RESOLUTION

TO ADOPT AN AMENDMENT TO THE COMPREHENSIVE PLAN FOR KENT COUNTY, MARYLAND

WHEREAS, Maryland House Bill 1141 requires the Water Resources Element to establish a clear relationship between existing and proposed future development; between drinking water sources and wastewater facilities that will be necessary to serve that development; and measures to limit or control the stormwater and non-point source water pollution that will be generated by new development.

WHEREAS, A public hearing was held by the Kent County Planning Commission on August 5, 2010 on the proposed amendment to the Comprehensive Plan relating to the Water Resources Element. Following this public hearing, the Kent County Planning Commission voted to recommend to the County Commissioners for the adoption of the Water Resources Element as an appendix to the Comprehensive Plan.

WHEREAS, A public hearing was held by the Board of County Commissioners on September 14, and was approved by a majority of the Board during their regular meeting on September 21, 2010.

BE IT FURTHER RESOLVED that this Resolution be affixed to as Appendix "E" entitled "Water Resources Element" and made a part of the Comprehensive Plan of Kent County, Maryland.

ADOPTED this 21st day of September, 2010.

THE COUNTY COMMISSIONERS
OF KENT COUNTY, MARYLAND

Roy W. Crow, President

Ronald H. Fithian

Ronald H. Fithian, Member

William W. Pickrum, Member

ATTEST: Venisha C-B

Appendix E

Water Resources Element

The purpose of the Water Resources Element, as defined in Maryland House Bill 1141, is to establish a clear relationship between existing and proposed future development; it further establishes the relationship between drinking water sources and wastewater facilities that will be necessary to serve that development and measures to limit or control the stormwater and non-point source water pollution that will be generated by new development. This document identifies drinking water sources and wastewater treatment facilities needed to support the existing and future development. It also identifies suitable receiving waters for existing and future wastewater and stormwater discharges. Collaboratively, Kent County and the Towns of Betterton, Chestertown, Galena, Millington, and Rock Hall have prepared a Water Resources Element that will "focus growth to areas best suited to use the existing and planned water and wastewater infrastructure that will protect and preserve the natural environs, promote economic growth and support diversity of living environments in Kent County."

Coordination between Kent County and its Towns

The five incorporated Towns in Kent County all offer public water and sewer service to residents and businesses within their boundaries and, in most cases, to residents in limited, designated areas outside of their corporate limits. The Kent County Department of Water and Wastewater owns and operates all water and wastewater systems (including transmission and collection infrastructure) in the unincorporated services areas in the County and holds inter-municipal agreements with the Towns of Chestertown, Millington, and Rock Hall for several systems which were installed to correct failing septic systems.

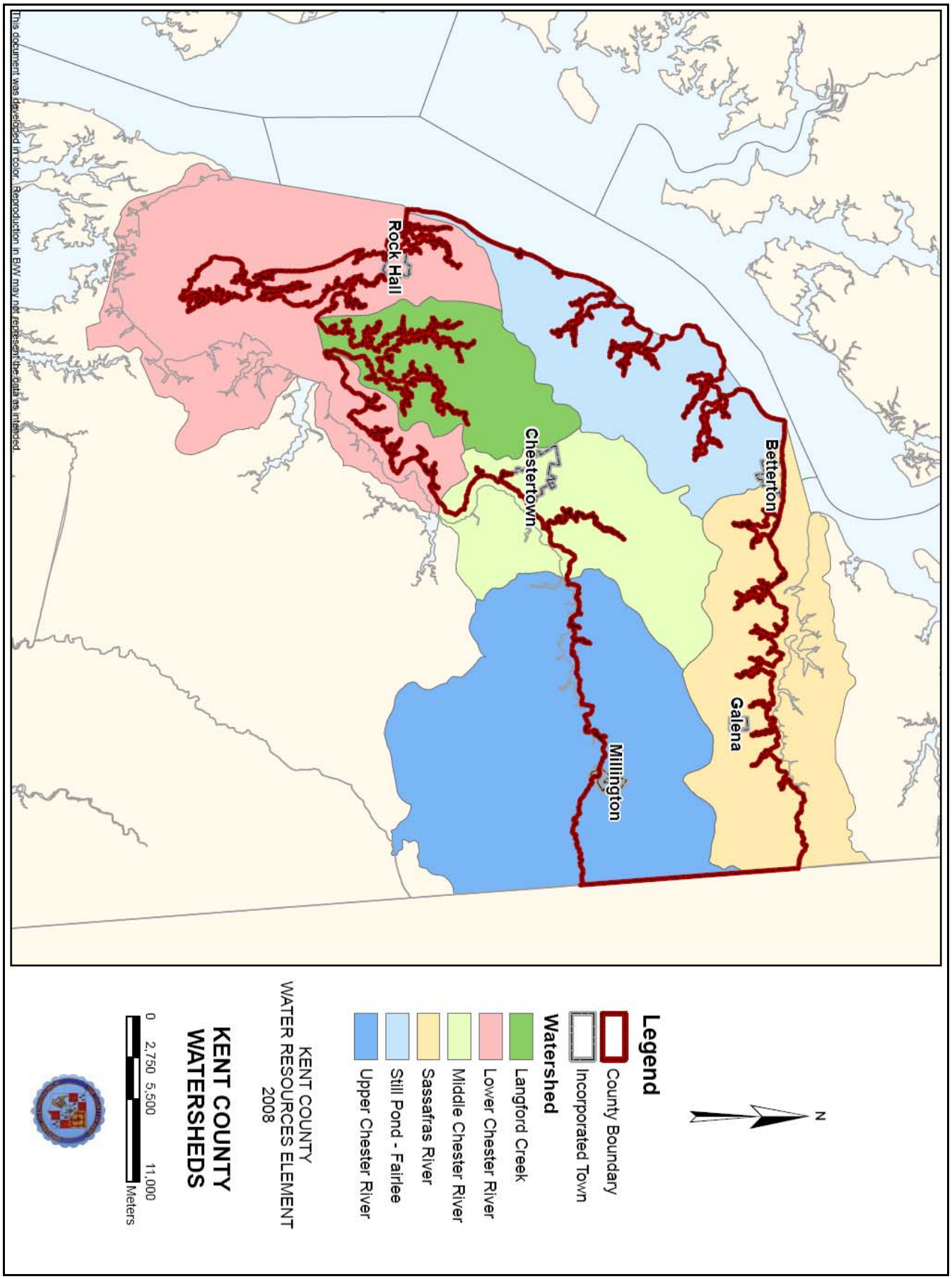
Each of the five municipalities in the county will incorporate the Water Resources Elements into their Comprehensive Plans which link future growth in the Towns with the availability of water and sewer resources to serve that growth. Because of the critical need for the County and the municipalities to coordinate their efforts to address water resources, this County Water Resources Element compiles—to the greatest degree possible—the data necessary to link water resources, growth, and land use for the County and for the towns and all five municipalities have worked closely with the county to comply with the WRE mandate. The water resources policies for unincorporated portions of the County are listed in this element, while water resources policies for the incorporated municipalities, are set forth in each town's Comprehensive Plan.

Goals and Objectives

The Water Resources goals for the County are to, in cooperation with the County's municipalities, maintain a safe and adequate water supply and adequate amounts of wastewater treatment capacity to serve projected growth; to take steps to protect and restore water quality; and to meet water quality regulatory requirements in the county's rivers and streams.

Objectives to support the goals are listed below.

- Assure that existing and planned public water systems meet projected demand.
- Assure that existing and planned public wastewater collection and treatment systems meet projected demand without exceeding their permitted capacity for treatment or nutrient load limits.
- Assure that the County's stormwater management policies reflect the most recent state requirements.
- Maintain land use patterns that limit adverse impacts on water quality.


Betterton
Galena
Millington
Chestertown
Rock Hall
This document was developed in color. Reproduction in B/W may not represent the data as intended.
N
Legend
County Boundary
Incorporated Town
Watershed
Langford Creek
Lower Chester River
Middle Chester River
Sassafras River
Still Pond - Fairlee
Upper Chester River
KENT COUNTY
WATER RESOURCES ELEMENT
2008
KENT COUNTY
WATERSHEDS
0 2,750 5,500 11,000
Meters

Drinking Water Supply Assessment

Ground water is the sole source for domestic water supplies in the County comprising 94% of its overall water supply. Surface water is used for irrigation and livestock watering only. The layers of sediments underlying the county contain an abundance of water for wells; however, a groundwater study is necessary in order to confirm this data. These layers dip to the southeast and thus are generally deeper in the eastern part of the County and shallower in the northwestern portion. There are four aquifers that supply nearly all groundwater in Kent: Aquia, Monmouth, Magothy, and Raritan Patapsco Formations.

The present consumption of ground water is about 4.81 million gallons per day (gpd). The estimated ground water recharge is 0.4 to 0.6 million gallons per square mile per day. The quantity of ground water appears to be substantial; however, the Delmarva Water Study will supply the County will more up to date information regarding its water supply and quality. The quality of the ground water is generally good although water from several aquifers contains iron in sufficient quantity to cause some problems to domestic users necessitating iron removal systems for satisfactory domestic use.

In some wells the water is hard and in others there are problems with contamination from nearby septic systems. There are homes with old, shallow, hand-dug or – driven wells. Most new wells are drilled to depths ranging from 60 feet to over 200 feet.

Various state and federal agencies are currently developing 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. When the assessment is completed, Kent County will incorporate applicable parts of the assessment into its Plan.

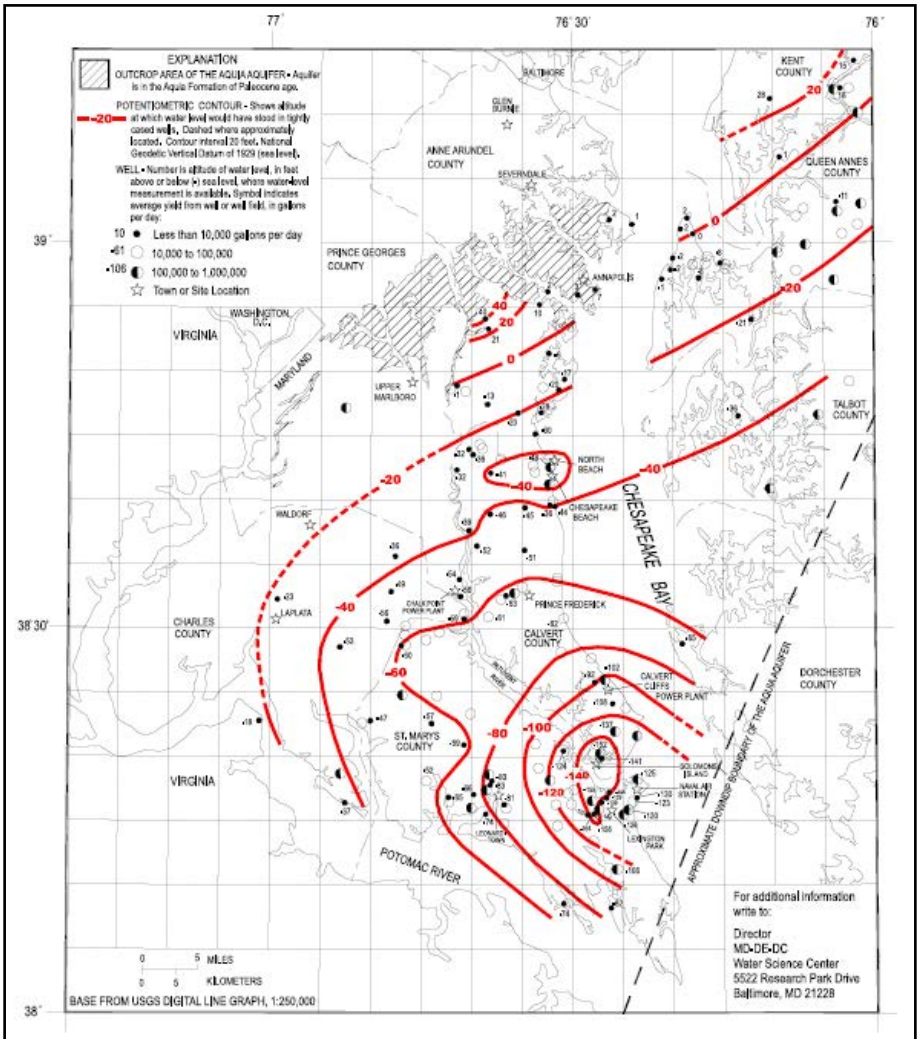


Figure 6. Potentiometric surface of the Aquia aquifer in southern Maryland, September 2003 (modified from Curtin and others, 2005).

Kent County Watersheds

Located in the Atlantic Coastal Plain, Kent County is comparatively low-lying, with relief seldom exceeding 80 feet. The eastern and central portions of the County are characterized by a broad, gently rolling plain; the northwestern section is deeply incised by streams. These streams have steep banks along their shorelines and, in some cases, bluffs 20 to 80 feet high. The character of the southwestern portion of the County is characterized by flat plains and terraces sloping toward the water. The Sassafras and Chester Rivers are tidal estuaries navigable by small boats almost to the Delaware line. These rivers and the Bay shape the County in the form of a long crescent, 40 miles long and eight to ten miles wide narrowing to a peninsula at the southern end. The shoreline is irregular with numerous bays and inlets. A deepwater channel suitable for ocean-going vessels passes close to the coast between Tolchester and Howell Point. In many places the water is deep enough for pleasure boats to come within a few feet of shore.

Minor streams are few and short. A divide which separates the streams flowing north into the Sassafras River and those flowing south into the Chester River has a general westerly direction from Massey to Still Pond. At Still Pond the divide splits, one branch continuing west, the other turning southwest and gradually losing altitude toward Rock Hall. The County has 17,280 acres of surface water within its boundaries.

