



Using a Systematic Approach to Improve Water Quality Management Effectiveness and Efficiency

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Agenda

- Brief History
- How TMDL is linked to permits
- Description of permit requirements
 - 12-SW
 - NPDES
- Applying management principals to improve outcomes
- Discussion of costs in terms of life cycle
- Conclusion

History

- Federal Water Pollution Control Act of 1948
- Clean Water Act 1972
- MS4 Permits
 - Phase I issued 1990
 - Phase II issued 1999
 - MTA Phase II Permit issued 09/08/2005
- 12-SW Permits
 - EPA regulation published 1990 requires permit for Stormwater discharge associated with industrial activity
 - 1997 Maryland Issues 02-SW/MTA NOI Submitted 2007
 - 2014 Maryland issues 12-SW to replace 02-SW/MTA NOI Submitted 2014
- December 29, 2010 EPA Established TMDL for Chesapeake Bay and its tributaries for sediment, nitrogen and phosphorus

How TMDL is linked to permits

MS4

- Opportunity for specific requirements to permit holders
- Easier small scale enforcement

12-SW

- Targets industrial users
- Opportunity for specific requirements to permit holders
- Easier small scale enforcement

Permit Requirements

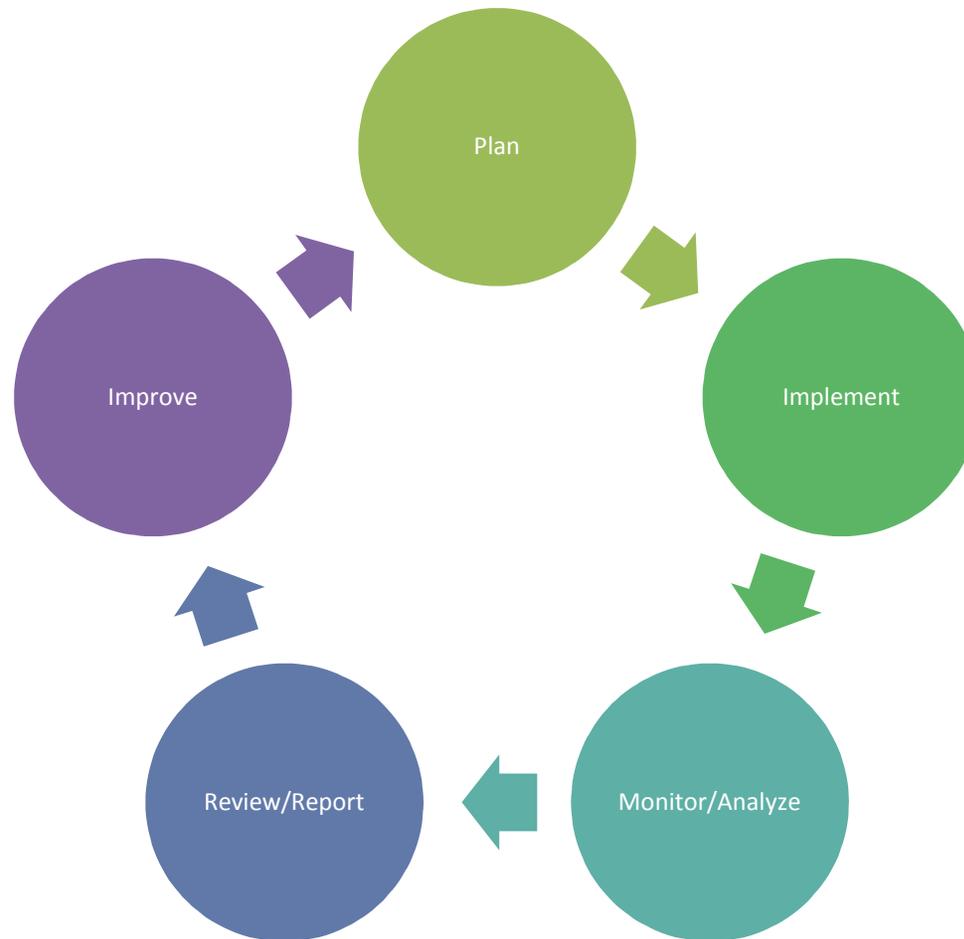
MS4

- Specific pollution reduction goals
 - 20% in first cycle
 - Anticipates 20-40% more in second cycle
- Specific pollution targets in terms of pounds

