Chesapeake Bay TMDL: Development of a Comprehensive Implementation Program

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Material to be Covered

- TMDL Implementation
  - Background and History
  - Program Evolution
- Integrated Approach to TMDL Implementation
  - Charles Co. Case study
- Benefits to Charles County and Lessons Learned

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TMDL Implementation Background and History

- CWA and regulations say little about TMDL implementation
- Federal guidance has been limited
- Historically – implementation can be disjointed
  - Sources
    - Wastewater
    - Stormwater
    - Septics
  - Programs
    - Forest Conservation
    - Urban Planning
    - Zoning
    - Land Preservation
    - Facilities improvements (roads, etc.)

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Evolution of TMDL Implementation

- 2006 - MDE TMDL Implementation Guidance
- June, 2010 - MDE Draft TMDL Implementation Framework
- July, 2010 - EPA Region 3 Permit Expectation Letter
- 2010-2011… - New MS4 Permit language (MD, MI, VT, etc.)
- 2012 - Stormwater Rule

- Increasingly stronger linkage of MS4 permits to TMDL implementation, but still not much of incentive or “hook” to look at multiple sectors holistically

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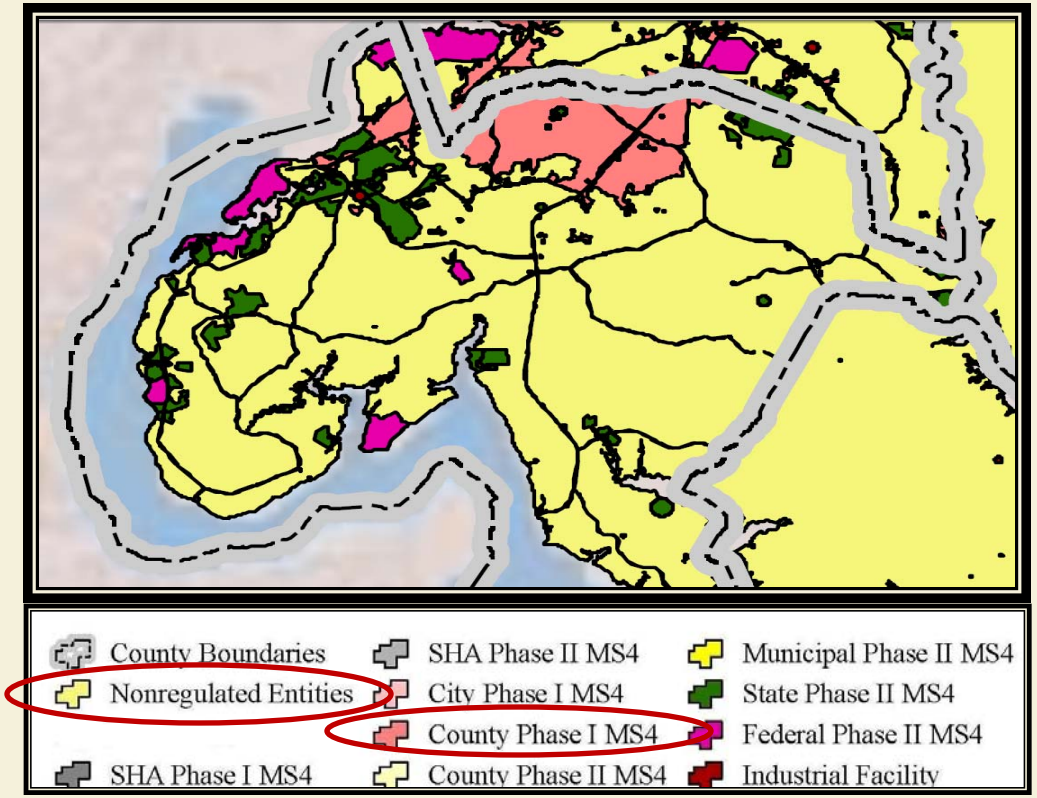
Integrated Approach to TMDL Implementation

- "Multi-disciplinary field involving planning and decision-making across different scales and sectors…"
- Charles County:
  - Looked at all programs for which County was responsible:
    - Wastewater
    - Septic
    - Regulated stormwater (MS4)
    - Non-regulated stormwater



Strategy for Meeting Chesapeake Bay TMDL

Step 1: Evaluate “baseline”

Step 2: Determine impact of currently planned projects

Step 3: Determine “gap”

Step 4: Develop strategy to close gap

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Step 1: Evaluate Baseline Data

- MDE/EPA data
  - Differences in septic, wastewater loads
  - What has been credited, what hasn't been?

