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Section 2.0 – Sensitive Areas, Water Resource and Mineral Resources Elements

Sensitive areas, water resources and mineral resources are key components of the County’s natural environment as well as a part of the natural-resource based economy. The County contains 495 miles of shoreline with wildlife and aquatic habitats, and considerable acreage preserved as County and State parkland, natural areas or open space, agricultural lands, woodlands, wetlands and a variety of water resources. The land use ethic to preserve natural resources applies *sustainable smart growth management strategies* which contribute to the success of *maintaining the County as a quintessential rural community* through:

- Protection and preservation of sensitive areas and water resources using a variety of land use management tools and techniques;
- Reduction of stormwater runoff by using best management practices and best agricultural practices;
- Reduction of environmental impacts by using innovative technology for on-lot septic systems and public sanitary sewer systems; and
- Protection of quality and quantity of drinking water supplies and through watershed planning.

This Plan Element is part of the County’s approach to *land use planning looking through the “lens of water resources management”* focusing on preservation of rural agricultural lands and protection of sensitive areas.

Due to the relationship of various natural resources and interrelationship of various Plan Elements, the following Plan Elements are contained within this section:

- Sensitive Areas Element;
- Water Resource Element; and
- Mineral Resources Element.

These Plan Elements are supported by background information and technical analysis contained in Appendix 3: Water Resource Analysis and Best Management Practices Toolkit (Appendix 3).

All maps referenced in this Element are contained in the tabbed Maps section titled Sensitive Areas, Water Resources, Mineral Recovery Areas and Preservation.

Article 66B Visions

1. *Quality of Life*

2. *Public Participation*

3. **Growth Areas**

4. *Community Design*

5. *Infrastructure*

6. *Transportation*

7. *Housing*

8. *Economic Development*

9. **Environmental Protection**

10. **Resource Conservation**

11. **Stewardship**

12. *Implementation*



Section 2.1 Legislative & Regulatory Background

Article 66B, which incorporates the provisions of HB 1141, requires a plan element to address sensitive areas and water resources contained within the County. Article 66B requires the County to assess and implement strategies in a Water Resource Element (WRE) that addresses the relationship of planned growth to water resources for wastewater treatment, stormwater management and safe drinking water. The legislation also requires that jurisdictions direct growth to areas where sufficient wastewater treatment capacity exists or can be expanded to ensure that water quality goals can be achieved.

Section 2.2 Vision, Overarching Goals & Guiding Principles

Article 66B visions with respect to sensitive areas and water resources emphasize environmental protection, resource conservation, stewardship and establishing Planning Areas. The following key visions provide the framework for the protection, preservation and conservation of the County's sensitive areas, water resources and natural resources.

- **Planning Areas (also known as Growth Areas)** – Growth is concentrated in existing population and business centers, growth areas adjacent to these centers, or strategically selected new centers.
- **Environmental Protection** – Land and water resources, including the Chesapeake Bay and Coastal Bays, are carefully managed to restore and maintain healthy air and water, natural systems and living resources.
- **Resource Conservation** – Waterways, forests, agriculture areas, open space, natural systems, and scenic areas are conserved.
- **Stewardship** – Government, business entities, and residents are responsible for the creation of sustainable communities by collaborating to balance efficient growth with resource protection.



Section 2.2.1 Overarching Goal and Vision

The Overarching Goal is for adoption of the policies, regulations, legislation and enforcement procedures and the appropriation of funding for programs and projects necessary to restore, enhance, protect and conserve our land, air, and water resources, and establish programs designed to generate an awareness of and support for these measures.

The Vision is that Queen Anne's County will remain a rural, agricultural, and maritime County because it restores, enhances, protects and conserves its valuable land, air and water resources through such measures as:

- *Conservation and protection of our agricultural lands, open spaces, woodlands, wetlands, wildlife and their habitat;*
- *Conservation and protection of our water resources: bays, rivers, creeks, lakes, groundwater, and shorelines, such as: adherence to environmental regulations and low-impact storm water practices that seek to restore the Chesapeake Bay;*
- *Preservation of good air quality and viewscapes, including the night sky;*
- *Support for our agricultural, maritime, and tourism industries; and*
- *Environmental education programs aimed at promoting energy efficiency, comprehensive recycling practices for residences, businesses and public buildings, clean air and water policies, resource conservation and sustainable land use practices.*

Section 2.2.2 Guiding Principles for Preservation/Conservation of Sensitive Areas and Protection of Water Resources

The following guiding principles provide the framework for protection, preservation and conservation of sensitive areas and water resources. These guiding principles provide management of future development for the purpose of sustaining current and future populations, the environment and economic vitality. These guiding principles include:

- ① **Universal stewardship of the land, water air** will result in sustainable communities and protection of the environment.
- ② Land and water resources are carefully managed to restore and **maintain healthy natural systems**.
- ③ **Concentrate and direct growth to Planning Areas** and strategically selected new Planning Areas to protect resource areas.
- ④ **Planning Areas have the water resources and infrastructure** to accommodate population and business expansion in an orderly, efficient, and environmentally sustainable manner.
- ⑤ Stewardship of the Chesapeake and Coastal bays, land and water resources is the responsibility of government, businesses, and residents for the **creation of sustainable communities** by collaborating to balance efficient growth with resource protection.



- ⑥ Apply *sustainable smart growth principles and best management practices* for the purpose of conserving resources, reducing resource consumption, and minimizing impacts on resources.
- ⑦ Encourage opportunities with respect to the County's *resource based economy and eco-friendly development*.

Section 2.3 Issues and Opportunities

Sustaining environmentally sensitive areas and the quality of water resources are factors in the overall quality of life of County residents. This section outlines various issues and opportunities for environmentally sensitive areas and water resources with respect to maintaining the County as a sustainable community through a balance of growth and economic development with protection, preservation and conservation of the environment.

