

Draft Calvert County Watershed Implementation Plan 2-yr Milestone Report – July 1, 2011 through June 30, 2013

The 2-yr milestone report for the period from July 1, 2011 through June 30, 2013 uses the Draft Calvert County WIP II Strategy as its background. The report only includes the sections in red that have the heading, “**2-yr Milestone Report.**” The milestone discussions are included in the appropriate sections of the Strategy.

Draft Calvert County WIP II Strategy

Section I: Calvert County’s Phase II WIP Team Process

Calvert County’s Phase II WIP Team is comprised of a multi-disciplined team committed to developing a strategy to meet 2017 interim target loads and 2020 load goals. The team membership is listed below.

- DNR Coordinator
 - Claudia Donegan
- Planning and Zoning
 - Dave Brownlee, County Lead
 - Mary Beth Cook, Deputy Director
 - Tay Harris, Assistant Lead
 - Steve Kullen, Watershed Planner
 - Robin Munnikhuysen, Environmental Planner
 - John Swartz, Environmental Planner
 - Denise Cherry - Secretary
- Public Works
 - Terry Carlson, Director
 - Allen Brunson, Water and Sewer, Project Engineer
 - Erica Jackson, Stormwater Engineer
 - Rick Mason, Water and Sewer, Project Engineer
 - Shukri Sharabi, Division Chief, Water and Sewer
- General Services
 - Wilson Freeman, Director
- Economic Development
 - Linda Vassallo
- Soil Conservation Service
 - Bill Clark, Director
- Ron Babcock, Soil Conservation
- Environmental Health Dept. – Paul McFaden, Director
- North Beach
 - John Hofmann, Town Engineer
- Chesapeake Beach
 - Bill Watson, Zoning Officer
- Maryland Cooperative Extension
 - Herb Reed, Director
- Tri-County Council
 - Wayne Clark, Executive Director
- State Highway Administration
 - Ling Li, Engineer
- U.S. Navy
 - Tracy Maningas

The team met monthly, from January 2011 to present (monthly meetings are on-going) to discuss potential actions to achieve Phase II WIP nitrogen, phosphorous and sediment target load goals. The team concentrated on existing programs and projects to achieve target load goals, assessed the load gaps, and identified actions to close the gaps. Some actions will be difficult to implement including the proposed schedule of septic system upgrades (due to an aggressive implementation schedule and a lack of qualified pool of contractors to install systems and County staff needed to administer upgrades); implementation of selected urban management measures (including County staff to administer BMP implementation),

financing the strategy in its entirety; and passing legislation associated with a stormwater utility fee and septic system required upgrades. To implement the Phase WIP II strategy, the County estimates it would need to double its annual operating budget.

Current programs in place that contribute to meeting target load goals include: the County's practice of land application of wastewater effluent rather than direct discharge at two of the County's three major wastewater treatment plants (WWTP); the use of shared community septic systems that utilize pretreatment and land application ; identifying and upgrading failing septic systems; initiating watershed Implementation plans in selected subwatersheds to identify pollution sources and develop a strategy to reduce pollutants ; upgrading to enhanced nutrient removal (ENR) at Chesapeake Beach WWTP; targeting growth to town centers served by public sewer; conducting public outreach and education on the importance of pumping septic systems through programs such as the Calvert County Environmental Commission's "Pump for the Bay Contest"; upgrading existing conventional septic systems to nitrogen-removing systems through a Bay Restoration Fund grant; minimizing future residential development in the Farm and Forest Zoning District through two downzonings and a TDR program, providing funding for land preservation through the Purchase and Retirement of TDRs (PAR Program); and implementing lots-to-TDRs program to convert existing undeveloped lots to open space.

Calvert County Phase II WIP Target Loads

It is anticipated that the Calvert County's Phase II WIP Strategy will not meet the County's target loading goals for nitrogen, phosphorus and sediment by 2020 due to the speed on implementation and the very high costs. The strategy proposed will, however contribute to achieving Maryland's Chesapeake Bay total maximum daily load (TMDL) for nitrogen, phosphorous and sediment. The County's required reductions for non-federal lands are given in Table 1. Reductions on federal lands are being addressed by the federal government. The Phase II WIP Strategy includes a capacity analysis in terms of staffing and funding, a description of tracking of progress, and a discussion of contingency measures if the strategy fails to accomplish the required reductions in the timeframe proposed. A discussion of the 2012-2013 (2-Year Milestones Report) milestones is also included. The Environmental Protection Agency's (EPA) assessment to account for growth is being developed; therefore, growth is not accounted for at this time. Upon EPA's completion of an "accounting for growth analysis" and EPA's guidance, the Phase II WIP Team will develop its analysis accounting for future growth.

Table 1. Calvert County Target Loads and Required Reductions

Nitrogen	Loadings			Reductions	
Non-Federal Land¹	2009	2017 Target	2020 Target	2017²	2020³
Agriculture⁴	148,669	109,362	92,516	-39,307	-56,153
Urban	195,663	154,264	136,522	-41,399	-59,141
Septic	299,785	215,492	179,366	-84,293	-120,419
Forest	150,410	150,667	150,776	257	366
Wastewater	27,893	32,589	30,313	4,696	2,420
Total	822,420	662,374	589,493	-160,046	-232,927
Total Excluding Ag⁴	673,751	553,012	496,977	-120,739	-176,774
Phosphorous	Loadings			Reductions	
Non-Federal Land¹	2009	2017 Target	2020 Target	2017²	2020³
Agriculture	14,020	11,558	10,503	-2,462	-3,517
Urban	20,777	14,164	11,330	-6,613	-9,447
Septic	0	0	0	0	0
Forest	3,881	3,886	3,888	5	7
Wastewater	12,803	6,917	4,740	-5,886	-8,063
Total	51,481	36,525	30,461	-14,956	-21,020
Total Excluding Ag⁴	37,461	24,967	19,958	-12,494	-17,503