Septic Systems in Charles County	EPA/MDE	Charles County*
Critical area	1,238	1,178
Not in critical area, but within 1,000 ft. of perennial stream	9,441	7,623
Not in critical area, and not within 1,000 ft. of perennial stream	16,184	8,266

Difference of ~74,000 lbs N/year

*76 septic systems in County not classified

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Step 2: Determine Impact of Currently Planned Projects

- Identify projects
  - Extract projects from CIP and other documents
  - Do projects meet BMP definition and requirements?
- Quantify estimated load reduction
  - Tracked load reductions by project – spreadsheet models
    - MAST doesn't track individual projects
  - "Rolled up" to estimate total load reduction by sector
- Put into MAST format
  - Translate "rolled up" information by project type into MAST (i.e., percent of landuse type for stormwater)

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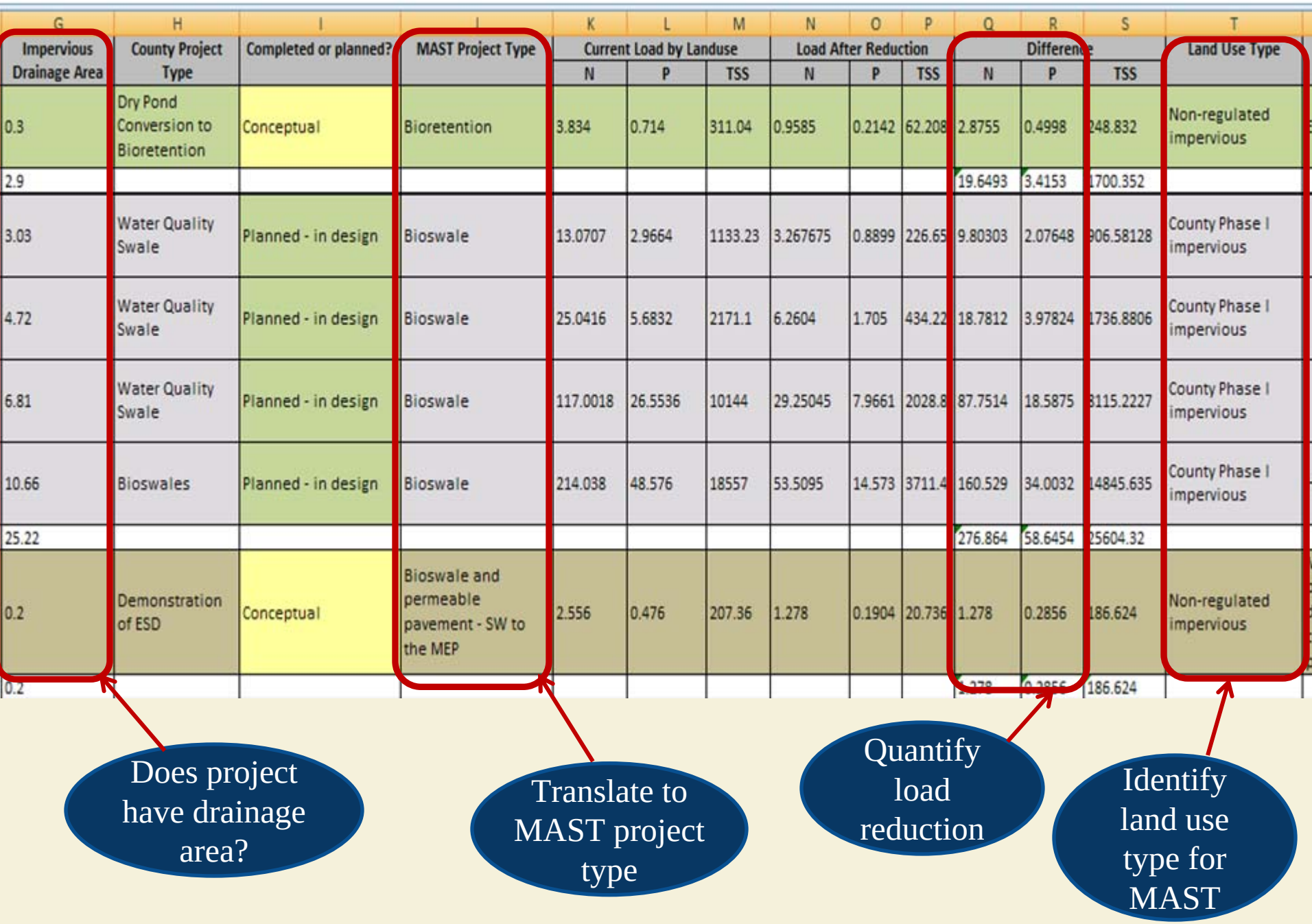
Accounting – Identifying and Quantifying Projects