Section 2.3.1 Environmentally Sensitive Areas

Environmentally sensitive areas as defined by Article 66B include:

- Streams, wetlands and their buffers;
- 100-year floodplains;
- Habitats of threatened and endangered species;
- Steep slopes;
- Agricultural and forest lands intended for resource protection or conservation; and
- Other areas in need of special protection, as determined in this Plan.

The following is a listing of planning issues and opportunities related to environmentally sensitive areas:

- Further protection of wetlands, both tidal and non-tidal, will have a positive impact on targeted ecological areas, wildlife habitat, flood control stream buffers and water quality.
- Further protection of woodlands or forested lands will have a positive impact on wildlife habitats, contribute to ecological balance and offer recreational opportunities for residents.
- Development in environmentally sensitive areas should use techniques to reduce impacts on water quality, wildlife habitats and shorelines.
- Preservation of wetlands and utilizing low impact design development techniques within groundwater recharge areas minimize impacts on life sustaining resources.
- Creating living shorelines will have a positive impact on both land and water resources.
- The quality of water is directly related to the sustainability of aquatic habitats, such as those for shellfish and fisheries, which are resources for the County's maritime industry.



Section 2.3.2 Water Resources

Water is a valuable and finite resource which must be carefully managed. The following is a listing of planning issues and opportunities related to the County's water resources:

Drinking Water

- Additional detailed hydro-geological studies are needed.
- Conversion of forest land and wetlands by development within groundwater recharge areas can impact the sustainability of the environment.

Water Quality

- Tidal waters in the County are already considered impaired.
- Total Maximum Daily Loads (TMDLs) have not been established by the State for all watersheds for the County and region. A TMDL establishes the maximum amount of an impairing substance or stressor, such as nutrients or other pollutants, that a water body can assimilate and still meet water quality standards. The *assimilative capacity* of waterways is its ability to receive pollutants without compromising water quality to the extent that recreational uses, human needs, and aquatic habitats are adversely affected.

Wastewater

- Limited wastewater treatment plant capacity and limited assimilative capacity of receiving waters impact both the environment and development opportunities.
- Wastewater infrastructure must have sufficient volume capacity and adequate nutrient removal capability or ability for expansion and/or upgrades to accommodate planned growth and development.
- Management and regulation of on-site sewerage disposal systems associated with new development that is not located within Planning Areas.
- Encourage reuse/recycling of treated effluent.

Stormwater

- Impervious surfaces affect the quality, volume, and rate of stormwater run-off. Limited capacity of receiving waters to assimilate non-point source nutrient loads could affect the ability to accommodate new residential and non-residential development.
- Studies have documented that the quality of aquatic and wildlife habitat of streams, lakes, and wetlands begins to decline when the area of impervious surface within a watershed reaches 10 percent of the total land area because of the increased volume of stormwater runoff.



Section 2.4 Resource Areas (refer to Map Tabs)

Environmentally Sensitive Areas include streams and stream buffers; 100-year floodplains; wetlands; groundwater; habitats of threatened and endangered species; and steep slopes. These sensitive areas can be vulnerable to adverse impacts from development activities, residential uses, and certain types of agricultural practices. Water resources include surface and ground water, drinking water supplies, management of stormwater runoff, and wastewater treatment. The following provides a brief explanation of the importance of each of these features.

- Wetlands, both tidal and non-tidal, offer benefits to ecological resources, such as providing unique wildlife habitat, flood control and natural water filtration.
- Woodlands or forested lands provide wildlife habitat, ecological balance, and in some cases, recreational opportunities for residents.
- Land adjacent to the shores of the Chesapeake Bay and its tidal tributaries offer great potential for improved water quality and natural habitats. Activities within this Critical Area are regulated in order to balance land use with levels of environmental protection.
- Water resources that supply drinking water need to be properly managed and maintained for current and future populations.

Section 2.4.1 Map ESA-1: Critical Areas

The Critical Areas Map ESA-1 identifies Critical Areas and wetlands. The data was provided by Maryland Department of Planning and Queen Anne's County Department of Land Use, Growth Management & Environment with other sources including the US Fish & Wildlife Service (USFWS), Maryland Department of Natural Resources (DNR), and the Maryland Department of the Environment (MDE).

In 2008, the Maryland General Assembly passed HB 1253, An Act concerning Chesapeake & Atlantic Coastal Bays Critical Area Protection Program Administration & Enforcement Provisions. Those areas affected by the Legislation include:

- | | |
|----------------------------|-------------------------------|
| ▪ Critical Area Mapping | ▪ Growth Allocation |
| ▪ Lot Coverage | ▪ Regulatory Authority |
| ▪ Erosion Control Measures | ▪ 200 Foot Buffer Requirement |
| ▪ Enforcement | ▪ Variances |

In order to implement those areas identified in the Critical Areas Act affected by the adoption of House Bill 1253, Sections of *Chapter 14, Queen Anne's County Environmental Protection Code* must be amended.

Critical Areas are lands that lie within 1,000 feet of the Chesapeake Bay and its tributaries as measured from mean high water line of tidal waters. Land within the Critical Areas is classified by its predominant use and intensity of development and is designated as one of the three following designations: IDA – Intensely Developed Area, LDA – Limited Development Area, and RCA – Resource Conservation Area. The following provides a brief description of each of these areas:

- **IDA – Intensely Developed Area** – An area where residential, commercial, institutional and/or industrial land uses are predominant and where relatively little natural habitat, if any, occurs.



- **LDA – Limited Development Area** – An area which is currently developed in low or moderate-intensity uses which contains areas of natural plant and animal habitats, and in which the quality of runoff has not been substantially altered or impaired.
- **RCA – Resource Conservation Area** – An area characterized by nature-dominated environments including wetlands, forests, abandoned fields, and resource-utilization activities including agriculture, forestry, fisheries activities or aquaculture.

Table 2-1 depicts changes with respect to impervious surface within Critical Areas for the IDA, LDA and RCA designations countywide. Currently, five percent of total lands within the Critical Area are impervious surface. Impervious surface includes building coverage, roadways, and parking lots along with other types of impervious cover such as driveways, patios, tennis courts, and sidewalks. Impervious surfaces can contribute to reduction in water quality, wildlife habitats and other environmentally sensitive areas.

