Kent County Comprehensive Water & Sewerage Plan

October 2012

Kent County Comprehensive Water & Sewerage Plan

Prepared for:
The County Commissioners of Kent County, Maryland

October 2012

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RESOLUTION

A RESOLUTION OF THE COUNTY COMMISSIONERS OF KENT COUNTY ADOPTING THE 2012 UPDATE TO THE COMPREHENSIVE WATER AND SEWERAGE PLAN

BE IT RESOLVED by the County Commissioners of Kent County that the attached Comprehensive Water and Sewerage Plan is hereby updated and amended in compliance with the requirements of Environment Article, Section 9.503 of the Annotated Code of Maryland.

BE IT FURTHER RESOLVED that this resolution shall be effective immediately.

WITNESS the hands and seal of the County Commissioners of Kent County this 31th day of October, 2012.

THE COUNTY COMMISSIONERS
OF KENT COUNTY, MARYLAND

Ronald H. Fithian, President

William W. Pickrum, Member

William A. Short, Member

ATTEST

Sondra Blackiston, Clerk

ENGINEERING CERTIFICATION

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

DATE: 11/7/12

SIGNED: _____

JAMES M. WRIGHT, JR., P.E.
COUNTY ENGINEER

Kent County Department of Planning, Housing and Zoning

TELEPHONE 410-778-7475

KENT COUNTY GOVERNMENT CENTER
400 HIGH STREET
CHESTERTOWN, MD 21620

FACSIMILE 410-810-2932

This is to certify that the Kent County Planning Commission and Director of Planning have reviewed the Kent County Water and Sewerage Plan and have found the Plan to be generally consistent with the Kent County Comprehensive Plan and Coastal Zone Management Program.

Date: November 8, 2012

Signed: Amy G. Moredock

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 0l 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 Water and Wastewater Services, 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, 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 law.

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 Water and Wastewater Services. 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.

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. The conservation of water supply is encouraged and is enforced through compliance with the Maryland Water Conservation Plumbing Fixtures Act, including but not limited to encouragement of retrofitting, public education, qualified management, and other measures.

1.3. Organization

A functional table of organization is included at the end of this Chapter.

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 Water and Wastewater Services

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 Water and Wastewater Services 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 Water and Wastewater Services 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 **W-1 or "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 **W-2 or "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).

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 Water and Wastewater Services. The Kent County Department of Water and Wastewater Services 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 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). 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 **S-1 or "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 **S-2 or "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.

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 Water and Wastewater Services. The Kent County Department of Water and Wastewater Services 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 treatment process acceptable to the Kent County Department of Water and Wastewater Services with disposal 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, 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 (drainfields, 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.

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 **S-2** and **W-2** 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)

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:

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 pass 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 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 (MWCPFA).

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 25 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 Water and Wastewater Services and the 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 Water and Wastewater Services 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 Water and Wastewater Services) 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 Water and Wastewater Services) 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. All critical equipment should be protected from debris carried by the waters of the 100-year flood where practical.

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, its 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 **S-1** and **W-1** 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 **S-2** and **W-2** 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 **S-1/W-1** 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 and correspond to COMAR's S-6/W-6.

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 Water and Wastewater Services, 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 Public Works 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 public works 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 PWA; 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 Commissioners reserve the right to review and recapture any allocations that have not been connected to Kent County's water and/or sewer lines in the event that the Wastewater Plant in the district for which they were approved is within 85 percent of its design capacity. Owner acknowledges the Commissioners' right to recapture any unconnected allocations subject to this Agreement and subject to the conditions stated in this paragraph. Owner further acknowledges that allocation fees for any recaptured allocation are NON-REFUNDABLE. The failure of the Commissioners to undertake the review and recapture at a time when the Wastewater Plant is within 85 percent of its design capacity shall not constitute a waiver of the provisions of this paragraph in the event that the Commissioners decide to conduct a review and recapture during a subsequent time when the plant is within 85 percent of capacity.

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.

The owner shall guarantee the construction for a period of one (1) year from initial acceptance by the Department.

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 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 2013. 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.
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 service 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 this Tributary Strategy element, (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 sewered 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 Society, 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 OSDSs. The 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 OSDSs. 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 Water and Wastewater 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 MDP 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 Water and Wastewater Services. 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 a PWA.

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 Water and Wastewater Services 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 must be 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 Water and Wastewater Services; 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, the Comprehensive Plan, and where applicable the Village Master 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, Comprehensive Plan, and where applicable the Village Master 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 Water and Wastewater Services. 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 Water and Wastewater Services.

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 Water and Wastewater Services 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 **W1/S1** or **W2/S2** 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.

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 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 5-3. 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; 59 percent of the land is agriculture, and forests and wetlands account for 29 percent (MDP Land Use, 2002). 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 22,700.

2.3. Planning

2.3.1. WRE Overview

The 2012 Water and Sewer Plan Update will comply 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 HB 1141 (Land Use-Local Government Planning), 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 county comprehensive plan.

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 2030 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 2030 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 because all of Kent County draws from same aquifer and there have been no previous reported water supply problems. The water service areas have no planned extensions and demand is not expected to increase. The exception is the Worton Treatment Plant which has adequate capacity for growth. No water supply problems are anticipated in the 2030 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 Surveys have developed a Science Plan for a Comprehensive Regional Assessment of the Atlantic Coastal Plain Aquifer System. The study area will encompass 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 and discharge nutrient caps and evaluated under present and projected future (2030) conditions. The available capacity is converted to growth potential and is presented in available equivalent dwelling units (EDUs) that can be added to each WWTP. This analysis will provide county officials with the information necessary to concentrate growth in areas served by WWTP 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

Detailed analysis procedures and intermediate results are presented in Appendix 2-A. 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 2011 Discharge Monitoring Reports (DMRs) and information provide by the towns. Tolchester provided loadings and flows for the first 5 months of 2012 which were converted to concentrations. The Betterton WWTP does not record effluent concentrations and were assumed to operating at ENR Strategy concentrations for minor WWTPs. The most recent DMRs (source details can be seen in Appendix 2-E were used to determine the concentrations for the Rock Hall, Galena, Millington and Kennedyville WWTPs. Chestertown was assumed to be operating at ENR because no information was provided by the Town. 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 estimated by comparing the ratio of acres in the current service area to acres in the future service area derived from the GIS files, with the exception of Chestertown and Millington where future flows were provided by the municipalities. In the future, this procedure will be refined using capacity management plans or growth simulation results from MDP when information becomes available.

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 140,000 gpd is used to calculate current conditions in the WWTP analysis. Rock Hall, Tolchester, Kennedyville and Betterton have adequate capacity for their projected future growth. Chestertown is expected to use all of its available hydraulic capacity for annexations. The Worton plant was upgraded to 250,000 gpd and is expected to use all of the 250,000 gpd capacity. Using the current design capacity and the assumed effluent nutrient concentrations, the Betterton WWTP cannot accommodate the proposed growth; however, if the planned expansion is completed, there will be adequate hydraulic capacity. The Galena WWTP capacity will need to be upgraded to accept the flow from Georgetown and additional growth in the future.

Table 2-4 and 2-5 show the results of the nitrogen and phosphorus analysis. The results show, that under current conditions, the County-owned WWTPs of Tolchester, Worton and Kennedyville along with the town-owned plants of Chestertown, Rock Hall and Galena are meeting their nutrient caps for both nitrogen and phosphorus and have potential room for growth. Based on the assumed effluent concentrations Betterton is currently over their nutrient caps.

Under projected 2030 conditions, Rock Hall, Tolchester and Kennedyville will have additional capacity for growth. Worton, Galena, Millington, and Betterton will be over their nutrient caps or hydraulic capacity and would be required to expand/upgrade their WWTPs to account for projected growth.

Meeting the nutrients caps is based on the assumption that Galena, Millington and Betterton WWTPs are required when upgraded to meet the ENR limits of a major plant. Chestertown is expected to use all of available capacity with proposed annexations. As noted previously in this section the Worton WWTP has been upgraded and upgrades are currently being planned for the Millington WWTP and are anticipated to meet 2030 conditions.

Table 2-1 Population

	1950 Census	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

MDP Projections

	2015	2020	2025	2030	2035	2040
Kent County	20,700	21,500	22,200	22,700	23,150	23,600

Projections prepared by the Maryland Department of Planning, March 2012

Table 2-2

Water Supply Evaluation

Water Supply Plant	Permitted Flow (GPD)	Current Demand (GPD)	Capacity*
Chestertown	975,000	709,000**	N/A
Rock Hall	230,000	185,000	N/A
Galena	90,000	51,000	N/A
Betterton	50,000	31,000	115,200
Millington	137,000	44,850	273,600
Kennedyville	51,800	17,400	129,600
Worton-Butlertown	71,000	66,100	216,000
Fairlee	146,000	46,400	N/A

* Based on Well Production

** 2009 Value from the Town master plan.

Table 2-3- Hydraulic Capacity

General Information		2011 Conditions			2030 Conditions		
Name of Plant	Design Capacity (gpd)	Flow (gpd)	Surplus/Deficit (gpd)	Available EDU Capacity	Flow (gpd)	Surplus/Deficit (gpd)	Available EDU Capacity
Major Plants							
Chestertown WWTP[3]	1,500,000	706,000	794,000	3,176	1,025,000	475,000	0
Minor Plants							
Rock Hall WWTP	510,000	278,000	232,000	928	300,000	210,000	840
Galena WWTP[5]	80,000	34,000	46,000	184	150,000	-70,000	-280
Millington WWTP[4]	145,000	63,600	81,400	326	250,000	-105,000	-420
Worton WWTP	250,000	87,000	163,000	652	250,000	0	0
Tolchester WWTP	265,000	83,000	182,000	728	116,810	148,190	593
Kennedyville WWTP	60,000	12,500	47,500	190	25,872	34,128	137
Betterton WWTP	200,000	23,000	177,000	708	23,000	177,000	708

1 Each Equivalent Dwelling Unit was assumed to discharge 250 gpd.

2 Documentation of Source Information can be seen in Appendix 2-E.

3 2011 conditions are based on 2009 flows, no updated information provided by the town. 2030 Chestertown flow calculation predicted 1,025,000 gpd taken from Town's 2009 master plan .

4 2011 Millington flows are 63,400 gpd. 2030 flows are based on discussions at the 1/14/09 meeting, adequate capacity is expected to be available once planned upgrades are completed.

5 Galena is in the process of upgrading their plant to ENR levels at 80,000 gpd and planning for additional capacity upgrades are included in the current upgrade. Adequate capacity is expected to be available once planned upgrades are completed.