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Sub-watershed	Site ID	Town or County	Name	Drainage Area/size	Units	Impervious Drainage Area	County Project Type	Completed or planned?	MAST Project Type	Current Load by Landuse			Load After Reduction			Difference			Land Use Type
										N	P	TSS	N	P	TSS	N	P	TSS	
Port Tobacco - La Plata	PT WRAS (R-23)	Town	Town Hall	0.6	acre	0.3	Dry Pond Conversion to Bioretention	Conceptual	Bioretention	3.834	0.714	311.04	0.9585	0.2142	62.208	2.8755	0.4998	248.832	Non-regulated Impervious
						2.9										19.6493	3.4153	1700.352	
Mattwoman - Main	WRS 2007	County	Northwood	3.09	acre	3.03	Water Quality Swale	Planned - in design	Bioswale	13.0707	2.9664	1133.23	3.267675	0.8899	226.65	9.80303	2.07648	906.58128	County Phase I Impervious
Zekiah	WRS 2007	County	Ryon Woods	5.92	acre	4.72	Water Quality Swale	Planned - in design	Bioswale	25.0416	5.6832	2171.1	6.2604	1.705	434.22	18.7812	3.97824	1736.8806	County Phase I Impervious
Mattawoman - Piney Branch	WRS 2007	County	Westlake Village	27.66	acre	6.81	Water Quality Swale	Planned - in design	Bioswale	117.0018	26.5536	10144	29.25045	7.9661	2028.8	87.7514	18.5875	8115.2227	County Phase I Impervious
Potomac, Mattawoman	HOA Project	County	Potomac Heights	50.6	acre	10.66	Bioswales	Planned - in design	Bioswale	214.038	48.576	18557	53.5095	14.573	3711.4	160.529	34.0032	14845.635	County Phase I Impervious
						25.22										276.864	58.6454	25604.32	
Port Tobacco - La Plata	PT WRAS (R-18)	Town	Wills Park	0.4	acre	0.2	Demonstration of ESD	Conceptual	Bioswale and permeable pavement - SW to the MEP	2.556	0.476	207.36	1.278	0.1904	20.736	1.278	0.2856	186.624	Non-regulated Impervious
						0.2										1.278	0.2856	186.624	
Mattawoman	NPDES MS4 Permit	County	Development District	1142	acres	573	Watershed Restoration	Conceptual	MS4 retrofit requirement	4830.66	1096.32	418817	3622.995	712.61	14658	1207.67	383.712	272231.1	County Phase I Impervious
						573										1207.67	383.712	272231.1	
Mattawoman	WRS 2011	County	Northwood	2	acre	0.85	Filterra	Conceptual	Urban Filtering Practice	8.46	1.92	733.48	5.076	0.768	146.7	3.384	1.152	586.784	County Phase I Impervious
						0.85										3.384	1.152	586.784	
Mattawoman/Zekiah	WRS 2004	County	Pinefield - North and South	14.1	acre	13.6	Filterras	Planned - in design	Urban Filtering Practice	59.643	13.536	5171.03	35.7858	5.4144	1034.2	23.8572	8.1216	4136.8272	County Phase I Impervious
Mattawoman - unnamed trib	WRS 2004	County	Bryans Road	20.8	acre	9.7	Underground filtering (contech filters)	Planned-in design	Urban Filtering Practice	87.984	19.968	7628.19	52.7904	7.9872	1525.6	35.1936	11.9808	6102.5536	County Phase I Impervious
						23.3										59.0508	20.1024	10239.381	
Port Tobacco - La Plata	PT WRAS (R-22)	Town	Sheriff's Dept	24.9	acre	8.7	Infiltration	Conceptual	Urban Infiltration Practices no underdrain	159.111	29.631	12908.2	23.86665	4.4447	645.41	135.244	25.1864	12262.752	Non-regulated Impervious
Port Tobacco - Jennie	PT WRAS (R-19)	County	Jennie Run Subshed, Church at corner of	1.9	acre	1.9	Infiltration, rain garden	Conceptual	Urban infiltration practices, no	12.141	2.261	984.96	1.82115	0.3392	49.248	10.3199	1.92185	935.712	Non-regulated Impervious

1 - Efficiency BMP by landuse | 2 - Landuse change BMPs | 3 - Load reduction BMPs | 4 - Stormwater Baseline



G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Impervious Drainage Area	County Project Type	Completed or planned?	MAST Project Type	Current Load by Landuse			Load After Reduction			Difference			Land Use Type
				N	P	TSS	N	P	TSS	N	P	TSS	
0.3	Dry Pond Conversion to Bioretention	Conceptual	Bioretention	3.834	0.714	311.04	0.9585	0.2142	62.208	2.8755	0.4998	248.832	Non-regulated impervious
2.9										19.6493	3.4153	1700.352	
3.03	Water Quality Swale	Planned - in design	Bioswale	13.0707	2.9664	1133.23	3.267675	0.8899	226.65	9.80303	2.07648	906.58128	County Phase I impervious
4.72	Water Quality Swale	Planned - in design	Bioswale	25.0416	5.6832	2171.1	6.2604	1.705	434.22	18.7812	3.97824	1736.8806	County Phase I impervious
6.81	Water Quality Swale	Planned - in design	Bioswale	117.0018	26.5536	10144	29.25045	7.9661	2028.8	87.7514	18.5875	8115.2227	County Phase I impervious
10.66	Bioswales	Planned - in design	Bioswale	214.038	48.576	18557	53.5095	14.573	3711.4	160.529	34.0032	14845.635	County Phase I impervious
25.22										276.864	58.6454	25604.32	
0.2	Demonstration of ESD	Conceptual	Bioswale and permeable pavement - SW to the MEP	2.556	0.476	207.36	1.278	0.1904	20.736	1.278	0.2856	186.624	Non-regulated impervious
0.2												186.624	

Does project have drainage area?