Kent County is composed of six (6), six digit watersheds: the Upper, Middle and Lower Chester River, Still Pond-Fairlee, Sassafras River, and Langford Creek. The individual watersheds are documented and characterized in this report to more fully understand impact of Kent County watersheds on the Chesapeake Bay and comply with the requirements of the Water Resources Element. A map of the watersheds is shown in Figure 2-3. Characteristics of the watersheds are shown in Table 5-1.

Sassafras River Watershed

The Sassafras River is a tributary of the Chesapeake Bay on the Delmarva Peninsula. Reaching approximately 20 miles long, the Sassafras begins in western New Castle County, Delaware, and frames the southern edge of Cecil County and the northern edge Kent. It rises southwest of Middletown, Delaware, and opens at the Chesapeake Bay in a wide mouth between Betterton in Kent and Grove Point in Cecil. The river is entirely within the coastal plain. Its watershed area (including the water surface) is 97 square miles and drains 83 square miles of land. Thus, its total watershed area is 14% water.

Along the Kent County shoreline, the Sassafras is comprised of many winding tributaries including Lloyd's Creek, Turner's Creek, Freeman Creek, Woodland Creek, Dyer Creek, Mill Creek, Swantown Creek, Jacobs Creek, and Herring Branch. The incorporated Towns of Betterton and Galena are located within the Kent County portion of the watershed. Both towns contain water and sewerage treatment plants. In 2004, the watershed was added to the Maryland List of Impaired Waters (303d) for biological impairments.

As projected by MDP in their Land Use Change Analysis for Kent County, the results of a generalized summary of preliminary future land use changes are presented in the table below. The MDP table attempts to predict how much land is estimated to be developed by 2030 under current programs (i.e. zoning and sewer service areas). Conversely, it also shows how much agricultural and forest lands could be preserved or lost.

Under MDP's current programs analysis, the Sassafras River Watershed could expect to see an increase in development by approximately 275 acres and a potential conversion of the same amount of forest and agricultural lands to development.

Summary of Land Use Change for the Sassafras Watershed (in acres)*

Land Use Category	2002	2030	Difference
Low Density Residential	1,061	1,299	238
Medium Density Residential	336	378	43
High Density Residential	10	11	1
Commercial	47	49	1
Industrial	0	0	0
Institutional	116	109	-8
Extractive	0	0	0
Open Urban Land	34	34	0
Cropland	20,139	19,892	-247
Pasture	92	92	0
Orchards & Vineyards	0	0	0
Row & Garden Crops	0	0	0
Deciduous Forest	7,684	7,656	-28
Evergreen Forest	197	197	0
Mixed Forest	470	470	0
Brush	45	45	0
Water	5,657	5,657	0
Wetlands	434	434	0
Beaches**	0	0	0
Bare Exposed Rock	0	0	0
Bare Ground	33	33	0
Very Low Density Residential	594	594	0
Feeding Operations	53	53	0
Agricultural Buildings	2	2	0

* Source: MDP Land Use Change Analysis
**There is a county-owned beach located within the Town of Betterton.

Town of Betterton

The town water system consists of two 8" diameter wells, one treatment plant, one 125,000-gallon elevated storage tank, and 3.5 miles of distribution piping. One well, drilled in 1969 and drawing from the Magothy aquifer, is 152 feet deep and is located within the treatment plant building. A second well is located approximately 550 feet from the other well and is 105 feet deep. It too was drilled in 1969 and draws from the Magothy. When last tested in 1987, both wells were found to be providing between 80 and 90 gallons per minute (gpm) with submersible pumps. Both wells were cleaned, redeveloped, and received new pumps in 1991.

The plant was constructed in 1969. Water is treated by a calcite neutralizer and caustic soda solution injection for pH adjustment, a polyphosphate solution as a sequestrant agent and calcium hypochlorite solution injection for disinfection. The water system is permitted for an average daily withdrawal of 50,000 gpd and a maximum daily flow of 60,000 gpd. The water treatment plant daily operating reports reveal that daily average water consumption ranges from 37,000 gpd in the winter to 41,000 gpd during the summer months. The system also

serves 30 fire hydrants; a dry hydrant adjacent to the public pier in the Sassafras River takes some of the burden off of the water system in the event of a major fire emergency.

The current system serves approximately 820 people with 326 connections and is nearing full capacity and upgrades will be required prior to any major development.

Town of Galena

The town water system is comprised of two Patapsco Aquifer groundwater wells, one 50,000-gallon elevated storage tank, one 100,000-gallon elevated storage tank, and 6-, 8-, and 10-inch diameter mains. The treatment at the Galena plant consists of the addition of sodium silicate for corrosion control and chlorination.

In addition to the area within the town limits, the service area includes 16 residential lots outside of Galena, serving over 560 people with 311 connections.

The water system is permitted for an average daily withdrawal of 90,000 gpd and a maximum monthly withdrawal is 120,000 gpd. Daily operating reports reveal an average daily flow of approximately 33,000 gpd with a maximum peak withdrawal of approximately 40,000 gpd. Town services provided within town boundaries are expected to easily accommodate the town's growth projection of 102 people or 44 additional households by 2025. No annexations are planned and the town has no plans to upgrade its water system. The town has applied in the past and would be interested in reapplying for funding to participate in a well head protection program for its residents.

Still Pond-Fairlee Watershed

Still Pond Creek originates near the intersection of Maryland Routes 298, 561 and 292 near the crossroads village of Lynch. At its confluence with Churn Creek, Still Pond Creek itself finally drains to the Chesapeake Bay. Still Pond Creek is approximately 5.2 miles in length. Fairlee Creek is approximately 5.2 miles in length, from its confluence with the Bay to the upper reaches of the headwaters near Fairlee/Georgetown. The Creek drains an area of about 13.2 square miles.

Still Pond Creek was first identified on the 303(d) list in 1996. It was listed as being impaired by nutrients, due to signs of eutrophication and suspended sediment. Fairlee Creek is impaired by an over-enrichment of the nutrients, nitrogen and phosphorous. This causes algae blooms, low dissolved oxygen levels, and general degrading of the aquatic habitat.

As projected by MDP in their Land Use Change Analysis for Kent County, the results of a generalized summary of preliminary future land use changes are presented in the table below. The MDP table attempts to predict how much land is estimated to be developed by 2030 under current programs (i.e. zoning and sewer service areas). Conversely, it also shows how much agricultural and forest lands could be preserved or lost.

Under MDP's current programs analysis, the Still Pond-Fairlee Watershed could expect to see an increase in development by approximately 105 acres and a potential conversion of approximately the same amount of forest and agricultural lands to development.

Summary of Land Use Change for the Still Pond-Fairlee Watershed (in acres)*

Land Use Category	2002	2030	Difference
Low Density Residential	1,731	1,707	-23
Medium Density Residential	499	622	124
High Density Residential	9	11	2
Commercial	82	85	2
Industrial	0	0	0
Institutional	332	332	0
Extractive	31	31	0
Open Urban Land	102	102	0
Cropland	22,118	22,042	-76
Pasture	84	84	0
Orchards & Vineyards	64	64	0
Row & Garden Crops	13	13	0
Deciduous Forest	10,204	10,176	-28
Evergreen Forest	131	131	0
Mixed Forest	353	353	0
Brush	72	72	0
Water	31,730	31,730	0
Wetlands	650	650	0
Beaches	0	0	0
Bare Exposed Rock	0	0	0
Bare Ground	0	0	0
Very Low Density Residential	1,072	1,072	0
Feeding Operations	22	22	0
Agricultural Buildings	26	26	0

* Source: MDP Land Use Change Analysis

Delta Heights—Privately-owned system

C&D Enterprises owns and operates a water system which serves the Delta Height Condominium Project. The system consists of a single 4-inch diameter well installed at a depth of 185 feet with a capacity to withdraw 32 gpm. The system includes a 2,500-gallon storage tank. Treatment consists of aeration, coagulation, flocculation, sedimentation, filtration, disinfection, fluoridation, and corrosion control. Expansion of the Delta Heights Condominium is not anticipated.

Fairlee/Georgetown

The Kent County Department of Water and Wastewater operates the water supply systems for the villages of Fairlee and Georgetown, including residences along Caulk's Field Road, and Wood's Edge Apartments totaling approximately 826 people with 324 connections. Extensively upgraded in 1994, the water system consists of two 8-inch groundwater wells located in the Upper Patapsco Aquifer (Potomac Group) with yields of 250 gpm each, two 100,000-gallon elevated storage tanks (one in Fairlee and one in Georgetown constructed in 1996), and 28,300 feet of 6- and 8-inch diameter water mains.

Treatment consists of the following: Aerator, Chemical injection, Mixing, FTC Unit, Clear Well, and Filtration; Pre-Treatment- Induced Aerator by Vulcan Industries - Model # I-42 AP rated for 250 gpm; Chemical Injection- Sodium Hypochlorite Generation System and an LMI

Metering Pump are used to Supply Polymer, KMNO4, and NaOH; Static Mixer by Koch; Flocculator/Clarifier: FTC- 150H (Microfloc), and Final Treatment by Green Sand Filters.

The system is permitted for an average daily withdrawal of 146,000 gpd with a maximum daily average of 200,000 gpd. Daily operating reports show an average daily withdrawal of 80,250 gpd and a maximum peak 147,000 gpd. Population projections based on current growth area build out would result in an additional 290 households by 2030 which would demand roughly 72,500 gallons of public water per day. Improvements to expand public water supply capacity would be required to accommodate anything over 150 dwelling units.

Lower Chester River Watershed

The Lower Chester River is a bifurcated watershed with the Langford Creek Watershed nestling itself within the Lower Chester. The Lower Chester contains the incorporated Town of Rock Hall, the village of Edesville, and several small communities such as Gray's Inn Creek, Herrington Creek, Cliff City, and Johnsontown. Eastern Neck Island is also located in this watershed. The Lower Chester is characterized by a vast array of sensitive tributaries as it is framed by the Chesapeake Bay and intersected by Langford Creek; therefore, much of this watershed is located within the Critical Area. Like its neighbors, the Lower Chester River Watershed has been placed on the 303d list for biological impairments.

As projected by MDP in their Land Use Change Analysis for Kent County, the results of a generalized summary of preliminary future land use changes are presented in the table below. The MDP table attempts to predict how much land is estimated to be developed by 2030 under current programs (i.e. zoning and sewer service areas). Conversely, it also shows how much agricultural and forest lands could be preserved or lost.

Under MDP's current programs analysis, the Lower Chester River Watershed could expect to see an increase in development by approximately 40 acres and a potential conversion of the same amount of forest and agricultural lands to development.

Summary of Land Use Change for the Lower Chester Watershed (in acres)*

Land Use Category	2002	2030	Difference
Low Density Residential	686	671	-15
Medium Density Residential	410	436	25
High Density Residential	0	5	5
Commercial	174.65	201	26
Industrial	0	0	0
Institutional	71	70	-1
Extractive	0	0	0
Open Urban Land	0	0	0
Cropland	11,161	11,137	-24
Pasture	135	135	0
Orchards & Vineyards	0	0	0
Row & Garden Crops	0	0	0
Deciduous Forest	2,656	2,644	-11
Evergreen Forest	586.37	586	0
Mixed Forest	2,682	2,677	-5
Brush	0	0	0

Land Use Category	2002	2030	Difference
Water	36510.61	36,511	0
Wetlands	2126.24	2,126	0
Beaches**	0	0	0
Bare Exposed Rock	0	0	0
Bare Ground	0	0	0
Very Low Density Residential	700.28	700	0
Feeding Operations	0	0	0
Agricultural Buildings	25.11	25	0

* Source: MDP Land Use Change Analysis
**There is a town beach/park located within the Town of Rock Hall.

Town of Rock Hall

The town water system consists of three Magothy Aquifer groundwater wells, two 125,000-gallon elevated storage tanks, one 100,000-gallon elevated storage tank located in Edesville and constructed in 2008, and water mains ranging in size from 2 inches to 12 inches in diameter. Treatment at the plant consists of aeration, chlorination, lime, and alum addition in conjunction with sand filtration.

In addition to town residents, the Rock Hall water treatment plant serves the Edesville area and the Wesley Chapel Corridor, both located within the county service area. The water system is permitted for an average daily withdrawal of 230,000 gpd and a max month withdrawal is 300,000 gpd. Daily operating reports reveal an average daily draw down of 220,000 gpd. The plant serves 2,958 people with 1,183 connections. Any large subdivision would require additional water supply.

Edesville

The Kent County Department of Water and Wastewater operates the water supply systems for the village of Edesville serving approximately 250 people with 98 connections. A new 100,000 gallon elevated storage tank has been constructed in Edesville and is connected to the Town of Rock Hall water system. Limited infill is expected in this village. The pre-existing water system was abandoned and has been connected to the Town of Rock Hall water system. See above.

Middle Chester River Watershed

The Kent County portion of the Middle Chester watershed consists of several small, unnamed streams draining directly to the Chester River and two larger diverse watersheds – Radcliffe and Morgan Creeks. Urieville Lake is within the Morgan Creek watershed. Approximately 29,600 acres are in the Kent County portion of the watershed. Chestertown is in the Radcliffe Creek watershed, which is the smaller and more developed watershed. This subwatershed drains approximately 4,030 acres. Since significant growth is planned for the Radcliffe Creek watershed, the strategies will identify measures that counterbalance the effects of growth on stream quality. Agricultural uses dominate the Morgan Creek watershed. The villages of Kennedyville, Worton, and a portion of Bultertown are also located it the Middle Chester, along with two industrial areas. The Morgan Creek watershed drains approximately 22,000 acres. Some of the County's most productive farmland is within this watershed.