Notes to Calvert County load goals and reductions

¹Loads and Reductions on Federal lands are being addressed by the Federal Government

²Calculated as the 2017 Target Load minus the 2009 load

³Calculated as the 2020 Target Load minus the 2009 load

⁴Agricultural loads and reductions are being addressed by the Soil Conservation Districts and the Maryland Department of Agriculture

Calvert County Phase II WIP Estimated Costs

The preliminary cost estimate to achieve Calvert County’s required reductions is approximately \$1.3 billion dollars (Table 2). This amount includes implementation of waste water treatment plant (WWTP) upgrades and improvements; septic system upgrades; septic system connections to WWTPs; stormwater management best management practices (BMPs) and associated land costs; and five (5) additional staff persons – two staff persons to administer septic system upgrades and 3 staff persons to administer stormwater BMP implementation. The County is identifying fees to fund staff dedicated to the septic system upgrades and a stormwater utility as the funding sources for the stormwater positions. A cost breakout of stormwater BMPs is provided in Table 3. The average cost per septic system upgrade is \$13,500.00 (which includes a \$1,000.00 administrative fee). Property owners would pay for the required upgrades. The average cost per septic system connection is roughly\$20,000.

The strategy’s tidal monitoring program, conducted by the Chesapeake Biological Laboratory (CBL), has been in existence for 23 years in Mill Creek and from 1-3 years for the other creeks (6 in addition to Mill Creek in the Patuxent River drainage and 3 along the Bay side). In June of 2010, the County began

quarterly sampling of one site in each of 21 of the County’s 22 subwatersheds. The samples are collected by County staff and volunteers, and the samples are delivered directly to the CBL for processing. The program provides a solid baseline from which to assess future water quality improvements that would be accomplished by the Phase II WIP Strategy. The tidal monitoring program is funded through the County and the freshwater sampling has been supported by a grant from the Cove Point Natural Heritage Trust (CPNHT). If the CPNHT funding continues, there would be no increased costs associated with this aspect of the strategy. The monitoring results are briefly discussed in Section VI and the reports are included in the Appendices.

Table 2: Calvert County Phase II WIP Implementation Estimated Costs

<u>Source</u>	<u>Best Management Practices</u>	<u>Estimated Total Costs</u>
Urban	Stormwater Management Practices	\$1.09 Million
Additional Urban Land Costs	Land for Placement of Stormwater Practices	under development
	Technician, Reviewer and Inspector	under development
Septic System Upgrades	Nitrogen-removing septic systems (12,673 systems)	\$171 Million
	Planner II and Health Department Inspector	under development
Additional Septic System Upgrade Costs		
Septic System Connections	To Waste Water Treatment Plants (962 connections)	\$19 Million
Wastewater	Plant Upgrades	\$20 Million
	Total	\$ 1.3 Billion*

**does not reflect staffing or land costs*

Table3. Stormwater Management Cost Breakdown

<u>Best Management Practice</u>	<u>2017</u>	<u>2020</u>	<u>Delta</u>
Bioretention/raingardens	\$201,866,531	\$266,855,156	\$64,988,625
Bioswales	\$21,640,458	\$24,731,952	\$3,091,494
Impervious Surface Reduction	\$106,270,106	\$141,693,475	\$35,423,369
Shoreline Erosion Control	\$15,000,000	\$15,000,000	\$0

Urban Stream Restoration	\$15,985,809	\$15,985,809	\$0
Infiltration Practices	\$251,986,075	\$325,125,670	\$73,139,596
Vegetated Channels	\$12,365,976	\$17,665,680	\$5,299,704
Wet Ponds/Wetlands	\$228,020,533	\$285,025,666	\$57,005,133
Staff (Technician, Reviewer & Inspector)	under development	under development	under development
Land Costs	under development	under development	under development
Total	\$853,135,488*	\$1,092,083,408*	\$238,947,920*
	*does not reflect staffing or land costs	*does not reflect staffing or land costs	*does not reflect staffing or land costs

2-yr Milestone Report – Financial Concerns

Programmatic Accomplishments:

The largest impediment to reaching the target load reductions is financial. Due to the extremely high implementation costs, the draft WIP that would meet the target load reduction of nutrients and sediment recommended by the State, has not been adopted. The State’s recommended approach was to obtain most of the reductions from septic systems and stormwater management, the two most expensive approaches.

While developing the draft Calvert County WIP, a graduate student from the University of Maryland, Nathan Bowen, prepared a cost/benefit analysis of the Calvert WIP and compared it to other County’s proposed WIPs. It was found that Calvert County had the second highest WIP implementation cost/household, when comparing all the counties. Only Frederick County had a higher cost/household. It appears that suburban counties have the highest cost/household. Counties dominated by agriculture obtain most of their nutrient and sediment reductions from the much less expensive agricultural BMPs. The larger urban counties can spread their costs over a larger population, thus reducing the costs/household. These urban counties also have a much greater fraction of their population served by community sewage treatment plants. Reducing nutrients from sewage treatment plant point sources is also less expensive per household than reducing nutrients from non-point sources such as septic systems and stormwater runoff.

Calvert County met with the University of Maryland Environmental Finance Center (EFC) to discuss applying for a grant to do a fiscal analysis of the County WIP to try to develop a less costly plan to meet the required reductions. EFC applied to the National Fish and Wildlife Foundation for a grant to do the study and was funded. Thus far, the County has received a “Cost Calculator” that works with the Maryland Assessment Scenario Tool (MAST) for Calvert County. MAST is a tool provided by the State that accepts inputs of BMPs by type and jurisdiction and calculates the nutrient reduction. The MAST

tool is compatible with the Chesapeake Bay Model used to develop the TMDLs. MAST was used by Calvert County to develop its draft WIP. The “Cost Calculator” tool estimates the cost of various scenarios when they are evaluated by MAST. A final report is expected from EFC by the end of August with a presentation to the Board of County Commissioners of Calvert County in September. The report should include proposed strategies to meet the target load reductions at a reduced cost. The Calvert County WIP cannot be finalized until the results of this study are received and evaluated.