Translate to MAST project type

Quantify load reduction

Identify land use type for MAST

Put Into MAST Format

Landuse Type	BMP Type	Total Acreage in landuse type	2017 Total Acreage of BMP Type	2020 Total Acreage of BMP Type	2017	2020
County Phase I Impervious	Wet ponds and wetlands	4331.2	170.49	229.07	3.9363%	5.2888%
	Urban Filtering	4331.2	23.3	24.15	0.5380%	0.5576%
	Bioswale	4331.2	25.22	25.22	0.5823%	0.5823%
	Bioretention	4331.2	0.74	57.17	0.0171%	1.3200%
	Urban infiltration w/o sand/veg	4331.2		20.86	0.0000%	0.4816%
	MS4 Retrofit Requirement	4331.2		573	0.0000%	13.2296%
	Impervious surface removal	4331.2		1.14	0.0000%	0.0263%
Nonregulated Impervious	Bioretention	4801.6	1.4	2.9	0.0292%	0.0604%
	SW to the MEP	4801.6		0.2	0.0000%	0.0042%
	vegetated open channel	4801.6		1.42	0.0000%	0.0296%
	infiltration no underdrain	4801.6		10.6	0.0000%	0.2208%
	Wet ponds and wetlands	4801.6		0.3	0.0000%	0.0062%
Nonregulated pervious	Urban forest buffer	18215.6		1.85	0.0000%	0.0102%
	Wet ponds and wetlands	18215.6	2	2	0.0110%	0.0110%
Entered in Feet						
Nonregulated pervious	Shoreline Erosion Control					300.0
County Phase I Impervious	Stream restoration				6230.0	7780.0

Percent of project acreage for MAST

Project acreage

Land use type

Step 3: Determine the "Gap"

Nitrogen

	2009 Current Load (lbs N/year)	2017 Target (lbs N/year)	Lbs Reduction Required to Meet 2017 Target (lbs N/year)	2020 Target (lbs N/year)	Lbs Reduction Required to Meet 2020 Target (lbs N/year)	2017 Current Strategy (lbs N/year reduced)	2020 Current Strategy (lbs N/year reduced)	Gap to Reach 2017 Target (lbs N/year)	Gap to Reach 2020 Target (lbs N/year)	Total Reduction from Gap Projects for 2017	Total Reduction from Gap Projects for 2020	Gap Left to Fill (2017)	Gap Left to Fill (2020)
County Phase I/II MS4	56,290	50,067	6,223	47,400	8,890	820.73	2,670.95	5,402.3	6,219.0	140.0	10,188.5	5,262.3	(3,969.
Non-regulated	111,896	94,256	17,640	86,696	25,200	423.00	608.37	17,217.0	24,591.6	29.1	12,863.1	17,187.9	11,728.

Phosphorus

	2009 Current Load (lbs P/year)	2017 Target (lbs P/year)	Lbs Reduction Required to Meet 2017 Target (lbs P/year)	2020 Target (lbs P/year)	Lbs Reduction Required to Meet 2020 Target (lbs P/year)	2017 Current Strategy (lbs P/year reduced)	2020 Current Strategy (lbs P/year reduced)	Gap to Reach 2017 Target (lbs P/year)	Gap to Reach 2020 Target (lbs P/year)	Total Reduction from Gap Projects for 2017	Total Reduction from Gap Projects for 2020	Gap Left to Fill (2017)	Gap Left to Fill (2020
County Phase I/II MS4	7,872	5,974	1,898	5,161	2,711	325.61	897.43	1,572.4	1,813.6	22.0	1,501.5	1,550.4	312.
Non-regulated	11,830	8,452	3,378	7,005	4,825	64.22	98.08	3,313.8	4,726.9	2.8	1,480.7	3,311.0	3,246.