Table 2-1: Impervious Surface by Critical Area Designation - 2008

Critical Areas	Total Acres	Impervious Area		Undeveloped Land	
		Acres	Percent	Acres	Percent
Intensely Developed Area – IDA	1,514.7	414.8	27.4%	1,099.9	72.6%
Limited Development Area – LDA	8,781.3	1,134.0	12.9%	7,647.3	87.1%
Resource Conservation Area – RCA	32,688.5	620.4	1.9%	32,068.1	98.1%
Total Critical Areas	42,984.5	2,169.2	5.0%	40,815.3	95.0%

Source: Queen Anne’s County, Department of Land Use, Growth Management and the Environment & MDE/MDP Datasets

Section 2.4.2 Maps ESA-2 and ESA-3: Sensitive Areas & DNR Targeted Ecological Areas (Greenprint Area)

Similar to the Critical Areas map, these maps illustrate National Wetland Inventory (NWI) wetlands and Department of Natural Resources (DNR) wetlands, and also illustrate Statewide Priority Wetlands, Sensitive Species Project Review Areas (SSPRA), and Targeted Ecological Areas (Greenprint Areas). The following provides a brief description of each of these areas:

- **Sensitive Species Project Review Areas (SSPRA)** – These areas primarily represent the general locations of documented rare, threatened and endangered species as created and updated by staff of the Wildlife and Heritage Service.
- **National Wetlands Inventory (NWI)** – These areas include wetlands as identified by the US Fish & Wildlife Service datasets. Typically these include wetlands that are 5 acres or larger in size. Note: additional wetlands may exist.
- **DNR Wetlands** – These areas include wetlands identified by the DNR which supplement the NWI dataset.
- **Statewide Priority Wetlands** – These areas are identified by MDE based on the “Prioritizing Sites for Wetland Restoration, Mitigation, and Preservation in Maryland” report published in 2006.



- **DNR Targeted Ecological Areas (Greenprint Area)** – These areas were identified by DNR for informational purposes, using a variety of methods developed by agency ecologists and include large blocks of forests and wetlands, rare species habitats, aquatic biodiversity hotspots and areas important for protecting water quality.

Section 2.4.3 Map ESA-4: Watersheds

This map represents the Maryland Department of Environment (MDE) and DNR eight-digit Watersheds within Queen Anne’s County. Eight-digit refers to the Hydrologic Unit Code (HUC) as carried out to 8 places, meaning that these areas are subsheds to larger watersheds. There are eleven of these eight-digit watersheds in the County. The map also illustrates those watersheds considered by MDE to have impairments and/or a completed TMDL study and established TMDLs. The map indicates that all watersheds in Queen Anne’s County have impairments and that four of the eleven watersheds within the County have a completed TMDL study.

A **waterway is impaired** if nitrogen, phosphorus, or a resulting water quality characteristic prevents attainment of a designated or existing use such as limiting or prohibiting use as a public water supply, or for swimming or fishing.

A very small portion of the Lower Chesapeake Bay watershed is on the western edge of Kent Island. The portion of this watershed within the County, because it’s less than 2 acres, is considered “deminimus” or “too small” by MDE for reporting purposes and is, therefore, not included in reports, summaries or the Appendix 3 analysis.

Section 2.4.4 Map ESA-5: Depth to Groundwater

This map illustrates the depth to ground water based on the Soil Survey Geographic (SSURGO) Database of 2003 as published by Natural Resources Conservation Service (NRCS). Depth to ground water refers to the shallowest depth to a wet soils layer (water table) during the months of April through June as expressed in inches from the soil surface for components whose composition in the map unit is equal to or exceeds 15%.

Section 2.4.5 Map ESA-6: Sewer Service Areas with Tier II High Quality Waterways

Sewer Service Areas are those areas identified in the County’s Comprehensive Water and Sewerage Plan. The map reflects designated service areas as of May 2009. The design of sewerage treatment methods and technologies utilized within these areas need to take into consideration the impacts on water resources. Therefore, the map also identifies High Quality Waterways including catchment areas and stream segments that have been designated by the State as Tier II Waters.

Tier II Waters are waters covered by the State’s Tier II anti-degradation designation of greatest concern with respect to discharges. This designation governs waters where water quality is better than the levels needed to meet clean water uses. Tier II waters, according to how anti-degradation policies are written, cannot receive new or increased discharges that would degrade their water quality.



Tier II specifies existing high quality water that is better than the minimum needed to support “fishable-swimmable” uses. While water quality can be slightly impacted, the State Anti-Degradation Policy identifies procedures that must be followed before an impact to Tier II waters can be allowed.

Section 2.4.6 Map ESA-8: Conservation Lands

The map identifies areas of conservation lands based upon the status of properties preserved through a variety of State and County preservation and conservation programs as of April 2009. The following types of conservation programs are identified on the map: Maryland Agricultural Land Preservation Foundation (MALPF) Districts; MALPF Easements; MALPF/Greenprint Easement; Maryland Environmental Trust (MET); Rural Legacy Easements and Areas; Private Conservation; Transfer of Development Rights (TDRs) Sending Areas; Deed Restricted Open Space; and, Non-Contiguous Open Space. Each of these programs is defined in a glossary contained in Appendix 2.

Section 2.4.7 Map ESA-10: Priority Preservation Areas 2010

Since 2008 and through the Comprehensive Plan update process, there has been discussion and consideration for expansion of the Priority Preservation Areas (PPA). The areas designated as PPA by this Plan are presented in Map ESA-10. Refer to the Section 3.0: Priority Preservation Area Element for additional details about the PPA. The PPA identified on this map encompasses approximately 119,004 acres or 50 percent of the land within the County, as an area targeted for permanent preservation of lands in agricultural production, forestry and/or natural resources. This map is included in this section because of the relationship between agricultural lands, sensitive areas and water resources. The protection of agricultural lands is a strategy for protecting sensitive lands and water resources.