Section II: Calvert County’s Phase II WIP Strategy Point Sources

Point Sources

Wastewater Treatment Plants - Implementation Milestones

The County anticipates meeting 2017 interim reduction goals and 2020 load cap goals for point sources through system reconstruction and Enhanced Nutrient Removal (ENR) upgrade to Chesapeake Beach WWTP (Table 4). Funding sources include the Bay Restoration Fund and the Maryland Department of the Environment (MDE) funds. Project completion is anticipated in 2012.

The County is also engaging in discussions with the U.S. Navy and MDE regarding the potential connection of the Naval Research Laboratory (NRL) in Randle Cliffs to the Chesapeake Beach WWTP. Potential funding being considered is bonds, capturing repayments through rate increases and federal funds. Alternative funding options will be explored and estimated costs will be developed as discussions evolve.

Table 4: Waste Water Treatment Projected Loading Rates ad Target Loads

	<u>2009</u> <u>Loading</u> <u>Rates</u>	<u>2017 Loading</u> <u>Rates</u>	<u>2017 Target</u> <u>Loads</u>	<u>2020 Loading</u> <u>Rates</u>	<u>2020 Target</u> <u>Loads</u>
Flow (mgd)	1.19	1.79	1.79	1.96	1.96
Nitrogen (lbs)	27,893	32,009	32,589	31,271	31,271
Phosphorous (lbs)	12,802	6,908	6,917	4,899	4,899

2-yr Milestone Report – Point Sources

Implementation Accomplishments:

Chesapeake Beach Waste Water Treatment Plant. Upgrades to the Chesapeake Beach Waste Water Treatment Plant are underway. Design is complete and funding is secured. The project costs are \$2,307,000 with \$1,892,000 coming from the Maryland Department of the Environment Water Quality Loan Fund to be paid back by rate payers over time and \$415,000 coming from capital connections. The project is expected to be completed by June 2016.

Calvert County Industrial Park Connection to Prince Frederick Waste Water Treatment Plant (WWTP) in Barstow. The Calvert County Industrial Park off of Rt. 231 near Hallowing Point is currently served by a wastewater treatment plant with subsurface disposal and no nitrogen removal technology. The County will be abandoning the Industrial Park on-site WWTP and will be connecting to the Prince Frederick Waste Water Treatment Plant in Barstow, which has land application. Design is complete and permits are pending. Completion of the project is expected in October of 2014. The cost of the project is about 2.2 million dollars paid for by County Bond funding that will be paid back by user fees.

Northern High School. Northern High School has its own WWTP with direct discharge. This system is old and needs to be upgraded. The Board of Education (BOE) will fund the project and currently has secured concept design funds.

Huntingtown High School. Huntingtown High School has its own WWTP with subsurface discharge. This facility has limited nitrogen removal technology. The BOE will be abandoning the Huntingtown High School on-site WWTP and will be connecting to the Marley Run Wastewater Treatment Plant that is equipped with nitrogen removal technology. The BOE will fund the project and currently has secured concept design funds.

Non-Point Sources

Proposed Septic System Upgrades - Implementation Milestones

The County does not anticipate meeting 2017 interim reduction goals or 2020 load cap goals for septic system upgrades through the proposed actions described below; however, the County does anticipate meeting 2025 load caps by implementing these actions:

- Continue installing about 60 advanced systems per year via the Count's on-going Bay Restoration Fund (BRF) Grant Program
- Require all new septic systems within the Critical Area as per State law to be advanced systems and require further that these systems have a nitrogen removing efficiency of at least 69%
- Require all new systems outside the Critical Area to be advanced systems with a nitrogen removal efficiency of at least 69%
- Require all repairs of failed systems (about 1.9%/year) to use advanced systems with a nitrogen removal efficiency of at least 69%
- Require all septic systems at "time of sale" (about 5%/year) to be upgraded to advanced systems with a nitrogen removal efficiency of at least 69%

Proposed Septic System Upgrades – Programmatic Milestones

The County would need to pass legislation requiring the use of advanced denitrifying systems capable of achieving nutrient reductions of at least 69% compared to conventional septic systems; and requiring such systems within the Critical Area, outside of the Critical Area, when repairing failed systems, and "at time of sale". This process is anticipated to take one year.

Based upon these proposed policies and the timetable associated with passing legislation, Table 5 contains the proposed schedule of septic systems upgrades to achieve 2020 target goals include a total of 1,997 septic upgrades per year. Broken down by proposed programs is as follows:

- 60 upgrades per year through the BRF
- 533 repairs to failing septic systems (augmenting the Health Department’s existing program)
- 1,403 EDUs at “time of sale”, assuming a 5% rate of housing sales per years

Table 5: Proposed Septic System Upgrades

	<u># Systems from MAST</u>	2017		2020	
		<u>Upgraded systems</u>	<u>% Upgraded</u>	<u>Upgraded systems</u>	<u>% Upgraded</u>
Critical Area	5,323	2,960	56	4,432	83
Within 1,000 ft of a stream	7,583	3,732	49	5,824	77
Other	15,163	7,345	48	11,528	76
Total	28,069	14,037	50	21,784	78

As discussed under *Section V: Identification of technical Discrepancies*, Maryland’s Assessment Scenario Tool (MAST) gives a 50% reduction in nitrogen load credit per upgraded septic system. However, the advanced systems being installed via the County BRF Program achieves 69% nitrogen reduction. Table 6 (on the next page) shows the loading reductions reached using the 50% reduction allowed in MSAT, a 69% reduction based on our current and proposed future programs and reductions from proposed septic systems to WWTP connections. The County implementation strategy for septic systems falls short of meeting the 2017 and 2020 target load goals with or without the septic systems to WWTP connections based on the 50% nitrogen reduction allowed in MAST. By 2025 the target load is exceeded only if septic systems to WWTP connections are included.