Table 2-4- Nitrogen Load Capacity

General Conditions		2011 Conditions			2030 Conditions		
Name of Plant	Limit (lb/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[1]	18,273	6,447	11,826	5,180	9,361	8,912	3,904
Minor Plants							
Rock Hall WWTP	15,615	4,902	10,713	1,656	7,762	7,853	1,214
Galena WWTP[5]	1,538	1,188	350	40	1,370	168	74
Millington WWTP [6]	3,342	1,181	2,161	466	2,283	1,059	464
Worton WWTP [7]	3,631	543	3,088	990	1,560	2,071	664
Tolchester WWTP	5,584	1,592	3,992	833	2,240	3,344	697
Kennedyville WWTP	1,399	198	1,201	304	410	989	250
Betterton WWTP	1,224	1,260	-36	-3	210	1,014	444

1 Limits were established from MDE worksheet, Appendix 2B.
2 2011 and 2030 Conditions Assume Chestertown is operating at ENR levels. 2030 Chestertown flow calculation predicted 1,025,000 gpd taken from Town's 2009 master 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 DMRs, if plant performance changes so will the number of available EDUs.
5 Galena is in the process of upgrading their plant to ENR levels at 80,000 gpd and planning for additional capacity upgrades are included in the current upgrade. Adequate capacity is expected to be available once planned upgrades are completed.
6 Millington 2030 flows are based on discussions at the 1/14/09 meeting.
7 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			2011 Conditions			2030 Conditions		
Name of Plant	Limit (lb/year)	Maximum Limit if Plant Expands (lb/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[7]	1,371	1,371	645	726	3,181	936	435	1,905
Minor Plants WWTP								
Rock Hall WWTP	461	461	305	156	571	274	187	819
Galena WWTP[5]	1,948	1,948	719	1,229	232	137	1,811	7,932
Millington WWTP [6]	457	457	194	263	346	228	229	1,002
Worton WWTP[8]	457	457	28	429	2,686	80	377	2,360
Tolchester WWTP	931	457	68	863	4,199	96	361	1,757
Kennedyville WWTP	233	233	21	212	497	44	189	443
Betterton WWTP	204	204	210	-6	-3	21	183	802

1 Limits were established from MDE worksheet.
2 2009 and 2030 Conditions Assume Chestertown is operating at ENR levels.
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 DMRs, if plant performance changes so will the number of available EDUs.
5 Galena is in the process of upgrading their plant to ENR levels at 80,000 gpd and planning for additional capacity upgrades are included in the current upgrade. Adequate capacity is expected to be available once planned upgrades are completed.
6 Millington 2030 flows are based on discussions at the 1/14/09 meeting, the plant is assumed to be operating at ENR levels.
7 2009 Chestertown flow calculation predicted 805,000 gpd. Based on 1/14/09 meeting, proposed annexations will use the remaining 695,000 gpd.
8 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	2011 Conditions		2030 Conditions	
Major Plants	**Available EDUs**	**Limiting Factor**	**Available EDUs**	**Limiting Factor**
Chestertown WWTP	3,176	Hydraulic	0	Hydraulic
Minor Plants WWTP				
Rock Hall WWTP	571	Phosphorus	819	Phosphorus
Galena WWTP	40	Nitrogen	-280	Hydraulic
Millington WWTP	326	Hydraulic	-420	Hydraulic
Worton WWTP[5]	652	Hydraulic	0	Hydraulic
Tolchester WWTP	728	Hydraulic	593	Hydraulic
Kennedyville WWTP	190	Hydraulic	137	Hydraulic
Betterton WWTP[4]	-3	Nitrogen/Phosphorus	444	Nitrogen

1 2009 and 2030 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 existing loadings are based on assumed effluent concentrations and not an actual representation.
5 Kent County upgraded their Worton plant to 250,000 gpd. 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 2030 Conditions Assume Chestertown, Millington and Galena are operating at ENR levels after capacity upgrades. And with Betterton's proposed plant upgrade it is assumed ENR levels will be obtained.

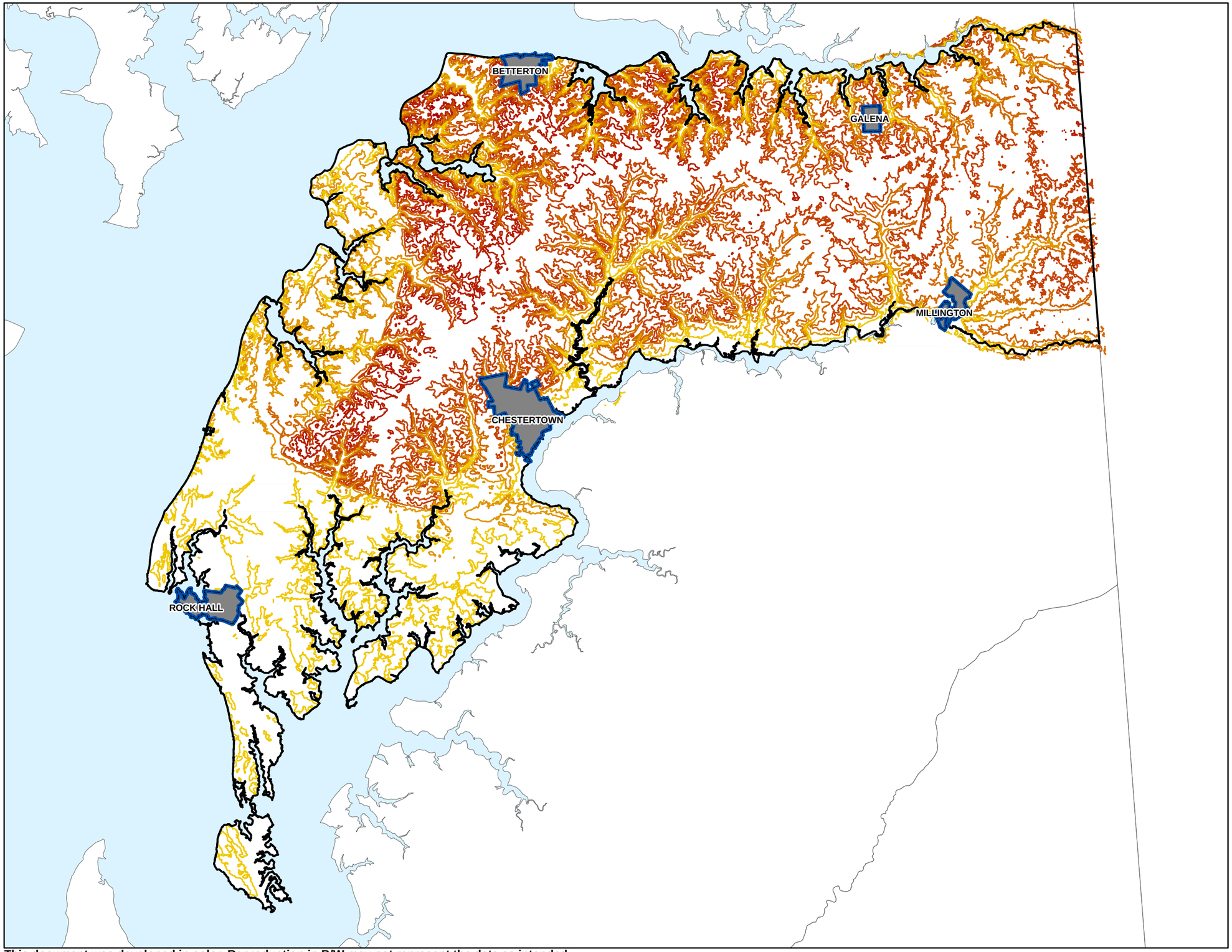

FIGURE 2-1

KENT COUNTY TOPOGRAPHY

Legend

- Incorporated Town
- County Boundary

Topography

Elevation (Meters)

- 5
- 10
- 15
- 20
- 25
- 30

Kent County
Comprehensive Water and
Sewer Plan 2012

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0 1.5 3 6

Miles

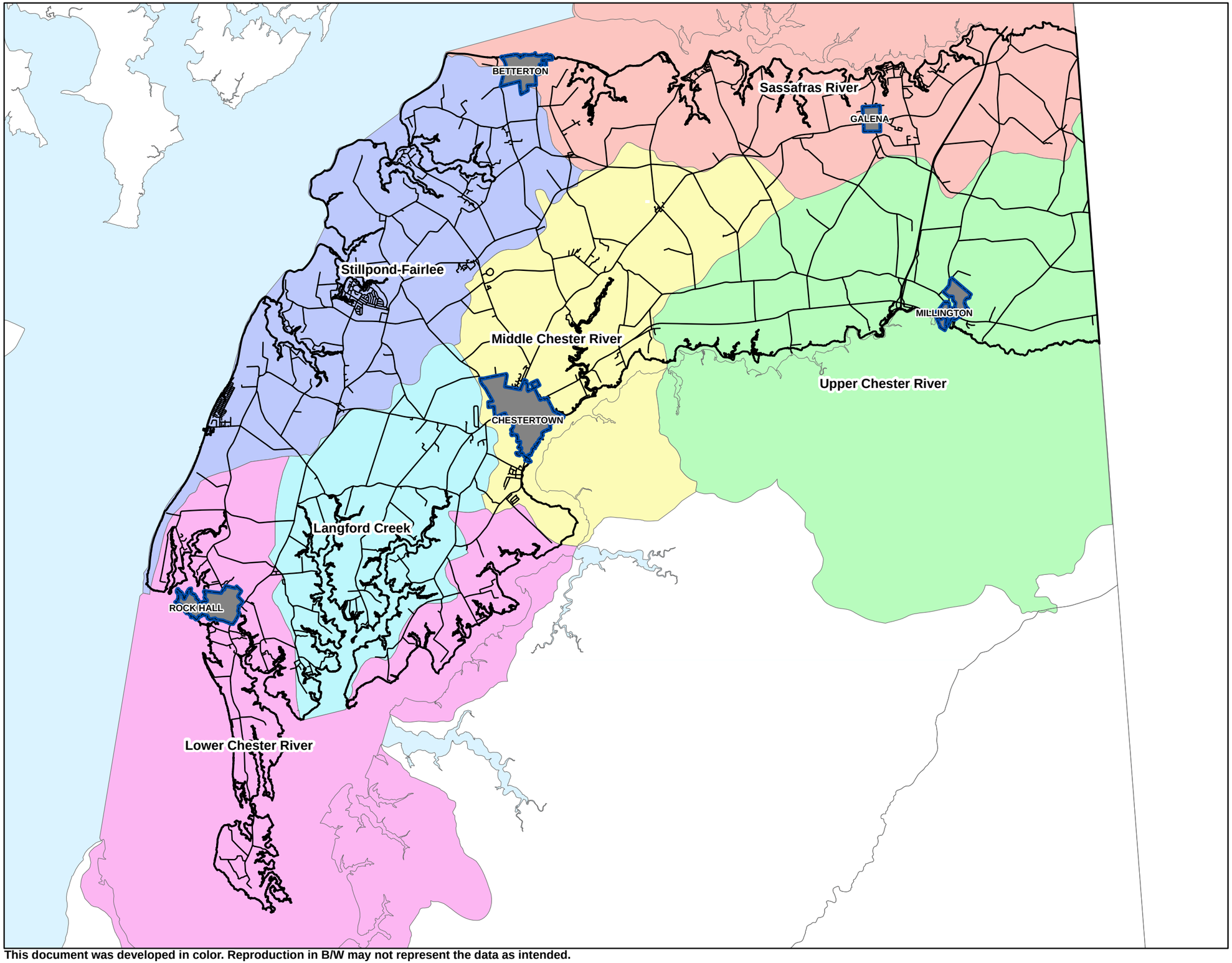
1 in = 3 miles

Kent County Department of Planning,
Housing and Zoning. October 2012.

This document was developed in color. Reproduction in B/W may not represent the data as intended.