Section 2.4.8 Map ESA-12: Stormwater Facilities & Impervious Cover

The identification of stormwater facilities and impervious cover was provided by the Queen Anne’s County Department of Land Use, Growth Management & Environment and the Queen Anne’s County Public Works Department. The map reflects stormwater facilities as of August 2009 and impervious cover as determined from 2008 aerial photography.

Tier II Anti-degradation Review

When development occurs, an application shall provide an analysis of reasonable alternatives that do not require direct discharge to a Tier II water body (this is referred to as a no-discharge alternative). The analysis must include cost data and estimates to determine the cost effectiveness of the alternatives.

Source: Maryland Dept. of the Environment



Section 2.5 Water Resources Element (WRE) and Land Use

The various land use patterns determined by Maryland Department of Planning (MDP) are used in the WRE to measure the nutrient loadings for nitrogen and phosphorus based upon formulas provided by Maryland Department of the Environment (MDE) for corresponding land use classifications. These detailed classifications have been reallocated as identified in the table below to support the creation of Map LU-7A: Comprehensive Plan Map – Countywide Land Use.

Table 2-2: Comparison of MDP Land Use Patterns and County Land Use Allocations

WRE Analysis – MDP Land Use Patterns	County Planning Areas & Rural Land Use Allocations (Map LU-7A)
Low Density Residential (1-2 Units per 5 acre) Medium Density Residential (2 to 8 units per acre)	Established Residential Areas
Industrial/Business Park Commercial & Mixed Use Institutional	Areas within County/Town Planning Areas and Rural Business/Employment Areas
Agricultural & Very Low Density Residential (1 unit per 5+ acres) Forest	Rural Agricultural Areas
Agricultural & Open Space (includes Greenbelts)	Rural Agricultural Areas and Permanently Preserved Lands

Appendix 3 provides a detailed analysis of water resources in the context of current land use and the 2030 projected land use patterns in order to determine the optimum land use scenario to minimize impacts on water resources. The analysis addresses the detailed requirements of the Water Resource Element outlined by the MDP and MDE. This Element of the Comprehensive Plan is summary level information that supports recommended strategies. Appendix 3 supplements the information contained in this Element.



Section 2.5.1 Water Resources – Wastewater

Table 2-3 identifies the demand and capacity of public wastewater treatment systems for various growth areas and towns. The remaining capacity of existing public systems is not sufficient to support projected growth. However, expansion of existing facilities and new facilities are identified to meet the needs of planned growth.

**Table 2-3: Public Sewer Systems Demand and Capacity Summary
Million Gallons per Day (MGD)**

Wastewater Treatment Plant (WWTP) Facility	Capacity Design (MGD)	Average Daily Flow (MGD)	Remaining Capacity (MGD)	Planned Growth – Future Demand Comments Relevant to Facility
Kent Narrows Stevensville Grasonville (KNSG) WWTP	3.000	1.533	1.467	The KNSG plant has reserved capacity for future development that includes non-residential space and 1,418 dwelling units plus 500,000 gallons per day (GPD) for failing septic systems. The plant is approaching capacity with these reserves.
Queenstown	.085	0.077	0.008	Plant is essentially at capacity; however the Town anticipates adding capacity for planned development as per the Queenstown Community Plan.
Centreville	0.542	0.381	0.161	The Centreville Community Plan identifies planned development which could exceed existing plant capacity, however additional plant capacity is anticipated to accommodate planned development*Plant has capacity which could be exceeded according to planned development identified in the Centreville Community Plan; however additional plant capacity is anticipated to accommodate planned development.*
Church Hill	0.080	0.047	0.033	The Town anticipates using remaining capacity for planned development as per the Church Hill Community Plan. Development in the Planning Area will require the expansion of the WWTP.
Sudlersville WWTP & Barclay**	0.090	0.044	0.046	Remaining capacity of 50,000 gpd is reserved for a new school flow and connection to the Town of Barclay. Anticipated flow associated with growth will require expansion of plant capacity.

* The Town of Centreville requested and, in 2008, MDE re-rated the new WWTP to process an average of 542,000 gpd of flow. This new WWTP is also capable of expansion to handle up to 1.2 million gpd of flow.

** Barclay is dependent on Sudlersville for Capacity; flows include anticipated connections.



Section 2.5.2 Water Resources – Drinking Water

Assessment of drinking water is accomplished by reporting on freshwater withdrawal by facility, treatment capacity and a summary of water system demand and capacity. Table 2-4 identifies the estimated freshwater withdrawal for the County with the identified Groundwater Appropriation Permit (GAP) or well withdrawal limits. Under current demands, the Stevensville and Riverside Distribution Systems show a deficit in the event that the best well is out of service as they have no back-up wells. The Stevensville vulnerability will be partially mitigated by the newly constructed water main interconnector from Stevensville to Bayside.

Table 2-4: GAP Well Withdrawal Limits Compared to Service Area Demand Projections

Service Area	GAP Well Withdrawal Limits		2006 Daily Well Withdrawal		Deficit with Best Well Out-of-Service, GPD
	Total GPD	Best Well Out-of-Service GPD	Average	Max-Month Daily Average	
Stevensville	1,255,000	265,000	639,000	811,000	546,000
Bridge Pointe	170,000	170,000	68,000	93,000	0
Bayside	300,000	45,000	91,000	135,000	0
Oyster Cove	187,000	187,000	84,000	135,000	0
Riverside	8,500	0	4,800	6,000	6,000
Grasonville	210,000	210,000	60,000	88,500	0
Prospect Bay	195,000	195,000	85,500	146,000	0

Source: Queen Anne’s County, Water Service Area Study for Queen Anne’s County Sanitary District, 2009

Table 2-5 identifies the net treatment capacity and deficits for various facilities. There is a need to improve on treatment capacity within the Stevensville water treatment system to meet 2010 demands. And, if all the properties in Grasonville that have access to the water system were to connect, treatment capacity will have to be improved for this system as well. There is also a need for additional treatment capacity for the projected 2040 demand for all facilities with the exception of the Riverside and Bayside-Queen’s Landing treatment plants. Treatment enhancements are required unless systems can be interconnected and utilize the combined treatment capabilities of several facilities or all facilities to meet projected demands.