Funding of required upgrades would be passed through to homeowners and homebuyers unless the County develops another funding mechanism. When the above policies are in place, the BRF could be used to pay for upgrades for low income families or to upgrade systems from 69% removal to 93% removal. Administration of system upgrades at the “time of sale” would be passed through to homeowners or homebuyers. Inspections of all upgrades and denitrifying systems associated with new construction would be administered by the Health Department.

The Department of Planning and Zoning administers the BRF Grant Program including receiving applications, evaluating sites, prioritizing sites, preparing bids for installations, providing property owner outreach and education and assisting in the upgrades process. The Environmental Health Department evaluates sites, reviews designs and inspects and monitors installed upgrades. The Health Department and Planning and Zoning would administer additional upgrades through this process. The County has

identified the need for two additional staff people to administer septic upgrades. One (1) staff person is needed in Planning and Zoning to conduct homeowner outreach/educational/technical assistance and monitor and track systems; and one (1) staff person is needed in the Environmental Health Department to conduct field inspections and monitor installed systems on-site. The County is identifying its General Fund as the funding sources for these positions.

Table 6: Target Load Goal Projections: Septic Systems and Septic Connections Without Growth

	2009 Loadings	2017		
		Loadings	lbs N removed (50%)	lbs N removed (69%*)
Critical Area	102,672	84,814	17,858	24,644
Within 1,000 ft of a stream	90,924	77,160	13,764	18,994
Other	109,099	92,857	16,242	22,414
Septic Connections			2,236	2,236
Total	302,695	254,831	50,100	68,288
Target			84,293	84,293
lbs reduction relative to target Without Septic Connections			-34,193	-16,005
			-36,429	-18,241
	2009 Loadings	2020		
	Loadings	Loadings	lbs N removed (50%)	lbs N removed (69%*)
Critical Area	102,672	77,043	25,629	35,368
Within 1,000 ft of a stream	90,924	70,916	20,008	27,611
Other	109,099	85,474	23,625	32,603
Septic Connections			13,838	13,838
Total	302,695	233,433	83,100	109,420
Target			120,419	120,419
lbs reduction relative to target Without Septic Connections			-37,319	-10,999
			-51,157	-24,837
	2009 Loadings	2025		
	Loadings	Loadings	lbs N removed (50%)	lbs N removed (69%*)
Critical Area	102,672	67,368	35,304	48,720
Within 1,000 ft of a stream	90,924	63,031	27,893	38,492
Other	109,099	76,178	32,921	45,431
Septic Connections			13,838	13,838
Total	302,695	206,577	109,956	146,481

Target	120,419	120,419
lbs reduction relative to target	-10,463	26,062
Without Septic Connections	-24,301	12,224

Proposed Septic System Connections to WWTPs: In combination with implementing septic system upgrades to meet 2025 load goals, the County will connect septic systems to water treatment plants as described below (See table 6):

- **Proposed Residential Connections to the Chesapeake Beach WWTP:** The Chesapeake Beach WWTP serves 9,750 equivalent dwelling units (EDUs). According to MAST, 2010 flow was 0.60 million gallons per day (MGD). The Chesapeake WWTP’s planned capacity is 1.5 MGD,ⁱ which will be accomplished upon the completion of its reconstruction and ENR upgrade in 2012. Proposed septic system connections to the Chesapeake Beach WWTP include:
 - 289 EDUs in Summer City/Randle Cliff sits along the shores of the Chesapeake Bay, south of Chesapeake Beach (by 2020).

- **Proposed Residential and Institutional Connections to the Prince Frederick WWTP:** The Prince Frederick WWTP, comprised of two wastewater treatment plants, serves 2,775 EDUs. Prince Frederick WWTPs I and II are interconnected via a force main that allows these facilities to work in tandem providing a combined capacity of 750,000 gallons per day of sewage disposal. According to the Chesapeake Bay’s MAST tool, due to the fact that these facilities utilize land application, nutrients are considered a 0 discharge into the Bay. Therefore, septic system connections to the Prince Frederick WWTP will translate into a 0 discharge. Proposed septic system connections to the Prince Frederick WWTP include:
 - 121 EDUs in Dares Beach, east of Prince Frederick, sits along the shores of the Chesapeake Bay (by 2017). Septic system failures occur due to high groundwater and poor percolation
 - 278 in Bayside Forest is located north of Dares Beach (by 2020)
 - 40 EDUs in Central Village is located off of Dares Beach Road north of Prince Frederick (by 2020)
 - 33 EDUs in Hallowing Point Trailer Park is located near where Route 231/Hallowing Point Road crosses the Patuxent River (by 2017)
 - The Department of Natural Resources (DNR) building is located where Route 231/Hallowing Point Road crosses the Patuxent River (by 2017)

- **Proposed Residential and Institutional Septic System Connections to Solomons WWTP:** Capacity at the Solomons WWTP is 1.052 MGD with an actual flow of 0.335 MGD (CY 2006). Proposed septic system connections to Solomons WWTP are presented below. According to the Chesapeake Bay’s MAST tool, due to the fact that this facility utilizes land application, nutrients are considered a 0 discharge into the Bay. Therefore, septic system connections to the Solomons WWTP will translate into a 0 discharge. Proposed septic system connections to the Solomons WWTP include:
 - 200 EDUs in Cove Point, located north of Solomons Island and south of Calvert Cliffs State Park, sits on the Chesapeake Bay (by 2020)
 - Cove Point, LNG is located west of the Cove Point community, north of Solomons Island and south of Calvert Cliffs State Park (by 2020)