FIGURE 2-2

KENT COUNTY WATERSHEDS



Legend

- Incorporated Town
- County Boundary

Watershed

- Stillpond-Fairlee
- Sassafras River
- Upper Chester River
- Middle Chester River
- Lower Chester River
- Langford Creek

Kent County
Comprehensive Water and
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1 in = 3 miles

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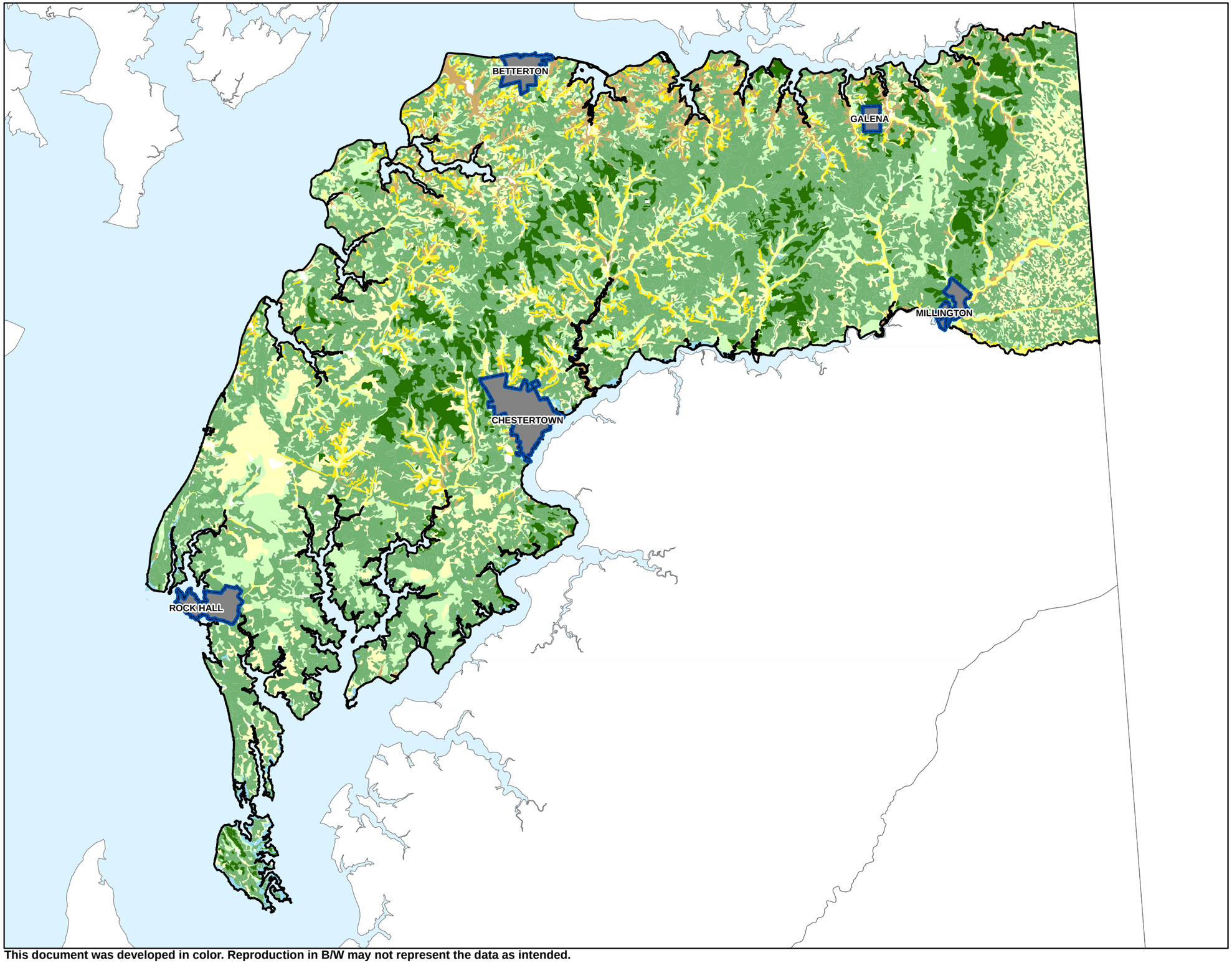

FIGURE 2-3

KENT COUNTY SOILS

Legend

- Incorporated Town
- County Boundary

Soil Capability Class

- I
- II
- III
- IV
- V
- VI
- VII
- VIII

Kent County
Comprehensive Water and
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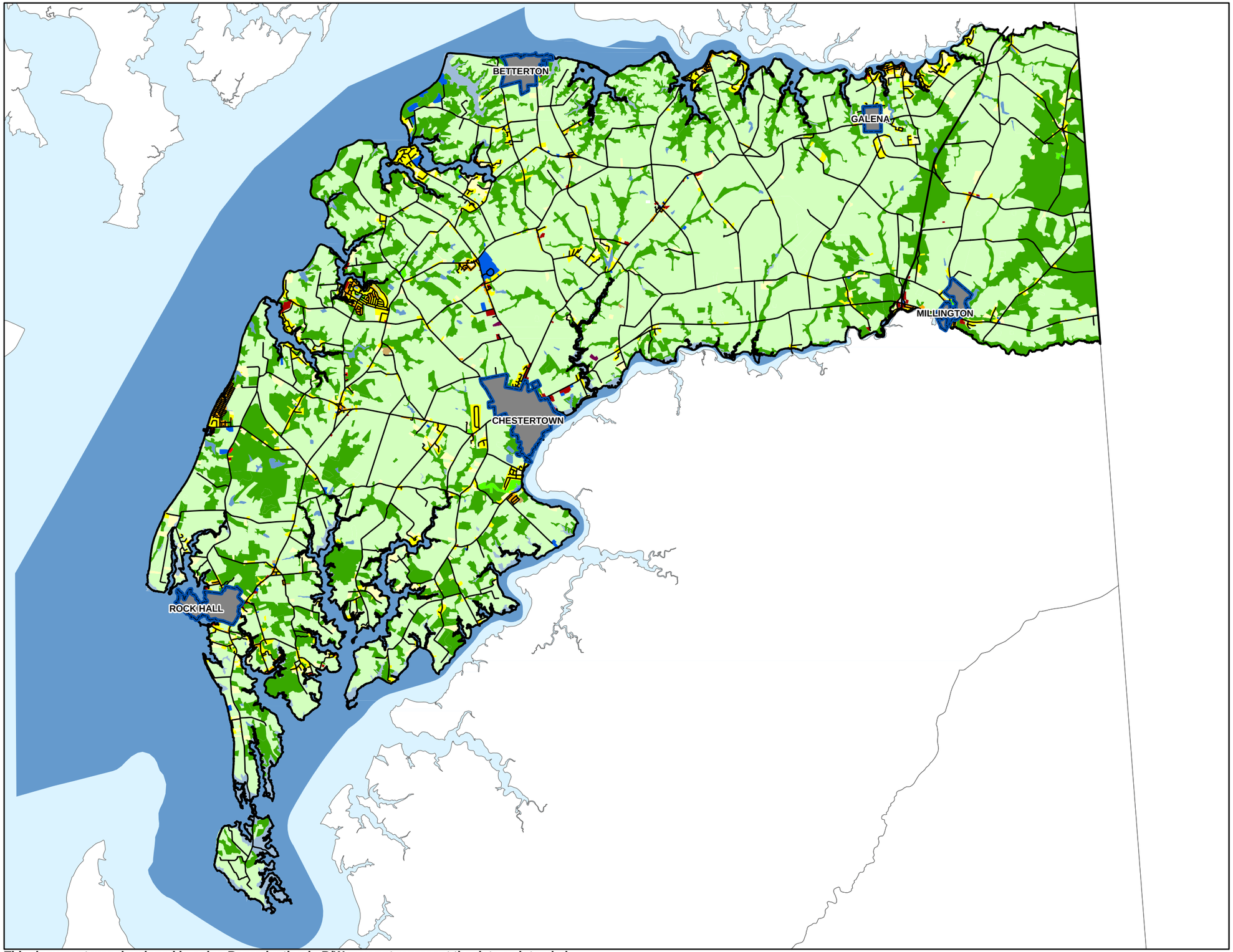

FIGURE 2-4

KENT COUNTY
LAND USE/LAND COVER

Legend

- Incorporated Town
- County Boundary

2010 Land Use/Land Cover

- Very Low Density Residential
- Low Density Resdential
- Medium Density Residential
- High Density Residential
- Commercial
- Industrial
- Institutional
- Open Urban Land
- Agriculture
- Forest
- Water
- Wetlands
- Barren

Kent County
Comprehensive Water and
Sewer Plan 2012

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Miles

1 in = 3 miles

Kent County Department of Planning,
Housing and Zoning. October 2012.

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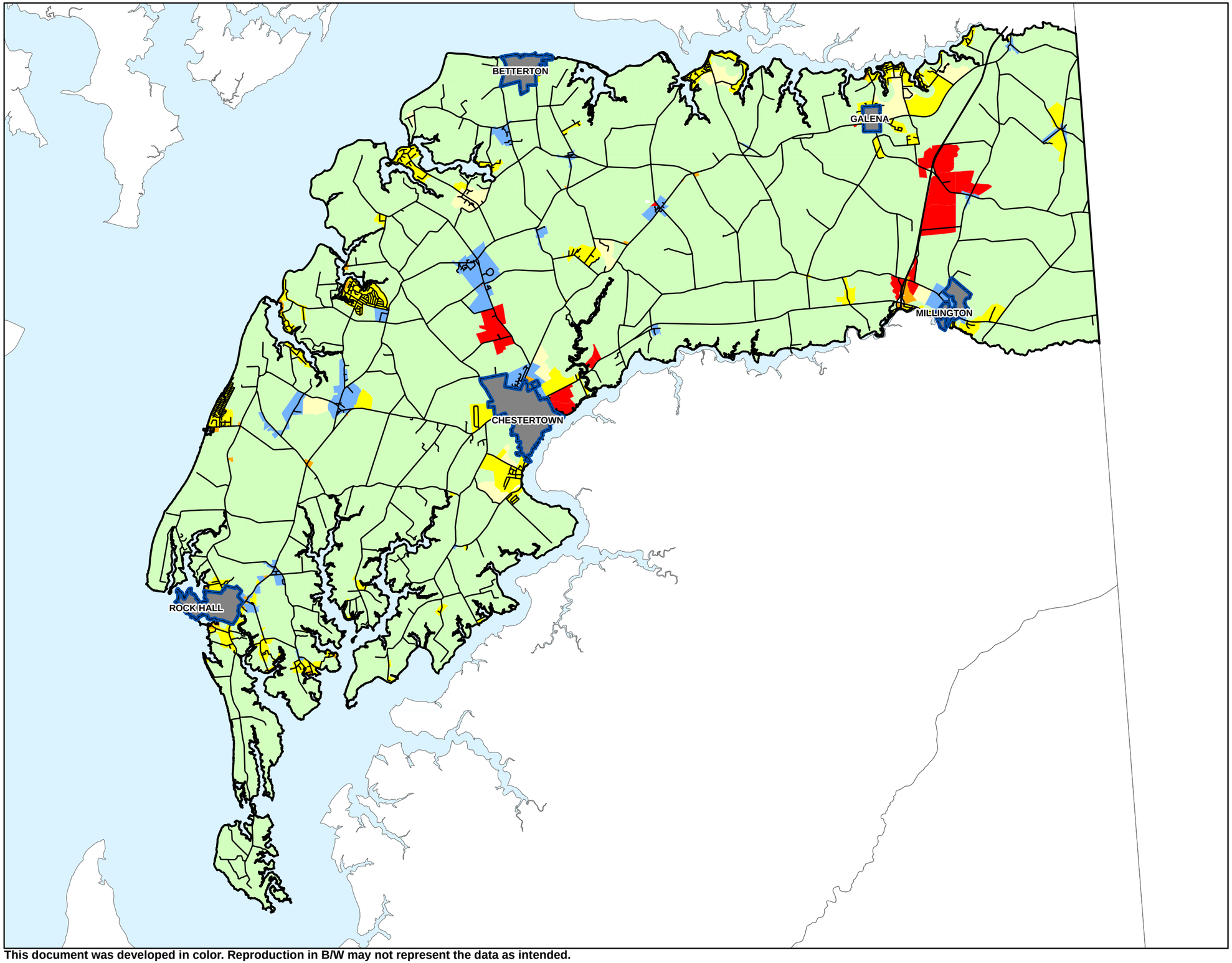

FIGURE 2-5

KENT COUNTY GENERALIZED ZONING

Legend

- Incorporated Town
- County Boundary

General Zoning

- Agricultural
- Very Low Density Residential
- Low Density Residential
- Medium Density Residential
- Commercial
- Industrial

Kent County
Comprehensive Water and
Sewer Plan 2012

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Miles

1 in = 3 miles

Kent County Department of Planning, Housing and Zoning. October 2012.

This document was developed in color. Reproduction in B/W may not represent the data as intended.

3. Water

3.1. General Information

This chapter inventories existing shared water 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 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 OSDSs. 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 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.

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 generally 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 1760 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)

Table 3-1. Source Water Assessment Report Data

Wellhead Protection Area	Source from Confined Aquifer?	WHPA determined to be susceptible to contaminants?	Specific Recommendations *(see below for general recommendations included in all reports)*
Fairlee	yes	no	--
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 (residential and commercial) within the WHPA is limited and is sewered to protect the ground water against microbiological contaminants, excessive nitrates and chemicals from household wastes.

* Two (2) deeper wells have replaced four (4) shallower wells on which source water assessment was based. The two (2) new wells are confined

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

General recommendations for all the Source Water Assessments include:

- Institute wellhead protection strategies.
- 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.

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. 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 within the 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 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 of 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 ground-water-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 poteniometric 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 the MDE. Rates and quantity of proposed withdrawal are design to utilize 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.