Table 2-5: Net Treatment Capacity Compared to Service Area Demand Projections

System	Net Treatment Capacity	Max-Daily Demand Assuming Moderate Growth (GPD)			Net Treatment Capacity Deficit Compared to 2010 Demands, GPD
		2008	2010	2040	
Stevensville	658,400	609,000	869,000	1,480,000	210,600
Bridge Pointe	258,325	74,000	228,000	271,000	0
Bayside-Queen’s Landing	355,010	107,000	168,000	264,000	0
Oyster Cove	237,900	125,000	197,000	254,000	0
Riverside	37,560	2,700	6,300	9,500	0
Grasonville	154,100	84,000	158,000	194,000	3,900
Prospect Bay	182,000	140,000	144,000	218,000	0

Source: Queen Anne’s County, Water Service Area Study for Queen Anne’s County Sanitary District, 2009



Table 2-6 identifies the public water system demand and capacity for facilities owned and operated by the County and for select facilities owned and operated by the Towns. Information reported is based upon available data supplied by those entities responsible for public water systems. This table reflects existing demand and planned capacity needs with projected capacity surpluses or deficits. Interconnectivity of County facilities, new facilities and/or system expansions may be necessary to meet future demands for planned growth in several communities.

Table 2-6: Water System Demand and Capacity

Facility	Total Permitted Annual Average Daily Appropriations	Existing Demand	Population Served	Excess Annual Average Daily Capacity	Planned and Anticipated Capacity Needs	Net Excess Capacity	Potential Additional Users
County Facilities							
Bay Side Chester Growth Area*	198,000 gpd	114,585 gpd	1,550	83,415 gpd	35,000 gpd	48,415 gpd	194
Bridge Pointe Chester Growth Area*	211,600 gpd	90,229 gpd	750	121,371 gpd	32,500 gpd	88,871 gpd	355
Grasonville Grasonville Growth Area*	100,000 gpd	51,170 gpd	766	48,830 gpd	60,000 gpd	-11,170 gpd	-45
Oyster Cove Kent Narrows Growth Area*	95,800 gpd	90,229 gpd	588	5,571 gpd	51,000 gpd	-45,429 gpd	-182
Prospect Bay Stevensville Growth Area*	125,000 gpd	104,711 gpd	754	20,289 gpd	2,250 gpd	18,039 gpd	72
Riverside Chester Growth Area*	5,100 gpd	6,510 gpd	58	-1,410 gpd	3,750 gpd	-5,160 gpd	-21
Stevensville Stevensville Growth Area*, Chesapeake Bay Business Park and Thompson Creek	925,000 gpd	706,430 gpd	5,530	218,570 gpd	110,000 gpd	108,570 gpd	434
TOTAL	1,660,500 gpd	1,163,865 gpd	9,996	496,635 gpd	294,500 gpd	202,135 gpd	809

Source: Appendix 3 – Water Resource Analysis and Best Management Practices Toolkit 2010

*Growth Areas are known in this Plan as Planning Areas.

Section 2.5.3 Water Resources – Stormwater

A change in land cover from vegetated or forested conditions to impervious surface increases stormwater run-off volumes, which when unmanaged can contribute to a reduction in water quality and can have the potential for flooding downstream properties. Construction associated with a wide array of community development activities can result in increased rates of stormwater run-off. Therefore, there are regulations for stormwater management when development occurs.



Based upon the 2008 conditions depicted in Table 2-7, watersheds of concern include the Kent Island Bay and Eastern Bay Watersheds since the impervious cover has reached 10.23% and 9.04% respectively.

Table 2-7: Impervious Surface Coverage Existing Conditions (2008)

Watershed	Total Watershed Acres	Acres of Impervious Surface	2008 % Impervious Surface
Corsica River Watershed	23,877.8	855.4	3.58%
Eastern Bay Watershed	11,497.1	1,038.9	9.04%
Kent Island Bay Watershed	5,171.8	529.2	10.23%
Kent Narrows Watershed	6,815.5	382.1	5.61%
Lower Chesapeake*	8.1	0.2	2.55%
Lower Chester River Watershed	17,647.5	810.8	4.59%
Middle Chester Watershed	7,849.9	246.1	3.14%
Southeast Creek Watershed	34,721.6	660.8	1.90%
Tuckahoe Creek Watershed	46,085.5	747.6	1.62%
Upper Chester River Watershed	52,066.8	1,073.4	2.06%
Upper Choptank Watershed	1,924.8	26.4	1.37%
Wye River Watershed	29,512.4	838.7	2.84%
Total	237,178.8	7,209.6	3.04%

Source: Lands Available for Development – Build-Out Analysis, 2009 and Queen Anne’s County Department of Land Use, Growth Management and Environment

*Lower Chesapeake Watershed –portion located within County boundaries is too small for assessment.

Section 2.5.4 Point and Nonpoint Sources Impacts

The impacts of non-point and point sources of nitrogen and phosphorous on water resources are detailed in Appendix 3. The following are key definitions and a general listing of impacts with respect to each.

- **Point Source** – A source of pollution which is easily identified; for example, a factory or a wastewater treatment plant.
- **Nonpoint Source** – A source of water pollution which is not readily identifiable; for example, runoff from development, farms, dumping from boats, automobile exhaust and air deposition.

Wastewater (point source pollutants)

- Additional point source loadings impact already impaired surface waters and thresholds for TMDLs have not yet been established for most watersheds.
- Development may be limited by wastewater treatment plant capacity.



- Wastewater treatment plants and on-site sewerage disposal systems are both point sources of nitrogen and phosphorus with the potential to further pollute both surface water and groundwater.
- Emphasis on the use of technology to limit impacts on water resources is crucial to areas such as County and Town Planning Areas with compact development patterns.