- **Proposed Septic Systems Connections to Marley Run WWTP:** Marley Run treatment facility is a shared community system that serves sixty (60) homes in the Marley Run Subdivision. The system discharges effluent to nearby drip irrigation fields. The current permitted capacity of the treatment facility is 15,000 gallons per day (gpd). Permitted capacity of the treatment facility is 40,000 gpd. The facility is currently being upgraded to meet the required build-out capacity and more stringent treatment limits for 160 EDUs. Completion of the new facility is scheduled for July of 2011.ⁱⁱ According to the Chesapeake Bay’s MAST tool, due to the fact that Marley Run utilizes land application, nutrients are considered a 0 discharge into the Bay. Therefore, septic system connections to Marley Run will translate into a 0 discharge. Proposed septic system connections to the Marley WWTP include:
 - Huntingtown High School, of which affluent is currently treated by extended aeration, clarification, nitrification/denitrification to an underground drainage field.ⁱⁱⁱ Capacity is 0.0115 MGD, and 2007 average peak flows were 0.0024 MGD^{iv}. (By 2020)

Septic system to WWTP connections to areas with failing septic systems could occur without amendment to the County Comprehensive Plan and Comprehensive Water and Sewerage Plan. In areas without failing septic systems, amendments to the County Comprehensive Plan and Comprehensive Water and Sewerage Plan would be required. Upon deciding to utilize this contingency measure, it is estimated to take one year to pass legislation. Project funding sources would be bonds, with the possible exception of residential units in the Cove Point, which would be paid for privately. Bond repayments will be captured through rate increases. Estimated cost per equivalent dwelling unit (EDU) is estimated at \$20,000.00. Additional staff requirements would be assessed when and if the need becomes apparent. Table 6 shows the target load reduction projections with septic system upgrades and connections

Contingency Action: Require Septic System Upgrades that Achieve a 93% Nutrient Reduction: In the event that the County fails to meet 2025 load goals by implementing the above described septic system upgrades (at 69% removal), the County will consider requiring septic system upgrades that achieve 93% nutrient removal in the Critical Area and within 1,000 feet of streams (where feasible), for all new subdivisions and “at time of sale”. The schedule of implementation as described above would be modified accordingly. If this contingency measure were used, it is estimated that passing the required legislation would take one year.

2-yr Milestone Report – Septic System Upgrades and Connections to Waste Water Treatment Plants

Implementation Accomplishments:

Septic System Upgrades. The County is currently installing about 90 nitrogen-removing septic systems per year through the Bay Restoration Fund Grant Program. Since inception of the Calvert County BRF Grant Program (2007), 358 such systems have been installed through this program. The Health Department has required installation of about another 100 pre-treatment systems during this time period resulting in about 450 such systems being installed. The table below gives the number of systems installed per fiscal year with BRF grant funding and the average percent nitrogen reduction for the technologies installed during that fiscal year. The number of nitrogen-removing septic systems installed between July 1, 2011 and June 13, 2013 was 155 and the average nitrogen reduction of the technologies installed was 72.2%. A list of all of the installations can be found in Appendix A and an ArcGIS shapefile of their locations is available upon request.

Number of Nitrogen-Removing Septic Systems Installed Per Calendar Year			
# Systems Installed	Avg % N Reduction¹	Fiscal Year	Dates
32	64.9	2008	7/1/07-6/30/08
36	63.7	2009	7/1/08-6/30/09
60	65.6	2010	7/1/09-6/30/10
68	71.8	2011	7/1/10-6/30/11
66	72.6	2012	7/1/11-6/30/12
89	71.7	2013	7/1/12-6/30/13
7	75.1	2014	7/1/13-8/1/13
358		Total	

The County has received \$5,457,967 in grant funds from the BRF through June 2013, and has spent \$5,162,458 to install pretreatment systems. The remainder was returned to the state. The County received another grant for \$1,317,000 for FY 2014. With the fairly new requirement for means testing, another \$9,243 was received as required home owner contributions. Between July 2011 and June 2013 the County received \$2,101,000 from the BRF grant program and installed 155 pre-treatment septic systems. This results in an average cost of \$13,555 per system. This includes Health Department and the Department of Community Planning and Building staff salaries to implement the program.

MDE Nitrogen Reduction Table by Manufacturer and Technology				
Manufacturer	Technology	Reduction %	Comments	Reduction % Applied
Bio-Microbics	Micro-Fast		Under field verification	57 ¹
Bio-Microbics	Retro-Fast	57		57
Hoot	ANR		Under field verification	64 ²
Hoot	BNR	64		64
Nitrex			Under field verification	93 ³
Norweco	Singular	55		55
Orengo	AX20	71		71
Orengo	AX20-RT	76		76
Premier Tech	EcoFlex		De-listed	50 ⁴
SeptiTech	M4000	67		67

1. Micro-Fast is more efficient than Micro-fast so 57% used until field verified by MDE
2. ANR system more efficient than BNR system therefore 64% used until field verified by MDE
3. Nitrex verified by the County in field test to achieve 93%
4. 50% is minimum allowed by MDE, so it is used for this de-listed technology

Calvert County Bay Restoration Grant Funding		
Fiscal Year	Dates	\$
FY07	July 2006 - June 2007	932,467
FY08-10	July 2007 - June 2010	1,582,000
FY11	July 2010 - June 2011	842,500
FY12	July 2011 - June 2012	866,000
FY13	July 2012 - June 2013	1,235,000
FY14	July 2013 - June 2014	1,317,000
	Total	\$6,774,967

Connections of Septic Systems to Waste Water Treatment Plants (WWTP).

Dominion LNG Plant, Lusby. The Dominion LNG Plant in Lusby is currently served by a septic system. They are expanding and it is expected that they will apply for sewerage service from the Solomons WWTP, which has existing lines down to the Cove Point Park. When application is made, the County will insure that the water and sewerage lines are large enough to also serve the Cove Point Community at some later date.