3.3. 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 system taking into account the most limiting factor 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 shall 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 2012 Water and Sewerage Plan includes future demand projections for 2030, as required for the Water Resources Element of the County Comprehensive Plan, based on a simple ratio of the existing service area and population to the projected population for 2030. The 2030 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 the County. The EPA in conjunction with state and local agencies and institutions continually evaluates the primary drinking water standards to promote human health and safety. The EPA issues new water quality rules periodically, requiring the County's monitoring and testing efforts to continually evolve. EPA's 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 Water and Wastewater Services, intermunicipal agreements between towns and the County exist for the supply of water to the 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)	
	Permitted	Actual2011
Chestertown	975,000	713,000*
Rock Hall	230,000	185000
Galena	90,000	51000
Betterton	50,000	31000 **
Millington	137,000	44850
Kennedyville	51,800	17400
Worton-Butlertown	71,000	66100
Fairlee	146,000	46400

* No new information provided by Town
**3 year average 2009, 2010 and 2011.

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 supply system 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 monthly flow of 1,300,000 gpd. Average daily flow and maximum monthly flow for 2007 were 713,000 gpd and 1,023,000 gpd, respectively.

The Chestertown water service area includes approximately 2,100 connections (EDUs) and approximately 5000 persons.

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 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.

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, the Edesville county service area, and the Wesley Chapel Corridor county service area. A map of the service areas is included at the end of this chapter.

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 and a maximum monthly flow of 300,000 gpd. Average daily flow for 2011 was 185,000 gallons.

The Rock Hall water service area includes 1,183 connections (EDUs) and approximately 2,958 persons.

System History and Upgrades:

In 2008, the town extended an 8-inch diameter water main to Edesville to provide water service to the county system.

3.5.2.1. Edesville Water Service Area

The Kent County Department of Water and Wastewater Services 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.

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.

The old 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 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 decleared to have /had failing septic systems.

3.5.2.2. Wesley Chapel Corridor Water Service Area

The Kent County Department of Water and Wastewater Services 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 and a maximum monthly flow of 120,000 gpd. Average daily flow and maximum month flow for 2011 were 51,000 gpd and 153,000 gpd respectively.

The Galena water service area includes 317 connections (EDUs) and approximately 628 persons.

System History and Upgrades:

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

The town will be applying for a grant for wellhead protection in the near future.

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 and a maximum monthly flow of 60,000 gpd. Average daily flow for winter and summer for 2011 were 29,000 gpd and 34,000 gpd, respectively.

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.

With this plan update, the Town is correcting its water service area to the south Fifth Avenue adding 14 parcels (16, 80, 88, 108, 130, 140, 1521-1, 1522, 1523, 1524, 1524-1, 1525, 1526 and 1527). Apparently, these properties have been always been served but shown incorrectly on the service area plan. See Figure 4-4 Town of Betterton WWTP and Sewerage Service Area.

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 Water and Wastewater Services. A map of the service area is included at the end of this chapter.

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 2011 for the Millington Water System is included in Appendix 3-G. The water system is permitted for an average daily flow of 137,000 gpd and a maximum monthly flow of 160,000 gpd. Average daily flow and maximum monthly flows for 2011 were 44,150 gpd and 50,000 gpd respectively.

The Millington water service area includes 417 connections (EDUs) and approximately 950 persons.

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.

3.5.6. Kennedyville

The Kent County Department of Water and Wastewater Services 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 and a maximum monthly flow of 83,000 gpd. Average daily flow and maximum monthly flows for 2011 were 18,000 gpd and 92.000 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.

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.

3.5.7. Worton / Butlertown

The Kent County Department of Water and Wastewater Services owns and operates the water supply system serving the Worton/Butlertown area 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 2011 for the Worton Subdistrict is included in Appendix 3-G. The water system is permitted for an average daily flow of 71,000 gpd and a maximum monthly flow of 112,000 gpd. Average daily flow for 2006 and maximum monthly flows for 2011 were 67,000 gpd and 190,000 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. The existing treatment facility will be upgraded and expanded. 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 Water and Wastewater Services owns and operates the Fairlee/Georgetown water supply system. It serves Fairlee, Georgetown including residences along Caulks Field Road and Woods Edge Apartments. A map of the service area is included at the end of this chapter.

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 2011 for the Fairlee Subdistrict is included in Appendix 3-G. The water system is permitted for an average daily flow of 146,000 gpd and a maximum monthly flow of 200,000 gpd. Average daily flow for 2011 and maximum monthly flows were 46,000gpd and 143,000 gpd respectively.

The Fairlee / Georgetown water service area includes 327 connections (EDUs) and approximately 820 persons.

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

C & D Enterprises owns and operates a private water supply system that serves the Delta Heights Condominium Project.

The water supply is provided by a single 4-inch diameter well, 185 feet deep, with a capacity of 32 gpm. The system includes a 2500 gallon storage tank.

Treatment consists of aeration, coagulation, flocculation, sedimentation, filtration, disinfection, fluoridation, and corrosion control.

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 from an annual average of 10,000 gpd and 30,000 gpd in month of maximum use to an annual average of 25,000 gpd and 75,000 gpd during the month of maximum use.

3.5.11. Angelica Nurseries

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

3.6. Water Problem Areas

Several areas in Kent County have bacterial contamination of the ground water used for domestic consumption. The primary reason for bacterial contamination of groundwater is 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 surrounding ground water 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 Water and Wastewater Services 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 4.7.3 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 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 and on-site systems. 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 Water and Wastewater Services 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

The Kent County Commissioners have requested that the Kent County Health Department perform an investigation and evaluation of these areas. These are older subdivisions which have very small lots containing both wells and OSDSs. This situation warrants the Health Department to look at both the drinking water quality issues and potential failing OSDSs.

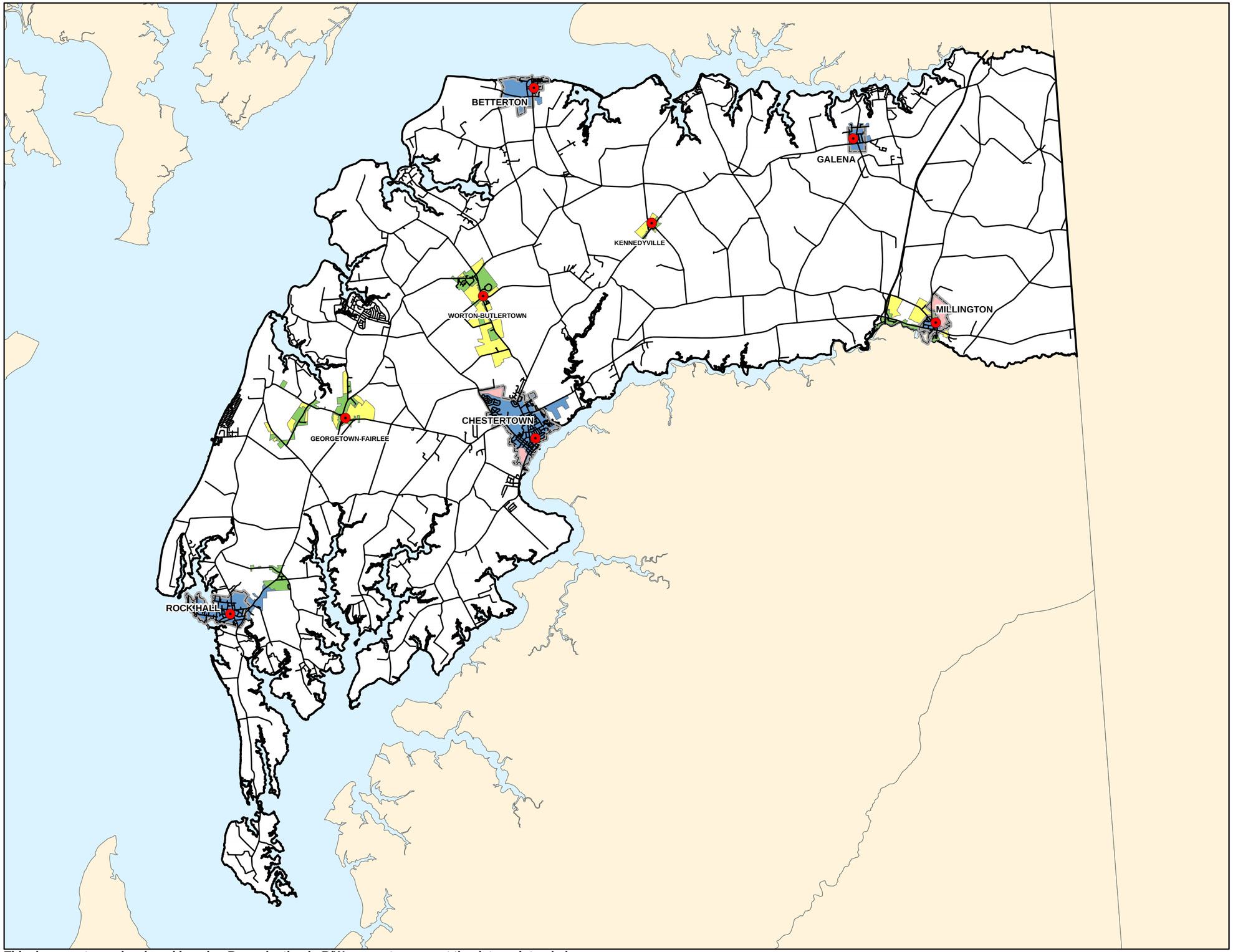

FIGURE 3

KENT COUNTY
WATER SERVICE AREAS

Legend

- Existing Town Service
- Planned Town Service
- Existing County Service
- Planned County Service
- Treatment Plant
- Incorporated Town
- County Boundary
- Road Centerline

Kent County
Comprehensive Water and
Sewer Plan 2012

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Kent County Department of Planning,
Housing and Zoning. October 2012.

This document was developed in color. Reproduction in B/W may not represent the data as intended.

FIGURE 3-1

TOWN OF CHESTERTOWN WATER TREATMENT PLANT & WATER SERVICE AREA

Legend

- Existing Town Service
- Planned Town Service
- Treatment Plant
- Town Boundary
- County Boundary

Kent County
Comprehensive Water and
Sewer Plan 2012

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Kent County Department of Planning, Housing and Zoning.October 2012.

This document was developed in color. Reproduction in B/W may not represent the data as intended.

FIGURE 3-2

TOWN OF ROCK HALL WATER TREATMENT PLANT & WATER SERVICE AREA

Legend

- Existing Town Service
- Existing County Service
- Treatment Plant
- Incorporated Town
- County Boundary

NOTES:
Includes Edesville and Wesley Chapel Corridor Water Service Areas

Kent County
Comprehensive Water and Sewer Plan 2012

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Kent County Department of Planning, Housing and Zoning. October 2012.