Target

Load reduction achieved with planned projects

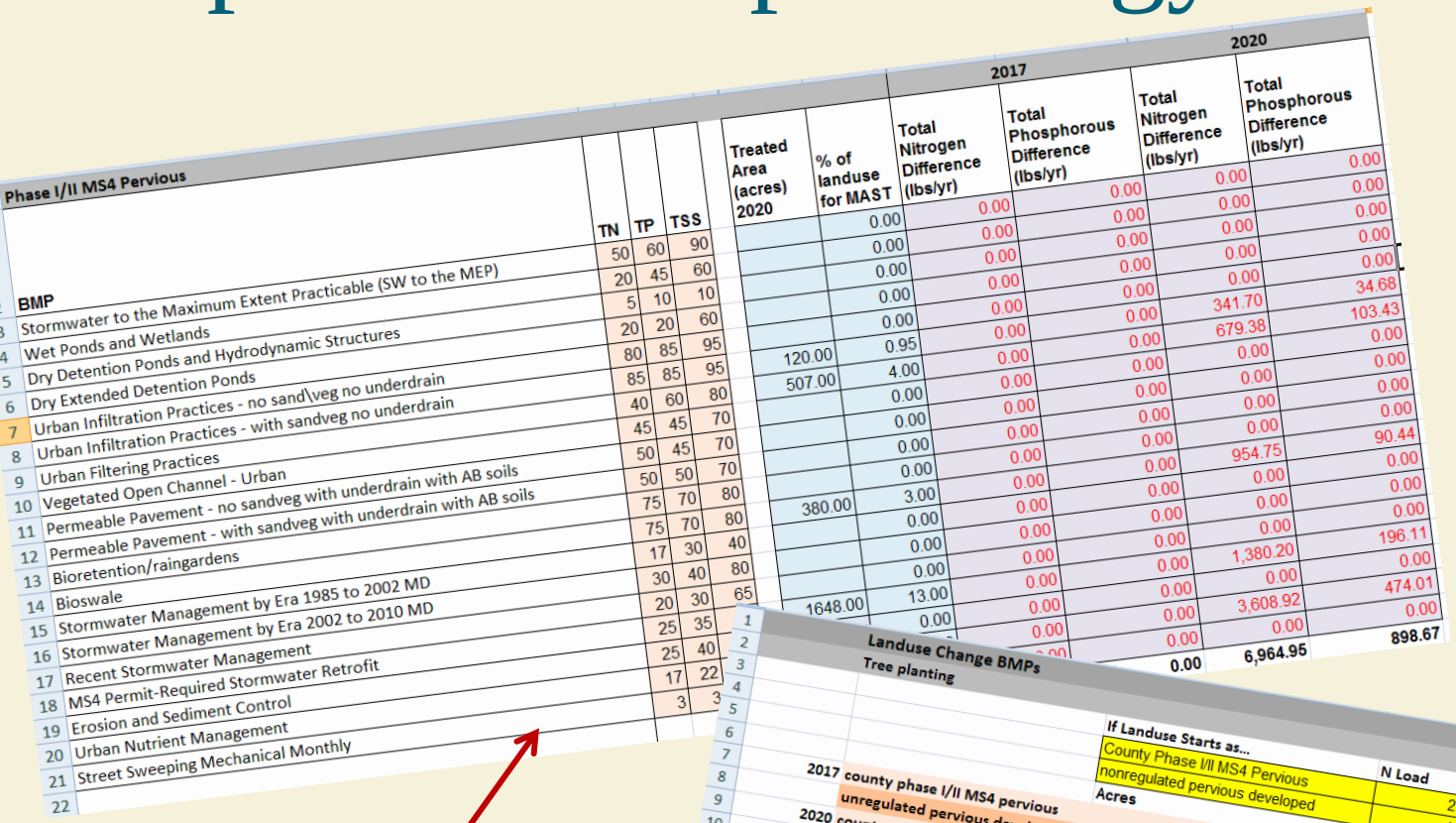
"Gap" left to fill

Extra "Cushion" Available?

	2009 Current Load (lbs N/year)	2017 Target (lbs N/year)	Lbs Reduction Required to Meet 2017 Target (lbs N/year)*	2020 Target (lbs N/year)	Lbs Reduction Required to Meet 2020 Target (lbs N/year)	Current Strategy (lbs N/year reduced) by 2017	Current Strategy (lbs N/year reduced) by 2020	Gap to Reach 2017 Target (lbs N/year)*	Gap to Reach 2020 Target (lbs N/year)
County Phase I/II MS4	56,290	50,067	6,223	47,400	8,890	945	1,850	5,278	7,040
Non-regulated	111,896	94,256	17,640	86,696	25,200	8	185	17,632	25,015
Septic	182,485	141,568	40,917	124,032	58,453	4,864	5,702	36,053	52,751
Municipal WWTPs	55,187	170,647		234,030	19,555	-	38,229	(18,674)	(18,674)
Total for County	405,858	456,538	64,780	492,158	112,098	5,817	45,966	40,289	66,132
*WWTPs have no 2017 targets, but it is assumed that the WWTP strategy will be in place by 2017									

	2009 Current Load (lbs P/year)	2017 Target (lbs P/year)	Lbs Reduction Required to Meet 2017 Target (lbs P/year)*	2020 Target (lbs P/year)	Lbs Reduction Required to Meet 2020 Target (lbs P/year)	Current Strategy (lbs P/year reduced) by 2017	Current Strategy (lbs P/year reduced) by 2020	Gap to Reach 2017 Target (lbs P/year)*	Gap to Reach 2020 Target (lbs P/year)
County Phase I/II MS4	7,872	5,974	1,898	5,161	2,711	344	572	1,554	2,367
Non-regulated	11,830	8,452	3,378	7,005	4,825	2	34	3,376	4,823
Municipal WWTPs	3,749			12,418	438	-	1,987	(1,549)	(1,549)
Total for County	23,451	14,426	5,276	24,584	7,974	346	2,593	3,381	5,641
*WWTPs have no 2017 targets, but it is assumed that the WWTP strategy will be in place by 2017									

Step 4: Develop Strategy to Close Gap



Phase I/II MS4 Pervious				Treated Area (acres) 2020	% of landuse for MAST	2017		2020	
BMP	TN	TP	TSS			Total Nitrogen Difference (lbs/yr)	Total Phosphorous Difference (lbs/yr)	Total Nitrogen Difference (lbs/yr)	Total Phosphorous Difference (lbs/yr)
Stormwater to the Maximum Extent Practicable (SW to the MEP)	50	60	90		0.00	0.00	0.00	0.00	0.00
Wet Ponds and Wetlands	20	45	60		0.00	0.00	0.00	0.00	0.00
Dry Detention Ponds and Hydrodynamic Structures	5	10	10		0.00	0.00	0.00	0.00	0.00
Dry Extended Detention Ponds	20	20	60		0.00	0.00	0.00	0.00	0.00
Urban Infiltration Practices - no sand\veg no underdrain	80	85	95		0.00	0.00	0.00	341.70	34.68
Urban Infiltration Practices - with sandveg no underdrain	85	85	95	120.00	0.95	0.00	0.00	679.38	103.43
Urban Filtering Practices	40	60	80	507.00	4.00	0.00	0.00	0.00	0.00
Vegetated Open Channel - Urban	45	45	70		0.00	0.00	0.00	0.00	0.00
Permeable Pavement - no sandveg with underdrain with AB soils	50	45	70		0.00	0.00	0.00	0.00	0.00
Permeable Pavement - with sandveg with underdrain with AB soils	50	50	70		0.00	0.00	0.00	954.75	90.44
Bioretention/raingardens	75	70	80	380.00	3.00	0.00	0.00	0.00	0.00
Bioswale	75	70	80		0.00	0.00	0.00	0.00	0.00
Stormwater Management by Era 1985 to 2002 MD	17	30	40		0.00	0.00	0.00	1,380.20	196.11
Stormwater Management by Era 2002 to 2010 MD	30	40	80		0.00	0.00	0.00	0.00	0.00
Recent Stormwater Management	20	30	65	1648.00	13.00	0.00	0.00	3,608.92	474.01
MS4 Permit-Required Stormwater Retrofit	25	35			0.00	0.00	0.00	0.00	0.00
Erosion and Sediment Control	25	40				0.00	0.00	6,964.95	898.67
Urban Nutrient Management	17	22							
Street Sweeping Mechanical Monthly	3	3							