Stormwater (non-point source pollutants)

- The amount of impervious surface impacts the quality, volume and rate of run-off and pollution of waterways.
- Increased impervious surface, if not managed properly, can result in increased impacts on water resources.
- Emphasis on agricultural best management practices and growth management strategies such as TDRs can reduce impacts on water resources within rural agricultural lands.
- Emphasis on the use of best management practices and innovative solutions to reduce impacts on water resources is crucial to areas such as County and Town Planning Areas with compact development patterns.

The State's current model for watershed based planning is accounting for two factors, the nutrient loading of total phosphorus and total nitrogen. The data generated in the WRE spreadsheets, contained in Appendix 3, Section 11.0 indicate that agricultural land use can be a greater non-point source loading of nitrogen and phosphorus for receiving waters. Residential and commercial development would result in lower nitrogen and phosphorus loadings in comparison to agricultural land use. However, accounting for other factors, nutrient loadings from residential and commercial development would likely be higher than agricultural land uses.

However, there are multiple variables that need to be factored into land use planning policy and decisions, including the amount of impervious coverage within a watershed as well as social, historical, cultural and economic considerations, the impact to public facilities and public safety, opportunities to preserve open space and farmland, to provide recreation and that new development needs to fit with the character and context of the existing community in its design.

Utilizing the State's data for the nutrient loading analysis would appear to promote residential development over agricultural land use as a strategy to improve water quality in the rural areas. Nevertheless, the County's *sustainable smart growth management strategies* articulated in this Plan emphasizes the principles of Smart Growth by directing new development to County and Town Planning Areas while preserving agricultural land in the rural areas.



Section 2.6 Sustainability Measures & Best Management Practices

Planning at the watershed level is essential to the health of streams, water bodies and groundwater. The analysis contained in Appendix 3 lays the groundwork for more detailed study in the future to develop a Watershed Management Plan and Water Protection Plan. The following sections identify sustainability indicators and measures for future tracking to determine progress toward protection of environmentally sensitive areas and water resources as well as applicable best management practices.

Section 2.6.1 Sustainability Indicators & Measures

The protection of environmentally sensitive areas and water resources through conservation of natural resources and ecological systems enhances the quality of life for County residents resulting in local and regional sustainability. The following indicators may be measured, evaluated and tracked over time to determine community impact with respect to meeting preservation goals and water resource goals contributing to the overall sustainability of the County.

- Change in environmentally sensitive lands.
 - Acres preserved versus acres converted to development.
- Change in land use patterns.
 - Track development inside and outside of Planning Areas and towns.
 - Track development within Critical Areas.
 - Assess nitrogen loads and phosphorus loads (point source and nonpoint source) by land use classification.
- Change in agricultural lands.
 - Acres of agricultural lands converted to development versus acres of preserved agricultural land.
- Change in the amount of forested lands.
 - Acres of forest land converted to other uses versus acres of preserved forest land.
- Change in impervious surface.
 - Impervious surface measured at the eight digit watershed level.

Other indicators of the health, safety and welfare of the watersheds within the County include the assessment and measurement of the following factors as part of the comparative ranking assessed for the County with respect to the Clean Water Act Status Report that is maintained and updated on line for each state, county and other jurisdiction by the Environmental Protection Agency (EPA).

- Overall Clean Water Act comparative ranking.
- Priority for regulation.
- Impervious coverage.
- Leading pollutants/stressors of surface waters:
 - Number of impaired water bodies;
 - Other habitat alterations;
 - Impaired biological community;
 - Nutrients, pathogens and sediment; and
 - Leading sources of water quality problems such as nonpoint sources, natural sources and municipal point sources.



Section 2.6.2 Best Management Practices, Tools & Techniques

Water resources are best protected when the appropriate best management practices, tools and techniques are used based upon the general characteristics of the landscape and site specific conditions. Table 2-8 summarizes the Best Management Practices (BMP), Environmental Site Design (ESD) and other tools, techniques and strategies typically associated with general characteristics of “landscapes” organized by Maryland’s Tributary Strategy. The Tributary Strategy, as outlined in Maryland’s Chesapeake Bay Tributary Strategy Statewide Implementation Plan (January 2008), includes a variety of strategies available for consideration in the implementation of local land use and environmental regulation for development.

BMPs, ESD and other tools, techniques and strategies specific to each eight digit watershed and agricultural, natural, rural, suburban and town/village landscapes are identified in Appendix 3, Table 11.1-3, Best Management Toolkit series for each watershed.



Table 2-8: Summary of Best Management Practices, Tools, Techniques and Strategies

BMP, Tools, Techniques and Strategies (Tributary Strategy)	Agricultural Landscapes	Natural Landscapes	Rural Residential Landscapes	Suburban Landscapes	Town/Village Landscapes
Point source/Urban Source Strategy				Expand water & wastewater systems	Expand water & wastewater systems
Stormwater Strategy	BMPs and Agricultural Best Practices	BMPs, Conservation and Agricultural Best Practices	BMPs and ESD	BMPs and ESD	BMPs and ESD
Onsite Sewage Disposal Strategy (OSDS)	Innovative Nutrient Reduction Technology	Innovative Nutrient Reduction Technology	Innovative Nutrient Reduction Technology	Septic Elimination through connection to public sewer and Innovative Nutrient Reduction Technology	Septic Elimination through connection to public sewer
Growth Management Strategy	PDR and Conservation/ Preservation	PDR, Conservation/ Preservation and Restrict Development in Critical Area Buffers	Cluster Development, ESD and Existing Infrastructure	Public Water and Wastewater Systems, TDR Receiving Areas	Infill/ Redevelopment, TDR Receiving Areas
Agricultural Strategy	Agricultural BMPs, Stormwater BMPs and Preservation/ Conservation	Stormwater BMPs and Preservation/ Conservation	Stormwater BMPs, Preservation/ Conservation and Cluster Development	TDR Receiving Areas	TDR Receiving Areas
Waterway Strategies	Buffers, Preservation/ Conservation and Tree Planting	Buffers, Preservation/ Conservation, Tree Planting and Living Shore Construction	Buffers, Preservation/ Conservation, Tree Planting and Living Shore Construction	Buffers, Tree Planting and Living Shore Construction	Buffers, Tree Planting and Living Shore Construction
Air Deposition Strategy	Forest Conservation and Preserve Green Infrastructure	Forest Conservation and Preserve Green Infrastructure	Forest Conservation Plans and Wooded Lot Standards	Forest Conservation, Woodlot Standards, Greenbelts and Trails/Paths	Walkable Communities (Pedestrian Facilities) and Expand Transit