The Maryland Clean Water Action Plan identified the Middle Chester River watershed on its 303d list. Kent County has coordinated with the Department of Natural Resources, local watershed organizations, Kent Soil and Water Conservation District, the Town of Chestertown, and various

other state and local agencies to complete the Middle Chester River Watershed Restoration Action Strategy (WRAS). The strategies within the WRAS include a wide variety of residential and agricultural best management practices including conservation subdivision techniques, innovative stormwater management initiatives, and extensive stream buffer and wetlands restoration projects. Four primary considerations guided planning for the Middle Chester watershed:

1) The County's long term goal of restoring the watershed to a point where aquatic and terrestrial organisms can thrive;
2) The removal of the watershed from the impaired list;
3) Agriculture remaining a strong presence in the watershed;
4) Significant growth occurring in some portions of the watershed.

The County has also coordinated with the Chester River Association and a wide array of partners to submit a 2010 Trust Fund Local Implementation Grant for the Middle Chester River watershed. The application focuses on non-point source pollution with agricultural, restoration, and denitrifying septic system initiatives.

As projected by MDP in their Land Use Change Analysis for Kent County, the results of a generalized summary of preliminary future land use changes are presented in the table below. The MDP table attempts to predict how much land is estimated to be developed by 2030 under current programs (i.e. zoning and sewer service areas). Conversely, it also shows how much agricultural and forest lands could be preserved or lost.

Under MDP's current programs analysis, the Middle Chester River Watershed could expect to see an increase in development by approximately 40 acres and a potential conversion of the same amount of forest and agricultural lands to development.

Summary of Land Use Change for the Middle Chester Watershed (in acres)*

Land Use Category	2002	2030	Difference
Low Density Residential	690	724	34
Medium Density Residential	583	638	55
High Density Residential	125	123	-2
Commercial	484	564	80
Industrial	38	88	49
Institutional	212	211	-2
Extractive	0	0	0
Open Urban Land	244	236	-8
Cropland	22,347	22,185	-161
Pasture	73	73	0
Orchards & Vineyards	211	211	0
Row & Garden Crops	21	21	0
Deciduous Forest	3,310	3,291	-18
Evergreen Forest	0	0	0
Mixed Forest	118	118	0
Brush	38	38	0
Water	1,281	1,281	0
Wetlands	567	567	0
Beaches	0	0	0
Bare Exposed Rock	0	0	0

Land Use Category	2002	2030	Difference
Bare Ground	20	20	0
Very Low Density Residential	414	414	0
Feeding Operations	133	106	-28
Agricultural Buildings	37	37	0

* Source: MDP Land Use Change Analysis

Town of Chestertown

The town water system consists of 7 Aquia-Monmouth Aquifer wells (5 of which are still active---with one inactive due to the Hospital oil spill and one inactive due to well point failure and nearby MTBE contamination), two Magothy Aquifer groundwater wells, one treatment plant, a 100,000-gallon elevated storage tank, a 1,000,000 gallon standpipe, two 450,000 gallon covered underground reservoirs. In addition, the town system is composed of 12-, 8-, and 6-inch mains with two 500 gpm pumps and one 1500 gpm variable flow pump.

The plant serves an area outside of the town limits on MD Rt. 291 in addition to the Chestertown residents. The town serves approximately 5,000 people with approximately 2,100 connections. The water system is permitted for an average daily withdrawal of 975,000 gpd and a maximum monthly draw is 1,300,000 gpd. Daily operating reports reveal an average daily withdrawal of 713,000 gpd with a maximum daily peak of 1,023,000 gpd.

A feasibility study may be required to determine the most appropriate and efficient location of any new wells to service any potential increase in demand beyond existing capacity. An impact study of the Magothy aquifer could suffice for a study in the near future.

Kennedyville

The Kent County Department of Water and Wastewater operates the water supply system for the village of Kennedyville serving 289 people with 113 connections. Extensively upgraded in 2007 following the approval of a new residential development, the Village at Kennedyville, the water system consists of two Monmouth Bedrock wells with yields of 80 gpm and 119 gpm (a third well is planned to be drilled during construction of Phase II of the Village at Kennedyville which will have a yield of 90 gpm), one 75,000 gallon elevated storage tank constructed in 1997, and one 50,000 gallon ground storage tank scheduled for construction during Phase II of the Village at Kennedyville.

Treatment consists of pre-chlorination, sand filtration, pH adjustment, polymer addition, mixing, and continuous sand filtration capable of producing 115 gpd. The 2007 system upgrade included the removal of the pre-existing hydra-sand continuously-cleaned filter, chlorine contact tank, clear well, and existing chemical feed equipment which were not in use. The liquid chlorine system remains in operation. New ion exchange water treatment equipment to remove iron and hardness will also be installed. The ion exchange treatment equipment has a throughput rating of 135 gpm.

The system is permitted for an average daily withdrawal of 51,800 gpd with a maximum daily average of 83,000 gpd. Daily operating reports show an average daily withdrawal of 22,000 gpd and a maximum peak of 106,000 gpd.

Estimated build-out based on current growth area would result in an additional 347 EDUs. Any increases in demand for water supply, including storage capacity, distribution lines and wells, will need to be provided at the expense of developers.

Worton/Butlertown

The Kent County Department of Water and Wastewater operates the water supply systems for the villages of Butlertown and Worton serving 1,065 people with 384 connections. Both Kent County High School and Worton Elementary School are served by this system. Extensive upgrading and expansion are planned for 2009. The water system consists of two Magothy Aquifer groundwater wells, one 125,000 gallon elevated storage tank with a second 250,000 elevated storage tank scheduled for construction in 2009, and 2-, 6-, and 8-inch diameter water mains.

Treatment consists of aeration, chlorination, flocculation, tube clarification, and green sand filtration. Pre-Treatment by Aeration is performed by a Vulcan Industries Inc. Model L-42 rated for 200 gpm. Chemical additions of sodium hypo-chlorite, caustic, and polymer are performed. A FTC-100H by Microfloc Products is used for flocculation & settling Final Treatment is performed by manganese green sand filters.

The system is permitted for an average daily draw of 71,000 gpd with a maximum daily average of 112,000 gpd. Daily operating reports show an average daily withdrawal of 65,250 gpd and a maximum peak of 143,000 gpd.

Population projection based on current growth area build out could result in an additional 694 residential and commercial EDUs. Existing water and sewer rate payers in Worton and Butlertown should not subsidize the infrastructure costs of future development in the Worton-Butlertown growth area. Accounting systems currently in place are designed to ensure that this does not occur.

Upper Chester River Watershed

The Upper Chester River Watershed is in the Chester River basin that drains Maryland and Delaware. In Maryland, this watershed is designated as a Category 1 watershed for restoration in the Maryland Clean Water Action Plan. For Maryland's portion of the watershed, Queen Anne's and Kent Counties worked collaboratively on a Watershed Restoration Action Strategy. The Upper Chester River and its tributaries drain to the Chesapeake Bay and then to the Atlantic Ocean. The Upper Chester River watershed covers 178 square miles in Maryland and Delaware. About 137 square miles of the Upper Chester River watershed are in Maryland, which includes 82 square miles in Queen Anne's County and 55 square miles in Kent County. Approximately 65% (56,176 acres) of the land in the watershed is categorized as agricultural land, 31% (26,958 acres) of land is forested and 3% (2,932 acres) is designated as urban. The towns of Barclay, Millington, and Sudlersville are located within the watershed.

As projected by MDP in their Land Use Change Analysis for Kent County, the results of a generalized summary of preliminary future land use changes are presented in the table below. The MDP table attempts to predict how much land is estimated to be developed by 2030 under current programs (i.e. zoning and sewer service areas). Conversely, it also shows how much agricultural and forest lands could be preserved or lost.

Under MDP's current programs analysis, the Upper Chester River Watershed could expect to see an increase in development by approximately 111 acres and a potential conversion of the same amount of forest and agricultural lands to development.

Summary of Land Use Change for the Upper Chester Watershed (in acres)*

Land Use Category	2002	2030	Difference
Low Density Residential	309	331	23
Medium Density Residential	154	158	4
High Density Residential	9	8	0
Commercial	87	171	84
Industrial	0	0	0
Institutional	20	20	0
Extractive	0	0	0
Open Urban Land	51	51	0
Cropland	21,368	21,265	-103
Pasture	332	332	0
Orchards & Vineyards	1,712	1,712	0
Row & Garden Crops	0	0	0
Deciduous Forest	8,646	8,644	-2
Evergreen Forest	66	66	0
Mixed Forest	1,108	1,102	-6
Brush	15	15	0
Water	595	595	0
Wetlands	223	223	0
Beaches	0	0	0
Bare Exposed Rock	0	0	0
Bare Ground	9	9	0
Very Low Density Residential	309	309	0
Feeding Operations	46	46	0
Agricultural Buildings	146	146	0

* Source: MDP Land Use Change Analysis

The following goals were identified by the WRAS workgroup:

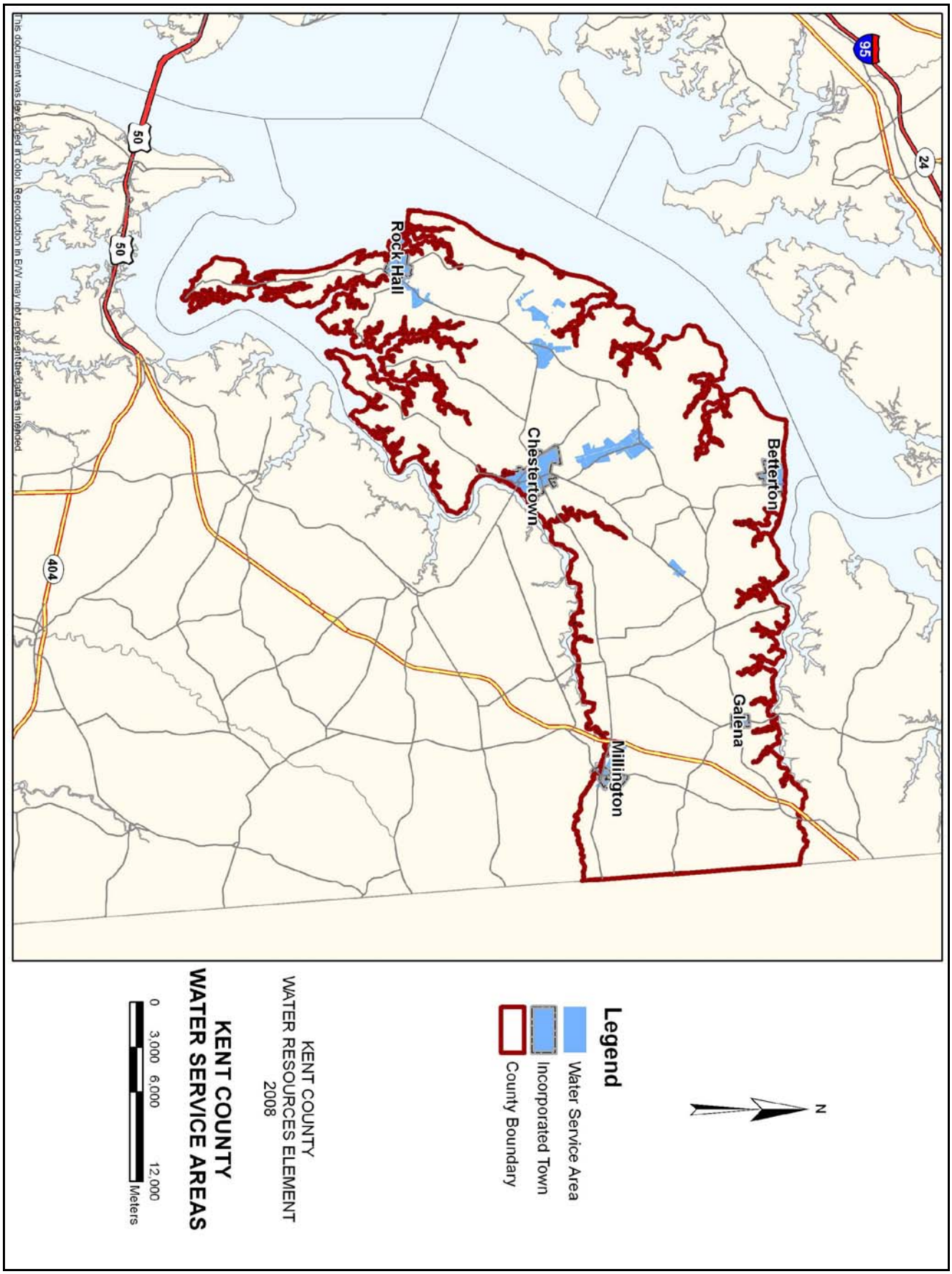
Goal One: Improve Water Quality
Goal Two: Protect and restore wildlife habitat
Goal Three: Sustain viable agriculture and retain small town community

Town of Millington

The Town of Millington owns and operates a water supply system that serves their residents. The town water system consists of three Aquia Aquifer Groundwater Wells, one treatment plant, one 125,000 gallon elevated storage tank. Well Number 1 has a safe yield of 190 gpm, a 10-inch diameter PVC casing, a - 0.03 slot size 6 inch diameter SS screen at 30 feet and is drilled to a depth of 200 Feet. Well Number 2 is the same as Well Number 1. Well Number 3 has a yield of 190 gpm, an 8-inch diameter steel casing at 100 feet, an SS screen at 60 feet, and is drilled to a depth of 190 feet.

