropolitan markets in the Washington/Baltimore/Philadelphia area is proposed to attract commercial/residential and industrial investment. The estimated impact of the annexation has the potential for 562,607 gpd of water demand and 1,526 dwelling units. The demand associated with the build out of the annexation area will exceed the current capacity of the Town's facilities.

It is anticipated that the Town annex targeted properties when conditions indicate it would be advantageous for developers and the Town enter into an annexation agreement and complete the annexation process. Staged annexations would be consistent with the Town's ability to plan for and implement increases in water capacity.

Figure 3-6 depicts the planned annexation area and Town of Millington water treatment plant service areas. Also shown are the proposed phasing of water priorities to be programmed for the 3 to 5/6-year period and within the 6/7 through 10-year period.

3.5.6 Kennedyville:

The Kent County Department of Public Works owns and operates the Kennedyville water supply system. A map of the service area is included at the end of this chapter. Table 3.5.6 in Appendix 3-F describes the water supply system sources, service area, flows, storage, treatment and distribution system. The water system is permitted for an average daily flow of 51,800 gpd with a maximum daily average flow of 83,000 gpd during the month of highest use. Average daily flow and maximum flow during the month of highest use in 2017 were 17,000 gpd and 105,000 gpd respectively.

The Kennedyville water service area includes 120 connections (EDUs) and approximately 300 persons.

System History and Upgrades:

In January 2005, the developer for the Village of Kennedyville and Kent County agreed to upgrade the existing water treatment plant in two phases. Phase One upgrades the treatment equipment to remove iron and reduce hardness. Phase Two adds an additional 50,000-gallon ground storage tank and other ancillary equipment that will add additional capacity to the system. These upgrades are being funded solely by the developer of The Village of Kennedyville, as part of the developer's agreement. Table 3.5.6 in Appendix 3-F reflects all upgrades. The timeline for these improvements is based on the build out schedule of the development which requires the improvements as a condition for issuance of additional building permits at certain points in the development of building lots.

After all upgrades are on-line, the rated capacity of the system will be 51,750 gpd on average daily basis. The treatment plant will have the ability to upgrade further if necessary in the future. Raw water wells and distribution pumps would need to be upgraded to increase the capacity of the system beyond 51,750 gpd.

The Annual Drinking Water Quality Report for 2017 is included in Appendix 3-G.

3.5.7. Worton/Butlertown

The Kent County Department of Public Works owns and operates the water supply system serving the Worton and Butlertown areas including the Kent County High and Elementary Schools and the industrial zoned area south of the existing service area along the west side of Md. Route 297. A map of the service area is included at the end of this chapter.

Table 3.5.7 in Appendix 3-F describes the water supply system sources, service area, flows, storage, treatment and distribution system. The Annual Drinking Water Quality Report for 2017 for the Worton/Butlertown water subdistrict is included in Appendix 3-G. The water system is permitted for an average daily flow of 125,000 gpd with a maximum daily average flow of 175,000 gpd during the month of highest use. Average daily flow and maximum flow during the month of highest use in 2017 were 61,000 gpd and 158,000 gpd respectively.

The Worton / Butlertown water service area includes 399 connections (EDUs) and approximately 998 persons.

System History and Upgrades:

In the fall of 2004, a new 8-inch well with a capacity of 125,000 gpd, drilled to the Magothy formation, was put on line in addition to the existing well to the Aquia formation.

In 2009, the Worton Water Treatment Plant was upgraded to accommodate projected growth in this service area. A 250,000-gallon elevated water tower was constructed in Butlertown to improve domestic service and provide increased fire suppression capability for existing and future users.

3.5.8. Fairlee/Georgetown

The Kent County Department of Public Works owns and operates the Fairlee/Georgetown water supply system. It serves the Fairlee and Georgetown areas including residences along Caulks Field Road and the Woods Edge Apartments. A map of the service area is included at the end of this chapter.

In 2018, Kent County completed a “Denied Access” water line from the Fairlee service district to serve the Delta Heights area. The private water treatment plant was taken out of service. The Tolchester area is not currently in a Planned Service Area. A Water and Sewer Amendment will be necessary before the Tolchester area can be served by the Fairlee/Georgetown water system.

Table 3.5.8 in Appendix 3-F describes the water supply system sources, service area, flows, storage, treatment and distribution system. The Annual Drinking Water Quality Report for 2017 for the Fairlee/Georgetown water service area is included in Appendix 3-G. The water system is permitted for an average daily flow of 146,000 gpd with a maximum daily average flow of 200,000 gpd during the month of highest use. Average daily flow in 2017 and maximum flow during the month of highest use were 45,000 gpd and 107,000 gpd respectively. Adding Delta Heights increased the average daily flow to 53,500 gpd and the maximum daily flow to 166,000 gpd.

The Fairlee/Georgetown water service area includes 327 connections (EDUs) and approximately 820 persons. The connection of Delta Heights added 30 Equivalent Dwelling Units (75 residents) to the system.

System History and Upgrades:

In 1996, the construction of the new 100,000-gallon elevated storage tank on Georgetown Road was completed.

In the spring of 1994, an extensive upgrade of the treatment facilities was completed.

3.5.9. Delta Heights

Fifth Investments, LLC previously owned and operated a private water supply system that served the Delta Heights Condominium Project (henceforth to be known as Tolchester Village). The Project has 24 dwelling units.

In 2017, The County installed a “Denied Access” water line from the Fairlee/Georgetown water service area to serve Tolchester Village. The private water treatment plant has been taken out of service when the new water line was completed.

To maintain water quality and provide distribution redundancy in the event of a water main break, another water line was designed and constructed to loop the distribution system by adding a section of water line that extends along Bay Shore Road connecting with the water lines at Caulks Field Road and Bay Shore Road. This water line is also a denied access water line.

3.5.10. Great Oak Resort Club

Mears, Inc. owns and operates the water treatment facility that serves the Great Oak Resort Club located at Great Oak Landing Road. The Club includes a restaurant, hotel and marina. The facility withdraws ground water from two wells in the Magothy aquifer used for potable supply, sanitary facilities and boat washing. In 2012, an application was submitted for modification to the ground water appropriation permit to increase useage from an average daily flow of 10,000 gpd with a maximum daily average flow of 30,000 gpd during the month of maximum use to an average daily flow of 25,000 gpd and maximum daily average flow of 75,000 gpd during the month of highest use.

3.5.11. Angelica Nurseries

Angelica Nurseries is a Community Water Supply that provides potable water to a small farm worker housing community.

3.5.12 Community or Non-transient Non-Community Water Systems

These type of water systems are permitted water systems of less than 10,000 gallons per day. A review of MDE records show three systems located in the County. Shore Homes (Delta Heights), Millington Elementary School, and Kent School. The Delta Heights Community system is not served by Public Water from the County Fairlee Water Plant. The Millington Elementary School is now closed. The Kent School is a private school that serves a population of 210. Water is supplied by one well (Permit No. KE-81-1027. There were no current water quality issues at the time of the Assessment by MDE in 2001.

3.5.13 Transient Community Water Systems

These type of water systems are a noncommunity water system that does not regularly serve at least 25 of the same individuals over 6 months per year. Examples of these systems include hotels, restaurants, parks, fire departments and churches. In Kent County a source assessment was conducted by MDE in 2001 for 62 water systems. Table 3-3 and Figure 3.9 from the MDE Source Assessment provide a summary of the well information and relative location for these systems.

3.5.14 Water Impoundment Supplies

There are no water impoundment supply reservoirs in the County.

3.6. Water Problem Areas

Several areas in Kent County have bacterial contamination of the groundwater used for domestic consumption. The primary reason for bacterial contamination of groundwater is surface water intrusion or failing septic systems. This issue is discussed in Chapters 3 and 4 because it is both a water and a sewer problem. Areas vary greatly in size and consist of:

- Villages
- Large subdivisions, consisting of small lots, recorded prior to the adoption of effective sewage regulations.
- Mixtures of cross road settlements and scattered individual homes.

Many of these areas cannot financially support a typical shared system for sewage disposal, which would improve the quality of the surrounding groundwater used for domestic consumption.

These areas include the communities of:

- Allen's Lane
- Spring Cove
- Green Lane
- Sharptown / Piney Neck / Skinner's Neck / Wesley Chapel Corridor
- Lover's Lane / Quaker Neck / Wilkins Lane (near Chestertown)
- Chesapeake Landing
- Still Pond / Coleman
- Golts

3.6.1. Allen's Lane

To address the groundwater contamination problem, in 2007, the Allen's Lane area was connected with sewer service from the Town of Rock Hall. The Allen's Lane sewer service area includes 43 connections (EDUs). No water service in this area is planned at this time.

3.6.2. Spring Cove and Green Lane

To address the groundwater contamination problem, in 1997 the Spring Cove and Green Lane areas were connected with sewer service from the Town of Rock Hall. The Spring Cove and Green Lane sewer service areas include 161 connections (EDUs). No water service in these areas is planned at this time.

3.6.3. Sharptown / Piney Neck / Skinner's Neck / Wesley Chapel Corridor

To address the groundwater contamination problem, in 1996 the Sharptown area along with Piney Neck, Skinner's Neck and Wesley Chapel Corridor (PN/SN/WC) were connected with sewer service from Rock Hall. These sewer service areas include 408 connections (EDUs).

The Kent County Department of Public Works owns and operates the Wesley Chapel Corridor service area, which is supplied water by the Town of Rock Hall. A map of the service area is included at the end of this chapter. The Wesley Chapel Corridor water service area includes 2 connections (EDUs) and approximately 5 persons.

No water service in Sharptown, Piney Neck or Skinner's Neck is planned at this time.

3.6.4 Lover's Lane / Quaker Neck / Wilkins Lane (near Chestertown)

The Lover's Lane / Quaker Neck / Wilkins Lane area (near Chestertown) is an area with groundwater contamination due to failing septic systems. Refer to section 4.7.1 for further information.

3.6.5. Chesapeake Landing

Chesapeake Landing is a large older subdivision with small lots, poor soils and failing septic systems. It contains approximately 210 private residences.

In 2005, the Kent County Department of Public Works proceeded with a study to determine the feasibility of providing water and sewerage to this area. The feasibility study was outlined to assess at least three alternatives: connection to the Tolchester wastewater treatment facility, connection to the Worton/Butlertown wastewater treatment facility and on-site systems. Due to cost the County has no plans to move forward with the project at this time.

3.6.6. Still Pond / Coleman

The Still Pond/Coleman area is a rural village with failing septic systems. It contains 184 parcels, 142 are developed.

The Kent County Department of Public Works has discussed a feasibility study for sewer service for the Still Pond/Coleman area. Possible alternatives for consideration are connection to the Town of Betterton WWTP or construction of a new wastewater treatment facility that would serve Still Pond/Coleman and the Town of Betterton with spray irrigation of the treated effluent. At this time, no plans are being considered to perform this study.

To address groundwater contamination, in 2007, Kent County submitted the Still/Pond Coleman area to MDE for placement on the state wastewater needs survey.

3.6.7. Golts

The Golts area is a village with groundwater contamination caused by failing septic systems. It contains 95 parcels, 41 are developed. There is no water or sewer service planned for the Golts area at this time.

3.6.8. Fox Hole, Shorewood Estates, Gregg Neck, Georgetown and Kentmore Park

There is presently no interest or request for evaluation of the Fox Hole, Shorewood Estates, Gregg Neck and Kentmore Park communities for water or sewer service.

The Georgetown area is presently under construction to provide sewer service.

3.6.9 Priority Projects

There are currently no priority projects for extension of public water service in Kent County for the immediate, 5 year or 10 year period.