Cove Point Community, Lusby. Explore funding opportunities to serve the Cove Point Community about 2 miles past the Dominion LNG plant. The Cove Point Community has about 175 homes and has been identified as an area of failing septic systems. The entire community is within the 100-yr floodplain. The County will explore using the Bay Restoration Fund to first upgrade the Solomons WWTP to ENR standards and then to fund or partially fund connection of the existing homes to the Solomons WWTP. In the 2014 draft of the Cove Point Community Flood Mitigation Plan, sewer service was identified as the top priority of the community.

Dares Beach Community, Prince Frederick. A portion of the Dares Beach Community is already connected to the Prince Frederick WWTP. In the future, connect additional homes to the Prince Frederick WWTP when their septic systems fail.

Programmatic Milestones

The programmatic Milestones for upgrading septic systems given above were not initiated. The Board of County Commissioners thought that the approaches recommended were too expensive and want to receive and review the University of Maryland Environmental Finance Center (EFC) report before considering the proposed programmatic changes. The County has begun Planning for the connection of the remainder of the Dares Beach Community, Cove Point Community, Hallowing Point Trailer Park and Summer City to WWTPs.

Urban Nutrient: Stormwater Management - Implementation Milestones

Upgrading Existing Failing And Inadequate Stormwater Management Facilities: Calvert County's urban nutrients stormwater management strategy initially focuses on upgrading existing failing and inadequate stormwater management facilities to provide greater detention quality treatment of runoff. Existing facilities such as dry extended detention ponds and grass swales will be converted to wet ponds, wetlands and bioswales where appropriate to achieve higher nutrient removal efficiency than can be achieved in their current form even when properly maintained. Current drainage channel repair and stream restoration implementation will be increased substantially to reduce the sediment loads that are flowing into our waterways.

Treat Unmanaged Impervious Surfaces: Calvert County is also proposing to provide stormwater management for currently unmanaged impervious areas through the reduction of impervious areas, providing stormwater management for all County structures and the majority of County roadways, and incentivizing the construction of infiltration and filtering facilities on existing residential and commercial properties. See the bulleted list below for the suite of combined actions: upgrades to existing failing or inadequate stormwater management facilities and treatment of impervious surfaces.

- Convert approximately 160 dry extended detention ponds to wet ponds or wetlands
- Convert approximately 200 miles of grass swales to bioswales and install an additional 160 miles of new grass swales along county and private roadways
- Increase current rate of drainage channel repair from 200 feet per year to 715 feet per year, representing a total of 5,000 feet
- Pursue implementation of regenerative stormwater conveyances or other vegetated flow attenuation wherever appropriate
- Partner with local communities to sponsor cliff stabilization projects at a rate of 715 feet per year, representing a total of 5,000 feet
- Provide or upgrade stormwater management facilities on approximately 30 County structures to provide environmentally sensitive design (ESD), to include public schools, the golf course and the County Services Plaza
- Construct or upgrade approximately 160 miles of grass swales along currently unmanaged County and privately owned roadways to provide water quality treatment
- Reduce total impervious cover in Calvert County by 15% by 2017, and by 20% by 2020 through changes to parking requirements
- Incentivize removal of unused impervious area, green roof retrofits, and expanded use of permeable pavement
- Incentivize the use of microscale ESD practices on approximately 600 existing commercial properties that drain to regional facilities or pre-2000 stormwater management facilities to reduce nutrient loading closer to the source
- Incentivize the construction of bioretention, micro-bioretention and raingarden facilities on approximately 1250 single family residential lots; focusing primarily on densely populated areas such as Chesapeake Ranch Estates where facilities can treat multiple homes

The stormwater management portion of the Phase II WIP strategy requires one staff person to review projects, one staff person to inspect projects and one person to administer the stormwater management impact fee and identify projects. All three staff persons would be housed in the Public Works Division of

the Department of Inspections and Permits. The County is identifying its General Fund as the funding sources for these positions. Currently the County

Urban Nutrient: Stormwater Management - Programmatic Milestones

The County would need to pass legislation establishing a stormwater utility fee. The County is considering two different approaches to developing the stormwater utility fee. The first approach would consist of a flat rate per household and an impervious surface-based fee for non-residential development. With an estimated 33,000 households in the County, \$1.98 million could be collected through a \$60 flat fee per household. The non-residential fees generated will need to be developed if this is the method approved. The second approach would consist of an impervious surface based approach for both residential and non-residential development. If the second option is the approved method, the County would need to develop an estimated income from this approach.

Tree Plantings: Through Calvert's existing Critical Area Program and Forest Conservation Program, the fees-in-lieu (FIL) fund for these programs currently contains enough funds to plant two (2) acres of trees per year inside the Critical Area and two (2) acres of trees outside the Critical Area annually through 2017, but more revenue from fees-in-lieu are expected during this time. Planning and Zoning will administer and track the four (4) acres of tree planting per year.

Contingency Action: Stream Restoration and Oyster Reefs and Floats

Alternative options for meeting 2017 interim goals and 2020 target load goals include stream restoration projects and oyster reefs and floats. The Southern Maryland Oyster Cultivation Society (SMOCS) has been active in encouraging oyster floats attached to private and commercial piers and in creating oyster reefs in local tidal creeks. Stream restoration projects are more expensive in nature (\$150/ linear foot) than other storm water management measures. State and Federal Grant funding will be sought to implement stream restoration projects.

2-yr Milestone Report – Stormwater Management

Implementation Accomplishments:

The Department of Public Works- Office of Engineering is focused on initiating a watershed implementation plan in selected sub watersheds to identify pollution sources and develop a strategy to reduce pollutants. This initiative will be achieved by the implementation of nonstructural and structural best management practices (BMP's), reducing impervious areas where possible, and stream restoration projects.

This aspect of the project was projected to cost 1.1 billion dollars over the life of the project. Lack of funding remains an obstacle to implementation of this portion of the program. The County Commissioners have determined that a stormwater tax similar to those mandated by the state in MS-4 counties will not be implemented in the County at this time.