Water is softened and disinfected: raw water is conditioned by two alternating softener treatment vessels. An on-site hypochlorite generation is used as a disinfectant. The water system is permitted for an average daily withdrawal of 137,000 gpd and a max month flow is 160,000 gpd. Daily operating reports reveal an average daily withdrawal of 65,425 gpd. The plant serves 660 people with 264 connections within the town and 293 people with 117 connections within the county.

The facility serves Millington, West Millington (Queen Anne's County), Sandfield (located in the county), and Millington Elementary School. The facility also serves areas via a newly-installed distribution line which runs from US Rt. 301 to MD Rt. 291 including homes in the River's Edge subdivision located on either side of US Rt. 301 and homes north of Millington along Chesterville Forest Road.


95
24
50
50
404
Rock Hall
Chestertown
Betterton
Galena
Millington
This document was developed in color. Reproduction in B/W may not represent the data as intended
Legend
Water Service Area
Incorporated Town
County Boundary
N
KENT COUNTY
WATER RESOURCES ELEMENT
2008
KENT COUNTY
WATER SERVICE AREAS
0 3,000 6,000 12,000
Meters

Individual wells

At present, it is estimated that approximately one half of the County's population depends upon onsite disposal systems; ergo it can be discerned that approximately one half of County residents have individual wells. Since 1945, approximately 6,735 wells have been drilled in Kent County for individual residences. These wells draw their water from a variety of water-bearing formations—typically the nearest available formation—in the County, with no single formation being prevalent.

Commercial and Agricultural Use

Overall Commercial Uses
Many of the County's major business and industrial parks, as well as most of its major commercial areas receive public water from one of the systems. However, the county is home to several major industries which rely on individual wells, such as a large number of nurseries. Since 1945, 113 wells have been drilled in Kent County for industrial and commercial use.

Overall Agricultural Uses
Natural rainfall is not generally adequate to support agriculture in the County. Many farmers use individual groundwater wells (approximately 147 wells have been drilled in Kent County since 1945 for agricultural use) on-property streams or springs, or reclaimed stormwater collected in farm ponds to provide water for livestock, or for limited irrigation purposes. Large-scale irrigation for agricultural purposes comprises a significant use of groundwater in Kent. Surface water is also used for irrigation and livestock watering, but to a smaller degree than groundwater.

Natural Resource Conservation Service (NRCS) promotes irrigation water management which is the process of determining and controlling the volume, frequency, and application rate of irrigation water in a planned and efficient manner. Irrigation water management is applied as part of a conservation management system for the purpose of managing soil moisture to promote desired crop response, optimizing use of available water supplies, reducing energy use, minimizing irrigation-induced soil erosion, decreasing non-point source pollution of surface and groundwater resources, and/or managing salts in the crop root zone.

NRCS also promotes and provides financial assistance to upgrade sprinkler irrigation systems which includes all necessary equipment and facilities to efficiently apply water by means of nozzles operating under low pressure. This means a low or medium pressure system with drops and approved nozzles must be installed. To be eligible for system replacement, the system must be high pressure with out drop nozzles. For Center Pivots, drop nozzles must be installed. If end guns are utilized, the system must include a programmable end gun stop to prevent irrigation on non cropland areas.

Micro-irrigation systems, as part of a conservation management system, distributes water directly to the plant root zone by means of surface or subsurface applicators. Funding is available when converting from a less efficient irrigation system to micro (i.e. traveling guns or center pivots that convert to drip irrigation qualify for funding). Funding for irrigation efficiency improvement available through USDA NRCS Environmental Quality Incentive Program.

Identification of Drinking Water Issues

The critical component of Kent County's development pattern is its people. Not to be underestimated in comparing current services to growth projections is the large County and town population comprised of second home residents. This population is not tracked by MDP, as this population is counted in its primary places of residency whether those residences are Maryland, Delaware,

Pennsylvania, Virginia, West Virginia, or Florida. However, many of these people are utilizing both public water and sewer services causing spikes in the sysems in summer months, weekends, and holidays. These inhabitants, along with a substantive population of recreational boaters, account for a discrepancy between people served by town and County water and sewer and MDP population statistics and growth projections.

Unmet Future Demand on Public Systems

To serve projected growth, the County and the municipalities will need to obtain additional water supplies, and will, in many cases, need to upgrade and expand treatment facilities and water distribution systems. MDP growth projections for the year 2030 reveal a population of 23,400 people and 10,175 households. The most recent MDP estimate (2005) for Kent reveals a current population of 19,850 people and 8,100 households. Based on actual service provided noted above, approximately 11,951 people are being served by public water with approximately 4,816 connections/EDUs.

Less than half of the County's population is served by individual wells. With a projection of an additional 3,550 people living in the County, it can be presumed that over 2,000 of these people will be served by public water supply resulting in approximately 852 new hookups to existing systems. Again referencing the county's second home population, projections should attempt to anticipate a transition in use from seasonal to full time as second homes become retirement homes. This transition will surely have an impact on withdrawal demand.

The chart below reflects existing water treatment plant supply. Population projection data is not provided by MDP for individual towns; therefore, neither population nor household projection data is truly available in a manner that accurately reflects water treatment plant projected demand. Another reason for this gap in data, beyond census projections, is that Municipal plants in many instances provide services beyond their boundaries. Betterton, for example, has generated two scenarios relative to water demand based on vacant lots. One scenario projects that by 2030 town service demand will result in a need for potentially 814 EDUs; while a second scenario projects a need for over 1,070 EDUs. Chestertown is currently calculating its future water demand.

Galena's projection for 2025 indicates that there will be an addition of 102 people/44 EDUs. The town projects that their existing water plant will be able serve this population without upgrade to the system. Millington projects an increase in EDUs to 471 by 2030. Studies related to water supply are anticipated by the town as the system reaches 75 percent of capacity (projected to be on or about 2025). Likewise, Rock Hall expects a 40% increase to their town population by 2030; this increase in town population does not reflect the accurate percent in the increase to users of the water system as the town provides services beyond its boundaries.

Kent County and Municipal Water Supply*

Water Treatment Plant	People Served (2008)	EDUs (2008)
Municipal Plants		
Betterton	823	329
Chestertown (Major)	5,000	2,100
Galena	560	311
Millington	953	381
Rock Hall	2,958	1,183
County Plants		
Kennedyville	289	113
Fairlee/Georgetown	826	324
Worton	1,065	384
Total	12,474	5,125

*Source: County and Municipal groundwater appropriations permits (daily operating reports)

Unmet Future Demand on Private Systems

A little less than half of the County population draws from individual wells; therefore of the projected 2030 population, approximately 1,400 of those people totaling over 560 households will require a private water supply. Since there are many homes with old and shallow wells, the preservation of water quality for adequate consumption becomes crucial. Since there are also many properties with onsite septic systems, improving ground water and reducing nitrogen in the Chesapeake Bay and its tributaries are also crucial. In order to protect an aquifer, the county needs information regarding the extent of the aquifer, the land overlying the aquifer and upgradient lands that recharge the aquifer. The U.S. Geological Survey (USGS) groundwater study provides and the Aquifer Assessment Plan will provide some of this information as well as the quality of the groundwater. Using information from this study, State and County agencies should consider the impact on ground water when reviewing development proposals. A wellhead protection plan must be prepared. Wellhead protection focuses on existing and proposed public water supply areas and their immediate recharge areas.

Water Quality Concerns

Over 90 percent of the water used in Kent is drawn from groundwater wells. Except in extreme drought conditions, such as those experienced during the spring and summer of 1991 (the worst on record), these groundwater resources, combined with surface water sources, have been adequate to meet demand.

However, information on the capacity of the County's groundwater resources—particularly groundwater's capacity to serve continued growth, and stresses upon those groundwater resources—is outdated. The last full study of the County's groundwater resources was a 1980 U.S. Geological Survey (USGS) groundwater study. Since then, the number of residents and seasonal housing units in the County has increased rapidly.

Based on MDE's water balance methodology, the water-bearing formations that serve Kent County recharge at the rate of more than 200 million gpd. At the broad scale, and lacking specific data to the contrary, this volume is adequate to serve projected growth in rural areas of Kent County through 2030. However, the caveats to this finding are important. Kent County's water-bearing formations serve a broader region beyond the County itself. In addition, geological and seasonal variations mean that groundwater resources may not be uniformly available in every location in the County.

A frequently-expressed concern is the impact of new development (and its wells) on existing groundwater wells serving individual homes and businesses. Neither the County Health Department nor MDE are aware of situations in Kent County where water use at a subdivision on individual wells is impacting other users. However, this situation could potentially arise in cases where the existing well is older and shallower. In such a situation, new wells could reduce flows to existing wells in the immediate vicinity, forcing existing well owners to drill new, deeper wells. While significant new wells (such as those serving public water systems) require a groundwater appropriations permit from MDE's Water Management Administration, wells for individual businesses and homes (even those in small subdivisions) require a permit from the Kent County Department of Environmental Health. Subdivisions which will draw more than 5,000 gpd must receive a groundwater appropriations permit.

Finally, it is also important to remember that groundwater and surface water resources are linked. While groundwater withdrawn through wells is typically returned to the ground (or surface) via septic systems, large withdrawals can potentially impact nearby surface water bodies. In developing expanded public water systems, consideration should be given to potential impacts on nearby bodies of water and private wells outside of the service area.

When the Aquifer Assessment Plan is completed, Kent County will incorporate applicable parts of the assessment in its Plan. Future updates to the Comprehensive Plan will incorporate the planned regional water resources study into decisions about growth and development—particularly if the groundwater study reveals limitations on groundwater capacity.

Wastewater Treatment Assessment

At present, it is estimated that less than half of the County's population depends upon onsite disposal systems. The remaining population is served by either a municipal, county, or private community/multiuse facility. The County provides sewerage services to the following unincorporated service areas: Fairlee/Georgetown, Kennedyville, Worton/Butlertown, Edesville, Rudnick (community septic system), Little Neck (community septic system), Piney Neck/Skinner's Neck/Wesley Chapel, and Tolchester. The County also provides services to the following privately-owned and operated sewerage systems: Delta Heights, Velsicol, and Great Oak Resort Club. The Towns of Betterton, Chestertown, Galena, Millington, and Rock Hall provide sewage services to their residents.

While a number of the County and Town wastewater treatment plants have upgraded to Enhanced Nutrient Removal (ENR) technology or are in the process of doing so, other plants have not and are not currently meeting Biological Nutrient Removal (BNR) standards.

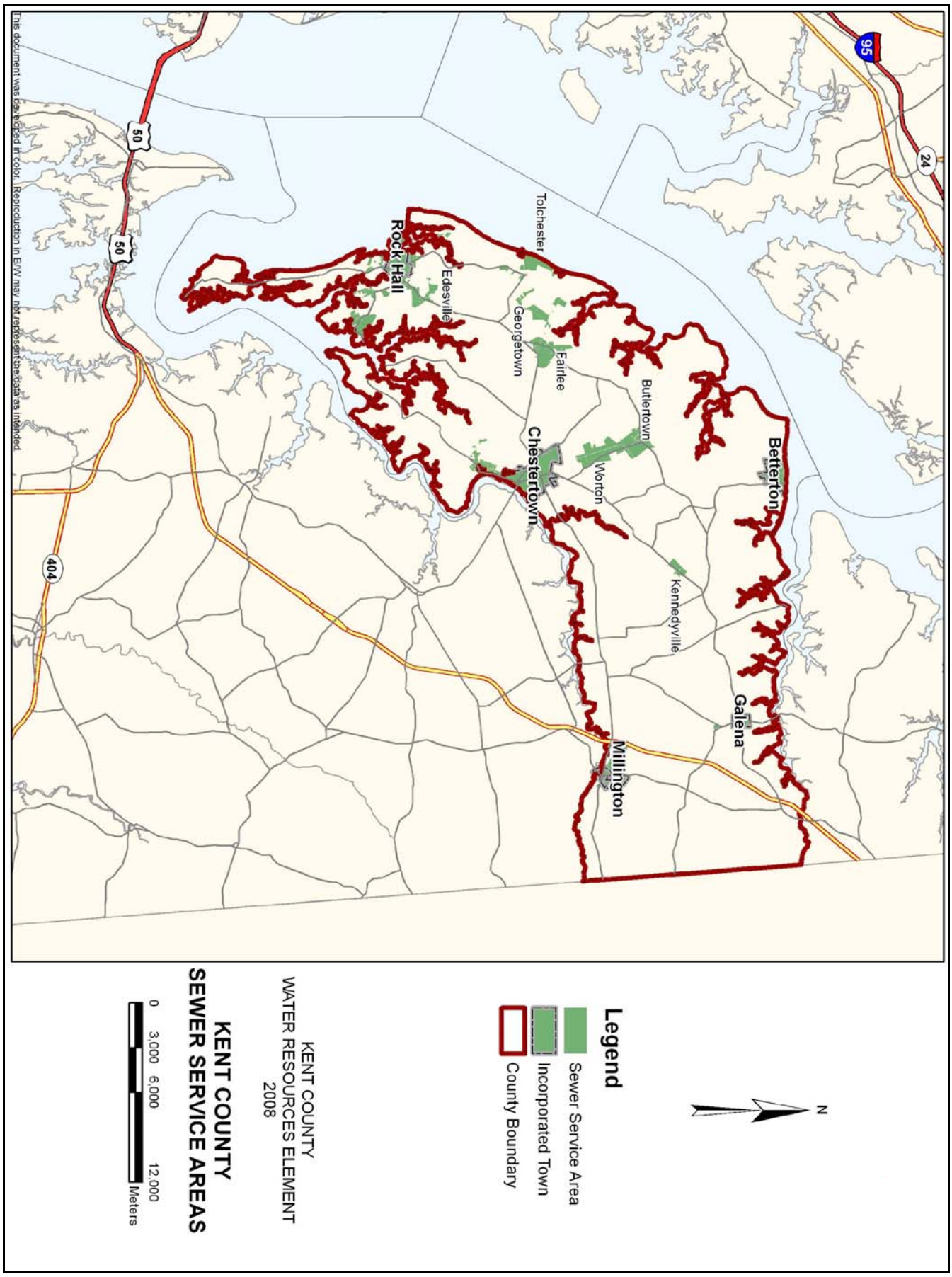
Most of the larger problem areas occur in subdivisions approved prior to regulations controlling onsite disposal systems. Some of theses areas are not targeted for growth by the County Comprehensive Plan but have occurred as a result of correction of failing septic systems. Correcting these failures without, at same time, promoting growth in unplanned areas has presented challenges. Older settlements, not involving hundreds of undeveloped lots of record, present the other extreme as there is not a sufficient number of users to bear the cost of sewerage correction.