Landuse Change BMPs

Tree planting

If Landuse Starts as...	N Load	P Load	Landuse Changes to...	N Load	P Load
County Phase I/II MS4 Pervious	2.91	0.27	forest	1.51	
nonregulated pervious developed	4.42	0.33	forest	1.51	
Acres	Original load			Load changes to	
2017 county phase I/II MS4 pervious	100	291	27	151	
unregulated pervious developed	10	44.2	3.3	15.1	
2020 county phase I/II MS4 pervious	60	174.6	16.2	90.6	
unregulated pervious developed	500	2210	165	755	

Forest buffers

If Landuse Starts as...	N Load	P Load	Landuse Changes to...	N Load	P Load
County Phase I/II MS4 Pervious	2.91	0.27	forest	1.51	
nonregulated pervious developed	4.42	0.33	forest	1.51	
Acres	Original load			Load changes to	
2017 county phase I/II MS4 pervious		0	0	0	
unregulated pervious developed		0	0	0	
2020 county phase I/II MS4 pervious	506	2236.52	136.62	764.06	
unregulated pervious developed	728	3217.76	240.24	1099.28	

BMPs credited by efficiency

Land use change BMPs

Evaluating Scenarios

Do they get to the targets?

More Accounting

Stormwater BMP	N Removal Efficiency	N Load/ acre	N Load (lbs)	Lbs N Removed / acre	Cost per Impervious Acre Treated				
					County-based Costs		Lifetime Costs		
					(7) Initial Cost	(8) Average Annual Maintenance Cost	(9) Total (Over 20 Years)	(10) Annual Costs (Over 20 Years)	Cost (Over 20 Years) per pound of pollutant
Impervious Urban Surface Reduction	N/A	2.91	2.91	N/A	$ 146,250	$ 885	$ 163,957	$ 8,198	N/A
Urban Forest Buffers	0.48	2.91	2.91	1.3968	$ 33,000	$ 1,210	$ 57,207	$ 2,860	$ 2,047.78
Urban Grass Buffers	N/A	2.91	2.91	N/A	$ 23,650	$ 870	$ 41,057	$ 2,053	
Urban Tree Planting	0.48	2.91	2.91	1.3968	$ 183,000	$ 1,210	$ 207,207	$ 10,360	$ 7,417.19
Wet Ponds and Wetlands (New)	0.2	2.91	2.91	0.582	$ 26,115	$ 763	$ 41,368	$ 2,068	$ 3,553.99
Wet Ponds and Wetlands (Retrofit)	0.2	2.91	2.91	0.582	$ 65,998	$ 763	$ 81,251	$ 4,063	$ 6,980.32
Dry Detention Ponds (New)	0.5	2.91	2.91	1.455	$ 44,000	$ 1,231	$ 68,620	$ 3,43	$ 2,358.08
Hydrodynamic Structures (New)	0.5	2.91	2.91	1.455	$ 42,000	$ 3,531	$ 112,620	$ 5,63	$ 3,870.11
Dry Extended Detention Ponds (New)	0.2	2.91	2.91	0.582	$ 44,000	$ 1,231	$ 68,620	$ 3,43	$ 5,895.20
Dry Extended Detention Ponds (Retrofit)	0.2	2.91	2.91	0.582	$ 72,500	$ 1,231	$ 97,120	$ 4,85	$ 8,343.65
Infiltration Practices w/o Sand, Veg. (New)	0.8	2.91	2.91	2.328	$ 63,450	$ 866	$ 80,770	$ 4,03	$ 1,734.75
Infiltration Practices w/ Sand, Veg. (New)	0.85	2.91	2.91	2.4735	$ 66,250	$ 906	$ 84,370	$ 4,21	$ 1,705.48
Filtering Practices (Sand, above ground)	0.4	2.91	2.91	1.164	$ 54,000	$ 1,431	$ 82,620	$ 4,13	$ 3,548.97
Filtering Practices (Sand, below ground)	0.4	2.91	2.91	1.164	$ 56,000	$ 1,631	$ 88,620	$ 4,43	$ 3,806.71
Erosion and Sediment Control	0.25	2.91	2.91	0.7275	$ 26,000	$ 10	$ 26,207	$ 1,310	$ 1,801.15
Urban Nutrient Management	0.17	2.91	2.91	0.4947	$ 61,000	$ 31	$ 61,620	$ 3,081	$ 6,228.03
Street Sweeping	0.03	2.91	2.91	0.0873	$ 6,049	$ 451	$ 15,079	$ 754	$ 8,636.29
Urban Stream Restoration		2.91	2.91	0	$ 64,500	$ 891	$ 82,320	$ 4,116	
Bioretention (New - Suburban)	0.75	2.91	2.91	2.1825	$ 49,875	$ 1,531	$ 80,495	$ 4,025	$ 1,844.10
Bioretention (Retrofit - Highly Urban)	0.75	2.91	2.91	2.1825	$ 186,750	$ 1,531	$ 217,370	$ 10,869	$ 4,979.84
Vegetated Open Channels	0.45	2.91	2.91	1.3095	$ 26,000	$ 610	$ 38,207	$ 1,910	$ 1,458.83
Bioswale (New)	0.75	2.91	2.91	2.1825	$ 44,000	$ 931	$ 62,620	$ 3,131	$ 1,434.60
Permeable Pavement w/o Sand, Veg. (New)	0.5	2.91	2.91	1.455	$ 239,580	$ 2,188	$ 283,347	$ 14,167	$ 9,737.00
Permeable Pavement w/ Sand, Veg. (New)	0.5	2.91	2.91	1.455	$ 335,412	$ 3,060	$ 396,603	$ 19,830	$ 13,628.96