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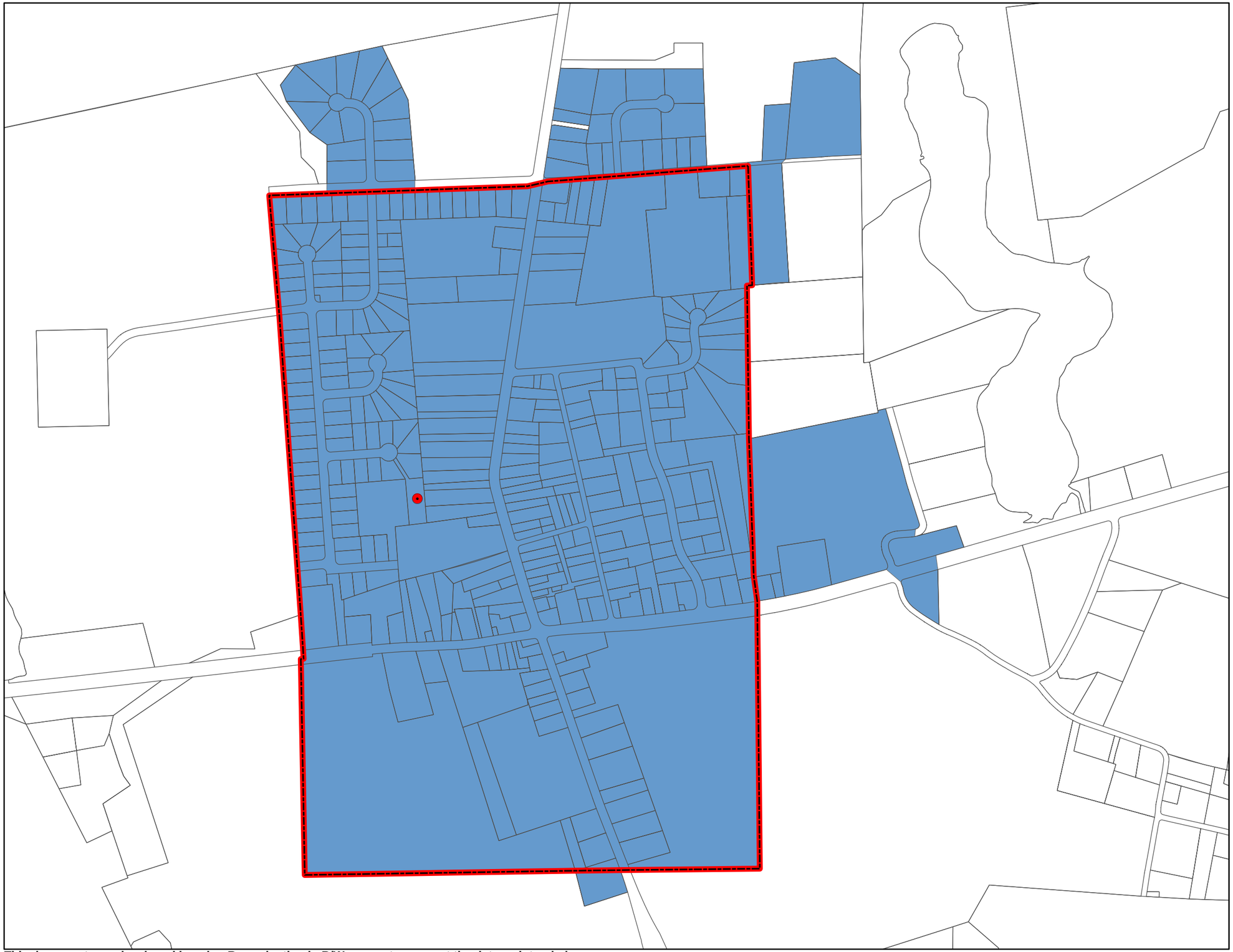

FIGURE 3-3

TOWN OF GALENA
WATER TREATMENT PLANT &
WATER SERVICE AREA

Legend

- Existing Town Service
- Treatment Plant
- Incorporated Town

Kent County
Comprehensive Water and
Sewer Plan 2012

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Kent County Department of Planning,
Housing and Zoning. October 2012.

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FIGURE 3-4

TOWN OF BETTERTON
WATER TREATMENT PLANT &
WATER SERVICE AREA

Legend

- Existing Town Service
- Treatment Plant
- Incorporated Town
- County Boundary

Kent County
Comprehensive Water and
Sewer Plan 2012

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Kent County Department of Planning,
Housing and Zoning. October 2012.

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FIGURE 3-5

TOWN OF MILLINGTON WATER TREATMENT PLANT & WATER SERVICE AREA

Legend

- Existing Town Service
- Planned Town Service
- Existing County Service
- Planned County Service
- Treatment Plant
- Incorporated Town
- County Boundary

Kent County
Comprehensive Water and
Sewer Plan 2012

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Kent County Department of Planning,
Housing and Zoning. October 2012.

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FIGURE 3-6

KENNEDYVILLE WATER TREATMENT PLANT & WATER SERVICE AREA

Legend

- Existing County Service
- Planned County Service
- Treatment Plant

Kent County
Comprehensive Water and
Sewer Plan 2012

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Kent County Department of Planning,
Housing and Zoning. October 2012.

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FIGURE 3-7

WORTON-BUTLERTOWN WATER TREATMENT PLANT & WATER SERVICE AREA

Legend

- Existing County Service
- Planned County Service
- Treatment Plant

Kent County
Comprehensive Water and
Sewer Plan 2012

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Kent County Department of Planning,
Housing and Zoning. October 2012.

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FIGURE 3-8

FAIRLEE-GEORGETOWN WATER TREATMENT PLANT & WATER SERVICE AREA

Legend

- Existing County Service
- Planned County Service
- Treatment Plant

Kent County
Comprehensive Water and
Sewer Plan 2012

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Feet

Kent County Department of Planning, Housing and Zoning. October 2012.

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4. Sewerage

4.l. 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, 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. Significant 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. Non-significant 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 non-significant 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 2012.

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 water supply 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 calculated by any means shall be included in Appendix 4-B of this Water and Sewerage Plan.

The 2012 Water and Sewerage Plan includes future demand projections for 2030, as required for the Water Resources Element of the County Comprehensive Plan, based on a simple ratio of the existing service area and population to the projected population for 2030. The 2030 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.

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.

House Bill 1058, which became effective October 1, 2009, addresses 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 Water and Wastewater 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 Synagro Technologies, Inc. Mid-Atlantic
- Galena – Managed by Synagro Technologies, Inc. Mid-Atlantic (2004)
- Betterton – Self-managed and hauled to Tri-County Landfill
- Millington – Managed by BFI and 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 Water and Wastewater Services, 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	706,000
Rock Hall	480,000	278,000
Galena	60,000	34,000
Betterton	200,000	23,000
Millington	140,000	63,6000[1]
Kennedyville	60,000	12,500
Worton-Butlertown	250,000	114,000[2]
Tolchester	265,000	83,000

1. Permitted flow increased per February 4, 2009, letter from the Mayor of Millington to Kent County. Actual flow estimated at permitted flow for nutrient load calculations.
2. Actual average flow for 2011-2012. 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 treatment facility is permitted for a flow of 900,000 gpd. The flow for 2007 and the average flow for 2005-2007 were 684,000 gpd and 706,000 gpd respectively.

The Chestertown wastewater treatment plant discharges to the Radcliffe Creek a tributary of 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) and approximately 5000 persons.

System History and Upgrades:

In 2012, the Intermunicipal Agreement between the Town and County is up for renewal.

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.

4.5.1.1. Quaker Neck

The Kent County Department of Water and Wastewater Services 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) and approximately 600 persons.

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 removed 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.

4.5.2. Rock Hall

The incorporated Town of Rock Hall owns and operates a wastewater treatment facility. The Rock Hall Wastewater Treatment Plant 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 was permitted for a flow of 505,000 gpd; the facility permit was revised by MDE in 2009 at the Town's request for an annual average flow of 480,000 gpd. The plant is currently considered a minor WWTP. The average flow calculated from 2011 Daily Monitoring Reports (DMRs) is 277,000 gpd.

The Rock Hall wastewater treatment plant discharges effluent to a new (1996) 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 6,152 lb/year and 461 lb/year respectively.

The Rock Hall sewerage service area (within the town limits) includes approximately 1,100connections (EDUs) and approximately 2,700 persons.

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 2006, Allen's Lane was connected to Rock Hall.
In 2006, 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 Water and Wastewater Services) 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 Water and Wastewater Services owns and operates the Green Lane/Spring Cove sewer service area (1996), 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) and approximately 240 persons.

Green Lane and Spring Cove are located adjacent to the Town of Rock Hall.

4.5.2.2. Allen's Lane

The Kent County Department of Water and Wastewater Services owns and operates the Allen's Lane sewer service area (2006). 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 access. See Appendix 4-H for more information.

The Allen's Lane sewer service area will include 40 connections (EDUs) and approximately 100 persons.

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 Water and Wastewater Services 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) and approximately 1,020 persons.

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 Water and Wastewater Services 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) and approximately 268 persons.

System History and Upgrades:

The County Commissioners own 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, the connection was designed and construction 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 60,000 gpd. The average daily flow was 34,000 gpd for 2011.

The Galena wastewater treatment plant discharges to the Dyer Creek, which is designated Use I waters protected for water contact recreation and aquatic life. It is located within the Sassafras Watershed. Tributary Strategy nutrient limits for nitrogen and phosphorus are 1,538 lb/year and 256 lb/year respectively.

The Galena sewerage service area includes 317 connections (EDUs) and approximately 628 persons.

System History and Upgrades:

The Maryland Department of the Environment recently inspected the WWTP and reported operational deficiencies. The Sassafras River Association has contacted the town and has offered its involvement in the discharge permit process so that it can be beneficial to the Sassafras River and its surrounding areas. 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 is 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.

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 the potential project. The County is evaluating the results of that study which includes connecting the entire Georgetown area, Olivet Hill, the section of Dogwood Village located beyond the Town limits, Maplewood Lane, and Lee Avenue areas for extension of sewer collection service. In order to provide sufficient treatment capacity for the new connections the County will work in concert with the Town on the Wastewater Plant upgrade. The preliminary engineering study was completed for the extension and plant upgrade in July of 2012. The Commissioners continue their assessment of the study prior to authorizing approval to proceed with the project.

In 2012, the Town began reevaluating the proposed treatment plant design to allow for the future upgrade by the County. With the addition of the Georgetown and Olivet Hills service areas, 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 schematic of the proposed treatment process is shown in Table 4.5.3 in Appendix 4-C.

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 200,000 gpd. The average flow calculated from Daily Monitoring Reports (DMRs) for 2011 is 23,000 gpd.

With this plan update, the Town is correcting its sewerage service area map to include an area located outside of the Town boundary south Fifth Avenue by adding 13 parcels (16, 80, 88, 108, 130, 140, 1522, 1523, 1524, 1524-1, 1525, 1526, and 1527). These properties have historically been served by the Town system, but, due to a mapping error, have not been but identified. See Figure 4-4 for the updated Town of Betterton WWTP and Sewerage Service Area.

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, hardshell 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 connections (329 EDUs) and approximately 480 persons.

System History and Upgrades:

The 5 pump stations in the collection system have required constant maintenance and need rehabilitation.

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 proposes to replace the existing treatment facility in its entirety with an oxidation ditch method of treatment. The new facilities will include a new head-works facility, a new aeration tank, two new clarifiers, chemical storage facilities, a new filter, a new ultra-violet disinfection facility, a post aeration facility, automated controls, a modernized alarm system, a new electrical system and improvements to the sludge drying beds. This upgrade is currently in the design phase.

4.5.5. Millington

The incorporated Town of Millington owns a wastewater treatment system. Maryland Environmental Services (MES) operates a 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 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 flow for year 2011 and the average flow for 2009-2011 were 63,600 gpd and 50,000 gpd respectively.

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 5,744 lb/year and 957 lb/year respectively.

The Millington sewerage service area includes 571 connections (EDUs) and approximately 1430 persons.

System History and Upgrades:

In 2011, a low pressure sewage collection system was constructed to Chesterville Forest Road, a Priority Funding Area, providing connections for 37 properties indentified 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.

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. Treatment included chlorination, aeration and dechlorination prior to 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.

4.5.5.1. Chesterville Forest

The Kent County Department of Water and Wastewater Services 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 is connecting pre-determined 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 Water and Wastewater Services 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 2011 and the average flow for 2009-2011 were 12,500 gpd and 17,000 gpd respectively.

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 2011 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 120 connections (EDUs) and approximately 300 persons.

System History and Upgrades:

The original system was comprised of a two cell stabilization lagoon facility with chlorination and dechlorination 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 proposed for Kennedyville. The project will be constructed in phases. The existing treatment facility will accommodate both phases of the project. Phase I is currently under construction. 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 Water and Wastewater Services 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 flow for year 2011 was 89,000 gpd.

The Worton/Butertown wastewater treatment plant discharges to Morgan Creek (restricted to November 1st through April 30th) and Groundwater of the State (spray irrigation). 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 457 lb/year respectively.

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

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 will be constructed adjacent to the old treatment lagoons. The old treatment lagoons will be 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 indentified 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 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.