Major and Minor Wastewater Treatment Facilities

A major wastewater treatment plant is characterized by a design capacity of 500,000 gpd or more. Minor plants are those which are designed to handle less than 500,000 gpd. Major facilities must meet nutrient caps which are based on MDE 2020 flow projections. Nutrient caps are legally enforceable aggregate mass load limits contained in a major plant's discharge permit. Nitrogen and phosphorus must be treated and must meet the caps. Minor plants must report nutrient loadings in a Daily Monitoring Report (DMR) which is submitted to MDE monthly. Minor plants are not required to treat nutrients or meet the caps set by the 2020 flow projections.

All plants have nutrient caps which are set based on 2020 flow projections; however, only major plants are required to treat these nutrients and to upgrade their facilities to meet Enhanced Nutrient Removal (ENR) standards. ENR is a wastewater treatment technology that is capable of reducing the nitrogen and phosphorus concentrations in wastewater effluent to achieve permit limits equivalent to concentrations of no more than 4 milligrams per liter total nitrogen and 0.3 milligrams per liter total phosphorus, as calculated on an annually averaged basis. Bay Restoration Funding (the Flush Fee) is meant to assist with the costs of upgrading major plants ENR capability and to upgrade failing onsite septic systems in the Critical Area.

Kent County owns and operates three minor wastewater treatment facilities and operates lines and pump stations for three systems which pump to the Rock Hall treatment facility. The Towns of Betterton, Galena, Millington, and Rock Hall operate minor wastewater treatment facilities; although Rock Hall is in dialogue with MDE and the County to upgrade to a major facility. Currently, the Town of Chestertown operates the only major wastewater treatment facility in the County. This plant has just been upgraded to ENR.


95
24
Betterton
Galena
Kennedyville
Millington
Butlertown
Worton
Chestertown
Fairlee
Georgetown
Tolchester
Edesville
Rock Hall
50
50
404
This document was developed in color. Reproduction in B/W may not represent the data as intended
N
Legend
Sewer Service Area
Incorporated Town
County Boundary
KENT COUNTY
WATER RESOURCES ELEMENT
2008
KENT COUNTY
SEWER SERVICE AREAS
0 3,000 6,000 12,000
Meters

Kent County Watersheds

Sassafras River Watershed

Town of Betterton
The town owns and operates a minor wastewater treatment facility with a collection system containing 3.7 miles of 4-8 inch diameter gravity sewer, 0.77 miles of 2-6 inch diameter force main, 5 pump stations, and 88 manholes. The treatment plant is a 200,000 gallon per day activated sludge packet plant built in 1969 and 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, soft-shell clams, hardshell clams, and brackish water clams.

Betterton reports an average flow of between 13,000 gpd and 18,000 gpd. The plant draws only one third of its designed flow. The 2020 projected flow is 22,000 gpd.

The town encourages infill development and would only approve annexation under conditions specifically outlined in its Comprehensive Plan. There is adequate acreage within the existing town boundaries to accommodate residential growth (of the 14 acres of commercial land, only one acre remains undeveloped). While the town's reserve capacity of the water treatment plant and wells would require expansion for any major development, the town has adequate sewage treatment flow capacity to accommodate an additional 490 EDUs. The plant currently serves over 800 people with 329 connections.

However, according to MDE, the town is currently exceeding and is projected to exceed the minimum EDUs of hydraulic, nitrogen and phosphorus limit analysis. The limiting factor for the town, according to MDE, is its phosphorus loading. While not regulated by MDE, the town reports these rates to the state on a monthly basis.

The town will undertake a feasibility study to explore operational or mechanical solutions to come into compliance with the annual loading rate.

Town of Galena
The town owns and operates a minor wastewater treatment facility that serves the town and a small area outside town limits on Mill Lane. The existing system consists of a 1.7-acre stabilization lagoon with chlorination prior to discharge into Dyer Creek which is designated Use I: waters protected for water contact recreation and aquatic life. In 2004, sludge was removed from the lagoon and a polished cell installed to facilitate sludge removal. The system has one pumping station which was replaced in 2007. The town's present plan includes an investigation to repair any infiltration problems.

The system serves approximately 600 people. The permitted flow is 60,000 gpd. The system has an average daily flow of 48,000 gpd with a design capacity of 80,000 gpd following an upgrade in 1992. The town projects a flow of 59,000 gpd by 2025. Town services provided within town boundaries are expected to easily accommodate the town's growth projection of 102 people or 44 additional households. To reach the Town build-out capacity of 438 additional people or 188 additional households, treatment capacity would have to reach approximately 95,000 gpd. This would require a lengthy permitting process though MDE and a significant treatment plant expansion.

According to MDE figures, the town currently exceeds and is projected to exceed loading rates for nitrogen and phosphorus. The current MDE analysis reveals the town exceeds its nutrient load capacity and the 2030 projection also reveals an overage. The limiting factor is phosphorus. While not regulated by MDE, the town reports these rates to the state on a monthly basis.

The town is currently working with MDE to address its nutrient loading overage. The town has been looking into the feasibility of a retrofit for the system and will have preliminary plans by the end of 2008. A survey of the existing system is currently being completed. The town will undertake a feasibility study to explore operational or mechanical solutions to come into compliance with the annual loading rate.

Rudnick—Privately-owned system
Owned by the community and operated by the Kent County Department of Water and Wastewater, the Rudnick sewerage system is a community septic system which serves nine single family homes with a permitted flow of 4,050 gpd. The operators of this system are not required to submit reports to MDE.

Still Pond- Fairlee Watershed

Drayton Manor—Privately-owned system
Currently not in operation and formerly the site of a church retreat, Drayton Manor's existing facility is proposed for expansion. This expansion has been indefinitely postponed. The formal proposal consisted of an upgrade to the current septic system to accommodate a drip irrigation system with a design capacity of 29,800 gpd to serve a proposed conference center, spa, and retreat. The County is also considering extending the Worton system to this site in order to correct health issues and to reduce the impact of private systems on Churn and Still Pond Creeks.

Great Oak Resort Club—Privately-owned system
Mears, Inc. owns and operates the wastewater treatment facility that serves this resort club consisting of a restaurant, motel, and marina. The treatment system is a one-acre lagoon with chlorination prior to discharge into Fairlee Creek with an average flow of 6,000 gpd and a design capacity of 14,000 gpd. The operators of this system are required to submit reports to MDE.

Tolchester
Construction of the Tolchester wastewater collection and treatment system was completed in 1996 consisting of approximately 41,000 feet of low pressure force main, 24,000 feet of force main, 12,000 feet of outfall pipeline, two main pump stations, and over 274 connections serving approximately 685 people. The system is maintained and operated by the Kent County Department of Water and Wastewater. Additional connections in this service may be permitted according to review criteria approved in an April 2008 resolution.

C&D Enterprises previously owned and operated the Delta Heights Condominium Project wastewater treatment facility. This system was abandoned and connected to the Tolchester wastewater treatment facility in 1996.

The facility is a sequencing batch reactor plant with ultraviolet disinfection, post aeration, and aerobic sludge digester with a design flow of 265,000 gpd. The system serves the Tolchester collection system (totaling 85,000 gpd) and the Fairlee/Georgetown system (totaling 180,000 gpd). In 2005, MDE and the County Commissioners approved an increase in allocations in this system from 40 EDUs to 50 EDUs. In 2008, MDE and the County Commissioners approved an increase in allocations provided 1) that the applicant can establish that the sewer lines will not need to be extended or improved or the system upgraded and 2) the property meets all application laws and is located within designated growth area shown on the Tolchester delineated development area map.

According to MDE 2030 projections, the facility is projected to exceed loading rates for nutrients. The limiting factor is phosphorus. While not regulated by MDE, the County reports these rates to the state on a monthly basis.

The Department of Water and Wastewater will undertake a feasibility study to explore operational or mechanical solutions to come into compliance with the annual loading rate.

Fairlee/Georgetown (Tolchester)
The Kent County Department of Water and Wastewater operates a minor wastewater treatment facility for the villages of Fairlee and Georgetown, including residences along Caulk's Field Road, and Wood's Edge Apartments totaling approximately 1050 people.

The original treatment facility was a three-cell stabilization lagoon system. After construction of the Tolchester wastewater treatment plant, the lagoons were abandoned and a new force main was installed carrying all wastewater from Fairlee and Georgetown to the new plant. A section of the old primary lagoon has been reconstructed to serve as a 24-hour emergency holding lagoon for the flow in the two villages. The wastewater from the towns of Fairlee and Georgetown is pumped via force main to the Tolchester facility (see above).

Lower Chester River Watershed

Little Neck—Privately-owned system
Owned by the community and operated by the Kent County Department of Water and Wastewater, the Little Neck sewerage system is a community septic system designed to serve sixteen single family homes and a future community area with a permitted flow of 7,650 gpd. Each home has or will have a septic tank followed by an effluent pump and chamber connected to a small diameter force main.

Town of Rock Hall
The town owns and operates a minor wastewater treatment facility that serves the town and two marinas located in the county. The town further serves two areas outside of town limits through an agreement with the Kent County Department of Water and Wastewater to correct failing septic systems: Green Lane and Spring Cove. Also, a 1996 upgrade to the town system by the County Department of WWS provides sewerage services to correct failing septic systems to the areas of Piney Neck, Skinner's Neck, and Wesley Chapel. The lines servicing these areas located outside of the town limits, aside from the two marinas, are owned and maintained by the county.

The system serves a total of 4,291 people and 1,716 connections (2,713 people with 1,085 connections within the Town limits and 1,578 people with 631 connections in the county). The plant's design capacity is 505,000 gpd with an average daily flow of 230,000 gpd. The facility is an activated sludge system incorporating oxidation ditch technology, screened grit removal, sand filter filtration, and drying beds for bio-solids. An emergency storage lagoon is located at the site.

According to MDE figures, the town currently exceeds and is projected to exceed nutrient loading rates. The current MDE analysis reveals the town exceeds its nutrient load capacity and the 2030 projection also reveals an overage. The limiting factor is nitrogen. While currently not regulated by MDE, the town reports these rates to the state on a monthly basis. The town will undertake a feasibility study to explore operational or mechanical solutions to come into compliance with the annual loading rate.

Potential upgrades and/or expansion of this system may place the town within the parameters of meeting ENR technology as the plant may be expanded to a major facility. MDE projects that the

plant's design capacity may place the town in a position to upgrade and meet ENR technology. The Town and County are currently in dialogue with MDE to explore plant options.

Edesville
The Kent County Commissioners own and the Department of Water and Wastewater operates the wastewater treatment facility in the village of Edesville serving approximately 250 people with 98 connections. The former Edesville system has been abandoned and has been connected to the Town of Rock Hall (see above).

Green Lane and Spring Cove/Allen's Lane
There are approximately 340 people and 133 connections in the service area which feed into the Rock Hall facility. The Green Lane and Spring Cove lines were installed in 1996 to correct failing septic systems identified by the Kent County Department of Environmental Health. The Allen's Lane line was added in 2007 to correct failing septic systems (see above).

Piney Neck/Skinner's Neck/Wesley Chapel
In 1996, this service area's collection system was installed to correct a large number of failing septic systems. The system consists of 61,000 feet of low pressure force main, 16,000 feet of force main, three pump stations, and over 400 connections serving over 1,000 people. The system is maintained and operated by the Kent County Department of Water and Wastewater. The wastewater is treated by the Rock Hall facility (see above).

Middle Chester River Watershed

Town of Chestertown
The town owns and operates the county's only major wastewater treatment facility that serves the town and areas outside town limits along MD Routes 291 and 289. The system serves approximately 5,400 people. The portion of the collecting system serving the area along MD Rt. 289, outside the town limits, is owned and maintained by the Kent County Department of Water and Wastewater through an inter-municipal agreement.

Treatment includes screening, grit removal, biological nutrient removal (BNR), sedimentation, enhanced nutrient removal (ENR), ultraviolet disinfection, and gravity aeration. The facility was upgraded to Enhanced Nutrient Removal (ENR) technology in 2006-8. The redesigned plant began receiving flow on January 17, 2008. Discharging to the Chester River, which is protected for shellfish harvesting, the system has a design flow of 900,000 gpd with an average daily flow of 667,000 gpd.

The town has infill responsibilities that would take up the remaining capacity between the present daily use and the present permitted flow of 900,000 gpd. There are several annexation proposals before it currently which are at varying stages in the review process. There is no indication of whether or not these annexations will be approved at this time; though if all proposed annexations were approved and built out within 12 years, then the town system could realize an additional demand of 4000-6,552 people (based on MDP population projections for 2020).