To date, the following projects have been completed:

- Established and recorded the Cage Farm Wetland Mitigation Bank and a 2nd unnamed wetland mitigation facility
- Various Infiltration trench projects

- Calvert Marine Museum drainage improvements with bio-retention
- Demolished 10 cliff front homes and converted the lots to grass. In 2014 these lots will be converted to forest by planting or natural regeneration.
- Inspected existing county SWM facilities to determine which ones can be retrofitted. The next step will be to begin the retrofits.
- Established a system to track and quantify improvements.

Green Schools Program. The Calvert County Public Schools have a Green Schools Program. The following schools have rain or native gardens: Appeal Elementary, Beach Elementary, Calvert Elementary, Calvert Middle, Dowell Elementary, Huntingtown Elementary, Huntingtown High, Mill Creek Middle, Mount Harmony Elementary, Mutual Elementary, Northern High, Northern Middle (300 sq ft), Patuxent Elementary, Patuxent High, Plum Point Middle, St. Leonard Elementary, Southern Middle (25 sq ft), Windy Hill Elementary, and Windy Hill Middle. The following schools have storm drain stenciling to discourage allowing contaminated run-off from entering the drains: Barstow Elementary, Calvert County, Calvert Middle, Huntingtown High, Mutual Elementary, Northern High, Northern Middle, Patuxent Elementary, Patuxent High, Plum Point Elementary, Plum Point Middle, St. Leonard Elementary, Southern Middle, Windy Hill Elementary, and Windy Hill Middle. In addition, the Calverton School installed a bog stormwater management facility in 2010 using grant funds. This project may not have been credited. Certain public schools have also established “NO MOW ZONES” and “School Forests” that assist in sediment and erosion control measures.

Programatic Milestones

The programmatic Milestones for stormwater management given above and below were not accomplished. The Board of County Commissioners thought that a stormwater utility was too expensive and wants to receive the University of Maryland Environmental Finance Center (EFC) report before considering the proposed programmatic changes. The Office of Public works has begun seeking outside funding sources through private grants. This Department in conjunction with local community organizations has submitted grant requests for funding for (5) projects within the County. We are awaiting the results of these requests. This office has also begun to analyze projects completed by other departments to determine if water quality enhancements can be credited to projects already funded. This would reduce the department’s burden of total construction cost to only the water quality components. This also reduces the cost of land acquisitions and additional staffing needs. We have determined two (2) sites where major upgrades to the drainage system will be completed in fiscal year 2014. These projects will include stormwater improvements to areas that currently have none. We are also trying to team up with other organizations that do environmental restoration.

Section III: Calvert County’s 2012-2013 Milestones

The County’s 2012-2013 milestone goals are to pass septic system upgrade legislation, requiring:

- All new septic systems within the Critical Area as per State law to be advanced systems and require further that these systems have a nitrogen removing efficiency of at least 69%
- All new systems outside the Critical Area to be advanced systems with a nitrogen removal efficiency of at least 69%
- All repairs of failed systems (about 1.9%/year) to use advanced systems with a nitrogen removal efficiency of at least 69%
- All septic systems at “time of sale” (about 5%/year) to be upgraded to advanced systems with a nitrogen removal efficiency of at least 69%

The County’s 2012-2013 milestone goals are to:

- Pass a stormwater management impact fee
- Hire five (5) additional staff people to implement the septic system upgrade and stormwater management aspects of the Phase II WIP.
- Resolve the septic system “50%” credit issue with EPA and the Chesapeake Bay Program, so that the County receives the accurate credit of 69% nitrogen reductions for upgraded septic systems; and the ability to receive 93% reduction if the County implements the requirement for septic systems to have 93% nitrogen reduction capabilities.

2-yr Milestone Report

The 2-yr implementation and programmatic accomplishments are discussed above under the individual sections.

Section VI: Calvert County’s Tracking, Verification and Reporting Methods

The County will monitor the Phase II WIP implementation by utilizing its existing monitoring program (in existence for 23 years) in 10 locations within Mill Creek; and from 10 newer stations in three (3) tributaries located in the lower Patuxent River estuary, all south of Broomes Island: three (3) stations in Hellen’s Creek, four (4) stations in Saint Leonard Creek; and three (3) stations in Island Creek (in existence from 1-3 years depending on location of station). The Calvert County Board of County Commissioners provides the University of Maryland System, Center for Environmental Science, Chesapeake Biological Laboratory (UMCES CBL) with funding to monitor water quality conditions in the Mill Creek system. Past monitoring grants were awarded in 1987-1988 and 1990-2010. The focal point of these studies was to measure the variables that best indicate stress to an estuarine system due to increased development and recreational activity. In the early years of this program, variables measured included particulate and dissolved nutrients, chlorophyll-*a*, fecal coliform concentrations, temperature, water column clarity, dissolved oxygen concentrations and salinity. In 2009, the water quality monitoring program expanded to include the 10 newer stations. At all stations (including the historical 10 stations in the Mill Creek sub-estuarine system), the County tracks surface and bottom water temperature, salinity, dissolved oxygen, and water clarity. Water samples are collected, filtered and analyzed for total and active chlorophyll-*a* concentration.

2-yr Milestone Report

The waste water treatment plant improvements are tracked by MDE and the state waste water discharge permit process. The number of nitrogen-removing septic systems installed via the BRF Grant Program is

being tracked along with the nitrogen reduction efficiency of the technologies installed. Community Planning and Building is working with the Environmental Health Department to assist them in tracking the advanced systems installed outside of the Grant Program. The installation of stormwater management devices is being tracked by the Department of Public Works.

Water Quality Sampling. The Tidal Creek Sampling Program, conducted by the Chesapeake Biological Laboratory over the past 25 years, is continuing. The 2012 study showed some remarkable improvements in water quality in the Mill Creek System. The 2012 Calvert County Tidal Creeks Report is included in Appendix B.