TABLE 3.3

Transient Noncommunity Systems

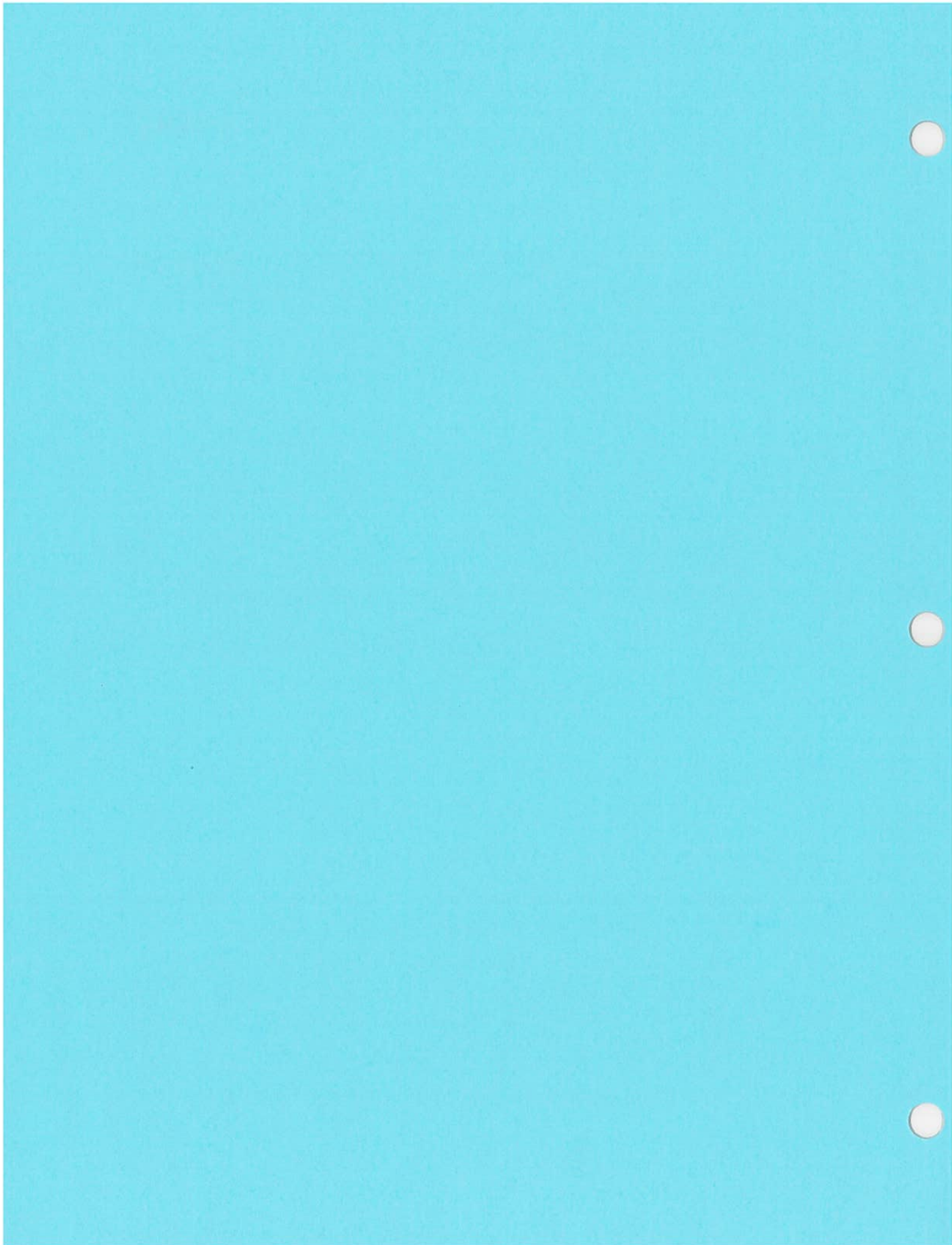
PWSID	System Name	Source #	Plant #	Use Code	Source Name	Ground Water Appropriation	Aquifer Code	Aquifer Type	Well Tag #	Casing Depth	Well Depth
1141082	ALEXANDER SPORTING FARMS	1	1	P	WELL	KE1997G001	211D	C	KE940048	132	152
1141058	AMERICAN LEGION POST #36	1	1	P	WELL		9999	U			
1141096	ASBURY METHODIST CHURCH	1	1	P	WELL	KE1979G003	125B	U	KE730914	87	125
1141014	BAY COUNTRY CAMPGROUND	1	1	P	WELL		125B	U	KE940075	140	160
1141092	BRAMPTON BED & BREAKFAST	1	1	P	WELL	KE1995G007	211D	C	KE920056	135	150
1141005	CARRIAGE COUNTRY CLUB	1	1	P	WELL	KE1974G009	125B	U	KE730228	67	130
1141037	CAULKS FIELD ONE STOP	1	1	P	WELL	KE1980G003	125B	U	KE731009	86	96
1141093	CHESAPEAKE FARMS	1	1	P	WELL		211D	C	KE940243	95	125
1141007	CHESTER RIVER YACHT CLUB	1	1	P	WELL	KE1955G002	125B	U	KE880418	72	87
1141087	CRESTVIEW SQUARE	1	1	P	WELL		9999	U			
1141084	DAVIS TEXACO INC	1	1	P	WELL	KE1987G006	125B	U	KE811457	90	100
1141010	DRAYTON MANOR RETREAT CENTER	1	1	P	WELL		211D	U	KE730732	97	118
1141081	DUPONT FISH & GAME	1	1	P	WELL	KE1993G003	125B	U	KE940077	129	139
1141011	DUTCH FAMILY DELI	1	1	P	WELL	KE1901G004	125B	U	KE810299	77	85
1141080	EASTERN NECK REFUGE	1	1	P	WELL	KE1978G102	217C	C	KE880321	574	630
1141089	EASTERN SHORE BIBLE CHURCH	1	1	P	WELL	KE1996G001	125B	U	KE920217	100	120
1141012	ECHO HILL CAMP	1	1	P	WELL	KE1993G004	211D	U	KE880561	57	72
1141091	ELK LODGE 2474	1	1	P	WELL	KE1973G004	125B	U	KE730101	123	136
1141097	FAITH UNITY FELLOWSHIP	1	1	P	WELL		9999	U			
1141088	FARMERS NATIONAL BANK	1	1	P	WELL		9999	U			
1141020	GEORGETOWN YACHT BASIN	1	1	P	WELL	KE1986G003	217C	C	KE810501	424	457
1141098	GRAVES CHAPEL JAME	1	1	P	WELL	KE1991G001	125B	U	KE880139	112	120
1141025	GREAT OAK LANDING	1	1	P	WELL 1	KE1974G003	211D	U			60
1141025	GREAT OAK LANDING	2	1	P	WELL 2	KE1974G003	211D	U			
1141024	GREAT OAK MANOR	1	1	P	WELL		211D	U			60
1141026	GREEN POINT MARINA INC.	1	1	P	WELL	KE1986G002	211D	U	KE810481	75	82
1141018	GREGG NECK BOAT YARD	1	1	P	WELL		125B	U	KE810690	67	72
1141099	HAWKEYES	1	1	P	WELL		125B	U			
1141083	HOPKINS GAME FARM	1	1	P	WELL	KE1998G003	211D	C	KE880762	118	158
1141002	HOWARD JOHNSONS	1	1	P	WELL	KE1959G001	125B	U			
1141029	INN AT MITCHELL HOUSE	1	1	P	WELL		211D	C	KE811166	43	50
1141085	JOES SHELL STATION	1	1	P	WELL	KE1960G001	125B	U			
1141031	KENT AGRICULTURE CENTER	1	1	P	WELL		9999	U			
1141071	KITTY KNIGHT HOUSE	1	1	P	WELL		211D	C	KE731132	96	103
1141033	LANGFORD BAY MARINA STORE	1	1	P	WELL	KE1971G005	125B	U	KE710083	70	80

TABLE 3.3 cont.
 Transient Noncommunity Systems

PWSID	System Name	Source #	Plant #	Use Code	Source Name	Ground Water Appropriation	Aquifer Code	Aquifer Type	Well Tag #	Casing Depth	Well Depth
1141034	LONG COVE MARINA	1	1	P	WELL		125B	U	KE810018	107	123
1141077	MILLINGTON FIRE DEPARTMENT	1	1	P	WELL	KE1975G003	125B	U			
1141038	MILLINGTON FOOD RITE	1	1	P	WELL	KE1957G602	125B	U			
1141061	MILLINGTON PIZZA	1	1	P	WELL	KE1989G001	125B	U	KE811190	140	150
1141068	MILLINGTON POOL	1	1	P	WELL		125B	U	KE700025	85	130
1141086	PEOPLES BANK OF MILLINGTON	1	1	P	WELL	KE1978G005	125B	U			
1141041	POMONA GENERAL STORE	1	1	P	WELL		211D	C	KE811322	130	140
1141095	PRESBYTERIAN CHURCH OF CHESTERTOWN	1	1	P	WELL	KE1990G001	211D	C	KE880354	115	130
1141073	RAUM CHAPEL CHURCH	1	1	P	WELL		211D	C	KE940026	87	101
1141009	RIVER CRABS	1	1	P	WELL	KE1974G002	125B	U	KE880573	25	40
1141055	ROBBINS DELI	1	1	P	WELL		9999	U			
1141045	ROCK HALL YACHT CLUB	1	1	P	WELL	KE1982G005	125B	U	KE731189	55	65
1141090	SHREWSBURY CHURCH	1	1	P	WELL	KE1998G008	211D	C	KE940391	85	100
1141070	ST JAMES CHURCH	1	1	P	WELL		211D	C	KE810854	165	175
1141069	ST PAULS CHURCH	1	1	P	WELL	KE1995G016	211D	C	KE920155	370	163
1141072	STARKEY FARM TRACTORS	1	1	P	WELL	KE1985G002	211D	U	KE810225	98	110
1141040	STILL POND MARKET	1	1	P	WELL	KE1987G024	211D	C	KE810865	70	80
1141048	SUDS & SODA	1	1	P	WELL	KE1983G005	211D	C	KE810144	112	122
1141027	THE WATER HOLE	1	1	P	WELL		9999	U			
1141094	THE WHARF AT HANDY POINT	1	1	P	WELL	KE1988G002	211D	U	KE810868	165	175
1141050	TOLCHESTER MARINA INC.	2	1	P	WELL	KE1971G007	110C	U	KE710091	37	42
1141050	TOLCHESTER MARINA INC.	1	1	P	WELL	KE1971G007	110C	U	KE730151	25	32
1141079	TOYS OUTDOOR STORE	1	1	P	WELL		9999	U			
1141063	VFW POST #652	1	1	P	WELL	KE1987G027	125B	U	KE811337	200	220
1141054	VONNIES MOTEL	1	1	P	WELL	KE1993G009	211D	C	KE880599	70	80
1141053	VONNIES RESTAURANT	1	1	P	WELL	KE1997G002	211D	C	KE940051	175	195
1141078	WILLARDS DELMARVA AGRI SERVICE INC	1	1	P	WELL 1	KE1958G003	211D	C			300
1141056	WORTON CREEK MARINA INC	1	1	P	WELL	KE1949G003	211D	U	KE811282	48	58
1141057	YMCA CAMP TOCKWOGH	1	1	P	WELL 1	KE1967G001	211D	U	KE810341	86	94
1141057	YMCA CAMP TOCKWOGH	2	1	P	WELL 2	KE1967G001	211D	U	KE811015	96	114
1141057	YMCA CAMP TOCKWOGH	3	1	P	WELL 3	KE1967G001	211D	U	KE811197	90	100

CHAPTER 4

Sewerage



4. Sewerage

4.1. General Information

This chapter inventories existing shared wastewater treatment facilities and shared facilities along with any authorized systems under development. Problem areas are discussed with alternative solutions and recommendations.

In 2008, it was estimated that approximately one half of the Kent County's population depends on on-site disposal systems (OSDSs). It is estimated that there are approximately 4,850 OSDSs within Kent County. The remaining population is served by either a municipal, county or private shared facility.

Most of the larger problem areas occur in subdivisions approved prior to regulations controlling OSDSs. Some of these areas are not targeted for growth by the Kent County Comprehensive Plan; and correction of the sewerage problems without promoting growth is a difficult task. Older settlements, not involving hundreds of undeveloped lots of record, present a different challenge as there are not a sufficient number of users to bear the cost of sewerage correction. Most problem areas in the County must be investigated on an area-by-area basis. Resolutions to each of these problems will be derived from a balance of planning, engineering and economics.

4.2. Point Source Strategy

Maryland's Point Source Strategy for the Chesapeake Bay is based on a two-part plan to:

- (1) Upgrade Maryland's wastewater treatment plants to state-of-the-art Enhanced Nutrient Removal (ENR) technology to meet concentrations of 4.0 mg/l or less total nitrogen and 0.3 mg/l or less total phosphorus, and;
- (2) Maintain nutrient loading caps as follows:
 - a. Major wastewater treatment plants are those with design capacity of 500,000 gpd or greater. These plants will be required to achieve ENR, and meet established nutrient loading limits based on ENR, as soon as possible.
 - b. Minor wastewater treatment plants are those with design capacity of less than 500,000 gpd. Annual nutrient loads are based on flows established by the MDE and concentration of 18 mg/l total nitrogen and 3 mg/l total phosphorus. Expanding minor facilities cannot exceed 6,100 lbs/year in nitrogen and 457 lbs/year in phosphorus.
 - c. Significant industrial wastewater treatment plants are those with a minimum total nitrogen discharge of 75 pounds per day or a minimum total phosphorus discharge of 10 pounds per day, which are equivalent to loading limits for significant municipal wastewater treatment plants.

The Point Source Strategy summarized above compelled a reorganization of Kent County's 2009 Water and Sewerage Plan. Sewerage service areas are ordered based on the wastewater treatment plant to which they flow rather than the 2005 Plan's organization based on municipal, county or private system. Information relating to the Point Source Strategy is included for each wastewater treatment plant: discharge water body, designations and protected uses of discharge water body, watershed, nutrient limits, permits and connected sewer service areas.

Chapter 4 of the Water and Sewerage Plan shall serve as an inventory of wastewater systems for planning. Details of the Point Source Analysis are included in Chapters 2 and 5 of this Plan because they are required for the Water Resources Element (WRE), but not required as part of the triennial update of the Water and Sewerage Plan. All elements included in Chapter 4 shall be updated on a triennial basis and amended as required.

4.3. Future Demand Projections

Existing sewerage demands reported in this Plan were provided by the operating agency (County or municipality), based on records as of January 2018 or as otherwise noted based on available information.

Subsequent Comprehensive Water and Sewerage Plans may reference Wastewater Capacity Management Plans (WWCMPs). These plans will be prepared as part of the development of the basis of design for future infrastructure capital projects and will be used as the basis for amendments to this plan. WWCMPs review the operational records of wastewater systems for three years to determine:

- Sewerage demand per capita and connection;
- Capacity of the wastewater system taking limiting factors into account;
- An estimation of extraneous flow or inflow and infiltration (I&I) should be calculated by comparing flows during drought periods and wettest years on record;
- An estimation of the potential additional wastewater demand from approved but undeveloped subdivisions and building permits;
- An estimation of the excess wastewater system capacity available for allocation to new growth;
- One process to track and control the allocation of new connections to the sewerage system.

The 7-page Worksheets and Capacity Forms with reference tables, that may be used to develop WWCMPs for any wastewater system, are included in Appendix 4-A of this Water and Sewerage Plan. Refer to MDE's Guidance Document on WWCMPs to complete these worksheets for a wastewater system.

Kent County uses Sewage Flow Capacity Reports to track existing demand and account for potential demand generated by the approval of record plats and building permits. This tracking system may be compared to the one outlined in the WWCMP Guidance.

Future demand projections for a wastewater system in Kent County where the current flow is greater than 75% of capacity as calculated by any means are included in Appendix 4-B of this Water and Sewerage Plan. Chestertown is currently the only WWTP in this condition at 80% of capacity.

The 2018 Water and Sewerage Plan includes future demand projections for 2048 based on either information from Municipal Comprehensive Plans or population projections. The 2048 projections are included in Chapter 2 of this Water and Sewerage Plan, which discusses Planning in relation to the Water Resources Element. These projections shall be refined as more comprehensive methods to estimate future demand for each wastewater system are employed.

Wastewater flow estimates are based on 100 gallons per capita per day and 2.5 persons per equivalent dwelling unit. This is conservative in that the average household size in the County is 2.29 persons per the 2010 Census. The Maryland Department of Planning projects the average household size for future growth to be 2.1 persons.

Based on Population estimates, the population growth from 2018 (21,080) to 2048 (24,194) will result in an additional 1,246 residential EDU's in the County.