4.5.8. Tolchester

The Kent County Department of Water and Wastewater Services owns and operates the Tolchester wastewater treatment system (1996). 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 2011 and the average flow for 2009-2011 were 83,000 gpd and 91,000 gpd respectively. 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) and approximately 1,548 persons.

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 Appendix 4-E.

4.5.8.1. Fairlee/Georgetown

The Kent County Department of Water and Wastewater Services 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) and approximately 835 persons.

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 Water and Wastewater Services 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 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 WW 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 secondary clarifier 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 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.

4.6. Shared Septic Systems

4.6.1. Rudnick

The Kent County Department of Water & Wastewater Services 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 Water and Wastewater Services 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.

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 Water and Wastewater Services 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 5-1-09 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. 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 is planning on connecting 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 has 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 Maplewood, Lee Avenue, and Mill Lane areas located adjacent to the Town boundary are proposed for connection due to existing services provided to intermittent parcels on these streets.

In order to obtain treatment capacity for this project, the County will need to work in concert with the Town of Galena's proposed Wastewater Treatment Plant upgrade and be responsible for the County's share of the needed capacity for the project. The County proposes to increase the plant capacity to accommodate the wastewater from these service areas.

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.

In July of 2012, a preliminary engineering report was completed and presented to the Commissioners. The report evaluated various types of sewer service and wastewater treatment plant upgrade options. These options were reviewed and evaluated based upon construction and operation costs along with future worth values.

4.7.7 Fox Hole, Shorewood Estates, Gregg Neck, and Kentmore Park

The Kent County Commissioners have requested that the Kent County Health Department perform an investigation and evaluation of these areas. These are older subdivisions which have very small lots containing both wells and OSDSs. This situation warrants the Health Department to look at both the drinking water quality issues and potential failing OSDSs.

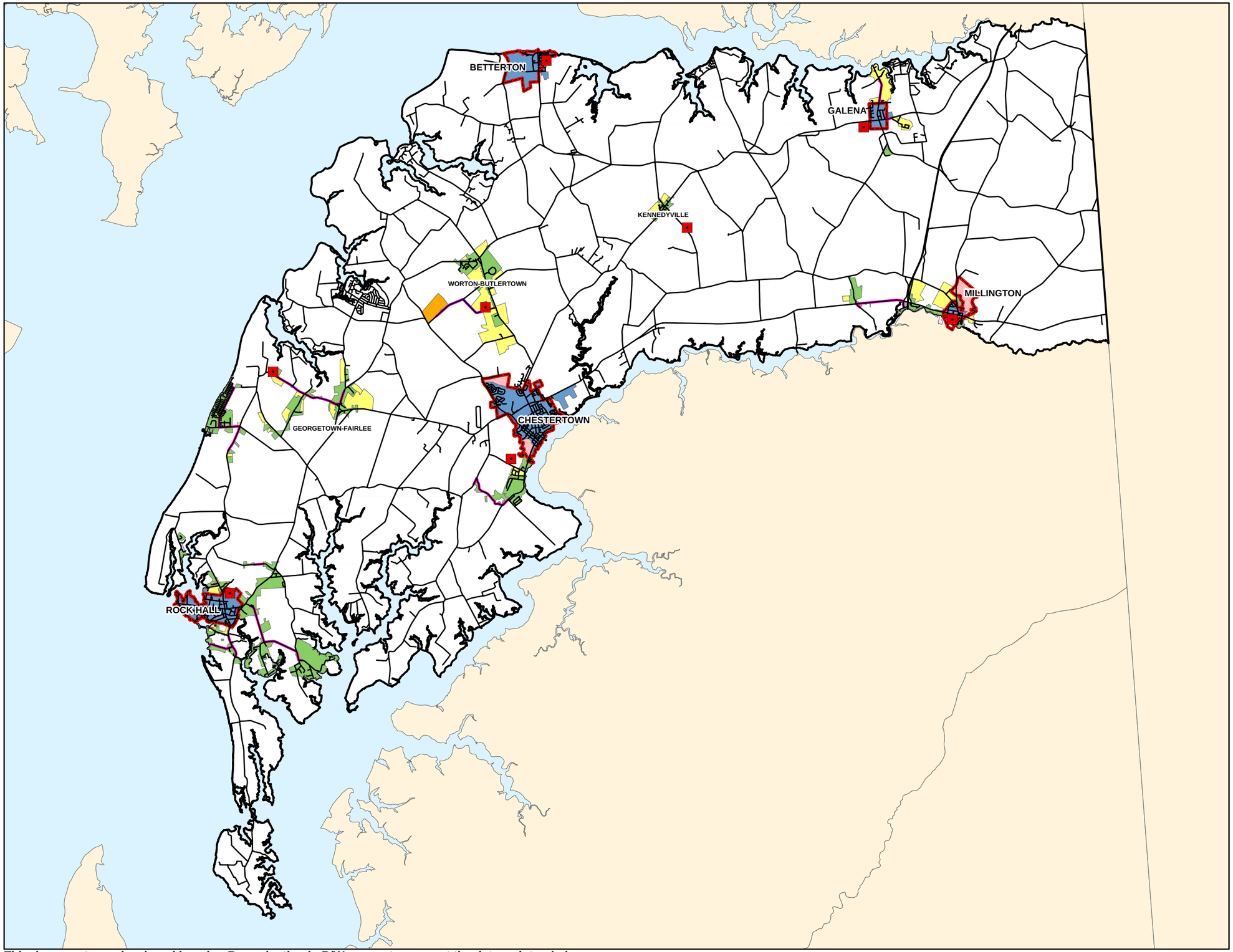

FIGURE 4

KENT COUNTY SEWERAGE SERVICE AREA

Legend

- Existing Town Service
- Planned Town Service
- Existing County Service
- Planned County Service
- Community Septic System
- Wastewater Spray Irrigation Fields
- Treatment Plant
- Denied Access Force Main
- Wastetwater Effluent Line
- Incorporated Town
- County Boundary
- Road Centerline

Kent County
Comprehensive Water and
Sewer Plan 2012

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1 in = 3 miles

Kent County Department of Planning,
Housing and Zoning. October 2012.

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FIGURE 4-1

TOWN OF CHESTERTOWN WASTEWATER TREATMENT PLANT AND SEWERAGE SERVICE AREA

Legend

- Existing Town Service
- Planned Town Service
- Existing County Service
- Planned County Service
- Treatment Plant
- Force_Mains
- Town Boundary
- County Boundary

NOTES:
Includes Quaker Neck Service Area

Kent County
Comprehensive Water and
Sewer Plan 2012

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Kent County Department of Planning, Housing and Zoning. October 2012.

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FIGURE 4-2

TOWN OF ROCK HALL WASTEWATER TREATMENT PLANT AND SEWERAGE SERVICE AREA

Legend

- Existing Town Service
- Existing County Service
- Planned County Service
- Treatment Plant
- Denied Access Force Main
- Incorporated Town

NOTES:
Includes the following service areas:
- Allen's Lane
- Green Lane and Spring Cove
- Piney Neck/Skinner's Neck/Wesley Chapel
- Edesville

Kent County
Comprehensive Water and
Sewer Plan 2012

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Kent County Department of Planning,
Housing and Zoning. October 2012.

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FIGURE 4-3

TOWN OF GALENA
WASTEWATER TREATMENT PLANT
AND SEWERAGE SERVICE AREA

Legend

- Existing Town Service
- Planned County Service
- Treatment Plant
- Denied Access Force Main
- Incorporated Town
- County Boundary

Kent County
Comprehensive Water and
Sewer Plan 2012

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Kent County Department of Planning,
Housing and Zoning. October 2012.

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FIGURE 4-4

TOWN OF BETTERTON
WASTEWATER TREATMENT PLANT
AND SEWERAGE SERVICE AREA

Legend

- Existing Town Service
- Treatment Plant
- Incorporated Town

Kent County
Comprehensive Water and
Sewer Plan 2012

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Kent County Department of Planning,
Housing and Zoning. October 2012.

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FIGURE 4-5

TOWN OF MILLINGTON WASTEWATER TREATMENT PLANT AND SEWERAGE SERVICE AREA

Legend

- Existing Town Service
- Planned Town Service
- Existing County Service
- Planned County Service
- Treatment Plant
- Denied Access Force Main
- Incorporated Town
- County Boundary

NOTES:
Includes Chesterville Forest Service Area

Kent County
Comprehensive Water and
Sewer Plan 2012

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FIGURE 4-6

KENNEDYVILLE
WASTEWATER TREATMENT PLANT
AND SEWERAGE SERVICE AREA

Legend

- Existing County Service
- Planned County Service
- Treatment Plant

Kent County
Comprehensive Water and
Sewer Plan 2012

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Kent County Department of Planning,
Housing and Zoning. October 2012.

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FIGURE 4-7

WORTON-BUTLERTOWN WASTEWATER TREATMENT PLANT AND SEWERAGE SERVICE AREA

Legend

- Existing County Service
- Planned County Service
- Wastewater Spray Irrigation Fields
- Treatment Plant
- Wastewater Effluent Line

Kent County
Comprehensive Water and
Sewer Plan 2012

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FIGURE 4-8

FAIRLEE-GEORGETOWN/ TOLCHESTER WASTEWATER TREATMENT PLANT AND SEWERAGE SERVICE AREA

Legend

- Existing County Service
- Planned County Service
- Treatment Plant
- Denied Access Force Main

Kent County
Comprehensive Water and
Sewer Plan 2012

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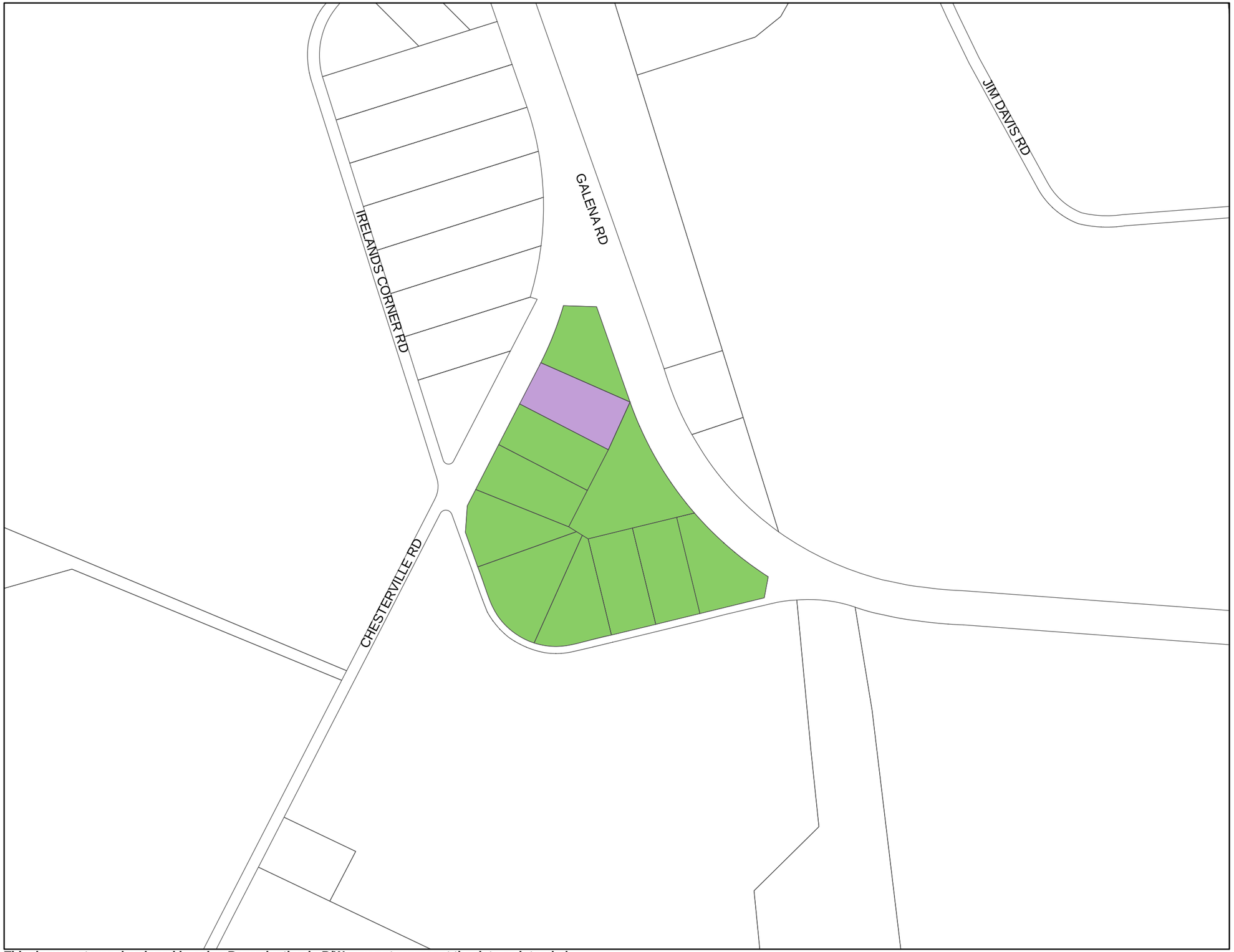

FIGURE 4-9

RUDNICK
SEWERAGE SERVICE AREA

Legend

- Existing County Service
- Community Septic System

Kent County
Comprehensive Water and
Sewer Plan 2012

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Kent County Department of Planning,
Housing and Zoning. October 2012.