Biggest Bang for the Buck?

Benefits of Integrated Approach to TMDL Implementation

- Incorporates local priorities
- Improves internal integration
- Improves synergy with others

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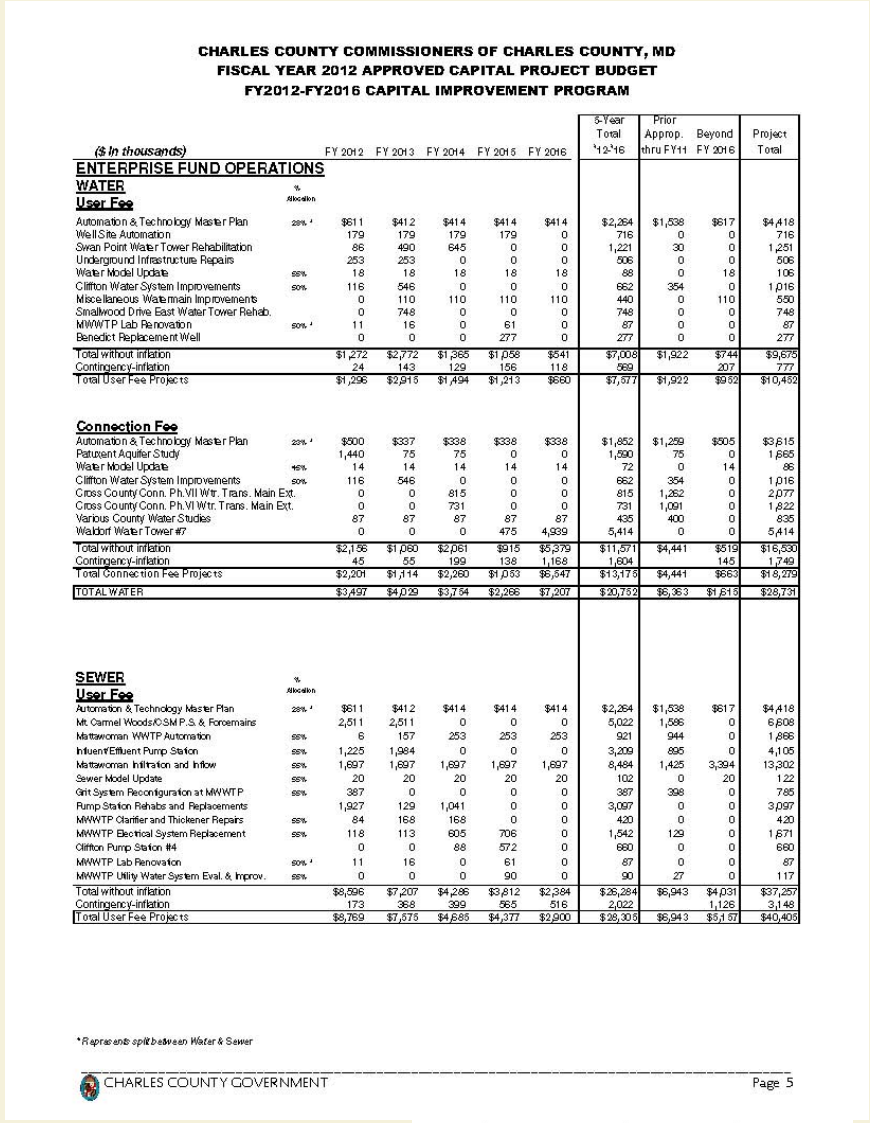
Incorporates Local Priorities

- Identifies and quantifies projects “on the books”
  - Important to identify those projects not yet credited (i.e., shoreline erosion control)



CHARLES COUNTY COMMISSIONERS OF CHARLES COUNTY, MD
FISCAL YEAR 2012 APPROVED CAPITAL PROJECT BUDGET
FY2012-FY2016 CAPITAL IMPROVEMENT PROGRAM