4.4. Sludge Disposal and Septage Management

4.4.1. Sludge Disposal

Sewage sludge is one of the final products of the treatment of sewage at wastewater treatment plants. The U.S. Environmental Protection Agency has long promoted the beneficial use of sewage sludge. MDE, which governs the application of sewage sludge, reports that approximately 50 percent of the sewage sludge in Maryland is applied to agricultural land for beneficial use.

MDE regulations address the local notice for Sewage Sludge Utilization Permits. When MDE receives an application for permit to use sewage sludge at a site, the department is responsible for mailing a copy of the permit application to the legislative body and any elected executive of a county and to the elected executive of any municipal corporation where the sewage sludge utilization site is to be located as well as to the legislative body and elected executive of any other county within 1 mile of the sewage sludge utilization site.

Where the permit is for the application of sewage sludge on marginal land or to construct a permanent facility designed primarily to utilize sewage sludge, MDE has additional local notification of officials as well as publication of notice in a local newspaper. The executive or legislative body of the county or the legislative body of the municipal corporation may request that MDE hold a public hearing. Marginal land means land where the soil characteristics do not support normal vegetative growth over time. Marginal land includes, but is not limited to, land abandoned from mineral extraction, strip mine areas, areas where topsoil has been removed, fill areas with poor soil characteristics, and completed landfills with poor topsoil.

Where the permit is for the application of sewage sludge on land other than marginal land, MDE has specific local notification requirements for local officials. The executive or legislative body of the county or the legislative body of the municipal corporation may request that MDE conduct a public information meeting.

The land application of sewerage sludge in Kent County requires the granting of a special exception by the Kent County Board of Appeals on land in the Agricultural Zoning District. The Towns of Betterton, Millington, and Rock Hall in addition to the facilities operated by the Kent County Department of Public Works require sludge removal and disposal.

MDE is required to provide each county and municipal corporation that receives a copy of any sludge utilization permit with an opportunity to consult with the Department about the decision to issue, deny, or place restrictions on such permit.

Current Disposal of Sludge is managed through private contractors as follows:

- Chestertown - (No information provided)
- Rock Hall – Managed by Old Line Environmental, Inc.
- Galena – Self-managed and hauled to Tri-County Landfill
- Betterton – Self-managed and hauled to Tri-County Landfill
- Millington – Managed by Waste Management
- Kennedyville – Self-managed and hauled to Tri-County Landfill

- Worton / Butlertown – Self-managed and hauled to Tri-County Landfill
- Tolchester – Self-managed and hauled to Tri-County Landfill

4.4.2. Septage Management

The Kent County Commissioners implemented regulations for septage disposal. All septage, including marine pump-out wastes, generated in Kent County is disposed of at the Worton/Butlertown Wastewater Treatment Facility. In 1998, the County upgraded the septage receiving cell at the treatment facility. Improvements included the installation of mechanical aeration, grit removal, and electronically-controlled access. In 2010, with the completion of the wastewater plant upgrade at Worton, septage is diverted away from the lagoon and into the plant digesters for treatment. Haulers are charged an annual permit fee and a per gallon disposal fee.

4.5. Sewerage Systems

The following pages describe the various sewerage systems in Kent County.

Where municipal sewerage systems provide wastewater treatment for sewer service areas owned and operated by the Kent County Department of Public Works , intermunicipal agreements between Towns and the County exist for the treatment of wastewater from the County service areas. Intermunicipal agreements are included in Appendix 1-E of this document.

The table below lists Kent County’s wastewater treatment plants.

Table 4-1. Kent County Wastewater Treatment Plants

Wastewater Treatment Plant	Average Daily Flow (gpd)	
	Permitted	Actual
Chestertown	900,000	723,000
Rock Hall	480,000	242,000
Galena	110,000	38,000
Betterton	146,000	20,000
Millington	105,000	70,000
Kennedyville	60,000	12,000
Worton-Butlertown	250,000	67,000 ⁱ
Tolchester	265,000	59,000

i. Half of this flow is used in nutrient load calculations based on spray irrigation used half of each calendar year.

4.5.1. Chestertown

The incorporated Town of Chestertown owns and operates a wastewater treatment facility. The Chestertown Wastewater Treatment Plant serves Chestertown, areas outside town limits along Md. Routes 291 and 289, and the Quaker Neck service area. Areas outside the town limits and the Quaker Neck service area are owned and operated by the County (Appendix 1-E contains intermunicipal agreements). A map of the service areas is included at the end of this chapter.

Table 4.5.1 in Appendix 4-C summarizes the wastewater treatment system technology, treatment process, service area, design and production flows and basic discharge information.

The Chestertown wastewater treatment plant discharges to the Chester River, which is protected for shellfish harvesting. It is located within the Middle Chester Watershed. Tributary Strategy nutrient limits for nitrogen and phosphorus are 18,273 lb/year and 1,371 lb/year respectively.

The Chestertown sewerage service area (within the town limits) includes approximately 2,300 connections (EDUs).

System History and Upgrades:

In 2016, the Town of Chestertown annexed 79.67 acres of vacant land to the northeast of Chestertown located along Washington Avenue and Scheeler Road. Lands identified on Tax Map 37 to include Parcels 10, 486, 172 (Lot 1), and 20, as well as a 1.02-acre unidentified parcel/right of way) are included in the planned Town service area.

In 2011, the County added 15 new connections with the Quaker Neck/Lover's Lane failing septic system sewer extension project and provided a connection for the 12-unit subdivision Prestwick Woods.

In summer 2008, the ENR upgrades to the Chestertown wastewater treatment plant were completed. Upgrades included construction of two (2) oxidation wave aeration systems, screening, grit removal clarifiers, de-nitrification filters, sludge pumping, chemical feed systems, liquid chlorination and de-chlorination systems, control building, raw sewage pump station modifications, instrumentation, and control systems. The cost of the upgrades was \$9.8 million.

In 1997, Chestertown revised the Town Charter to its original language prohibiting out of town sewer extensions without annexation.

In 1990, the facility was upgraded with an outfall line discharging into the Chester River and construction of a new aeration system.

In 2022, the Intermunicipal Agreement between the Town and County is up for renewal.

4.5.1.1. Quaker Neck

The Kent County Department of Public Works owns and operates the Quaker Neck sewer service area, which is provided sewage treatment by the Chestertown wastewater treatment plant (Appendix 1-E contains intermunicipal agreements).

The Quaker Neck sewer service area includes 241 connections (EDUs).

System History and Upgrades:

In 2006, a design to upgrade the pumping station located on John Hanson Road was completed. Construction of this project was completed in 2008. This pumping station upgrade is required to comply with MDE requirements as part of Chestertown's 2008 ENR upgrade to their wastewater treatment facility.

Treatment capacity at Chestertown's wastewater treatment plant provided relief to many residents in the Quaker Neck area, but not all residents experiencing septic problems have been served as of 2008 and there is continuing demand for growth.

In 2007, discussions with the Town of Chestertown permitted the County to proceed with a feasibility study to serve failing septic systems along Lover's Lane and also a proposed small residential project on Lover's Lane by expanding the Quaker Neck service area.

In 2009 the Quaker Neck service area was amended to serve a maximum of 12 lots in the Prestwick Woods subdivision. The amendment and revised service area map are shown in Appendix 4-G.

In 2011, the construction of the Lover's Lane sewer extension and Quaker Neck Pumping Station Upgrade was completed. The project would provide for removal of 15 failing septic systems and provided a connection for the Prestwick Woods 12-unit subdivision. The lines constructed under this project are designated as a "Denied Access Sewer Line", allowing only one sewer allocation for each property served, in accordance with Section 1.4.6. Denied Access Facilities. The Quaker Neck Pump Station upgrade replaced the submersible pumps with a self-priming package pump station and new standby generator providing the needed capacity for the 27 proposed connections on Lover's Lane. For service area details see Appendix 4-G for service area details.

There are presently 8 remaining lots in Prestwick Woods, 2 remaining connections out of the original 15 on Lover's Lane to be connected and 13 remaining connections in the original Quaker Neck service area for a total of 23 residential lots.

4.5.2. Rock Hall

The incorporated Town of Rock Hall owns and operates a wastewater Treatment Plant that serves Rock Hall, two (2) marinas outside the town limits (maintained by the town), and the following County service areas: Green Lane, Spring Cove, Allen's Lane, Piney Neck / Skinner's Neck / Wesley Chapel corridor, and Edesville. (Appendix 1-E contains intermunicipal agreements). Maps of the service areas are included at the end of this chapter.

Table 4.5.2 in Appendix 4-C summarizes the wastewater treatment system technology, treatment process, service area, design and production flows and basic discharge information. The treatment facility has an annual average daily design capacity for a flow of 505,000 gpd; the facility discharge is permitted for an annual average flow of 480,000 gpd. The plant is currently considered a minor WWTP. The average flow calculated from 2015-2017 Daily Monitoring Reports (DMRs) is 242,000 gpd.

The Rock Hall wastewater treatment plant discharges effluent to a discharge point in Gray's Inn Creek, which is designated Use II waters protected for shellfish harvesting. It is located within the Lower Chester Watershed. Tributary Strategy nutrient limits for nitrogen and phosphorus are 15,615 lb/year and 461 lb/year respectively.

The Rock Hall sewerage service area includes approximately 1,751 connections (EDUs).

System History and Upgrades:

The following list summarizes the chronology in which County sewer service areas were connected to the Town of Rock Hall wastewater treatment plant:

In 2007, Edesville was connected to Rock Hall via a force main along Route 20.

In 2007, Allen's Lane was connected to Rock Hall.

In 1997, Green Lane and Spring Cove were connected to Rock Hall.

In 1996, the Piney Neck / Skinner's Neck / Wesley Chapel corridor was connected to Rock Hall.

In December 1995, an upgrade to the Rock Hall wastewater treatment plant by the Kent County Sanitary District (now Kent County Department of Public Works) was completed. The new plant (1995) is located adjacent to the town's abandoned lagoon.

4.5.2.1. Green Lane / Spring Cove

The Kent County Department of Public Works owns and operates the Green Lane/Spring Cove sewer service area (1997), which is provided sewage treatment by the Rock Hall wastewater treatment plant (Appendix 1-E contains intermunicipal agreements).

The Green Lane/Spring Cove sewer service area includes 96 connections (EDUs).

Green Lane and Spring Cove are located adjacent to the Town of Rock Hall. All of the forcemains installed in the Green Lane Service area are designated as restricted (denied) access.

4.5.2.2. Allen's Lane

The Kent County Department of Public Works owns and operates the Allen's Lane sewer service area . Sewage is collected via a low-pressure collection system connecting to the Green Lane sewer main which discharges into the Town's gravity system for treatment by the Rock Hall wastewater treatment plant (Appendix 1-E contains intermunicipal agreements). All of the force mains installed in the Allen's Lane service area are designated restrictive (denied) access. See Appendix 4-H for more information.

The Allen's Lane sewer service area will include 40 connections (EDUs).

Allen's Lane is located south of the Town of Rock Hall.

System History and Upgrades:

In 2007, the Allen's Lane low pressure sewerage collection system was completed and online

In 2006, the County received approval from MDE and MDP to proceed with the design of the Allen's Lane sewerage system project (MDE Project # WQ04-342-151), subject to the following conditions: "The proposed force main shall be designated 'restrictive access;' Existing residential lots with failing septic systems as identified and documented by the Kent County Environmental Health Department shall be allowed to connect to the new sewer system; Unimproved lots of record existing as of September 2006 that could meet the requirements for private well and septic systems shall be allowed to connect to the new sewer system; and No further subdivision of any lots in the service area shall be allowed."

In 2004, a preliminary engineering report was completed.

4.5.2.3. Piney Neck / Skinner's Neck / Wesley Chapel

The Kent County Department of Public Works owns and operates the Piney Neck / Skinner's Neck / Wesley Chapel (PN/SN/WC) sewer service area (1996), which is provided sewage treatment by the Rock Hall wastewater treatment plant (Appendix 1-E contains the intermunicipal agreements).

The PN/SN/WC sewer service area includes 408 connections (EDUs).

System History and Upgrades:

In 2010, the Crosby Woods Subdivision (10 lots) was constructed with a standard gravity collection system that discharges into the Wesley Chapel Pump Station.

In 2007, the Edesville sewage was connected to the Wesley Chapel Pump Station via a force main from the lagoon site and along Route 20.

In 1996, the Kent County Sanitary District installed the PN/SN/WC collection system. The system consists of 61,000 feet of low pressure force main; 16,000 feet of force main; 3 main pump stations; and over 350 individual grinder pumps.

In 1995, the Kent County Sanitary District funded an expansion of the Rock Hall WWTP through an intermunicipal agreement with the Town of Rock Hall (Appendix 1-E contains the intermunicipal agreement). The expansion was designed to accommodate flow to the Rock Hall WWTP prior to the PN/SN/WC connection, additional flow from the PN/SN/WC connection, and the anticipated flow for the next 20 years.

4.5.2.4. Edesville

The Kent County Department of Public Works owns and operates the Edesville sewer service area, which is provided sewage treatment by the Rock Hall wastewater treatment plant since 2007. (Appendix 1-E contains intermunicipal agreements).

The Edesville sewer service area includes 107 connections (EDUs).

System History and Upgrades:

The County Commissioners owned a wastewater treatment facility that once served approximately 225 users in the Edesville area and a small affordable income housing project, Edesville East. The Kent County Department of Water and Wastewater Services operated the facility.

The old Edesville system consisted of a small diameter gravity collection system with pump stations and a land treatment system. Septic tanks were installed at each connection and served as primary treatment. Clarified sewage effluent was collected and directed to a two-cell lagoon for natural aeration. The effluent was chlorinated and discharged to a ridge and furrow land treatment area where the effluent was treated through continuous aeration, absorption, evapotranspiration and evaporation. Furrows and ridges consisted of grass and trees. The system had a design capacity of 21,000 gpd.

The system's lagoons were leaking and, an intermunicipal agreement was signed with the Town of Rock Hall to connect the system to the town system.

In 2007, construction on the connection was completed. In 2008, the County abandoned the lagoons at the treatment facility and converted them to waterfowl habitat.