The new system was brought online in August 2008; per to MDE's data, the completion of the facility's transition to ENR technology will place the facility's readings well within the permitted nutrient discharge range with additional EDUs. MDE's 2030 projection reveals the availability in EDUs. The limiting factor is nitrogen. The town reports these loading rates to the state on a weekly and monthly basis. The town will continue to submit weekly and monthly monitoring reports to ensure compliance with the annual loading rate.

The town has hired a consultant to draft a Water and Wastewater Facilities Needs Analysis to prepare for the above discussed annexation proposals and any infill projections. The analysis will guide the Town in making decisions concerning the responsibilities of annexing parties for infrastructure improvements that will have to be built to meet EPA standards, capacities, and MDE regulations.

Chestertown Foods—Privately-owned system

No longer in operation as of 2008, this facility was owned and operated by Chestertown Foods, formally owned and operated by the Campbell's Soup Company. The system consisted of a spray irrigation and/or overland flow system with an average daily flow of 500,000 gpd. The treatment included settling, screening, grease floatation, and chlorination prior to discharge.

Kennedyville

The Kent County Department of Water and Wastewater operates a minor wastewater treatment facility for the village of Kennedyville serving approximately 289 people. Extensively upgraded in 2007, the system is a two-tank sequential batch reactor capable of meeting ENR permit levels. The system is preceded by influent pump station with a fine-screen removal system and discharges into Morgan Creek with UV disinfection.

The system currently treats approximately 14,000 gpd. Based on a 2002 feasibility study which assessed zoning within the service area, the plant's design capacity is 60,000 gpd with a permitted daily flow of 60,000 gpd.

The Kennedyville plant is currently meeting its loading rate limit. The MDE 2030 projections reveal the availability of additional EDUs with the hydraulic system onsite determined to be the plant's limiting factor.

Current growth area build out could potentially result in an additional 347 residential units as the village grows over time. Increases in capacity will need to be planned and constructed in some phasing sequence to accommodate demand for additional capacity.

Worton/Butlertown

The Kent County Department of Water and Wastewater operates a minor wastewater treatment facility for the villages of Butlertown and Worton serving 1,065 people. Kent County High School and Worton Elementary School are served by this system, along with several commercial and industrial users. The Kent County Community Center will also hook into the Worton system. With several proposed subdivisions totaling nearly 700 potential new residential and commercial connections, extensive upgrading and expansion are planned for the system.

Current growth area build out could potentially result in 694 additional residential and commercial EDUs. Existing water and sewer rate payers in Worton and Butlertown should not subsidize the infrastructure costs of future development in the Worton-Butlertown growth area. Accounting systems currently in place are designed to ensure that this does not occur.

The current facility is comprised of a gravity collection system with four pump stations and treatment provided by a three-cell stabilization lagoon with chlorination and dechlorination prior to discharge into Morgan Creek. Discharge is limited to a window between November 1 and April 30 and is permitted for a discharge of 75,000 gpd. The system has a fourth cell which is used for both septage and marine pump out disposal. The system has been upgraded to include mechanical aeration and grit removal.

According to MDE, the facility currently exceeds loading rates for nutrients; MDE also reports 2030 projections set to exceed loading rates for nutrients. The limiting factor is phosphorus. While not regulated by MDE, the County reports these rates to the state on a monthly basis.

The proposed upgrade to the existing system will consist of technology which will be ENR capable. Additional upgrades to the system will be required based on the growth projections noted above.

Upper Chester River Watershed

Town of Millington

The town owns and operates a minor wastewater treatment facility which was upgraded in 2004. The facility was not upgraded to ENR but is ENR capable. The minor treatment plant has a design flow capacity of 145,000 gpd and a current flow of 55,000 gpd. The 2020 projected flow is 61,000 gpd. Discharging into the Chester River which is designated as Use I water and is protected for water contact recreation and aquatic life, the plant is an activated sludge facility with contact stabilization. The treatment includes ultraviolet disinfection prior to discharge.

The facility serves Millington, West Millington (Queen Anne's County), Sandfield (located in the county), and Millington Elementary School. The facility also serves areas via a newly-installed force main which runs from US Rt. 301 to MD Rt. 291 including homes in the River's Edge subdivision located on either side of US Rt. 301 and homes north of Millington along West Edge Road. The new line was installed to correct over 50 failing septic systems. It has been approved by MDE and MDP to extend the existing line on West Edge Road along MD Rt. 291 and Chesterville Forest Road to serve approximately 49 lots identified by KCEHD as having failing septic systems.

Projected infill and development of the town's growth areas reveals that the town expects to grow beyond its sewerage capacity by 2015 with a proposed 266 EDUs by 2015 and 457 EDUs by 2030. According to MDE 2030 projections, it is anticipated that the town will exceed loading rates for nutrients. While not regulated by MDE, the town reports these rates to the state on a monthly basis.

An engineering study and permit application for increased capacity will be undertaken when the plant reaches 75 percent capacity in 2010; in the meantime, the town will undertake a feasibility study to explore operational or mechanical solutions to come into compliance with the annual loading rate.

Kent County On-Site Disposal Systems

Onsite Sewage Disposal Systems (OSDS) are a valuable investment in rural areas where sewer service is not available. At present, it is estimated that approximately one half of the County's population depends upon onsite disposal systems. Many areas of Kent County have soil conditions that are not well-suited for on-site sewage disposal systems. Individual septic systems can be acceptable in these areas when development remains fairly scattered, but the need for replacement with central sewer systems becomes greater as development densities increase. Proper maintenance of septic systems prolongs their useful life and reduces the amount of nutrients that pass into the groundwater. However, even well-maintained septic systems do not remove more than a minimal amount of nitrogen from the effluent; therefore, Kent County, in partnership with the Upper Eastern Shore Tributary Strategy Team will provide information and contact information concerning the use, installation and maintenance of both conventional and nitrogen removing septic systems.

To that end, the County, in partnership with the Kent County Department of Environmental Health, has received grants through MDE's Bay Restoration Fund to implement a local nitrogen removing septic system initiative. Since receiving the grant in 2006, approximately 40 nitrogen removing

systems have been installed in the County with many homeowners on a waiting list to participate in the BFR program. The County has spent over $400,000.00 to date of Bay Restoration Fund dollars on local denitrifying systems. The Cliff City community located in the Lower Chester River Watershed has been the focal point of many of the 18 installations.

Summary of Total Households on Septic and Sewer for all Watersheds*

Watershed	Households on Sewer	Households on Septic	Nonresidential Acres on Septic
Langford, 2002	156	810	11
Langford, 2030	237	971	28
Lower Chester, 2002	1,575	510	13
Lower Chester, 2030	1,869	526	34
Middle Chester, 2002	2,125	865	372
Middle Chester, 2030	2,521	865	474
Sassafras, 2002	310	1,818	30
Sassafras, 2030	440	2,117	33
Still Pond-Fairlee, 2002	1,165	2,187	40
Still Pond-Fairlee, 2030	1,623	2,325	42
Upper Chester, 2002	357	719	18
Upper Chester, 2030	421	753	75
2002 Totals	5,688	6,909	484
2030 Totals	7,111	7,557	686

* Source: MDP Land Use Change Analysis

Identification of Sewage Issues

The critical component of Kent County's development pattern is its people. Not to be underestimated in comparing current services to growth projections is the large County and town population comprised of second home residents. This population is not tracked by MDP, as this population is counted in its primary places of residency whether those residences are Maryland, Delaware, Pennsylvania, Virginia, West Virginia, or Florida. However, many of these people are utilizing both public water and sewer services causing spikes in the systems in summer months, weekends, and holidays. These inhabitants, along with a substantive population of recreational boaters, account for a discrepancy between people served by town and County water and sewer and MDP population statistics and growth projections.

Unmet Future Demand on Public Systems

To serve projected growth, the County and the municipalities will need to upgrade existing wastewater treatment facilities, and will, in many cases, need to undertake feasibility studies to determine best operational or maintenance practices to meet both community needs and nutrient caps. MDP growth projections for the year 2030 reveal a population of 23,400 people and 10,175 households. The most recent MPD estimate for Kent reveals a current population of 19,850 people and 8,100 households; therefore, the County is expected to grow by 3,550 people by 2030. If over one half of the County's projected population is served by public sewerage systems then the county and town systems can expect over 2,100 people (60%) totaling approximately 840 hook up requests.

MDE projections, based on nutrient cap limits and MDP growth projections, reveal an approximate availability of 460 EDUs by 2030. If the current trend continues which shows that over half of all county residents are currently being served by public water and sewer, then public sewerage providers can anticipate approximately 840 households in the County requesting public service by 2030. This projection reveals a potential deficiency in service. Also to be considered when assessing demands on public wastewater service is the county's second home population. Projections should attempt to anticipate a transition in use from seasonal to full time as second homes become retirement homes. This transition will surely have an impact on flow and nutrient readings.

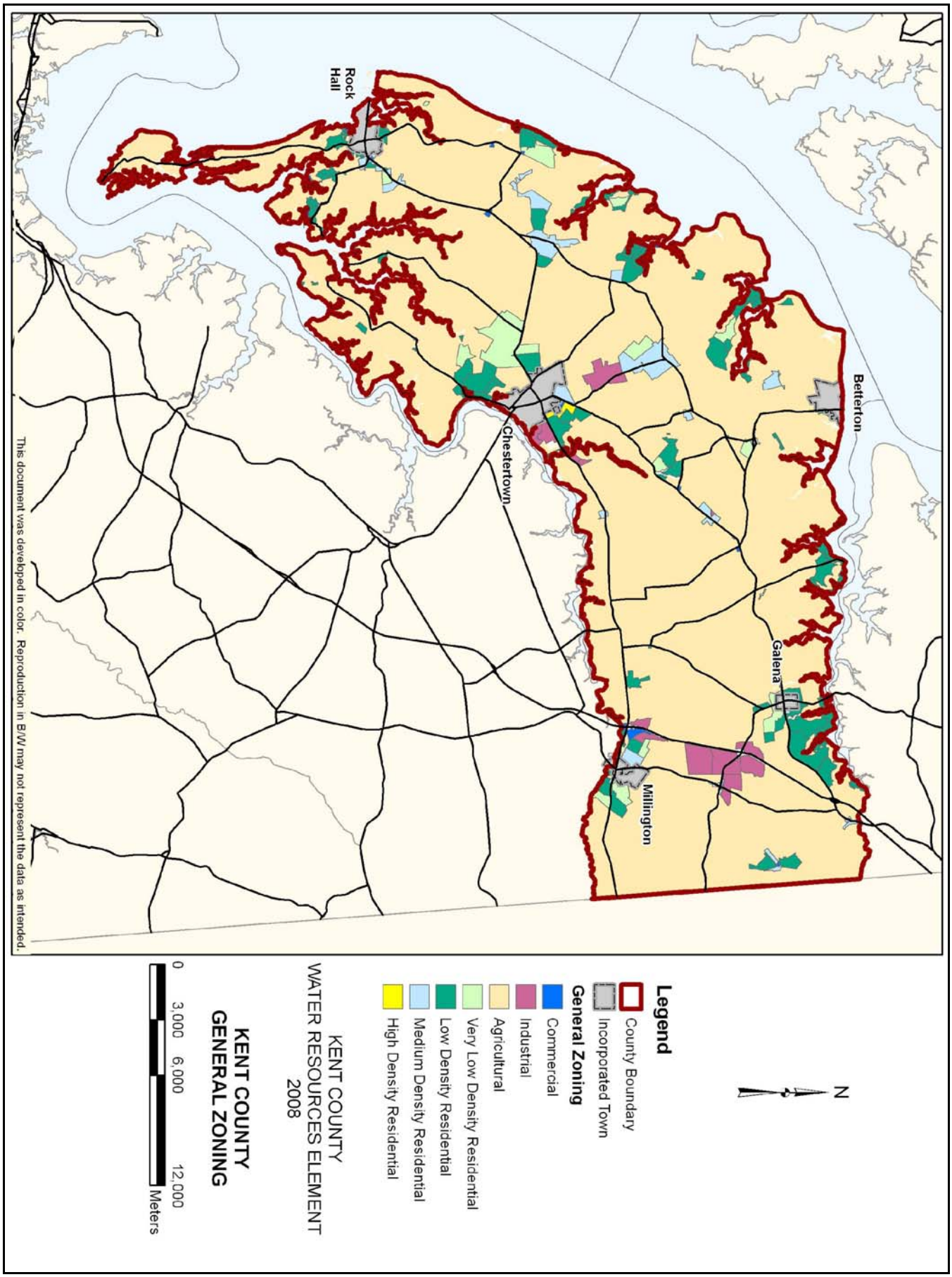
The chart below reflects existing wastewater treatment plant supply. Population projection data is not provided by MDP for individual towns; therefore, neither population nor household projection data is truly available in a manner that accurately reflects wastewater treatment plant projected demand. Another reason for this gap in data, beyond census projections, is that Municipal plants in many instances provide services beyond their boundaries.

Kent County and Municipal Wastewater Treatment Plant EDU's*

Wastewater Treatment Plant	People Served (2008)	EDUs (2008)
Municipal Plants		
Betterton	823	329
Chestertown (Major)	5,400	2,300
Galena	600	240
Millington	953	381
Rock Hall	4,291	1,716
County Plants		
Kennedyville	289	116
Tolchester	685	274
Worton	1,065	384
Total	17,706	5,640

*Source: County and Municipal groundwater appropriations permits (daily operating reports)

The Comprehensive Plan directs new growth to the existing towns and villages. In order for the towns and villages to accommodate this growth, adequate water and sewer facilities are essential. However, the County will investigate means to ensure that new development pays its share of the cost of providing water and sewer facilities. The priority for the County is to locate water and sewer systems in the designated growth areas. See the Kent County General Zoning Map for agricultural, residential, commercial and industrial areas within the County.