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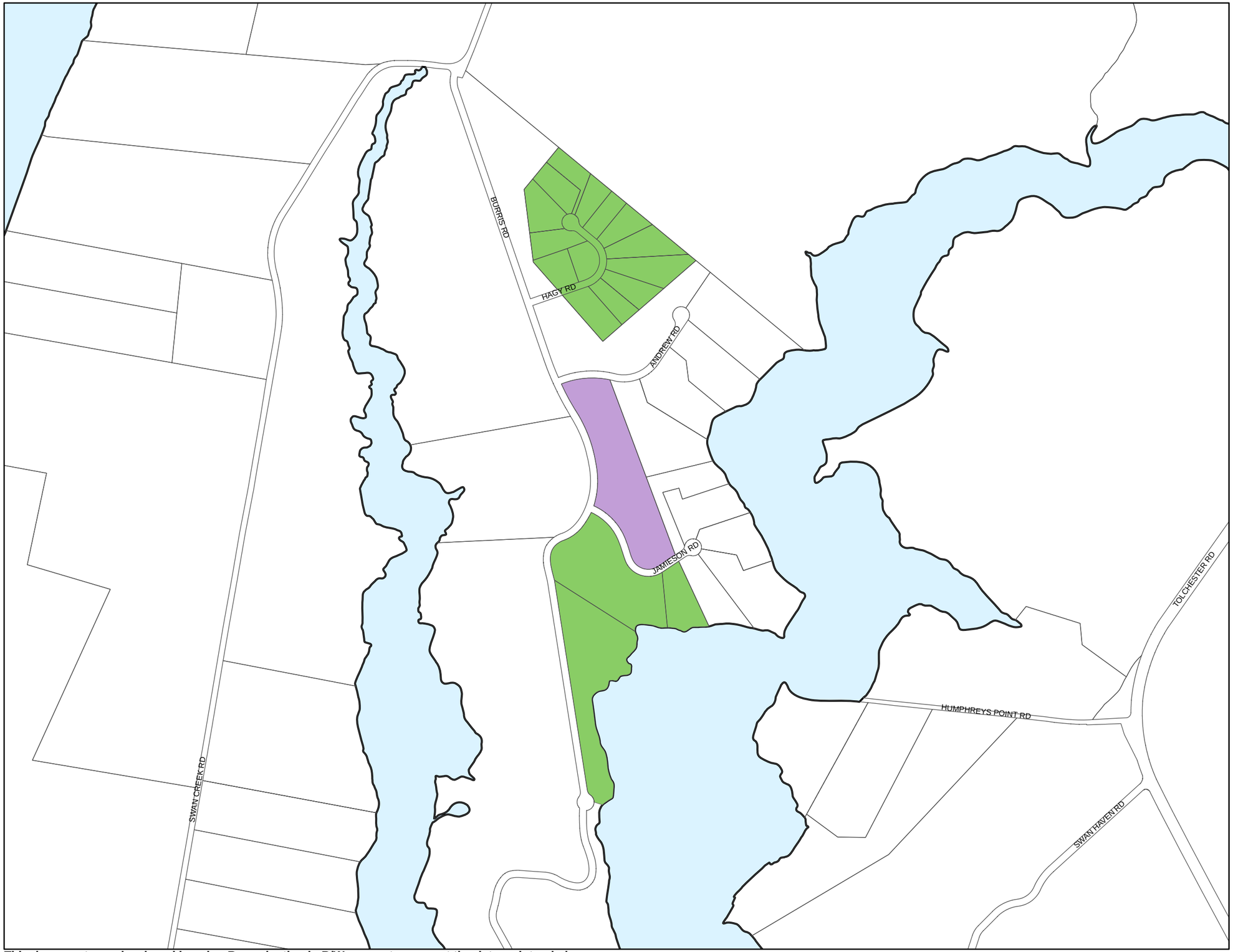

FIGURE 4-10

LITTLE NECK
SEWERAGE SERVICE AREA

Legend

- Existing County Service
- Community Septic System

Kent County
Comprehensive Water and
Sewer Plan 2012

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Kent County Department of Planning,
Housing and Zoning. October 2012.

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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 has developed the Tributary Strategy Statewide Implementation Plan (Tributary Strategy), known as the Watershed Implementation Plan (WIP). Maryland Department of the Environment (MDE) has completed its Phase I WIP. The Kent County's Total Maximum Daily Load Committee (TMDL) completed its Local Phase II WIP in November 2011 and is currently working to implement the strategies identified therein. 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. TMDL details can be found in Appendix 5-B. 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 2002 land use 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. The alternative scenarios proposed were 1) smart growth with Tributary Strategy loading rates and 2) annexations.

Kent County is currently awaiting the results from MDP and will incorporate the results into future amendments or updates to the plan and to the Local Phase II 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 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/Olivet Hill (north of Galena), 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. The current status of these areas is as follows:

- Chesapeake Landing is a large existing subdivision with small lots and failing septic systems. The county has reviewed a study to determine the feasibility of providing water and sewerage service to the area and has determined…

- 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. A decision regarding this line has been tabled.

- 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 will include enhanced denitrification technology.

- 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 2013.

While recent legislation and MDE policy assumes 100 percent implementation of upgraded OSDSs is 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.

MDE has estimated that Kent County has approximately 4025 OSDSs. The Kent County Department of Water and Wastewater Services, Department of Public Works, Department of Planning, Housing, and Zoning, and the Department of Health have been jointly participating in the BRF OSDS Grant Awards and Installations Program, as well as the 2010 Middle Chester Trust Fund Program. To date, the County has received $2.3 million in grants to upgrade qualifying onsite systems and has installed 180 upgrades.

Kent County's BRF plan targets OSDSs in the Critical Area. The County's Comprehensive Plan promotes the use of BAT systems.

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.

The County promotes the use of best management practices and support for full funding of technical assistance and cost share programs. Farms are employing best management practices, however, there is a need to develop comprehensive farm management plans and update existing practices. Comprehensive farm management means coordinated nutrient and erosion control practices, which are one of the best ways to mitigate the environmental impacts of agriculture. One way to introduce new practices to farmers, contractors and the community is with agricultural and habitat restoration field days. Increased funding is necessary to provide the technical assistance to prepare the plans and the cost share to then implement the plans.

NRCS, MDA, and the Kent Soil and Water Conservation District, known collectively as the District, work together to promote best management practices that address nonpoint source pollution on agricultural land in the County and align with the Kent County Total Maximum Daily Load Committee and Local Phase II WIP for Agriculture. The goals of this partnership include 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.

The District promotes and develops complete conservation plans on all agricultural land including Comprehensive Nutrient Management Plans, Grazing Plans, Prescribed Burn Plans, and Irrigation Water Management Plans. Technical assistance is provided to all agricultural landowners and operators with the planning, design, and implementation of BMPs. A priority has been placed on innovative BMP development for nurseries. Some of the typical BMPs routinely implemented by producers in the county include no-till and conservation tillage, nutrient management, cover crops, riparian herbaceous and forested buffers, filter strips, grassed waterways, grade stabilization structures, sediment ponds, shallow water wildlife areas, waste storage facilities, micro-irrigation, and prescribed grazing. Precision farming is also in place in the County.

The District promotes participation in federal, state and local conservation programs by providing outreach, education, planning and technical assistance to county landowners and operators on Farm Bill Conservation Programs (EQIP, WHIP, AMA, CSP, CRP and CREP) and MDA Conservation Programs (MACS, Cover Crop, Manure Transport, Nutrient Management). The District staff is responsible for the administration of the MDA conservation programs. NRCS has program management responsibility for all Farm Bill Conservation Programs except CRP and CREP which is managed by the USDA Farm Service Agency

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

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

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 of 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
- Conservation Reserve Enhancement Program (CREP)
- Chesapeake Bay Foundation
- Ducks Unlimited
- Maryland Department of Agriculture (MACS) Forest Conservation
- Maryland State Woodland Incentive Program
- USDA Stewardship Incentive Program (WIP)

Wetland Restoration
- USDA Wetland Reserve Program (WRP)

Improve Fish and Wildlife Habitat
- USDA Wildlife Habitat Incentive Program (WHIP)
- Fish and Wildlife Service (FWS)

Cover Crop
- Maryland Department of the Environment (Bay Restoration Fund)

The programs listed above are meant to assist landowners in implementing BMPs and to help to achieve the 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 $2,338,000 in grants to upgrade qualifying onsite systems and has installed approximately 180 upgrades.

- Environmental Quality Incentives Program (EQIP)

  EQIP provides financial assistance of up to 75 percent for the installation of BMPs, with a maximum of $450,000 for any individual or eligible entity through 2007. Approximately 60 percent of the funds are directed to livestock related conservation practices. Funds are also available to address locally identified conservation concerns. Contracts are from 1 to 10 years in length. The program is administered by the Natural Resource Conservation Service (NRCS) through local Soil Conservation Districts. Projects may be co-cost-shared with MACS Program support.

- Wildlife Habitat Incentive Program (WHIP)

  WHIP provides cost-share assistance to private landowners to help them enhance wildlife habitat areas on their lands. WHIP complements other cost share/incentive programs and provides a mechanism capable of overcoming two major obstacles to increasing wildlife habitat area. First, WHIP compensates landowners for the lack of market incentive to invest in public goods, such as watershed and wildlife protection. Second, it encourages landowners to make long term investments in maintaining the natural resource base (particularly land management practices capable of improving habitat areas).

- Agricultural Management Assistance (AMA)

  AMA provides cost share assistance to agricultural producers to voluntarily address issues such as water management, water quality, and erosion control by incorporating conservation into their farming operations. Authorized by the Agricultural Risk Protection Act of 2000, AMA is available states where participation in the Federal Crop Insurance Program is historically low.

- Conservation Security Program (CSP)

  This program supports ongoing conservation stewardship of agricultural lands by providing assistance to producers to maintain and enhance natural resources. Administered through NRCS, it provides tiered payments to qualified farmers who are managing natural resources on their farms to achieve certain levels of soil and water quality as well as other identified natural resource objectives. Cost-share is also available to enhance current conservation efforts. Farmers in the Chester-Sassafras watersheds are eligible for this program.