($ In thousands)		FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	5-Year Total FY12-FY16	Prior Approp. thru FY11	Beyond FY 2016	Project Total
ENTERPRISE FUND OPERATIONS										
WATER	% Allocation									
User Fee										
Automation & Technology Master Plan	28% *	$611	$412	$414	$414	$414	$2,264	$1,538	$617	$4,418
Well Site Automation		179	179	179	179	0	716	0	0	716
Swan Point Water Tower Rehabilitation		86	490	645	0	0	1,221	30	0	1,251
Underground Infrastructure Repairs		253	253	0	0	0	506	0	0	506
Water Model Update	56%	18	18	18	18	18	88	0	18	106
Cliffton Water System Improvements	50%	116	546	0	0	0	662	354	0	1,016
Miscellaneous Watermain Improvements		0	110	110	110	110	440	0	110	550
Smallwood Drive East Water Tower Rehab.		0	748	0	0	0	748	0	0	748
MWWTP Lab Renovation	50% *	11	16	0	61	0	87	0	0	87
Benedict Replacement Well		0	0	0	277	0	277	0	0	277
Total without inflation		$1,272	$2,772	$1,365	$1,058	$541	$7,008	$1,922	$744	$9,675
Contingency-inflation		24	143	129	156	118	569		207	777
Total User Fee Projects		$1,296	$2,915	$1,494	$1,213	$660	$7,577	$1,922	$952	$10,452
Connection Fee										
Automation & Technology Master Plan	28% *	$500	$337	$338	$338	$338	$1,852	$1,259	$505	$3,615
Patuxent Aquifer Study		1,440	75	75	0	0	1,590	75	0	1,665
Water Model Update	44%	14	14	14	14	14	72	0	14	86
Cliffton Water System Improvements	50%	116	546	0	0	0	662	354	0	1,016
Cross County Conn. Ph.VII Wtr. Trans. Main Ext.		0	0	815	0	0	815	1,262	0	2,077
Cross County Conn. Ph.VI Wtr. Trans. Main Ext.		0	0	731	0	0	731	1,091	0	1,822
Various County Water Studies		87	87	87	87	87	435	400	0	835
Waldorf Water Tower #7		0	0	0	475	4,939	5,414	0	0	5,414
Total without inflation		$2,156	$1,060	$2,061	$915	$5,379	$11,571	$4,441	$519	$16,530
Contingency-inflation		45	55	199	138	1,168	1,604		145	1,749
Total Connection Fee Projects		$2,201	$1,114	$2,260	$1,053	$6,547	$13,175	$4,441	$663	$18,279
TOTAL WATER		$3,497	$4,029	$3,754	$2,266	$7,207	$20,752	$6,363	$1,615	$28,731
SEWER	% Allocation									
User Fee										
Automation & Technology Master Plan	28% *	$611	$412	$414	$414	$414	$2,264	$1,538	$617	$4,418
Mt. Carmel Woods/OSMP.S. & Forcemains		2,511	2,511	0	0	0	5,022	1,586	0	6,608
Mattawoman WWTP Automation	56%	6	157	253	253	253	921	944	0	1,866
Influent/Effluent Pump Station	56%	1,225	1,984	0	0	0	3,209	895	0	4,105
Mattawoman Infiltration and Inflow	56%	1,697	1,697	1,697	1,697	1,697	8,484	1,425	3,394	13,302
Sewer Model Update	56%	20	20	20	20	20	102	0	20	122
Grit System Reconfiguration at MWWTP	56%	387	0	0	0	0	387	398	0	785
Pump Station Rehabs and Replacements		1,927	129	1,041	0	0	3,097	0	0	3,097
MWWTP Clarifier and Thickener Repairs	56%	84	168	168	0	0	420	0	0	420
MWWTP Electrical System Replacement	56%	118	113	605	706	0	1,542	129	0	1,671
Cliffton Pump Station #4		0	0	88	572	0	660	0	0	660
MWWTP Lab Renovation	50% *	11	16	0	61	0	87	0	0	87
MWWTP Utility Water System Eval. & Improv.	56%	0	0	0	90	0	90	27	0	117
Total without inflation		$8,596	$7,207	$4,286	$3,812	$2,384	$26,284	$6,943	$4,031	$37,257
Contingency-inflation		173	368	399	565	516	2,022		1,126	3,148
Total User Fee Projects		$8,769	$7,575	$4,685	$4,377	$2,900	$28,305	$6,943	$5,157	$40,405

*Represents split between Water & Sewer

Improves Internal Integration

- Evaluates pollutant reduction needs by sector (WW, SW, septic, non-regulated) and overall
- Integrates other County-based programs
  - Identifies programs/projects more comprehensively (i.e., shoreline erosion control, land preservation, forestry)
- Evaluates costs
  - Determine “biggest bang for the buck”

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Improves Synergy With Others

- Involvement with local groups and other agencies
  - Maryland State Highway Administration
  - Schools
  - Environmental groups
  - Other MS4s

Schoolyard wetland creation

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Lessons Learned

- Some projects not yet credited
  - i.e., Shoreline erosion
- Guidance not finalized or complete
  - What is required to get Urban Nutrient Management credit? Forest conservation and urban growth reduction are MDE practices
- Numbers are still in flux
  - Allocations, efficiencies, number of practices
  - Calculations are providing an **estimate** of where you are and where you need to go
  - Important to base this path on the direction the county wanted to go in the first place
  - Careful documentation and tracking of internal data is needed – identify any discrepancies with MDE/EPA numbers

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Accounting for Growth

- Still a “wild card”
- Will add additional complexity to meeting Chesapeake Bay TMDL goals

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