Betterton
Galena
Millington
Chestertown
Rock Hall
This document was developed in color. Reproduction in B/W may not represent the data as intended.
N
Legend
County Boundary
Incorporated Town
General Zoning
Commercial
Industrial
Agricultural
Very Low Density Residential
Low Density Residential
Medium Density Residential
High Density Residential
KENT COUNTY
WATER RESOURCES ELEMENT
2008
KENT COUNTY
GENERAL ZONING
0 3,000 6,000 12,000
Meters

All County and municipal plants are currently meeting flow requirements based on design capacity and average daily flow; likewise, all plants show current gpd surpluses in flow capacity. Based on 2030 flow and population projections, all but one plant will have a gpd surplus in flow capacity. Worton Wastewater Treatment facility shows a deficit in flow capacity in 2030.

All plants have nutrient caps which are set based on MDE 2020 flow projections; however, only major plants are required to treat these nutrients and to upgrade their facilities to meet Enhanced Nutrient Removal (ENR) standards. Nutrient caps are legally enforceable aggregate mass load limits contained in a major plant's discharge permit. Nitrogen and phosphorus must be treated and must meet the caps. Major plants must meet these caps, while minor plants must report nutrient loadings in a Daily Monitoring Report (DMR) which is submitted to MDE monthly. Minor plants are not required to treat nutrients or meet the caps set by the 2020 flow projections.

These nutrient caps set limits on plant expansion. When a minor facility meets 75 percent of its permitted flow capacity, it must begin a feasibility study and permitting process with MDE to identify operation and maintenance issues which are preventing the facility from meeting its nutrient caps. The design capacity and permitted flow numbers are different numbers from the nutrient caps that are set for permitting discharge limits. This is often where minor and major facilities meet their greatest challenge. The County and municipal facilities which are not currently meeting those loading rates and are not projected to do so by 2030 without upgrades are captured in the chart below.

Kent County and Municipal Treatment Plant Nutrient Cap Assessment*

Wastewater Treatment Plant	Current Condition	Limiting Factor	2030 Projection	Limiting Factor
Municipal Plants				
Betterton	Exceeding loading rate	Phosphorus	Exceeding loading rate	Phosphorus
Chestertown (Major)	Exceeding loading rate*	Phosphorus	Meeting loading rate	Nitrogen
Galena	Exceeding loading rate	Phosphorus	Exceeding loading rate	Phosphorus
Millington	Meeting loading rate	Nitrogen	Exceeding loading rate	Phosphorus
Rock Hall	Exceeding loading rate	Nitrogen	Meeting loading rate	Nitrogen
County Plants				
Kennedyville	Meeting loading rate	Hydraulic	Meeting loading rate	Hydraulic
Tolchester	Meeting loading rate	Phosphorus	Exceeding loading rate	Phosphorus
Worton	Exceeding loading rate	Phosphorus	Exceeding loading rate	Phosphorus

*This condition reflects reports submitted prior to the completion of ENR upgrade completed in August 2008.

Unmet Future Demand on Private Systems

With projected County growth projections totaling 3,550 new residents, it can be expected that over 1,400 of those people (39%) will be utilizing private septic systems. While OSDS perform a valuable function for rural residents, if not properly maintained, they can become a public health hazard through bacterial and potential nitrogenous groundwater contamination and ultimately, contribute to

nitrogen loadings to the watersheds. The County is currently investigating ways to address failing septic system problems in several areas. 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. These areas include the communities of Chesapeake Landing, Golts, Still Pond/Coleman, and Lover's Lane in Chestertown.

- There is no water or sewer service planned for the Golts area in the near future.

- The Still Pond/Coleman area is being considered for a feasibility study for sewer service by the Town of Betterton or a new facility to serve both the Still Pond/Coleman area and the town.

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

- Lover's Lane near Chestertown is being considered for sewer service by expansion of the Quaker Neck service area. A feasibility study is under consideration by the county. Connection of failing OSDS areas to existing or new wastewater treatments plants will decrease their contribution of nitrogen loadings to the Chesapeake.

In addition, the County is actively pursing denitrifying upgrades and retrofits to existing septic systems through the Kent County Bay Restoration Fund Program (approximately 40 units installed and many residents on the waiting list).

Nutrient Loading Analysis

The following Nutrient Loading Analysis has been provided by Maryland Department of the Environment with nitrogen and phosphorus loading rates established in the Kent County Water and Sewer Plan. The following charts attempt to quantify local loading rates as compared to Maryland Department of Planning land use categories and Department of Natural Resources Tributary Strategy best management practices. While local zoning and state land use categories are not directly interchangeable, the loading rate numbers below will give the County a baseline in order to examine existing zoning and best management practices while meeting the TMDL load reductions.

Land Use and Septic Systems	2002 LU, 2002 BMPs	2002 LU, Trib Strat BMPs	Current Programs Trib Strat BMPs
	(Acres)	(Acres)	(Acres)
Development	9,545	11,327	12,409
Agriculture	118,454	135,145	134,187
Forest	49,135	25,738	25,632
Water	77,988	1,346	1,346
Other	1,311	1,147	1,129
Total Area	256,432	174,704	174,704
Residential Septic (EDUs)	4,695	6,909	7,557
Non-Residential Septic (EDUs)	3,862	1,210	1,710

Total Nitrogen Loading	2002 LU, 2002 BMPs	2002 LU, Trib Strat BMPs	Current Programs Trib Strat BMPs
	(Lbs/Yr)	(Lbs/Yr)	(Lbs/Yr)
Development Nonpoint Source (NPS)	83,027	29,150	31,353
Agriculture NPS	1,841,805	551,292	548,474
Forest NPS	73,702	18,410	18,352
Other Terrestrial NPS	11,261	3,334	3,270
Total Terrestrial Load	2,009,795	602,186	601,449
Residential Septic (EDUs)	41,570	18,540	17,272
Non-Residential Septic (EDUs)	12,200	3,183	4,183
Total Septic Load	53,770	21,723	21,455
Total Non-Point Source Nitrogen Load	2,063,565	623,909	622,905
Total Point Source (PS) Load	0	35,736	50,556
Total Nitrogen Load (NPS+PS)	2,063,565	659,645	673,461

Total Phosphorus Loading	2002 LU, 2002 BMPs	2002 LU, Trib Strat BMPs	Current Programs Trib Strat BMPs
	(Lbs/Yr)	(Lbs/Yr)	(Lbs/Yr)
Development Nonpoint Source (NPS)	10,697	3,516	3,739
Agriculture NPS	129,387	50,356	50,099
Forest NPS	1,104	247	246
Other Terrestrial NPS	1,469	408	400
Total Terrestrial Load	142,658	54,526	54,483
Total Point Source (PS) Load	0	11,696	7,578
Total Phosphorus Load (NPS+PS)	142,658	66,222	62,061

Impervious Cover and Open Space	2002 LU, 2002 BMPs	2002 LU, Trib Strat BMPs	Current Programs Trib Strat BMPs
Total Impervious Cover	2,534	2,216	2,546
Agriculture	118,454	135,145	134,187
Forest	44,736	24,606	24,500

Point Source Assessment

Maryland Department of Planning and Maryland Department of the Environment generated a Kent County specific growth scenario which attempts to project development and land preservation based on growth projections and County zoning. While local zoning and state land use categories are not directly interchangeable, the proposed changes to land use and cover offer a baseline for beginning the TMDL load reduction dialogue with the state and local partners. Likewise, MDP/MDE loading rate numbers below will give the County a baseline in order to examine existing zoning and best management practices while meeting the TMDL load reductions.

What is revealed by the following land use scenario is very little projected change to existing land use over the next 20 years. Less than 1,000 acres of cropland, pasture, orchards, feeding operations, and row/garden crops are expected to change. The change is expected to occur predominantly to developed land, but some conversion to institutional, extractive, open urban, beaches, bare rock, or bare ground is projected. While loss of agricultural land is projected, the County Land Use Ordinance and the Comprehensive Plan emphasize that agricultural use is the preferred land use in Kent County. Density in the agricultural zoning districts is 1 per 30 and 1 per 20 in the Critical Area. The County does not foresee changing this density requirement, but will continue to direct residential and commercial growth to its towns and villages.

In addition, a loss of over 100 forested acres is predicted in this growth scenario. The County Comprehensive Plan outlines a no net loss strategy for Kent. In order to implement this policy, forest conservation plan and Critical Area afforestation plans are required. In addition, the County collaborates with area watershed organizations to encourage residential stewardship of the Chesapeake Bay and its tributaries. Local municipalities have completed Urban Tree Canopy studies and are currently working on the implementation of their studies.

Land Use Summary

Land Use/Cover	Initial (2004)	Future (2030)	Change
	(Acres)	(Acres)	(Acres)
Development	11,327	12,409	1,082
Agriculture*	135,145	134,187	-958
Forest	25,738	25,632	-106
Water	1,346	1,346	0
Other**	1,147	1,129	-18
Total Area	174,704	174,704	0
Residential Septic (EDUs)	6,909	7,557	648
Non-Residential Septic (EDUs)	1,210	1,710	500

* Agriculture is made up of Cropland, Pasture, Orchards, Feeding Operations, Agricultural Buildings, and Row & Garden Crops

** Other land uses include Institutional, Extractive, Open Urban, Beaches, Bare Rock and Bare Ground

In conjunction with the land use summary above, the nutrient loadings have been projected by MDP/MDE below. As expected, where an increase in development is anticipated, an increase in nutrient loading associated with that development is projected, making essential the implementation of best management practices from low impact development to the implementation of the new stormwater management regulations to the installation of nitrogen removing septic systems. It is also essential to ensure that development is directed to town or county wastewater treatment facilities.

Nitrogen Loading Summary

Land Use/Cover	Initial	Future	Change
	(Lbs/Yr)	(Lbs/Yr)	(Lbs/Yr)
Development	29,150	31,353	2,204
Agriculture	551,292	548,474	-2,818
Forest	18,410	18,352	-58
Water	3,027	3,027	0
Other**	3,334	3,270	-64
Total Terrestrial Load	605,213	604,477	-736
Residential Septic (EDUs)	18,540	17,272	-1,268
Non-Residential Septic (EDUs)	3,183	4,183	1,001
Total Septic Load	21,723	21,455	-268
Total NPS Nitrogen Load	626,936	625,932	-1,004

Phosphorus Loading Summary

Land Use/Cover	Initial	Future	Change
	(Lbs/Yr)	(Lbs/Yr)	(Lbs/Yr)
Development	3,516	3,739	223
Agriculture	50,356	50,099	-257
Forest	247	246	-1
Water	205	205	0
Other**	408	400	-8
Total NPS Phosphorus Load	54,731	54,689	-42

Current Point Source Programs

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 Middle Chester Partners Local Implementation Grant
- Upper Chester River Watershed Restoration Action Strategy
- Sassafras Watershed Action Plan
- Early Action Compact
- Draft Kent County Local Basin Implementation Plan
- Draft 2010 Trust Fund Program for the Middle Chester River
- Hazard Mitigation Plan
- Kent County Bay Restoration Fund Program

Nonpoint Source Assessment

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%, but impervious cover climbed by 41% and turf cover has climbed by nearly 80% (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 and flooding of adjacent land. The transformation has contributed 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.

Stormwater Policies

Kent County is not required by MDE to submit NPDES stormwater permits. The County implements the Stormwater Management Ordinance which sets regulations governing stormwater which encourage responsible growth and protect the health of the Chesapeake Bay. 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.

The Maryland Stormwater Management Act of 2007 was signed into law by Governor Martin O'Malley in Senate Bill 784. This Bill gives the Maryland Department of the Environment the authority to regulate stormwater throughout the State of Maryland. Kent County will be exempt from the NPDES Phase I and II permits but will comply with general regulations. The updated regulations of the Stormwater Management Act will be finalized and communicated to Kent County in late 2008. Future updates of this plan will incorporate these regulations where appropriate.

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 is based upon 13 core principles, which are listed below:

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

Agricultural Nonpoint Source Analysis

The County promotes the use of best management practices and support full funding of technical assistance and cost share programs. Although most farms already employ best management practices, 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. 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 stablization structures, sediment ponds, shallow water wildlife areas, waste storage facilities, micro-irrigation, and prescribed grazing.

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.