Source: Appendix 3: Water Resource Analysis and Best Management Practices Toolkit 2010
 BMPs=Best Management Practices, ESD=Environmental Sensitive Design, TDR=Transfer of Development Rights,
 PDR=Purchase of Development Rights



Section 2.7 Environmental Policies, Programs and Regulations

There are a variety of regulatory, review and permitting processes designed to protect and regulate activity associated with environmentally sensitive areas and water resources. The following provides a brief overview for each.

Section 2.7.1 Federal and State Preservation Programs

There is a variety of Federal and State environmental protection regulations as well as a variety of environmental stewardship programs. Several key regulations and programs are described as follows:

- **Clean Water Act, Section 404** – The US Army Corps of Engineers (COE) regulates the discharge of dredged or fill material into wetlands. The COE district office determines whether various activities such as placement of fill material, levee and dike construction, mechanized land clearing, land leveling, transportation infrastructure construction and dam construction requires a permit.
- **Maryland Non-tidal Wetlands Protection Act** – The Maryland Department of the Environment (MDE), Nontidal Wetlands and Waterways Division ensures there is no overall net loss of non-tidal wetland acreage and reviews the following construction activities: grading or filling, excavating or dredging, changing the existing drainage pattern, disturbance of water levels or water table or destroying or removing vegetation. Permits are required for activities that alter a non-tidal wetland or wetland buffer.
- **Maryland Tidal Wetlands Act** – Maryland Department of the Environment manages tidal wetlands and provides resource protection for the activities such as: filling open water and vegetated wetlands, construction of piers, bulkheads, revetments, dredging and marsh establishment.
- **Chesapeake Bay Restoration Act** – The Act and subsequent policies, programs and regulations addresses Bay restoration. The Act established the Chesapeake Bay Restoration Fund administered by MDE for upgrading the 66 largest wastewater treatment plants to Enhanced Nutrient Reduction (ENR) standards. The Act established the following:
 - Septic Upgrade Program to remove nitrogen; and
 - Fee paid by onsite sewage disposal system (OSDS) or septic users to fund the upgrade of septic systems through the Septic Upgrade Program.
- **Maryland's Stormwater Management Act of 2007** – These regulations, effective May 4, 2009, requiring Environmental Site Design (ESD) through the use of nonstructural best management practices and other better site design techniques to be implemented to the maximum extent practicable. MDE is charged to implement the provisions of the Act.
- **Policy for Nutrient Cap Management and Trading** – MDE has developed this policy to support restoration of the Bay while accommodating expected population growth.
- **Water Quality Infrastructure Program** – This program, administered by MDE, provides grants and loans for sewage treatment and drinking water system upgrades through the State's Biological Nutrient Removal (BNR) Cost-Share Grants Program, Supplemental Assistance Program and State Revolving Loan Fund (SRF).
- **Maryland Department of the Environment, Land Management Administration (LMA)** – The LMA is responsible for licensing and permitting processes associated with mining activities, sewage



sludge utilization, refuse disposal, groundwater discharge permits for rubble landfills and other related permitting to protect the environment.

- **Sediment and Erosion Control Plans** – Requirements for submission, review and approval of a Sediment and Erosion Control Plan.

Section 2.7.2 County Environmental Policies, Programs and Regulations

The following is a listing of key County Ordinances adopted since 2004, when the County's Zoning and Subdivision Regulations codified in Chapters 14 and 18 of the County Code were comprehensively revised, to further minimize environmental impacts and to define regulatory activities with the potential to protect environmentally sensitive areas and water resources. Some of the ordinances listed below pertain to the Chesapeake Bay Critical Area Act and the County's Environmental Protection Code and other chapters of the County Code.

- **County Ordinance No. 08-15** – The ordinance makes minor extraction and dredging disposal uses requiring a permit from the Maryland Department of the Environment permitted as a conditional use.
- **County Ordinance No. 08-13** – The ordinance incorporates the County's Environmental Site Design Manual into Chapter 14:4 of the Code of Public Local Laws and established a preference for non-structural practices for stormwater management plans.
- **County Ordinance No. 08-10** – The ordinance prohibits application of commercial or chemical fertilizer within the Critical Area Buffer during certain times of the year.
- **County Ordinance No. 08-09** – The ordinance requires mandatory pump-out of on-site septic systems at least once every five years.
- **County Ordinance No. 08-08** – The ordinance provides the right-to-conduct seafood industry operations.
- **County Ordinance No. 08-04** – The ordinance defines setbacks of 100 feet from Tidal and Non-Tidal Waters and Wetlands for principal residential structures in the Waterfront Village Center Zoning District.
- **County Ordinance No. 04-07** – The ordinance establishes setback from stream buffers for certain uses.
- **County Ordinance No. 04-06** – The ordinance adds provisions requiring vegetative improvements to stream buffers when development activity occurs on adjacent land.

The following is a listing of the County's key reference standards and regulations.

- **Environmental Site Design Manual** – The manual contains concepts and design procedures for Environmental Site Design (ESD) also referred to as Low Impact Development (LID). The manual was produced in association with the Corsica River Watershed Restoration Action Strategy and is to be used as a supplement and complement to the Maryland 2000 Stormwater Management Design Manual (MDE, 2000).