- Conservation Reserve Program (CRP)/ Conservation Reserve Enhancement Program (CREP)

  The USDA administers these programs. They 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. The State also offers 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 $20,000 per project and $50,000 per farm applies. Farmers receiving MACS funds for animal waste treatment and containment projects may receive up to $75,000 per project with a maximum of $100,000 per farm when combined with other BMPs. In many instances, MACS and U.S. Department of Agriculture (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 Program (WRP)

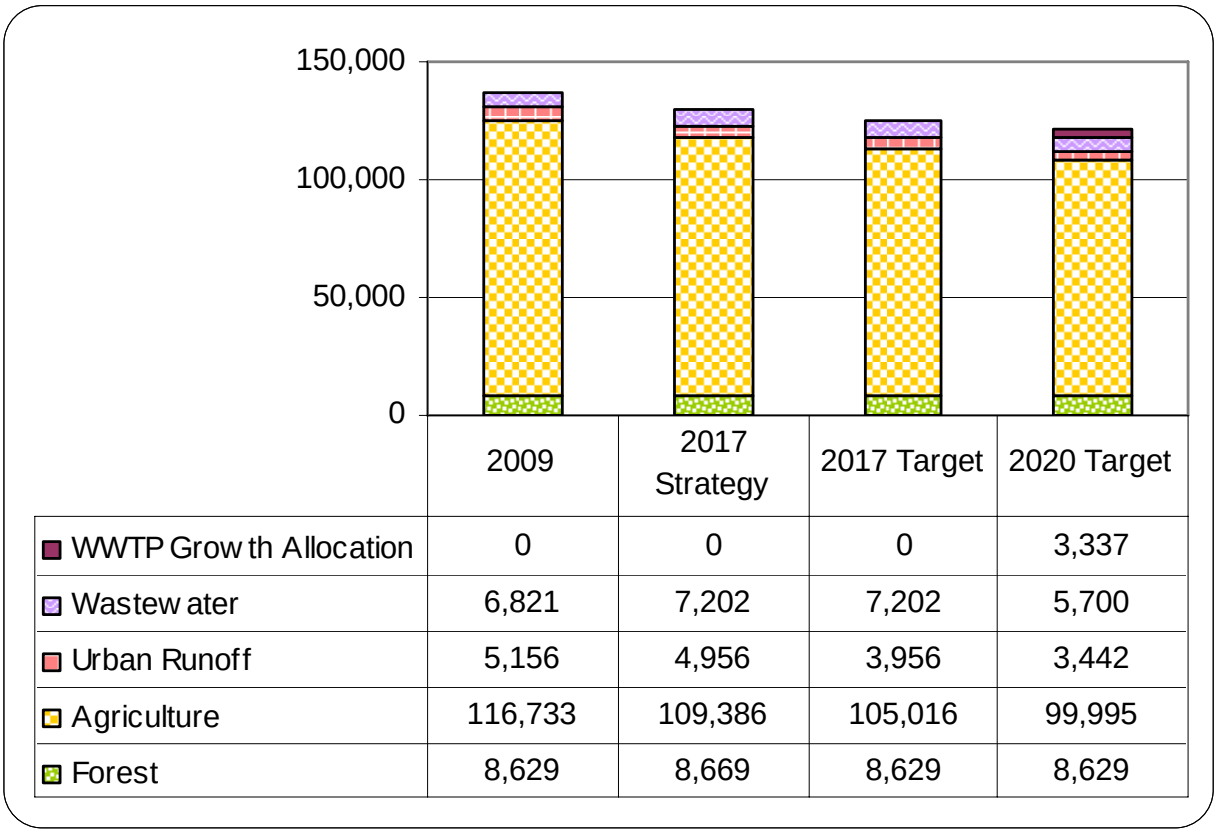
  NRCS administers this program to provide financial incentives to landowners seeking to restore nontidal wetlands. Payment includes compensation for a wetland easement as well as cost-share funding to restore wetlands. There are three options for participants:

  - Permanent easements are conservation easements in perpetuity. USDA pays for the easement as well as 100 percent of the cost of restoring the wetland.
  - A 30-year easement is a conservation easement lasting for 30-years. USDA pays 75 percent of what would be paid for a permanent easement as well as 75 percent of restoration costs.
  - A restoration cost-share agreement is an agreement to reestablish a degraded or lost wetland habitat. USDA pays 75 percent of the restoration costs. This does not place an easement on the property. The landowner provides the restoration site without reimbursement and agrees to maintain it for a minimum of 10-years.

The programs, subject to annual appropriations and eligibility listed above are meant to assist landowners in implementing BMPs and to help to achieve the programs that foster achieving TMDLs. No one landowner or government agency or program can solve the problem independently. Achieving TMDLs and improving the water quality of the Bay will require the cooperation of different state agencies, counties and individual stake holders for many years. 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)



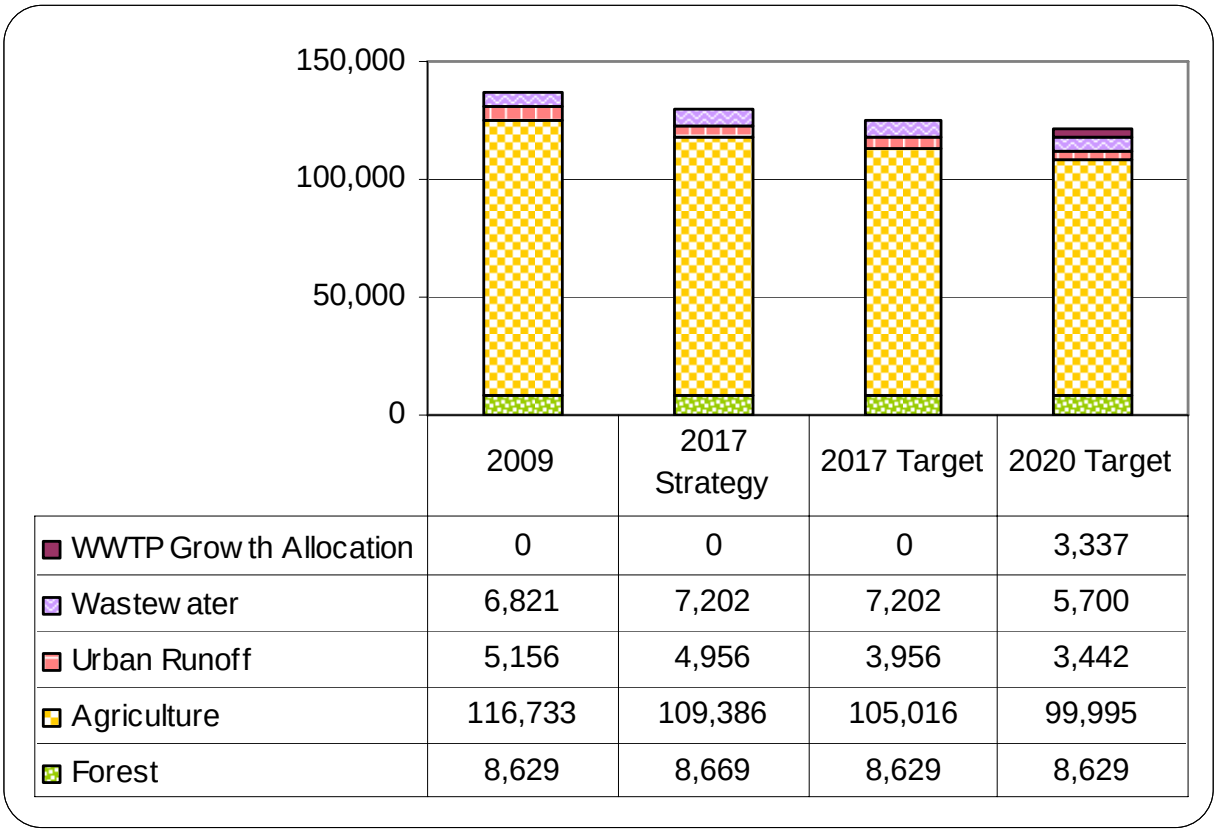
	2009	2017 Strategy	2017 Target	2020 Target
WWTP Growth Allocation	0	0	0	3,337
Wastewater	6,821	7,202	7,202	5,700
Urban Runoff	5,156	4,956	3,956	3,442
Agriculture	116,733	109,386	105,016	99,995
Forest	8,629	8,669	8,629	8,629

** 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)



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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	4,397
Total Resource Lands	**162,755**
Total Land	178,428
Water	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).

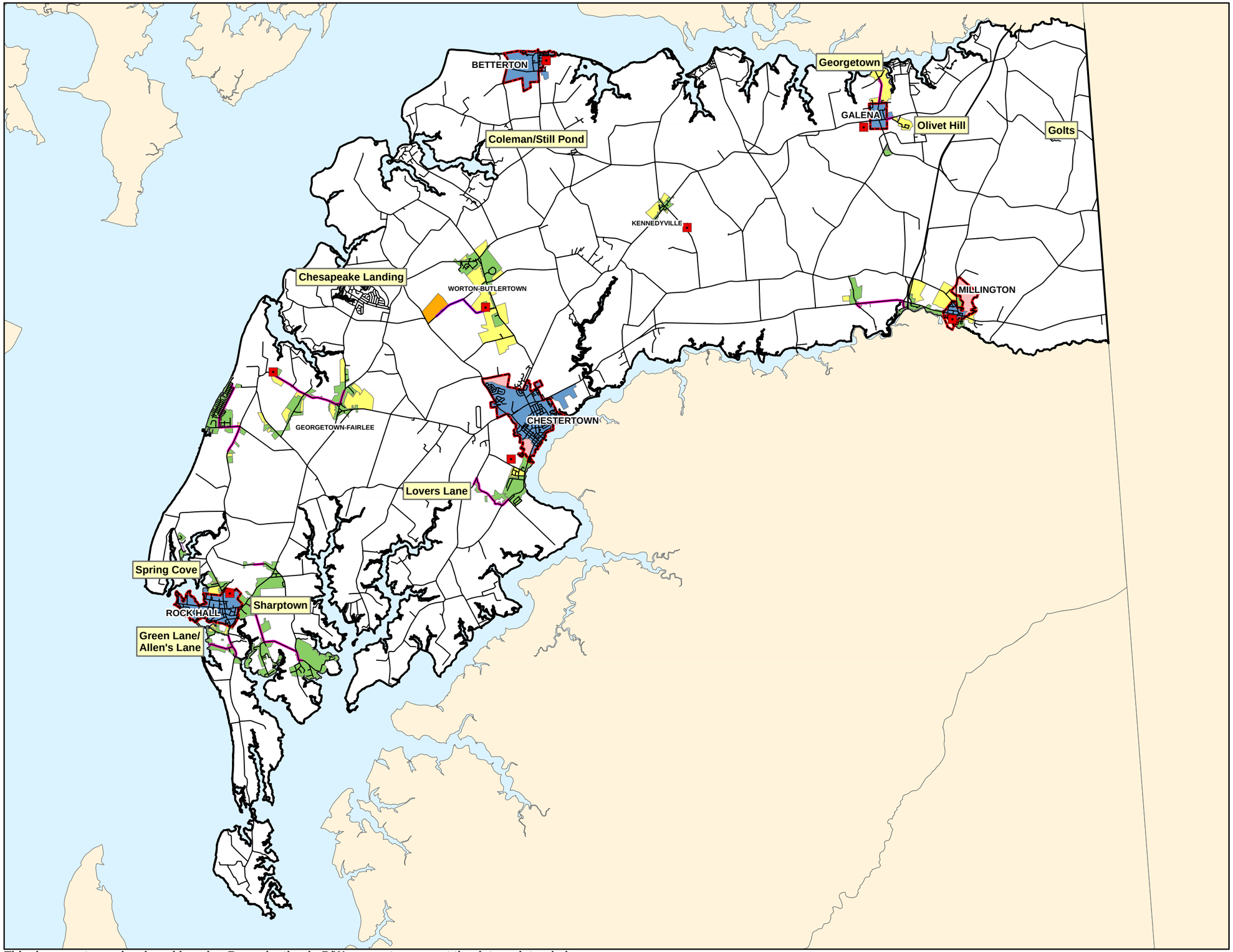

FIGURE 5

KENT COUNTY
OSDS PROBLEM AREAS

Legend

- Existing Town Service
- Planned Town Service
- Existing County Service
- Planned County Service
- Community Septic System
- Wastewater Spray Irrigation Fields
- Treatment Plant
- Denied Access Force Main
- Wastetwater Effluent Line
- Incorporated Town
- County Boundary
- Road Centerline

Kent County
Comprehensive Water and
Sewer Plan 2012

N
W E
S

0 1.5 3 6

Miles

1 in = 3 miles

Kent County Department of Planning,
Housing and Zoning. October 2012.

This document was developed in color. Reproduction in B/W may not represent the data as intended.