In 2007, the Kent County Commissioners approved the design and construction of the extension of the sewer and water system to 11 failing septic systems along Lover's Lane. In 2011, the Lover's Lane Water and Sewer Extension was constructed and brought online. This collection system consists of step tanks, a low-pressure collection system, and dosing pump station that discharges to the existing small diameter gravity system. The lines constructed under this project are designated as a "Denied Access Sewer Line",

allowing only one sewer allocation for each property served, in accordance with Section 1.4.6. Denied Access Facilities. The revised Edesville map with relevant parcel numbers can be seen in Appendix 4-F.

4.5.3. Galena

The incorporated Town of Galena owns and operates a wastewater treatment system that serves the town and a small area outside town limits. A map of the service area is included at the end of this chapter.

Table 4.5.3 in Appendix 4-C summarizes the wastewater treatment system technology, treatment process, service area, design and production flows and basic discharge information. The treatment facility is permitted for a flow of 110,000 gpd. The average daily flow was 38,000 gpd in 2017.

The Galena wastewater treatment plant, lagoon system discharges to the Dyer Creek, which is designated Use I waters protected for water contact recreation and aquatic life. The plant became ENR rated in 2018. It is located within the Sassafras Watershed. Tributary Strategy nutrient limits for nitrogen and phosphorus are 1,339 lb/year and 101 lb/year respectively.

The Galena sewerage service area includes 348 connections (EDUs).

System History and Upgrades:

In 2008 the Maryland Department of the Environment inspected the WWTP and reported operational deficiencies. On May 20, 2009, the Smart Growth Coordinating Committee granted an exception to the Priority Funding Area law for the site of the existing WWTP which lies just outside of the municipal limits of the town.

The selected alternative was to upgrade treatment for 80,000 gpd and remove a portion of the lagoon – this would include a new system on the existing site with removal of 75% of the existing lagoon capable of Enhanced Nutrient Removal (ENR) which would meet all limitations on a new discharge permit and would all but guarantee that the WWTP and lagoon would be in compliance to future permit limitations for approximately 25 years. This project was considered as the best alternative because it uses the latest technology, reduces impervious surfaces, eliminates seasonal effects and uses the existing site of the lagoon. In 2011, this amendment to the Water and Sewer Plan was approved by MDE. The initial design was completed in December 2011.

In 2011, the County received a request from the owner of the Georgetown Yacht Basin and Kitty Knight House restaurant and hotel requesting sanitary sewer service due to failing on-site disposal systems. The Town was supportive of the project and the Kent County Commissioners approved the evaluation of the potential project. The County Health Department did the evaluation and has classified the entire Georgetown area as a public health emergency due to failing septic systems and the presence of lots that do not have the capacity for repair or replacement of their septic systems. The evaluation also recommended that the County provide public sewer services. The sewer service to the Georgetown area will be provided by a County owned collection system that will be connected to the Galena collection system via a “denied access” interconnection. Olivet Hill was not considered a public health emergency since the lot sizes were large enough to repair or replace failing septic systems, A section of Dogwood Village, Maplewood Lane, and Lee Avenue areas which are adjacent to the Town’s service area will be provided with sewer collection service. In order to provide sufficient treatment capacity for the new connections the County has partnered with the Town on the Wastewater Plant upgrade and expansion. The preliminary engineering report was completed for the extension and plant upgrade in July of 2012.

To accommodate the new users of the Galena wastewater system the treatment plant will be expanded to 110,000 gpd. The Commissioners approved the County moving ahead with the project.

In 2012, the Town began reevaluating the proposed treatment plant design to allow for the future upgrade by the County to include 30,000gpd of capacity. With the addition of the Georgetown and the area adjacent to the Town, MDE was willing to amend the Consent Order revising the completions for construction of the WWTP from May 1, 2013 to February 1, 2015 and compliance with ENR permit limits from October 31, 2013 to no later than June 1, 2015. A description of the proposed treatment process is shown in Table 4.5.3 in Appendix 4-C.

The wastewater treatment plant upgrade was completed in late 2017. The Georgetown area collection system design was completed and bid in early 2018. Construction started in the summer of 2018.

A map of the service area is included at the end of this Chapter. A copy of the Sewer agreement is provided in Appendix 1-E.

4.5.4. Betterton

The incorporated Town of Betterton owns and operates a wastewater treatment system that serves the town. A map of the service area is included at the end of this chapter.

Table 4.5.4 in Appendix 4-C summarizes the wastewater treatment system technology, treatment process, service area, design and production flows and basic discharge information. The treatment facility is permitted for a flow of 146,000 gpd. The average flow calculated from Daily Monitoring Reports (DMRs) for 2017 is 20,000 gpd.

The Betterton wastewater treatment plant discharges to the Sassafras River, which is Designated as Use II (shellfish harvesting) waters- protected as actual or potential areas for the harvesting of oysters, softshell clams, hard shell clams, and brackish water clams. It is located within the Sassafras Watershed. Tributary Strategy nutrient limits for nitrogen and phosphorus are 1,224 lb/year and 204 lb/year respectively.

The Betterton sewerage service area includes 282 EDUs.

System History and Upgrades:

The 5 pump stations in the collection system have required constant maintenance and it is recommended further investigation be performed to determine rehabilitation or upgrade needs.

In 2010, due to more stringent effluent requirements in the discharge permit, the town authorized an engineering study to consider alternatives to meet the new discharge requirements. As a result of the preliminary engineering report, the Town of Betterton proposed to replace the existing treatment facility with an enhanced nutrient removal facility. The new facilities will include a new headworks with fine screen and grit removal, sequencing batch reactor, denitrification and phosphorus removal filter, ultra-violet disinfection, post aeration, effluent pump station, waste sludge tanks, improvements to the existing sludge beds, rehabilitation of the existing treatment basin to an emergency storage tank, automated controls, modernized alarm system, electrical system, stormwater best management practices, and other miscellaneous site work along with a new administration/lab/garage. Upon completion, the facility would be re-rated at 146,000 gallons per day (gpd) achieving enhanced nutrient removal with concentration goals of 3.0 mg/l total nitrogen and 0.3 mg/l total phosphorus which will allow for 83% reduction in

nitrogen and 90% reduction in phosphorus. The project bid January 2017 and construction began in June 2017. The project is being funded through the Maryland Department of the Environment (MDE) Bay Restoration Program and United States Department of Agriculture-Rural Development. The startup of the upgraded facility occurred in October 2018.

4.5.5. Millington

The incorporated Town of Millington owns a wastewater treatment system. Maryland Environmental Services (MES) operates the wastewater treatment system contractually for the Town of Millington. The Millington wastewater treatment plant serves Millington, West Millington, Sandfield, Millington Elementary School, the former Howard Johnson's Restaurant located on U.S. Rte. 301, and the development at Rte. 291 / 301 including Food Lion, River's Edge, and Stoltzfus. An extension of service was authorized by MDE to the Chesterville Forest development to address failing septic systems. Please see section 4.7.7 for more details. The amendment can be seen in Appendix 4-I.

The collection system in areas outside the town limits is owned and operated by the County (Appendix 1-E contains intermunicipal agreements). A map of the service areas is included at the end of this chapter.

Table 4.5.5 in Appendix 4-C summarizes the wastewater treatment system technology, treatment process, service area, design and production flows and basic discharge information. The treatment facility is permitted for a flow of 105,000 gpd. Millington requested a design capacity permit revision from MDE which would allow flow up to 140,000 gpd. The revised discharge permit allows for an increase in average daily flow to 140,000 gpd after appropriate upgrading and approval by MDE that the design capacity is sufficient. The average flow for 2017 was 70,000 gpd.

The Millington wastewater treatment plant discharges to the Chester River, which is designated as Use I water and is protected for water contact recreation and aquatic life. It is located within the Upper Chester Watershed. Tributary Strategy nutrient limits for nitrogen and phosphorus are 3,342 lb/year and 457 lb/year respectively.

The existing Millington town sewerage service area includes 281 connections (EDUs). There are an additional 150 EDU connections in the County served by the wastewater treatment plant ¹.

System History and Upgrades:

In 2017, KCI Technologies, on behalf of the Town of Millington, initiated USDA Funding inquiries into replacing the existing town wastewater treatment plant in part, due to its location within a floodplain and thereby open to potential flooding risks and also to upgrade the treatment process to enhanced nutrient removal (ENR). The proposed alternative consists of constructing a new pump station, at the location of the existing treatment plant, that would convey the town's wastewater flow south to the Town of Sudlersville's wastewater system. At this time, the plan is conceptual and requires further investigation and numerous State, County and local approvals.

In 2011, a low-pressure sewage collection system was constructed to Chesterville Forest Road, a Priority Funding Area, providing connections for 37 properties identified with failing septic systems.

In 2009, upgrades and service area extensions were being planned for the Millington service area. The map of the service area included at the end of this chapter includes proposed service area extensions.

¹ MDE Text Modification 9/2019

In 2004, the flood-proofed Biolac treatment facility was completed. This facility has a treatment capacity of 145,000 gpd. Maintenance of the plant is performed through a contractual agreement.

The new plant provides service to properties that previously were not served by the force main that runs from U.S. Rte. 301 to the town boundary along Md. Rte. 291. Service was extended to the homes in the River Run subdivision both east and west of U.S. Rte. 301 and also to the homes just north of Millington along Chesterville Road and Md. Rte. 313.

The old treatment plant was a 70,000 gpd activated sludge facility with contact stabilization and discharge into the Chester River. It was owned and operated by the incorporated Town of Millington and was demolished with completion of the new Biolac facility.

Future Growth Planning

The Town has recently updated its Comprehensive Plan to include an expanded annexation plan to include the area between the Town Corporate limits and the Route 301/MD291 interchange as well as future annexation of property north of Millington Road. The proposed annexation plan is intended to provide for the extension of Town public services including water and sewer service to promote area economic development. This is as a result of transportation improvements being constructed by DelDOT and MDOT to provide an alternative route for I-95 traffic in the Maryland corridor. Improved access to nearby metropolitan markets in the Washington/Baltimore/Philadelphia area is proposed to attract commercial/residential and industrial investment. The estimated impact of the annexation has the potential for 562,607 gpd of sewer and water demand and 1,526 dwelling units. The demand associated with the build out of the annexation area will exceed the current capacity of the Town's facilities.

It is anticipated that the Town annex targeted properties when conditions indicate it would be advantageous for developers and the Town enter into an annexation agreement and complete the annexation process. Staged annexations would be consistent with the Town's ability to plan for and implement increases in water and sewer capacity.

Figure 4-5 depicts the planned annexation area and Town of Millington wastewater treatment plant service areas. Also shown are the proposed phasing of water and sewer priorities to be programmed for the 3 to 5/6-year period and within the 6/7 through 10-year period.

As the Town's wastewater plant is located in Queen Anne's County, coordination of planning will be necessary as annexations in the Town's proposed water and sewer area drive the expansion of treatment capacity. Amendments to the Kent and Queen Anne's County Comprehensive Water and Sewer Plans to accommodate the annexations and economic growth are recommended to be supported with the following:

- Engineering feasibility study describing the proposed expansion of services and preliminary engineering to determine location, environmental issues (including permitting, TMDL loadings, siting concerns), project costs, and implementation steps.
- Proposed agreements between the Developers, Town, County and other government agencies needed for planning, funding and project approval.
- Coordination and support from the Maryland Department of the Environment and Department of Planning.

4.5.5.1. Chesterville Forest

The Kent County Department of Public Works owns, operates, and maintains the Chesterville Forest sewage collection system. In 2011, the low-pressure sewage collection system was constructed to Chesterville Forest Road, a Priority Funding Area by an extension of the County portion of the Millington collection system. The project provided connections for 37 properties with failing septic systems identified by the Kent County Environmental Health Department. Select properties along MD Route 291 (River Road) were provided service due to failing septic systems. The force main along River Road from its point of connection with the force main in West Edge Road to Chesterville Forest Road is deemed a “Denied Access Force Main” in accordance with the County’s policy see Section 1.4.6. Denied Access Facilities. See Appendix 4-I Chesterville Forest Amendment for service area details.

System History and Upgrades:

The Chesterville Forest area is a rural village with failing septic systems. The community is a Priority Funding Area. In 2007, residents along Chesterville Road approached the Kent County Commissioners seeking help with their failing septic systems. The Kent County Health Department performed a sanitary survey in the Chesterville Forest Area.

In 2009, due to the inability to locate a site for the treatment facilities, the County developed a new study to convey the wastewater to Millington via the Edge Road Pump Station, and the Kent County Health Department conducted a sanitary survey in the River Road area. Based on the results of the study and sanitary survey, the County connected the Chesterville Forest development to the Millington wastewater treatment plant, by use of a low-pressure grinder pump force main system traversing MD Route 291 and intersecting with an existing force main at Edge Road. The connecting sewer main to the Millington Service area is a “Denied Access Sewer Main”. Service is limited to the existing lots within the rural village PFA and those single connections indicated in the MDE amendment.

Construction was completed in 2011, providing connections for 37 of the properties in the service area. A sewer main and service connections could not be provided to the remaining properties at that time due to an inability to obtain a right-a-way or easement across private property to access the parcels.

4.5.6. Kennedyville

The Kent County Department of Public Works owns and operates the Kennedyville wastewater treatment system. A map of the service area is included at the end of this chapter.

Table 4.5.6 in Appendix 4-C summarizes the wastewater treatment system technology, treatment process, service area, design and production flows and basic discharge information. The treatment facility is permitted for a flow of 60,000 gpd. The flow for year 2015-2017-was 11,000 gpd.

The Kennedyville wastewater treatment plant discharges to Morgan Creek, which is Use I water and protected for water contact recreation and aquatic life. It is located within the Middle Chester Watershed. With the new discharge permit issued in 2016 the nutrient limits for nitrogen and phosphorus were set at 1,399 lb/year and 233 lb/year respectively.

The Kennedyville sewerage service area includes 129 connections (EDUs).

System History and Upgrades:

The original system was comprised of a two-cell stabilization lagoon facility with chlorination and ichlorination prior to discharge into Morgan Creek. The system treated approximately 14,000 gpd. The plant's design capacity was 50,000 gpd with a permitted daily flow of 30,000 gpd. The County had a feasibility study completed in late 2002 that indicated under the present zoning within the service area, there could be approximately 60,000 gpd flow needed to serve potential new growth.