The freshwater creeks study conducted by the County Department of Community Planning and Building and with the help of citizen volunteers was begun in 2010 with grant support from the Cove Point Natural Heritage Trust (CPNHT) and is continuing to present. In this study, about 25 sites are sampled in various creeks located in 21 of the 22 12-digit watersheds in the County. Measurements are made of temperature, nutrients (Ammonia (NH₄), Nitrates + Nitrites (NO₂3) and Phosphates (PO₄)) and total suspended solids. In the 2012-2013 study period, stream flow and discharge rates were measured at the various stations so that loadings could also be estimated. In the summer of 2012, many of the stations showed improved water quality. The 2011-2012 Report is included in Appendix C and the 2012-2013 report is in preparation.

Section V: Identification of Technical Discrepancies

Septic System Nitrogen Credit: As discussed in the septic system upgrades portion of the County's Phase II WIP Strategy, Maryland's Assessment Scenario Tool (MAST) gives a 50% reduction in nitrogen load credit per upgraded septic system. However, the advanced systems being installed via the County BRP Program achieves 69% nitrogen reduction. The County will seek approval from EPA and the Chesapeake Bay program to receive 69% denitrification success with the existing system required. The County possesses the scientific data to verify the findings and make the argument. In addition, the County has utilized, on a limited basis, a septic system that achieves 93% denitrification, and has the scientific data to verify such findings. The County will pursue, simultaneously in its pursuit to receive a 69% credit, approval to receive 93% credit per unit that achieves a 93% reduction in nitrogen. Table 7 (on the following page) shows the comparable loading reductions achieved using:

- The 50% reduction allowed in MAST
- A 69% reduction based on our current and proposed future programs
- A 93% reduction if the County were to require 93% nitrogen removing septic systems in the future
- The above three scenarios include proposed septic systems to WWTP connections

Septic System Connections to WWTPs Utilizing Land Application: Additionally, the County proposes to explore connecting a potential 683 individual systems and three (3) non-residential septic systems to achieve septic system 2025 target goals. However, septic system connections to WWTPs that utilize land application provides the County with no additional "credit" even though there will be water quality benefits will be derived with connections. Of the 683 proposed septic system connections to WWTPs, only 289 would receive credit under MAST. The remaining 398 EDUs, the DNR Building and the Cove Point Natural Gas Facility would receive no credit. Recognizing this is a double edged sword because WWTPs utilizing land application loadings are not counted against the County, the County's feasible options for addressing nonpoint source loads is limited due to MAST's inability to credit and account for such measures.

Land Use Categories in MAST: The current land use categories in MAST lack details that provide a more accurate measurement of impervious surface, which impacts the accuracy of assessing stormwater management BMP implementation needs to meet urban loading goals. MAST should incorporate land uses that better reflect land uses used in the discipline of planning, and incorporate more accurate impervious surface ratios associated with the different types of land uses (e.g. low, medium and high density residential land uses, light and heavy industrial land uses, commercial and retail land uses, etc.)

Ground Truthing MAST Numbers with County Numbers: MAST’s inventory and location of septic systems needs to be verified. The County identified a discrepancy in the number of septic systems within the County and their locations (inside the Critical Area versus outside the Critical Area, within 1,000 feet of a stream, etc.). The County anticipates the need to identify all other data in MAST such as units of stormwater BMPS, acres of trees planted, etc.

Table 7: Comparison Table for Septic Systems with 50%, 69% and 93% Denitrification Capabilities (includes septic connections without growth)

		2017			
		2009 Loadings	lbs N removed (50%)	lbs N removed (69%*)	lbs N removed (93%*)
Critical Area	102,672	84,814	17,858	24,644	33,216
Within 1,000 ft of a stream	90,924	77,160	13,764	18,994	25,601
Other	109,099	92,857	16,242	22,414	30,210
Septic Connections			2,236	2,236	2,236
Total	302,695	254,831	50,100	68,288	91,263
Target			84,293	84,293	84,293
lbs reduction relative to target			-34,193	-16,005	6,970
Without Septic Connections			-36,429	-18,241	4,734
		2020			
		2009 Loadings	lbs N removed (50%)	lbs N removed (69%*)	lbs N removed (93%*)
Critical Area	102,672	77,043	25,629	35,368	47,670
Within 1,000 ft of a stream	90,924	70,916	20,008	27,611	37,215
Other	109,099	85,474	23,625	32,603	43,943
Septic Connections			13,838	13,838	2,236
Total	302,695	233,433	83,100	109,420	131,063
Target			120,419	120,419	84,293

lbs reduction relative to target				-37,319	-10,999	46,770
Without Septic Connections				-51,157	-24,837	44,534
				2025		
	2009			lbs N	lbs N	lbs N removed
	Loadings		Loadings	removed	removed	(93%*)
				(50%)	(69%*)	
Critical Area	102,672	67,368	35,304	48,720	65,665	
Within 1,000 ft of a stream	90,924	63,031	27,893	38,492	51,881	
Other	109,099	76,178	32,921	45,431	61,233	
Septic Connections			13,838	13,838	13,838	
Total	302,695	206,577	109,956	146,481	192,617	
Target			120,419	120,419	120,419	
lbs reduction relative to target			-10,463	26,062	72,198	
Without Septic Connections			-24,301	12,224	58,360	

ⁱ Calvert County Draft Comprehensive Water and Sewer Plan 2011, Table 10, pg.71.

ⁱⁱ Calvert County Draft Comprehensive Water and Sewer Plan 2011, pg. 68.

ⁱⁱⁱ Calvert County Comprehensive Water and Sewer Plan 2011, Table 10, pg. 72.

^{iv} Calvert County Draft Comprehensive Water and Sewer Plan 2011, Table 10, pg. 72.

Appendix A

**Bay Restoration Funded
Nitrogen-removing Septic System Installations**

Appendix B

2012 Water Quality Monitoring Program for Tidal Creeks in Calvert County, Maryland

Appendix C

Subwatershed Water Quality Monitoring in Calvert County, MD