Section 2.8 Goals, Objectives and Recommendations

This section identifies various goals, objectives and recommendations that will contribute to realizing the goal for protection, preservation and conservation of environmentally sensitive areas and water resources.

*The **Overarching Goal** is to adopt policies, regulations, legislation, enforcement procedures and appropriate funding for programs and projects necessary to restore, enhance, protect and conserve our land, air, and water resources, and establish programs designed to generate an awareness of and support for these measures.*

Goal 1: Resource Protection, Conservation and Preservation Strategies that Promote High Water Quality and Protect Aquatic Life with Emphasis on Critical Areas

Objective 1: Seek to implement watershed based planning to comply with nutrient Total Maximum Daily Loads (TMDLs) of receiving waterways as identified by the State.

Recommendations:

1. Develop and implement strategies to reduce pollutant loads on a watershed by watershed basis in accordance with the nutrient TMDLs.
2. Consider innovative nutrient reduction technologies for septic systems.
3. Reduce the impacts of impervious surfaces through Environmental Site Design (ESD).
4. Collaborate closely with Kent, Caroline and Talbot Counties with whom we share watershed boundaries.

Objective 2: Promote and facilitate the protection of Sensitive Areas.

Recommendations:

1. Support State programs for the protection of wetlands.
2. Continue to implement the County's wetland and stream buffer protection ordinances.

Objective 3: Seek to protect Critical Areas.

Recommendations:

1. Do not allow classification changes in Critical Areas except for:
 - a. designated Planning Areas;
 - b. a public service need is demonstrated;
 - c. existing and future institutional uses; or
 - d. where there is no net increase in intensity.
2. Establish shoreline buffers on Critical Area parcels in accordance with State legislation and requirements.
3. Within the Agricultural (AG) and Countryside (CS) zoning districts, no new development within the 300 foot buffer is permitted, except where grandfathered by provisions in Chapter 14, or unless a hardship is demonstrated.



4. When Critical Area Transfer of Development Rights (TDRs) is used, both sending and receiving parcels must provide established buffer areas consistent with adopted State regulation.
5. No growth allocation granted, outside of designated Planning Areas, to create Intensely Developed Areas (IDA), except for institutional and public service uses.

Goal 2: Conservation, Preservation and Regulation Strategies to Include Environmental Protection and Resource Conservation Measures

Objective 1: Develop steps to improve water quality in order to be removed from the State's impaired waterway list.

Recommendations:

1. Promote agricultural "best management practices" and in residential communities incorporate Environmental Site Design (ESD).
2. Manage the County's water resources in accordance with the County's Comprehensive Water and Sewerage Plan.
3. Encourage water conservation practices.
4. Promote innovative and environmentally sustainable development to protect water resources in order to meet future demands.
5. Seek grant opportunities for storm water management retrofits.
6. Encourage the development of watershed management plans.
7. Track impervious surface percentage on a watershed basis.
8. Further limit fertilizer use on residential properties.

Objective 2: Protect Sensitive Areas.

Recommendations:

1. Continue to implement County resource protection standards, ordinances and regulations pertaining to floodplains, steep slopes, streams and stream buffers, shore buffers, wetlands, erosion hazard areas, woodlands, and habitats of threatened and endangered species.
 2. Evaluate the need to increase the size and effectiveness of buffers.
 3. To accommodate storm surges, rising sea level, and climate change, prevent development in mapped flood zones for category 3 storms and evaluate the appropriateness to go beyond the FEMA requirements and consider further restrictions based upon projected sea level rise.
 4. Implement aggressive efforts to reduce sediment, nutrient and pollution delivery to flowing streams and the Chesapeake Bay by employing Environmental Site Design (ESD) techniques.
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Section 2.9 Mineral Resources Element

Mineral deposits of sand and gravel found in the County provide unique opportunities to support local and regional development and infrastructure needs while contributing to the County's economy. Roads, homes, commercial buildings, public facilities and utilities, industrial facilities as well as many community amenities require use of these minerals for construction as well as long-term maintenance. The following is a listing of planning issues and opportunities related to mineral resources:

- Include sustainable practices that allow for the use of non-renewable of minerals.
- Assure that other uses are compatible with the ability to extract the resource.
- Protection of the environment must consider that surface mining alters the natural environment.
- Protection of water resources must consider the impacts of surface mining on water resources.

In areas where sand and gravel supplies are predominant, the use of zoning tools and techniques such as low density zoning, Transfer of Development Rights (TDR), Purchase of Development Rights (PDR) and cluster development techniques contributes to the protection of mineral supplies necessary for continued economic growth.

Section 2.9.1 Legislative & Regulatory Background

Article 66B requires inclusion of a mineral resources element that identifies undeveloped land that should be kept in its undeveloped state until the land can be used to or assist in providing a continuous supply of minerals, that identifies appropriate post excavation uses for the land, and incorporates land use policies and recommendations for regulations.

Section 2.9.2 Map ESA-7: Potential Mineral Resource Areas

Map ESA-7 identifies areas with potential mineral resources. Potential areas of sand and gravel deposits in the County are depicted on the map as the Qu, Upland Deposits (Eastern Shore).

Section 2.9.3 Policies, Programs and Regulations

The following identifies regulation of mineral extractions through performance standards.

- **County Ordinance No. 08-20** – The ordinance regulates mineral extraction operations through performance standards including a defined maximum area permitted for major extraction, duration of operations, traffic study and roadway improvements and conditions for renewal of operations for grandfathered extraction operations.



Section 2.9.4 Goals, Objectives and Recommendations

This section identifies the goal, objective and recommendation with respect to mineral resource recovery.

Goal 1: Undeveloped Lands where Mineral Resources are Found Remain Available for Recovery Activities Accompanied with Appropriate Reclamation Plans

Objective 1: Promote mineral resource recovery practices that seek to minimize adverse effects on the environment and that the associated reclamation plans are compatible with adjoining land uses.

Recommendation:

1. Identify mineral resource recovery practices and standards that could be appropriate to enhance current regulation of mineral resource recovery with the intent to minimize environmental impacts.
-