Due to leakage of the lagoons, the County entered into a Consent Order with MDE to construct a new wastewater treatment facility and upgrade the pumping stations. A new 60,000 gpd Sequencing Batch Reactor (SBR) WWTP was completed in September 2006 and is currently operational.

A new residential development, The Village at Kennedyville, is under development for Kennedyville. The project will be constructed in phases. The existing treatment facility will accommodate both phases of the project. Phase I is completed. In Phase II, the developer is also responsible for upgrading pumping station number 2 located along Route 213/Augustine Herman Highway.

4.5.7. Worton / Butlertown

The Kent County Department of Public Works operates the Worton/Butlertown wastewater treatment system. Service includes two schools in addition to several commercial and industrial users and residential connections. A map of the service area is included at the end of this chapter.

Table 4.5.7 in Appendix 4-C summarizes the wastewater treatment system technology, treatment process, service area, design and production flows and basic discharge information. The existing treatment facility is permitted for a flow of 250,000 gpd with two separate outfalls allowing for year-round discharge. The average daily flow for 2015-2017 was 70,000 gpd.

The Worton/Butlertown wastewater treatment plant discharges to a tributary of Morgan Creek and Groundwater of the State (spray irrigation) during periods when crops and weather conditions permit. Morgan Creek is designated as Use-I water and is protected for water contact recreation and aquatic life. It is located within the Middle Chester Watershed. Under the current discharge permit, the nutrient limits for nitrogen and phosphorus are 3,631 lb/year and 228 lb/year respectively.

The Worton/Butlertown sewerage service area includes 399 connections (EDUs).

System History and Upgrades:

In 2009, the County began planning on constructing a new treatment facility that will include new mechanical treatment using membrane treatment technology to meet Maryland's enhanced nutrient removal requirements. The construction of the plant and effluent land application system were completed in 2010, with the plant going on line in January of 2011. The upgraded plant's discharge rate was increased from 150,000 gpd 6 months per year to 250,000 gpd 12 months per year. During the months of May through October, the effluent will be discharged via spray irrigation on agricultural fields located near Worton. The new wastewater plant was constructed adjacent to the old treatment lagoons. The old treatment lagoons were converted to a storage facility to accommodate the spray irrigation application period requirements. The upgrades will accommodate proposed growth in the area and the county business park.

With the expansion of the wastewater treatment plant in 2009, upgrades to the sewer force mains, pump stations, and gravity mains were anticipated but due to funding and lack of growth the project was

delayed. This project is the final phase of the upgrading of the public water system and wastewater system identified in the 2001 and 2005 engineering reports prepared by McCrone Engineering. The final phase involves upgrading the existing pumping stations #1 and #2, correcting existing deficiencies in collections system leading to the wastewater plant by constructing a new pump station #5 and establishing a path for future growth in the Worton. These deficiencies include 3,000 feet of flat gravity sewer and two 90 degree turn manholes that are restricting the capacity of the sewer system in Worton Road and a gravity sewer interceptor that passes under the water treatment plant. Additional upgrades will be constructed in phases as proposed residential development projects are approved. Upgrades to the infrastructure will be paid pro-rata by each developer in accordance with the project's impact on the system. Details of the upgrades can be seen in Appendix 4-D.

In 2018 the Department applied for revocation and reissuance of the discharge permit to allow a stream discharge to Morgan Creek year-round (18-DP-2109). Continued authorization to discharge an annual average of 195,000 gpd to the groundwater via the spray irrigation system was requested. A permit was issued December 1, 2018 which permits the year-round discharge and adjusts the annual Total Phosphorus loading from 457 lb/yr to 228 lb/yr. This change will allow flexibility in operation to discharge to Morgan Creek during periods of extended wet weather or crop conditions that limit the use of spray irrigation.

4.5.8. Tolchester

The Kent County Department of Public Works owns and operates the Tolchester wastewater treatment system. The Tolchester Wastewater Treatment Plant serves Tolchester Estates, Fairlee/Georgetown and Delta Heights Condominiums. A map of the service areas is included at the end of this chapter.

Table 4.5.8 in Appendix 4-C summarizes the wastewater treatment system technology, treatment process, service area, design and production flows and basic discharge information. The Tolchester treatment facility is a sequencing batch reactor (SBR) plant with ultraviolet disinfection, post aeration and aerobic sludge digester. The treatment facility is permitted for a flow of 265,000 gpd. The system serves the Tolchester collection system (85,000 gpd) and the Fairlee/Georgetown collection system (180,000 gpd). The flow for year 2015-2017 was 57,000 gpd. The collection system consists of approximately 41,000 feet of low pressure force main, 24,000 feet of force main, 12,000 feet of outfall pipeline, 2 main pumps stations and over 200 individual grinder pumps.

The Tolchester wastewater treatment plant discharges to the Chesapeake Bay, which is designated Use II waters protected for the support of estuarine and marine aquatic life, and shellfish harvesting. It is located within the Chesapeake Bay Watershed. Tributary Strategy nutrient limits for nitrogen and phosphorus are 5,584 lb/year and 931 lb/year respectively.

The Tolchester sewerage service area includes a total of 619 connections (EDUs).

System History and Upgrades:

In 1996, construction of a new wastewater treatment facility (Tolchester WWTP) and collection system was completed.

In response to requests from residents in the Tolchester service area for sewer allocations, a hydraulic study of the collection system was conducted by McCrone, Inc. and it was determined that additional allocation is allowable subject to certain criteria. In March of 2008, the County, with the concurrence of MDE, determined that additional sewer allocations may be granted provided that (1) the owner (s) of the

property seeking such allocation establishes through the McCrone study, or through another accepted study, that the County's sewer lines will not need to be extended; and no upgrades to the County's sewer system, including but not limited to the sewer lines, will be needed or necessary; and (2) the property shall otherwise meet all applicable laws, regulations and criteria including being located within and/or contiguous to the designated growth area shown on the Tolchester delineated development area map shown in Figure 4-8 and amended in Appendix 4-E.

4.5.8.1. Fairlee/Georgetown

The Kent County Department of Public Works owns and operates the Fairlee/Georgetown wastewater collection system / sewer service area, which is provided sewage treatment by the Tolchester wastewater treatment plant. A map of the service area is included at the end of this chapter.

The Fairlee/Georgetown sewer service area includes 334 connections (EDUs).

System History and Upgrades:

The original Fairlee/Georgetown treatment facility was a three-cell stabilization lagoon system. After construction of the Tolchester wastewater treatment plant in 1996, the lagoons were abandoned and a new force main was installed to carry all wastewater from Fairlee and Georgetown to the new Tolchester plant.

A section of the old primary lagoon was reconstructed to serve as a 24-hour emergency holding lagoon for flow from Fairlee/Georgetown.

4.5.8.2. Delta Heights

The Kent County Department of Public Works owns and operates the wastewater collection system serving Delta Heights Condominiums. It is included as part of the Tolchester service area.

System History and Upgrades:

C & D Enterprises previously owned and operated a wastewater treatment facility that served the Delta Heights Condominium Project. After construction of the Tolchester wastewater treatment plant in 1996, the system was abandoned, and it was connected to the Tolchester wastewater collection system and treatment facility in 1996.

4.5.9. Chestertown Foods

The Chestertown Foods, formally Campbell Soup Company, owned and operated a wastewater treatment facility for treatment of process wastewater. The plant closed down in 1995 and reopened in the fall of 1996. The facility closed again in 2008. The original facility was demolished sometime near 2014.

The system consisted of a spray irrigation and/or overland flow system with an average daily flow of 500,000 gpd. Overland flow was in the Middle Chester Watershed and eventually discharges into Morgan Creek. Treatment included settling, screening, grease flotation and chlorination prior to discharge.

4.5.10. Eastman Specialties Corp. (formerly Genovique Specialties Corp. and Velsicol)

The Eastman Specialties Corporation facility is located on MD Route 297 north of Chestertown. The wastewater treatment facility treats chemical process wastewater (since the late 1960s). The plant discharges treated wastewater effluent (Outfall 001) and stormwater (Outfall 002) in accordance with its NPDES Discharge Permit MD0000345 issued by the MDE. All sanitary flows are discharged to the Worton WWTP.

Eastman Specialties wastewater treatment system consists of API separators, aqueous decant/surge, a primary clarifier, an aqueous surge tank, equalization, a Dissolved Air Flotation (DAF) System, a bioreactor, and a membrane filter system (added in September 2015) prior to the plant discharge, averaging 83,000 gpd. This treated effluent is discharged from Outfall 001 to an unnamed tributary to Morgan Creek. Biosolids are dewatered in a dewatering centrifuge and shipped offsite for disposal. The site also has the capability of shipping sludge directly offsite for disposal if the centrifuge is down for maintenance or repairs.

Site History:

The facility occupies approximately 19 acres and was built by Lehigh Chemical during the 1950s. Tenneco Chemical purchased the facility and expanded the operation prior to the sale of the business to Nuodex Inc. in 1982. Hüls-America (now Evonik) purchased the operation in 1985 and operated the facility through 1994 when the assets were sold to Velsicol. Pursuant to the asset sales agreement, Evonik remains responsible for addressing impacted soils and groundwater identified in several areas on-site. The Chestertown facility ownership changed to Genovique Specialties Corporation in October 2008 and to Eastman Chemical Company on April 30, 2010.

Evonik conducted site assessment, impacted material remediation and impoundment closure activities through soil/sludge excavation and pond closure site work in the late 1990s – early 2000's. To address groundwater issues, Evonik operated a groundwater recovery and treatment system from 1990 through 2003.

In 1999, the Kent County Sanitary District (now defunct) asked MDE's Water Management Administration, Water Supply Program, for information on groundwater contamination at the Velsicol property. MDE reviewed the data and concluded the site did not present a risk to the Worton Water System.

In 2008, Velsicol signed a consent decree with the MDE to address the MDE's allegations of violation of the CWA. The site discontinued use of the remaining unlined surface impoundments in April 2008. In August 2008, Velsicol developed a Phosphorus Evaluation and Reduction Plan for the Chestertown facility to evaluate the presence of phosphorus in the Wastewater Treatment System (WWTS) of the facility, and to develop a plan for the reduction of phosphorus in Outfall 001. Upon approval by the MDE, this Plan was implemented by Genovique. On April 20, 2012, MDE approved the site's Remedial Action Plan (RAP). The RAP includes groundwater monitoring, limited surface soil excavation, institutional controls and best management practices for stormwater. In accordance with the consent decree schedule, the construction phase of the RAP is required to be completed within six months of the date of the RAP approval letter, or by October 20, 2012. Eastman has made available to the public the progress of implementation of the Consent Decree by posting all reports and work plans submitted to the MDE on a website.

4.5.11. Great Oak Resort Club

Mears, Inc. owns and operates the wastewater treatment facility that serves the Great Oak Resort Club. The Club includes a restaurant, motel and marina.

The system is a one-acre stabilization lagoon with chlorination and dichlorination prior to discharge into Fairlee Creek in the Stillpond-Fairlee Watershed. The facility treats an average flow of 6,000 gpd and has a design capacity of 14,000 gpd.

4.5.12. Bayshore Campground, LLC

Bayshore Campground is a private campground located at 4228 Eastern Neck Rd, Rock Hall. The Campground provides seasonal public camping sites.

The recreational vehicle camp sites provide electric and water service. There are four holding tank dump sites on the property.

The Campground currently utilizes holding tanks for recreational vehicle pump outs and onsite flows generated by the onsite bathrooms and office. There are no laundry facilities. Holding tank sewage is pumped out by a local septic hauling service and transported to the Kent County Worton wastewater treatment facility for disposal.

The Campground is in the process of designing and obtaining approval from the Maryland Department of the Environment for a conventional on-site disposal system on 6 acres of the property. The design is proposed to utilize Best Available Technology for reduction of nutrients and a trench infiltration leachate field with an average daily flow of 12,000 gallons per day and a maximum design flow of 24,000 gallons per day to be able to discontinue hauling of holding tank sewage.

Figure 4.12 identifies the proposed sewerage service area for the campground and location of the treatment facility. At this planning stage, the Campground is exploring (in conjunction with MDE) the possibility of installing a 12,000 gallon per day on-site disposal system. Inclusion of this planning step in the Kent County Water and Sewer Plan does not constitute approval of this project or of a re-designation of the proposed sewer service area in Figure 4.12.

4.6. Shared Septic Systems

4.6.1. Rudnick

The Kent County Department of Public Works operates and maintains the Rudnick sewerage system. It is a shared septic system that serves nine (9) single family homes. The septic system has multiple fields that are routinely alternated. A map of the service area is included at the end of this chapter.

4.6.2. Little Neck

The Kent County Department of Public Works operates and maintains the Little Neck sewerage system. It is a shared septic system is designed to serve sixteen (16) existing single-family homes and a future community area. Each home has a septic tank, which drains to an effluent pump and chamber connected to a small diameter force main, which flows to the shared septic system. A map of the service area is included at the end of this chapter (See Figure 4-2 upper left corner).¹

1. MDE Text Modification 9/20/19

4.6.3. Cacaway Farm Cooperative Housing Corporation

In 1992, Cacaway Farm Coop. and the Health Department entered into a Grant Agreement and Easement for the installation of an Innovative and Alternative on site sewage disposal system to serve four dwelling units and two accessory structures. This shared system does not provide adequate treatment consistent with current regulations. Another dwelling unit on the property has a failing septic system.

Cacaway Farm, the Health Department and the County have agreed that it is in the best interest of the public health and the environment to upgrade the current shared facility. A new sand mound infiltration system is under design to serve the five dwelling units and four accessory structures (9 EDUs). After the 9 EDUs are connected to the new shared facility, the existing facility will be appropriately disposed of and decommissioned. The Kent County Department of Public Works will act as the controlling authority of the new shared facility. A map of the proposed service area to be included in this Comprehensive Water and Sewer Plan is included at the end of this chapter.

4.7. Sewerage Problem Areas

Several areas in Kent County have failing septic systems. The primary reason for bacterial contamination of groundwater is failing septic systems. This issue is discussed in both chapters 3 and 4 because it is both a water and a sewer issue. Areas vary greatly in size and consist of:

- Villages
- Large subdivisions, consisting of small lots, recorded prior to the adoption of effective sewage regulations.
- Mixtures of cross road settlements and scattered individual homes.