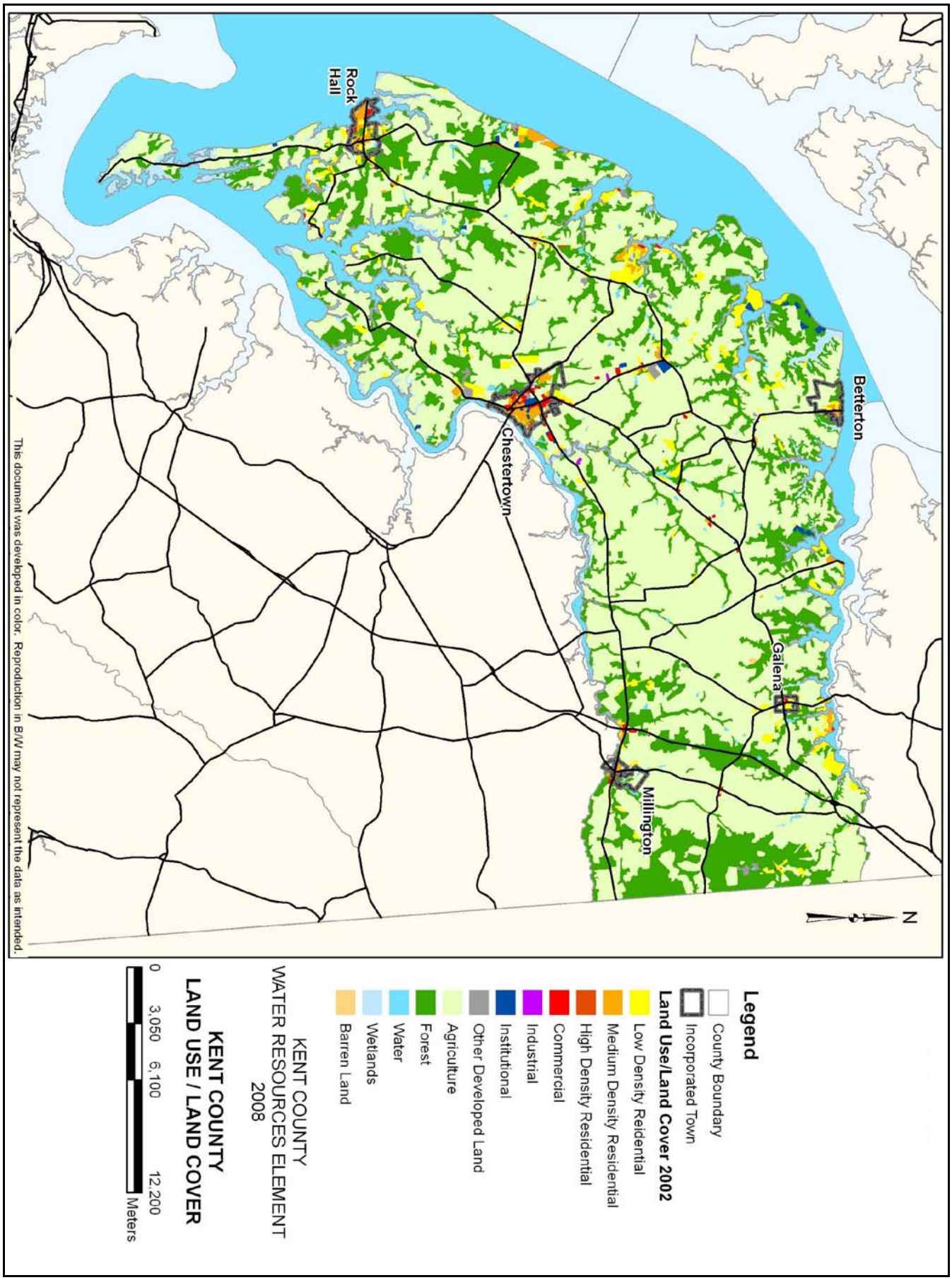
Growth Simulation Analysis and Nonpoint Source Loading Analysis

The Maryland Department of Planning has developed a non-point source nutrient loading analysis to determine how growth trends and land use planning 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 future planning scenarios.

The tributary strategy loading rates assume that there has been 100% implementation of the tributary strategy non-point source BMP's for the Upper Eastern Shore. Details can be seen in the Maryland Tributary Strategy Upper Eastern Shore Basin Report for 1985-2005 Data.

Kent County, through its Zoning, Comprehensive Plan, Watershed Restoration Action Strategies, and Total Maximum Daily Load Committee's Draft Local Implementation Plan, promotes growth that will minimize future deterioration its tributaries and would further encourage improvements to all of its watersheds. The location of prime agricultural land, forest, wetlands, and other sensitive environmental factors, in conjunction with existing municipalities and designated growth areas, drives County growth policy. See the Kent County Land Use/Land Cover Map.

Non-point source analyses were conducted to examine current and future nutrient loads for the six watersheds in the county. Alternative scenarios were run for the Langford, Middle Chester, and Upper Chester Watersheds. This is where the majority of the potential growth and near-term planning decisions will occur. The Middle Chester watershed contains Morgan Creek, which has 3 wastewater treatment plants discharging into it. Kent County promotes growth that will minimize future deterioration the Creek and would further encourage improvements to the watershed. Further, the County is currently pursuing a 2010 Trust Fund Grant with the Chester River Association and a long list of partners to improve water quality in the Middle Chester Watershed through a three-tiered, nonpoint source approach. The Langford, Middle Chester and Upper Chester Watersheds contain proposed areas of annexations. If these areas are annexed, homes or businesses currently on OSDS will no longer be contributing to the non-point source loadings. The alternative scenarios that were run were 1) smart growth with Tributary Strategy loading rates and 2) annexations.


Betterton
Galena
Millington
Chestertown
Rock Hall
N
Legend
County Boundary
Incorporated Town
Land Use/Land Cover 2002
Low Density Reidential
Medium Density Residential
High Density Residential
Commercial
Industrial
Institutional
Other Developed Land
Agriculture
Forest
Water
Wetlands
Barren Land
KENT COUNTY
WATER RESOURCES ELEMENT
2008
KENT COUNTY
LAND USE / LAND COVER
0 3,050 6,100 12,200
Meters
This document was developed in color. Reproduction in B/W may not represent the data as intended.

Current Non-Point Source Programs

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
- Upper Chester River Watershed Restoration Action Strategy
- Early Action Compact
- Draft Kent County Local Basin Implementation Plan
- 2010 Trust Fund Program for the Middle Chester River
- Sassafras Watershed Action Plan
- Hazard Mitigation Plan
- Kent County Bay Restoration Fund Program

There are many local, state, and federal agencies and sources of funding providing assistance for TMDL 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 Local Basin Implementation Plan, along with the project goals and outcomes of each initiative. Programs listed below under riparian buffers, wetland restoration, habitat enhancement, and cover crops are all implemented by the Kent Soil and Water Conservation District.

<u>OSDS (Conversion to Denitrifying OSDS)</u>

- Maryland Department of the Environment (Bay Restoration Fund)

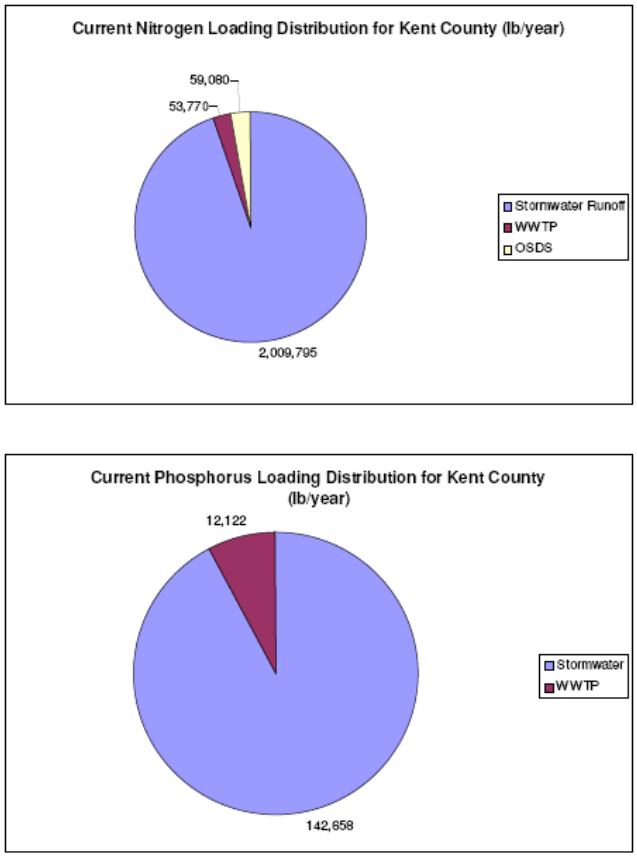
<u>Riparian Buffers</u>

- Conservation Reserve Enhancement Program (CREP)—USDA Farm Service Agency (FSA)
- Chesapeake Bay Foundation
- Ducks Unlimited
- Maryland Department of Agriculture (MACS) Forest Conservation—Maryland Department of Agriculture
- Environmental Quality Incentive Program (EQIP)
- Conservation Technical Assistance—USDA Natural Resources Conservation Service (NRCS)

<u>Wetland Restoration</u>

- Wetland Reserve Program (WRP)—USDA Natural Resources Conservation Service (NRCS)
- Conservation Reserve Enhancement Program (CREP)—USDA Farm Service Agency (FSA)
- Ducks Unlimited
- US Fish and Wildlife

Figure 5-1 Nutrient Loading Distribution (Draft)



Improve Fish and Wildlife Habitat
- USDA Wildlife Habitat Incentive Program (WHIP)—USDA Natural Resources Conservation Service (NRCS)
- Fish and Wildlife Service (FWS)

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

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 and improving the water quality of the Bay will require the cooperation of different state and federal agencies, counties and individual stake holders for many years.

Impervious Surfaces/Lot Coverage

Generally, impervious cover includes rooftops and roads that prevent stormwater from infiltrating in the ground. Significant water quality and habitat impacts are observed in streams in watersheds with average impervious cover of about 10% or greater. Impervious surfaces are calculated based on a number of project reviews including Stormwater Management and Critical Area. Recently, the Critical Area Program has changed its impervious surfaces requirements to lot coverage requirements. This means that some gravel, porous pavers, or open-deck projects which may not have been considered impervious surfaces will now be calculated in overall lot coverage limits.

Regardless of the manner in which lot coverage is calculated, the County supports a manageable increase in stormwater runoff through the enforcement of its Stormwater Management Ordinance and Critical Area program. In addition to traditional stormwater management practices, the county promotes bio-retention as a means of treating stormwater runoff. Bio-retention, or a rain garden, provides stormwater treatment that enhances the quality of downstream water bodies by using soil and both woody and herbaceous plants to remove pollutants from stormwater runoff.

In 2002, Kent County adopted conservation subdivision techniques for new subdivisions in designated growth areas. Conservation subdivision simply rearranges the development on a parcel as it is planned so that one half or more of the parcel remains in open space. This design technique not only uses low impact development measures but also contributes significantly to the corridor and buffer goals of this strategy. In the long term, conservation subdivision design can protect blocks and corridors of open space, reduce the amount of impervious surfaces, and reduce the impact of future growth on watersheds.

TMDL

The health of the Chesapeake Bay is dependent upon a variety of factors. These factors include point sources of pollutants (wastewater treatment plants) and non-point source pollutants (stormwater runoff and onsite disposal systems). Water quality regulations have traditionally focused on point source pollutants because they are easier to define, monitor and control. However, in many areas and watersheds, they only constitute a minor portion of the total nutrient loading in a Total Maximum Daily Load document (TMDL). Such is the case in Kent County as demonstrated in Figure 5-1.

TMDLs are designed on two levels, the macro level of the Chesapeake Bay and the micro level of individual watersheds. 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. This information is also shown in Table 5-1. The TMDLs that have been established for the watersheds in Kent County are summarized in Table 5-1.

Harvesting shellfish has historically been a vital part of the economy on the Eastern Shore of Maryland. Due to degrading water quality, the Maryland Department of the Environment has restricted shell fishing in certain water bodies due to water quality impairment. 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.

Table 5-1 (Draft)

Watershed	Area (Acres)	Wastewater Plants located in Watershed	TMDL	Date	303D Impaired List (Category 5) Reason why it is on the list
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

<u>Kent County TMDL Committee</u>

Maryland has addressed the non-point source pollution sources through the Tributary Strategy Implementation Plan. All six watersheds in Kent County are contained within the Upper Eastern Shore Tributary Strategy Area.

The County formed a Kent County TMDL Committee which has been meeting since November 2006 to draft the Local Tributary Strategy Basin Implementation Plan. The draft was completed in March 2008 and represents a snapshot in time. The Committee is awaiting state data both from MDE and Maryland Department of Agriculture.

The Draft Basin Plan includes the following initiatives (Draft Plan is attached):

- Point Source Implementation Plan
- Urban and Suburban Non Point Source Implementation Plan
  - Planning and Preservation Programs to Reduce Impacts of Future Growth on Water Quality
  - Regulations, Zoning, Ordinances and other Implementation Programs to Protect Water Quality
  - Watershed Restoration and Education Programs
  - New Initiatives to Address Barriers

Policies and Actions

- Agriculture is the preferred land use in Kent County. The County will ensure that priority is given to water availability on behalf of agricultural use rather than subdivision on agricultural land. The County will ensure that water appropriation for proposed subdivision or commercial development does not negatively impact agricultural water use in the Priority Preservation Area.
- Encourage improvements in irrigation efficiencies on agricultural land.
- Encourage the management of irrigation water.
- Encourage an inventory of existing irrigation system efficiencies and familiarize property owners with existing grant programs.
- Investigate the use of municipal wastewater for agricultural irrigation.
- Investigate upgrading all minor wastewater treatment facilities to ENR technology.
- Consider a wastewater capacity and feasibility study for all of its facilities.
- Investigate policies which encourage all new commercial and residential development on private septic systems be nitrogen removing septic systems.
- Avoid the proliferation of alternative wastewater systems (technologies utilized in lieu of those permitted by conventional regulatory authority). These systems shall not be permitted merely to allow property owners to develop previously undevelopable properties.
- Encourage marinas not hooked into public water and sewerage systems to consider the installation of nitrogen removing septic systems.
- Encourage all County marinas to become registered Clean Marinas.
- Investigate ways of incentivizing retrofits, inspections, and maintenance of existing systems.
- Pursue septic system education and/or maintenance agreements.
- Consider the installation of nitrogen removing septic systems in Rudnick and Little Neck.
- Consider water capacity plans for all of its systems.
- Identify groundwater recharge areas and investigate protection strategies accordingly.
- Consider the development of a wellhead protection plan.
- Continue to coordinate with the towns regarding annexations and proposed green belts.
- Consider the implementation of a 15 percent lot coverage limit on all new development.
- Encourage water quality improvements for new development through stormwater management techniques such as rain barrels, rain gardens, and native planting plans.
- Review initiatives found in its Local Basin Implementation Plan.