Many of these areas cannot financially support a typical shared system for sewage disposal, which would improve the quality of the surrounding ground water used for domestic consumption.

These areas include the communities of:

- Quaker Neck/Heather Heights
- Georgetown/Olivet Hill
- Chesapeake Landing
- Still Pond / Coleman
- Golts

The following sections describe proposed solutions for those areas investigated thus far. Some areas have not been addressed yet due to technical or financial limitations. The County continues to review its policy regarding sewerage problem areas in order to meet nutrient reduction goals established in the Local Phase II WIP. Connection of onsite systems to wastewater treatment facilities which meet ENR standards is a strategy supported in that document and by MDE.

4.7.1. Quaker Neck

Quaker Neck is a large, older residential area with failing septic systems.

The Kent County Department of Public Works owns and operates the Quaker Neck sewer service area, which is provided sewage treatment by the Chestertown wastewater treatment plant. The Quaker Neck sewer service area includes 190 connections (EDUs) and approximately 475 persons.

Treatment capacity at Chestertown's wastewater treatment plant provided relief to many residents in the Quaker Neck area, but not all residents experiencing septic problems have been served and there is continuing demand for growth.

In 2006, discussions with the Town of Chestertown permitted the County to proceed with a feasibility study to serve failing septic systems along Lover's Lane and also a proposed small residential project on Lover's Lane by expanding the Quaker Neck service area. On May 1, 2009 the Maryland Department of the Environment approved the extension of sewer service from the Town of Chestertown via a denied access sewer line in Lover's Lane to the Quaker Neck area to serve 15 existing homes with failing septic systems and 12 undeveloped lots in the Prestwick Woods subdivision.

In 2011, Lover's Lane sewer extension was constructed to include a low-pressure sewage collection system from the terminal manhole along Quaker Neck Road, along Lover's Lane to Airy Hill Road. The project removed the 15 failing septic systems. For service area details see Appendix 4-G for service area details.

4.7.2. Chesapeake Landing

Chesapeake Landing is a large, older subdivision with small lots, poor soils and failing septic systems. It contains approximately 210 private residences.

In 2005, the Kent County Department of Water and Wastewater Services proceeded with a study to determine the feasibility of providing water and sewerage to this area. The feasibility study was outlined to assess at least three alternatives: connection to the Tolchester wastewater treatment facility, connection to the Worton wastewater treatment facility, on-site systems. As significant cost was a factor, there are no plans to move forward with the project at this time.

4.7.3. Still Pond/Coleman

The Still Pond/Coleman area is a rural village with failing septic systems. It contains 184 parcels, 142 are developed.

A sanitary survey conducted by the Health Department in July 2010 determined there were no immediate health issues but there is a strong possibility of failing septic systems in the near future due to the age of existing systems and soil conditions. Furthermore, due to the lack of available recovery areas the County Commissioners may consider a feasibility study to investigate possible connection to the Town of Betterton's water and sewer treatment facilities and/or shared facilities to serve this area should system failures occur.

4.7.4. Golts

The Golts area is a rural village with failing septic systems. It contains 95 parcels, 41 are developed. There is no water or sewer service planned for the Golts area at this time.

4.7.5. Chesterville Forest

The Chesterville Forest area is a rural village with failing septic systems. This is a priority funding area. In 2007, residents along Chesterville Road approached the Kent County Commissioners seeking help

with their failing septic systems. The Kent County Health Department performed a sanitary survey in the Chesterville Forest Area.

In 2009, due to the inability to locate a site for the treatment facilities, the County developed a new study to convey the wastewater to Millington via the Edge Road Pump Station and the Kent County Health Department conducted a sanitary survey in the River Road area. Based on the results of the study and sanitary survey, the County connected the Chesterville Forest development to the Millington wastewater treatment plant, by use of a low-pressure grinder pump force main system traversing along MD 291 and intersecting with an existing force main at Edge Road. The connecting sewer main to the Millington Service area is a “denied access” sewer main. Service is limited to the existing lots within the rural village PFA and those single connections indicated in the MDE amendment.

Construction was completed in 2011, providing connections for 37 of the properties in the service area. A sewer main and service connections could not be provided to the remaining properties at that time due to an inability to obtain a right-a-way or easement across private property to access the parcels.

4.7.6 Georgetown and Olivet Hill

In 2011, the Kent County Commissioners received a request to evaluate the viability of extending sewer service to the Georgetown area by the owner of the Georgetown Yacht Basin and Kitty Knight House Restaurant and Hotel. The County approached the Town of Galena about entering into a wastewater treatment agreement for the sewer flows from Georgetown, and they were receptive and supportive of the proposed project. The Town of Galena asked the County to look into providing sewer service to the existing homes on the north side of town just outside of the town limits (Maplewood Avenue, Lee Avenue, and Mill Lane) and the rural village of Olivet Hill. These areas include approximately 142 properties.

The Georgetown and Olivet Hill areas are rural villages within the Sassafras River watershed and are both Priority Funding Areas (PFA). In early 2012, the Kent County Health Department performed a sanitary survey in these areas and recommended extension of public sewer to the areas based on failing on-site systems, inadequate space for replacement systems, and the locations within the Critical Area along the Sassafras River. The County Commissioners authorized proceeding with the Georgetown sewer extension which would also include the Maplewood, Lee Avenue, and Mill Lane areas located adjacent to the Town boundary due to existing services provided to intermittent parcels on these streets. The Olivet Hill was determined to have sufficient areas for replacement systems.

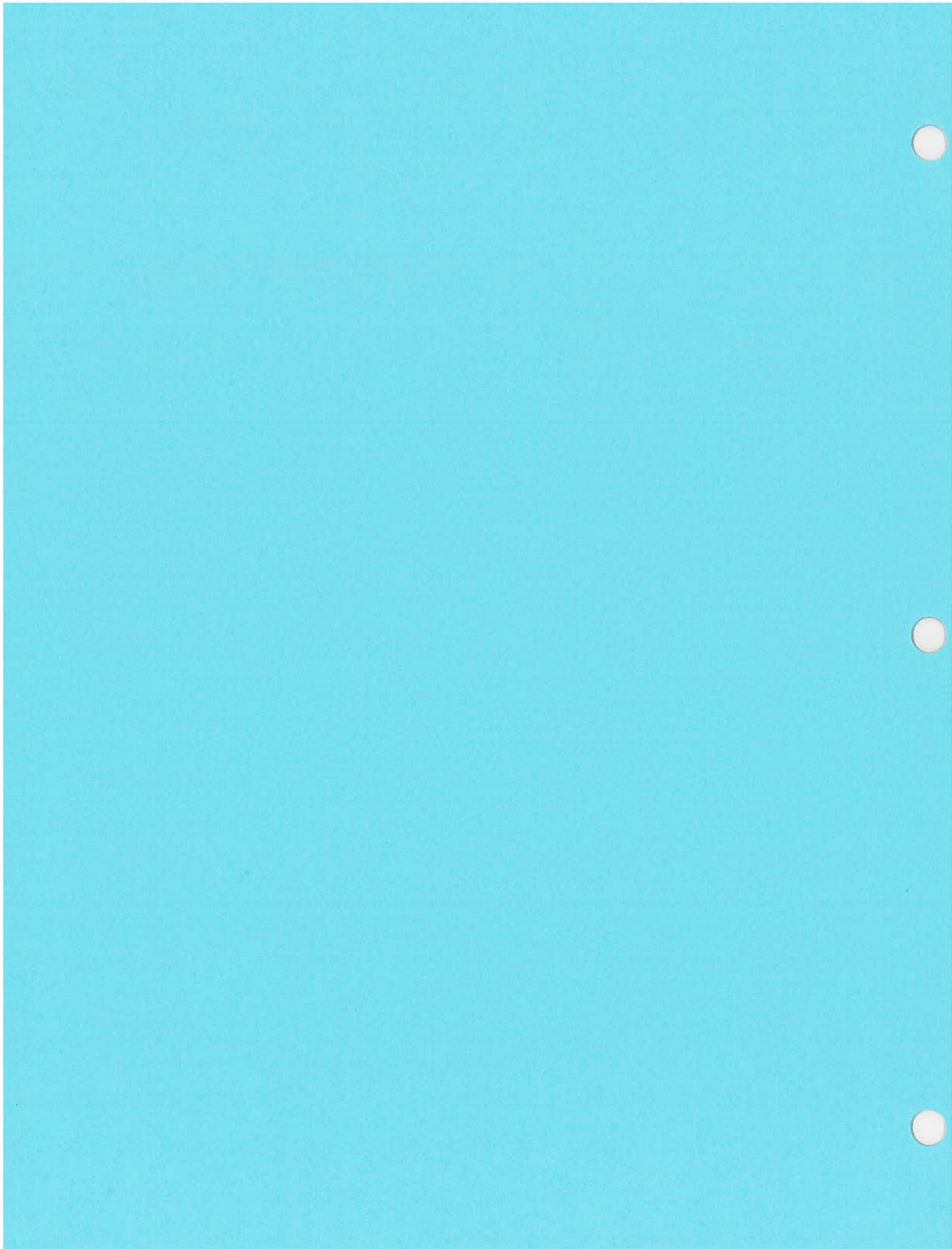
In order to obtain treatment capacity for this project, the County worked in concert with the Town of Galena’s proposed Wastewater Treatment Plant upgrade. The Wastewater Treatment Plant upgrade was completed in 2017. The collection system for the Georgetown area was designed and bid in early 2018. Construction started in summer of 2018.

The project will involve extending collection lines through areas outside of the PFA, passing existing homes. The collection and transmission lines extending through these areas will be classified as “Denied Access Sewer Lines” in accordance with the Chapter 1.4.6., Denied Access Facilities Policy. These parcels include: 7, 15, 16, 107, 85, 357-Lot 1 and Lot 2 and 4-Lot 2.

A copy of the wastewater treatment agreement is included in Appendix 1-E. The agreement provides 30,000gpd (120) EDU’s for the County. A map of the service area is included at the end of this Chapter.

CHAPTER 5

Stormwater and Watersheds



5. Stormwater and Watersheds

5.1. Introduction and Purpose

The health of the Chesapeake Bay is dependent upon a variety of factors, including point sources of pollutants (wastewater treatment plants) and non-point sources of pollutants (stormwater, septic, agriculture, resource land run-off). Water quality regulations have traditionally focused on point source pollutants because they are easier to define, test and control; however, they only constitute a minor portion of the total nutrient loading in Kent County. To address the non-point source pollution, Maryland Department of the Environment (MDE) has completed its Phase I Watershed Implementation Plan (WIP). The Kent County's Total Maximum Daily Load Committee (TMDL) completed its Local Phase II WIP in November 2011 and is currently monitoring the implementation of the strategies identified therein. MDE is currently developing the Phase III WIPs.

Maryland is divided into 10 tributary areas each with a Best Management Practice (BMP) implementation plan. All six watersheds in Kent County are contained within the Upper Eastern Shore Tributary Strategy Area. The non-point source element demonstrates how growth decisions at the county level can affect nutrient loading and TMDL progress. Improving the health of Chesapeake Bay by reducing stormwater and non-point pollution is a process that will involve many state agencies, local governments, and private citizens.

Please consult the Kent County Phase II Watershed Implementation Plan for specific load reduction strategies.

5.2. Kent County Watersheds

TMDLs are designed on two levels, the macro level of the Chesapeake Bay and the micro of individual watersheds. MDE characterizes watersheds by USGS hydrologic unit codes, the more digits in the code the smaller the watershed. For example, each six-digit watershed will contain several eight-digit watersheds. Kent County is composed of six, six-digit watersheds: the Upper, Middle, and Lower Chester River, Still Pond-Fairlee, Sassafras River, and Langford Creek Watersheds. The individual watersheds are documented and characterized in this report to more fully understand Kent County's impact on the Chesapeake Bay and comply with the requirements of the Water Resources Element and strategies identified in the Local Phase II WIP. A map of the watersheds is shown in Figure 2-2.

MDE categorizes the streams and rivers according to impairment level at the 8-digit watershed scale. Healthy streams are listed as category 1; the numerical listing increases as the pollution level increases until category 5 (impaired streams) is reached. The category 5 streams are listed on the 303d impaired waters list. The Middle and Upper Chester River and Sassafras River watersheds contain rivers or streams that are listed on the 303d impaired waters list. All 3 of these watersheds also have Watershed Restoration Plans in place which focus point source and nonpoint source BMP strategies in accordance with the impairments noted in each watershed.

Harvesting shell fish has historically been a vital part of the economy on the Eastern Shore of Maryland. Due to degrading water quality and increased demand MDE has restricted shell fishing in certain water bodies in Kent County. Grey's Inn Creek, portions of the Chester River, Fairlee Creek and Worton Creek, Still Pond Creek, and the Sassafras River are MDE-restricted shellfish waters. These maps can be seen in Appendix 5-A.

MDE has established total maximum daily loads (TMDLs) for selected watersheds to limit the pollutants that reach the Chesapeake Bay. A TMDL is comprised of point, non-point, and air deposition. The TMDLs that have been established for the watersheds in Kent County are documented in Table 5-1. Detailed reports on TMDLs in the Kent County Watershed can be downloaded on MDE's website at <https://mde.maryland.gov/programs/Water/TMDL/ApprovedFinalTMDLs/Pages/index.aspx>.

Non-point (stormwater) sources are not fully regulated by MDE and the TMDLs are not legally-enforceable at this point in time; however, the Local Phase II WIP attempts to identify strategies which may be attainable for local county and municipal agencies in proactive attempt to meet nutrient load reduction gaps established by MDE.

5.3. Growth Simulation Analysis and Non-point Source Loading Analysis

The Maryland Department of Planning (MDP) has developed a non-point source nutrient loading analysis to determine how growth trends and land use decisions will impact future (2030) nutrient loading. The 2030 land use is determined by a growth simulation model, which uses land use (see Table 5-2) and current growth trends as the input. Nitrogen and Phosphorus loading rates (lb./acre/year) based on current practices are applied to the 2002 and 2030 land use to establish a baseline. These baseline results can be compared to alternative scenarios.

Non-point loadings from the TMDLs have been identified for each tributary and have also been grouped by watershed for this plan. MDE has established nutrient load reduction goals for each County. The nitrogen and phosphorus load reduction goals for Kent County are noted in Figures 5-1 and 5-2. BMPs include but are not limited to: stormwater management plans, sediment control plans, precision agriculture, and residential and agricultural forest buffers. Details can be seen in the Maryland Phase II WIP.

Non-point source analyses to examine current and future nutrient loads for the six watersheds in the county were developed by MDP. There will be a dramatic decrease in nutrient loadings if the non-point Tributary Strategy loading rates are achieved. There will be little difference in nutrient loading as a result of the land use change from 2002 to projected 2030 land use.

MDP has offered to model alternative scenarios for the Langford, Middle Chester, and Upper Chester Watersheds. This is where the majority of the potential growth and planning decisions will occur in the foreseeable future. The Middle Chester watershed contains Morgan Creek, which has 3 wastewater treatment plants discharging into it. Kent County would like to manage growth to minimize future deterioration the Creek. The Langford, Middle Chester and Upper Chester Watersheds contain proposed areas of growth and annexations in accordance with the municipal grow area element. The alternative scenarios proposed were 1) smart growth with WIP/Bay Model loading rates and 2) annexations.

Kent County will consider the results of MDP's scenario during the drafting of its Phase III WIP.

5.4. Stormwater

The population of the Chesapeake Bay is increasing and expanding through the process of low density development. For example, between 1990 and 2000, Bay population climbed by 8 percent, but impervious cover climbed by 41 percent and turf cover has climbed by nearly 80 percent (Stormwater Consortium, 2007). As land is transformed from forests to general development and agricultural land, the volume of stormwater runoff will increase. This can result in erosion in downstream water bodies and flooding of adjacent land. There will be additional nutrient and sediment loading to the local water bodies

degrading the health of the water system and resulting in pollution and eutrophication of the Chesapeake Bay. Stormwater regulations have been developed to protect the water resources of Maryland, including the Chesapeake Bay, from the effect of development.

The Maryland Stormwater Management Act of 2007 was signed into law by Governor Martin O'Malley in Senate Bill 784. This Bill gave MDE the authority to regulate stormwater throughout the state of Maryland. The state developed a model ordinance which Kent County adopted in 2011. Kent is exempt from the NPDES Phase I and II permits but must comply with general regulations specific to environmental site design requirements to the maximum extent possible.

The Stormwater Management Act of 2007 is based upon Environmental Site Design (ESD) Principles, which attempt to mimic natural hydrology on developed sites. The Stormwater Management Act of 2007 was based upon 13 core principles, which are listed below and have been incorporated into the county's ordinance:

1. Increase Onsite Runoff Reduction Volumes
2. Require a Unified Early ESD Map
3. Establish Nutrient – Based Stormwater Loading Criteria
4. Apply ESD Technique to Redevelopment
5. Integrate ESD and Stormwater Together at Construction Sites
6. Provide Adequate Financing to Implement the Act and Reward Early Adopters
7. Develop an ESD Ordinance that Changes Local Codes and Culture
8. Strengthen Design Standards for ESD and Stormwater Practices
9. Ensure All ESD Practices can be Adequately Maintained
10. Devise an Enforceable Design Process for ESD
11. Establish Turbidity Standards for Construction Sites
12. Craft Special Criteria for Sensitive and Impaired Waters of the State
13. Implement ESD Training, Certification and Enforcement

Kent County implements stormwater management through the Kent County Code Chapter 210 and its Land Use Ordinance in Article VI, Section 10. This ordinance encourages responsible growth and establishes minimum requirements to protect the health of the Chesapeake Bay with procedures to control adverse impacts associated with increased stormwater runoff. Kent County promotes the use of non-structural stormwater BMPs over structural BMPs. Kent County also regulates agricultural, residential, and commercial landowners to utilize technology to reduce the volume and improve the quality of runoff from their property.

5.5. Kent County On-Site Disposal Systems and Problem Areas

Onsite Sewage Disposal Systems (OSDSs) are a valuable investment in rural areas where sewer service is not available. While OSDSs perform a valuable function for rural residents, if not properly maintained, they can become a public health hazard through bacterial groundwater and potential nitrogenous contamination. Residents are expected to comply with Kent County policy, which is to abate and prevent OSDS failures and subsequent public health emergencies. Several areas in Kent County are not in compliance and have bacterial contamination of the ground water used for domestic consumption. Abatement of OSDS problem areas will decrease non-point discharge of nitrogen to the watersheds. These areas include the communities of Georgetown, Chesapeake Landing, Golts, Still Pond/Coleman, and Lover's Lane. Some of these areas have been addressed through water or wastewater service; other areas are in the planning stage. Figure 5-3 illustrates the location of the OSDS Problem Areas. The current status of these areas is as follows:

- A construction contract for the extension of sewer to the Georgetown area with treatment at the Galena wastewater plant will be completed in 2019.
-
- Chesapeake Landing is a large existing subdivision with small lots and failing septic systems. The County has reviewed a study in 2005 to determine the feasibility of providing water and sewerage service to the area. The County has no plans to move forward with a project due to cost at this time.
- The Sharptown area along with the Wesley Chapel corridor, Skinners Neck and Piney Neck areas are currently being provided with sewer service. The Wesley Chapel corridor is currently provided water by the town of Rock Hall, and the line is extended to Edesville system for an emergency backup system.
- The Spring Cove and Green Lane areas have been connected with sewer service from the Town of Rock Hall. No water service is planned at this time.
- There is no water or sewer service planned for the Golts area in the near future.
- The Still Pond/Coleman area feasibility study has been completed and included an analysis of sewer service by the Town of Betterton and/or a new facility to serve both the Still Pond/Coleman area and the town. There are no plans to proceed with this project at this time.
- Allen's Lane is served by the Rock Hall system.
- Lover's Lane near Chestertown has been connected to the Chestertown WWTP for sewer service in the Quaker Neck service area.

Recognizing the potential impact on both local and downstream water quality, the Local Phase I WIP includes an OSDS element. The Bay Restoration Fund Program estimates that on average 12.2 pounds of nitrogen per year per OSDS reaches surface water. OSDS upgrade goals are:

- One hundred percent of new OSDSs installed beginning in 2010 included enhanced denitrification technology. Since 2016, BAT systems are required for systems located only in the Critical Areas of the State (per an August 2016 announcement by Governor Hogan).
- One hundred percent of all existing septic systems will need to be upgraded to improve nitrogen removal.
- By 2020, it is anticipated that a total of 270 BAT systems will be installed in the Critical Area (16%).
- Overall approximately 104 (county) properties with failing septic systems have been or are in the process of being connected to either ENR or ENR capable WWTPs in Kent County. Of the 104 systems, 37 have been connected to WWTPs. It is anticipated that half of the remaining 67 systems will connect to WWTPs by 2020.

While the 2012 legislation and MDE policy assumed 100 percent implementation of upgraded OSDSs would be necessary to close the gap for reducing nitrogen loading to the Bay, the Local Phase II WIP recognizes the difficulty of achieving the goal of upgrading 100 percent of OSDSs. Funding through the

BRF program has overcome some implementation barriers for properties located within the Critical Areas.

MDE has estimated that Kent County has approximately 4,025 OSDSs. The Kent County Department of Public Works, Department of Planning, Housing, and Zoning, and the Department of Health historically participated in the BRF OSDS Grant Award and Installations Programs, as well as the 2010 Middle Chester Trust Fund Program. To date, the County has received \$5.726 million in grants to upgrade qualifying onsite systems and has installed 439 upgrades. Kent County's BRF plan targets OSDSs in the Critical Area. The County's Comprehensive Plan promotes the use of BAT systems. Currently the Department of Environmental Health manages the County's BRF program dollars.

5.6. Agricultural Nonpoint Source Analysis

The Agriculture Strategy element of the Local Phase II WIP includes a plan to work with Maryland's farm community to implement a range of BMPs on farmland across the watershed to reduce nutrient and sediment loads. These BMPs are conservation practices that accomplish water quality goals while balancing the needs of crop and livestock production. This strategy has significantly expanded BMP options, including an extensive list of practices that work to protect the soil and natural resources. Projected statewide implementation schedules emphasize cost effective practices and the need to continue to pursue additional state and federal funding to increase implementation rates.

United States Department of Agricultural (USDA), the Natural Resources Conservation Service (NRCS), Maryland Department of Agricultural (MDA), and the Kent Soil and Water Conservation District (KSWCD) work cooperatively to promote best management practices that address nonpoint source pollution on agricultural land in the County and that align with the Kent County TMDL Committee and Local Phase II WIP for Agriculture. One of the goals of this partnership includes protection of the soil resource base from degradation by erosion and the protection of surface and groundwater from excessive sedimentation and detrimental runoff from animal waste, nutrients, and pesticides.

County farmers and agricultural landowners voluntarily work with KSWCD, MDA, USDA, and NRCS to develop Soil Conservation and Water Quality Plans (SCWQP) that address soil erosion and water quality concerns. KSWCD and MDA have an annual acreage goal for developing SCWQ plans in order to meet the goals of the Phase II WIP. Often these goals are exceeded and many of the plans are expanded to address additional resource concerns related to livestock and grazing management, wildlife habitat improvements, and irrigation water management. Technical and financial assistance is available to all agricultural landowners and operators for the planning, design, and implementation of a diverse list of conservation practices. The primary practices routinely implemented that are most beneficial for nutrient reduction include nutrient management, cover crops, no-till and conservation tillage; riparian herbaceous and forested buffers, wetland restorations, and animal waste management practices.

KSWCD promotes and facilitates participation in federal, state, and local conservation programs by providing outreach, education, planning, and technical assistance to county landowners and operators. KSWCD is responsible for the administration of the District and MDA conservation programs. USDA Farm Service Agency staff administers the CRP and CREP. NRCS administers EQIP, AMA, CSP, WRE, RCPP and CIG. NRCS is responsible for the technical support for all programs.

5.7. Current Programs

A critical water quality issue for water bodies in and bordering Kent County is nitrogen and phosphorus from non-point sources. The problem and its mitigation is a long-term prospect based on implementation

of OSDSs and Best Management Practices (BMPs) by the County, state and federal agencies and corresponding programs and is at a broad planning level of detail. This element of this document is a starting point for future non-point source analyses requiring collaboration of many agencies.

Kent County promotes growth that will minimize future deterioration of watersheds and further encourages improvements to all of its watersheds. The County achieves these goals through the Kent County Code, its Zoning, Land Use Ordinance, Stormwater Management Ordinance, Sediment Control Ordinance, Floodplain Ordinance, Critical Area Program, Comprehensive Plan, Watershed Restoration Action Strategies, the Water Resources Element, and Local Phase II Watershed Implementation Plan.

The County has completed and is currently pursuing a wide variety of both funded and unfunded water quality improvement initiatives including but not limited to the following:

- Middle Chester River Watershed Restoration Action Strategy
- 2010 Trust Fund Program for the Middle Chester River
- Upper Chester River Watershed Restoration Action Strategy
- Upper Chester River Showcase Watershed
- Sassafras Watershed Action Plan (partner)
- Early Action Compact
- Local Phase II Watershed Implementation Plan
- Hazard Mitigation Plan
- Kent County Bay Restoration Fund Program
- Coast Smart Communities Grant – Kent County Coastal Resiliency and Vulnerability Study

There are many state agencies and sources of funding providing assistance for TMDL non-point source program implementation. Several state agencies and funding sources are available to assist land owners in participating in the TMDL program. All the initiatives noted below are also listed in the Kent County Phase II WIP, along with the project goals and outcomes of each initiative.

OSDSs (Conversion to Denitrifying OSDSs)

- Maryland Department of the Environment (Bay Restoration Fund)

Riparian Buffers

- USDA FSA Conservation Reserve Enhancement Program (CREP)
- Chesapeake Bay Foundation
- Ducks Unlimited
- Maryland Department of Agriculture (MACS)
- Maryland State Woodland Incentive Program
- USDA NRCS Environmental Quality Incentive Program (EQIP)
- USDA NRCS Conservation Stewardship Program (CSP)

Wetland Restoration

- USDA Wetland Reserve and Easement Programs (WRP and WRE)
- USDA FSA Conservation Reserve Enhancement Program (CREP)

Improve Fish and Wildlife Habitat

- Fish and Wildlife Service (FWS)
- USDA NRCS Environmental Quality Incentive Program (EQIP)
- USDA NRCS Conservation Stewardship Program (CSP)
- USDA FSA Conservation Reserve Enhancement Program (CREP)
- USDA NRCS Wetland Restoration Easement Program (WRE)

Cover Crop

- Maryland Department of the Environment (Bay Restoration Fund) via MACS
- USDA NRCS Environmental Quality Incentive Program (EQIP)
- USDA NRCS Conservation Stewardship Program (CSP)

The programs listed above are meant to assist landowners in implementing BMPs and to help to achieve TMDLs; however, no one landowner or government agency can solve the problem independently. Achieving TMDLs as outlined by MDE in the WIPs and improving the water quality of the Bay will require the cooperation of different state agencies, counties, and individual stake holders for many years.

5.8. Funding Sources for Non-Point Source Programs

Programs providing funding to address non-point sources of nitrogen, phosphorus, and other pollutants include the following:

- **OSDSs (Conversion to Denitrifying OSDSs)**
The Kent County Department of Environmental Health has implemented the BRF OSDS Grant Awards and Installations Program. To date, the County has received more than \$5,726,000 in grants to upgrade qualifying onsite systems and has installed approximately 439 upgrades.
- **Environmental Quality Incentives Program (EQIP)**
USDA NRCS manages and implements the Environmental Quality Incentives Program (EQIP) through a locally led process that promotes agricultural production and environmental quality as compatible goals. Through EQIP, agricultural producers receive financial and technical assistance to implement structural and management conservation practices that optimize environmental benefits on working agricultural land. Some of the priority resource goals addressed through EQIP include nonpoint source pollution reductions, conservation of water resources, reduced soil erosion and sedimentation, increased nutrient management implementation. Program payment limitation is \$450,000 for the life of the current Farm Bill. Producers enter into contracts for 1 to 5 years.
- **Agricultural Management Assistance (AMA)**
USDA NRCS provides cost share assistance to agricultural producers through AMA to help producers manage risk and to voluntarily address natural resource issues such as water management, water quality, and erosion control by incorporating conservation into their farming operations. In 2016 Maryland NRCS is offering assistance with irrigation and seasonal high tunnels.
- **Conservation Stewardship Program (CSP)**
USDA NRCS offers the Conservation Stewardship Program (CSP) to help agricultural producers maintain and improve their existing conservation systems and adopt additional conservation activities to address priority resources concerns. Participants take additional steps to improve the resource conditions on their land—including soil, air and habitat quality, water quality and quantity, and energy conservation. CSP provides two types of payments through five-year contracts: annual payments for installing new conservation activities and maintaining existing practices; and supplemental payments for adopting a resource-conserving crop rotation. Participants earn CSP payments for conservation performance—the higher the performance, the higher the payment.

- **Conservation Innovation Grant**

USDA NRCS administers the Conservation Innovation Grant program (CIG) which is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging Federal investment in environmental enhancement and protection, in conjunction with agricultural production. Under CIG, Environmental Quality Incentives Program (EQIP) funds are used to award competitive grants to non-Federal governmental or non-governmental organizations or individuals.

CIG enables NRCS to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the Nation's most pressing natural resource concerns. CIG will benefit agricultural producers by providing more options for environmental enhancement and compliance with Federal, State, and local regulations. The Natural Resources Conservation Service (NRCS) administers CIG. The CIG requires a 50-50 match between the agency and the applicant.
- **Conservation Reserve Program (CRP)/ Conservation Reserve Enhancement Program (CREP)**

The USDA Farm Service Agency administers the CRP programs while USDA NRCS provides the technical support. The programs are designed to set aside and implement conservation measures to protect highly erodible land and other sensitive farmland for a period of 10 to 15 years. CREP also targets the creation of riparian buffers and wetland restoration. MDA also offers additional cost-share through the MACS Program for installation of BMPs and may purchase easements under CREP.
- **Maryland Agricultural Water Quality Cost-Share (MACS) Program**

MACS was established by State law in 1984 to help farmers control nutrient runoff and protect water quality and natural resources on their farms and comply with Federal and State environmental regulations. MACS provides farmers with grants to cover up to 87.5 percent of the cost to install BMPs on their farms to control soil erosion, manage nutrients, and safeguard water quality. A maximum funding level of up to \$50,000 per project and \$ 150,000 per farm applies. Farmers receiving MACS funds for animal waste treatment and containment projects may receive up to \$200,000 per project with a maximum of \$300,000 per farm when combined with other BMPs. In many instances, MACS and (USDA) funds may be combined.
- **Cover Crop Program**

The Cover Crop Program provides cost share assistance to farmers to implement this BMP through the BRF. Since October 1, 2005, a \$30 annual fee is collected from each home served by an OSDS. The total estimated program income is \$12.6 million per year in Maryland. Forty percent of these funds will be used for cover crops. Cover crops absorb unused crop nutrients remaining in the soil following the fall harvest and act as a ground cover to keep the soil from eroding during the winter months. Maryland continues to refine the program, providing tiered incentives to encourage early planting, which maximizes nutrient uptake. Cost-share support is administered through MACS.
- **Manure Transport**

This program provides cost-share assistance of up to \$20 per ton to transport manure from animal operations with excess waste or documentation of phosphorus over-enrichment to farms where it is land applied in accordance with a nutrient management plan or for alternative uses. Poultry companies provide a 50 percent match for litter transported from their growers' farms. Cost-share support is administered through MACS.

- Maryland Nutrient Management Program

This program provides financial and technical assistance to farmers to help them meet requirements of the Water Quality Improvement Act. Farmers who have a gross income of \$2,500 or more or who have 8,000 pounds or more of animals must have a nutrient management plan. Nutrient management plans address the timing, application, and management of all nutrient sources used in the farming operation. The Maryland Department of Agriculture (MDA) certifies and licenses private and public sector nutrient management consultants who provide technical assistance in the development and implementation of nutrient management plans. Maryland Cooperative Extension develops nutrient management plans for farmers and trains consultants and farmers to become certified planners, enabling farmers to prepare their own plans. Cost share for private sector development of plans is available from MACS or the Environmental Quality Incentives Program (EQIP).

- Wetland Reserve Easement (WRE)

NRCS also provides technical and financial assistance directly to private landowners to restore, protect, and enhance wetlands through the purchase of a wetland reserve easement.

There are three enrollment options for participants:

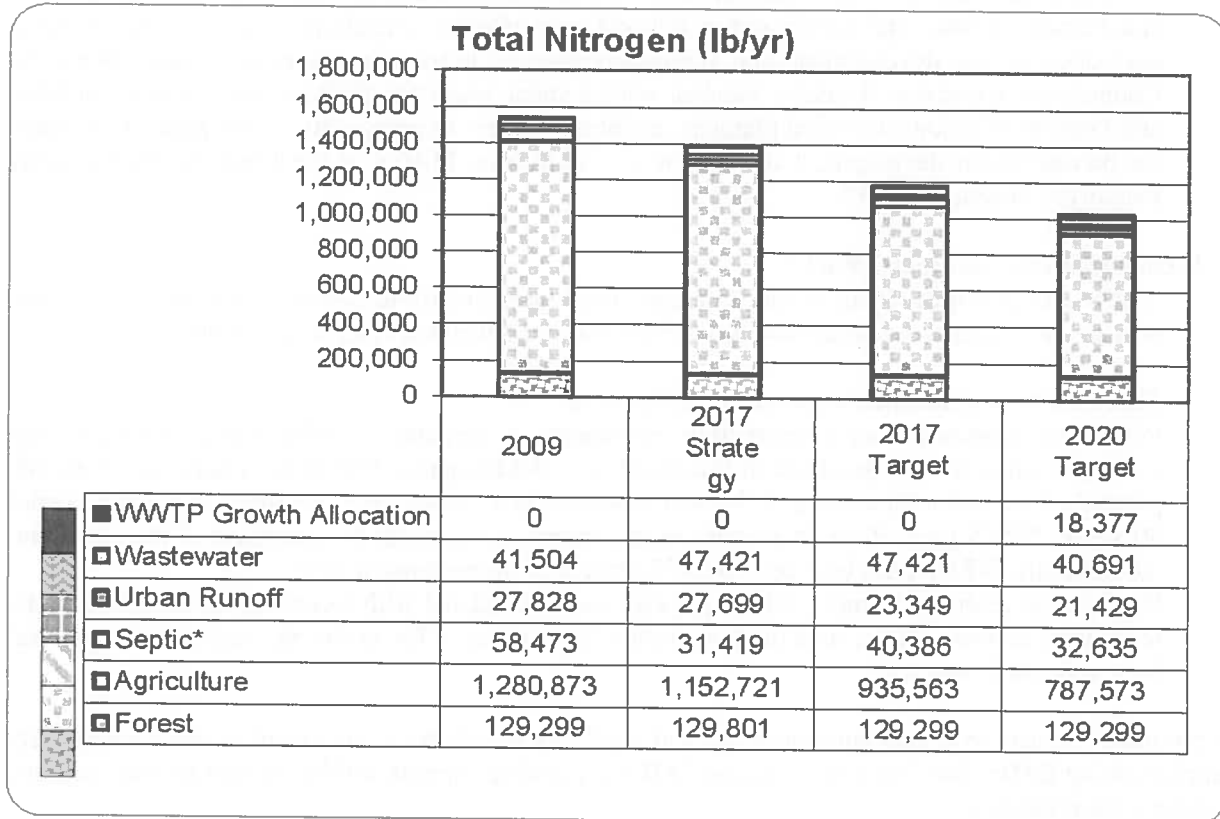
Permanent easements are conservation easements in perpetuity. NRCS pays 100% of the easement value for the purchase of the easement. Additionally, NRCS pays between 75 to 100 percent of the restoration costs. A 30-year easement is a conservation easement that expires after 30 years. NRCS pays 50 to 75 percent of the easement value for the purchase of the easement. Additionally, NRCS pays between 50 to 75 percent of the restoration costs.

For wetland reserve easement, NRCS pays all costs associated with recording the easement in the local land records office, including recording fees, charges for abstracts, survey and appraisal fees, and title insurance.

The programs, subject to annual appropriations and eligibility listed above, are meant to assist landowners in implementing BMPs that assist in achieving TMDLs. Funding support will be an appropriate incentive to advance the programs.

Figure 5-1

Kent Delivered Loads - From Now to 2020
Total Nitrogen (lbs./year)

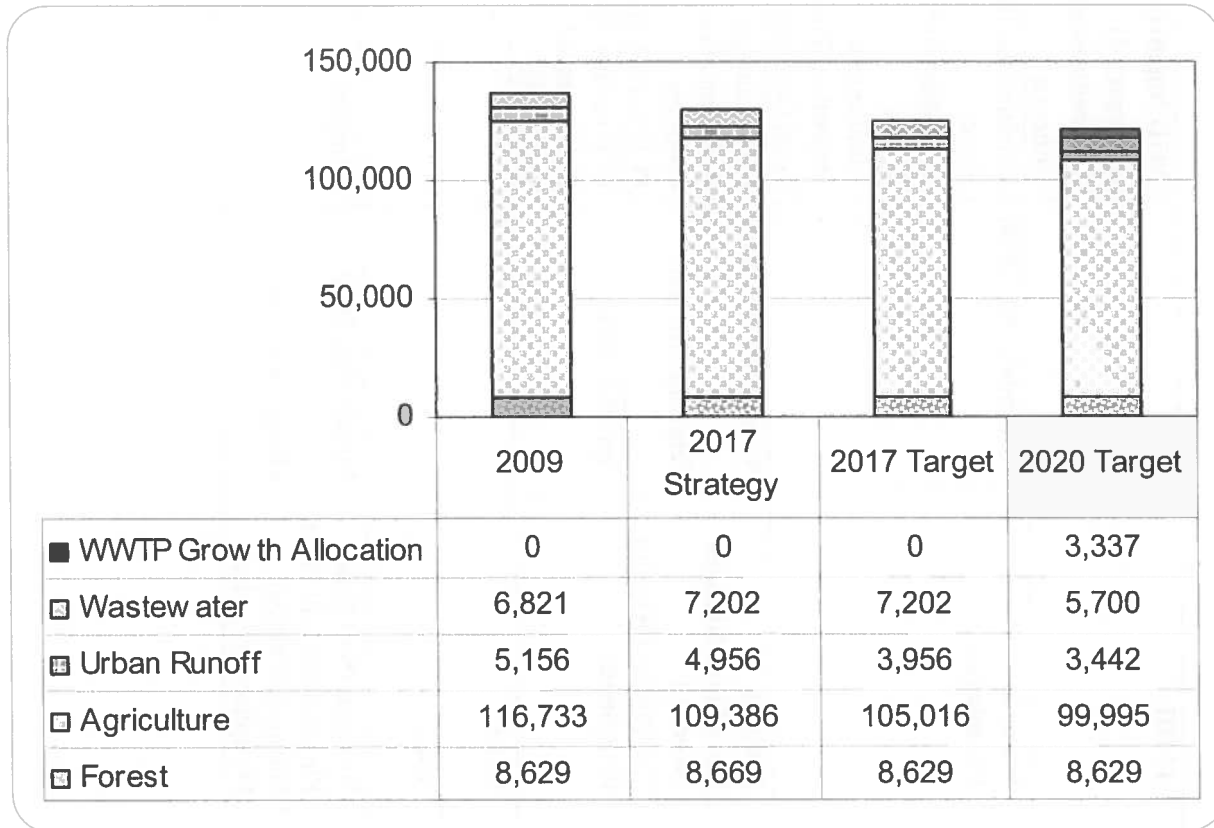


* Different assumptions were used by the US EPA for 2009 septic loads versus 2017 and 2020. Reductions from 2009 are likely less than indicated here.

Source: MDE 2011 (Kent WIP 2017 Strategies)

Figure 5-2

Kent Delivered Loads - From Now to 2020
Total Phosphorus (lbs./year)



Source: MDE 2011 (Kent WIP 2017 Strategies)

Table 5-1: Characteristics of Kent County, Maryland Watersheds

Watershed	Area (Acres)	Wastewater Plants located in Watershed	TMDL	Date	303D Impaired List (Category 5) Environmental Concern
Upper Chester River	87,980	Millington WWTP	Nitrogen Phosphorus	November 28th, 2006	Combination Benthic Fishes Methylmercury-Fish Tissue Atmospheric Deposition Toxics Fecal Coliform
Middle Chester River	39,948	Chestertown WWTP Kennedyville WWTP Worton WWTP Velsicol WWTP	Nitrogen Phosphorus Nitrogen (Worton) Phosphorus (Worton)	November 28th, 2006 February 6th, 2002	Contaminated Sediments Fecal Coliform PCB in Fish Tissue
Sassafrass River	56,935	Galena WWTP Betterton WWTP	Phosphorus	April 1st, 2002	PCB in Fish Tissue Contaminated Sediments
Lower Chester River	82,241	Rock Hall WWTP	None		
Langford Creek	27,025	None	None		
Stillpond Fairlee	40,909	Tolchester WWTP Great Oaks Resort Club WWTP	Nitrogen (Still Pond) Phosphorus (Still Pond) Nitrogen (Fairlee) Phosphorus (Fairlee)	March 25th, 2002 March 18th, 1999	Nitrogen

Table 5-2: Kent County Land Use Table

	Land Use in Acres 2010 ¹ Acres
Very Low Density Residential ¹	4,397
Low Density Residential	6,371
Medium Density Residential	2,128
High Density Residential	227
Commercial	994
Industrial	38
Other Developed Lands/ Institutional/Transportation ²	1,518
Total Developed Lands	15,673
Agriculture	116,313
Forest	41,997
Extractive/Barren/Bare	49
Wetland ³	4,397
Total Resource Lands	162,755
Total Land	178,428
<i>Water</i>	79,006

¹ Updates/modifications to the 2010 land use/land cover layers used the 2007 NAIP aerial imagery and parcel information from Maryland Property View 2008.

² Two new categories have been added to the 2010 Land Use/Land Cover layer update; very low density residential development (191,192) and transportation (80).

³ Wetlands acreage is provided by the Maryland Department of Planning to be able to assign land use. The National Wetlands Inventory mapping indicate approximately 19,267 acres of wetlands which includes tidal water wetlands.