12-SW

- Increased oversight of permits
- Requires same pollution reduction if owner/operator is not covered by MS4
- Storm water monitoring requirements
- Increased inspection frequency

Management Principles





Plan

MTA

- 110 + Facilities in 12 counties
- 12 Industrial Permits
- 1 MS4 Permit
- 5 Modals – Bus, Metro subway, Light rail, MARC train, Mobility Services
- Nearly 600 acres of property
- 305 acres impervious
- 51 impervious acres currently treated
- 51 acres needed to meet 20% Goal

Planning Goals

- 2017 target - **Schedule**
- Least impact to users
- Intercept high pollution potential (industrial)
- Meet treatment **goals**
- **Budget**
- All together – **Work Plan**

Implement

Work Plan

- More detailed study of priority sites (24 sites)
- Proceed with sites that have current projects (3)
 - Design
 - Construct



WATER QUALITY SUMMARY
Federalsburg Transloader Site

(A) OUTFALL NUMBER	(B) WQv REQUIRED (Pe = 1-inch) (CF)	(C) WQv PROVIDED (Pe = 1-inch) (CF)	(D) NEW DEVELOPMENT (ACRES)	REDEVELOPMENT		AREA TO BE TREATED [(D - F) + 0.5 x (E + F)] (ACRES)	*TREATED IMPERVIOUS AREA BY BIOSWALE OR STRUCTURAL BMP (ACRES)	WATER QUALITY CREDIT/DEFICIT (ACRES)
				(E) RE CONSTRUCTED EXISTING IMPERVIOUS AREA (ACRES)	(F) EXISTING IMPERVIOUS AREA REMOVED (ACRES)			
POI-1	190	353	0.00	0.160	0.05	0.06	0.19	0.13
							**Total Credit	0.13

*Does not account for offsite impervious area.

** Credit to be applied to MTAs TMDL Goals at Approval.

Monitor/ Analyze

Monitor Plan

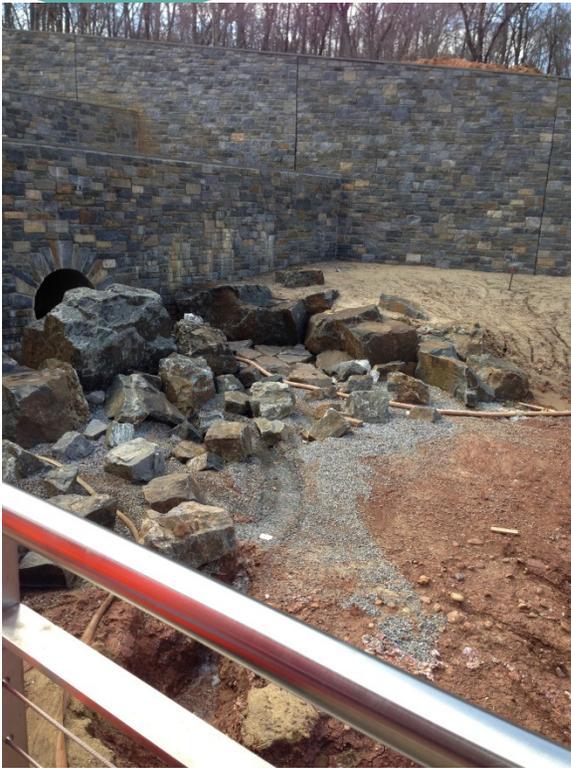
- Schedule
- Budget
- Progress towards goals



Monitor/ Analyze

Monitor Practices

- Visual inspection
- Visual Stormwater monitoring
- Maintenance needs
- Maintenance costs
- Effectiveness
- Acceptance (public and agency)



Review/ Report

Review

- Progress towards goals
- Budgets
- Schedules
- **Issues encountered**

Reporting

- MS4
 - Progress
 - Remaining budget
 - Schedule
 - **Issues encountered**
- 12-SW
 - Monitoring Results
 - Training
 - **Issues encountered**

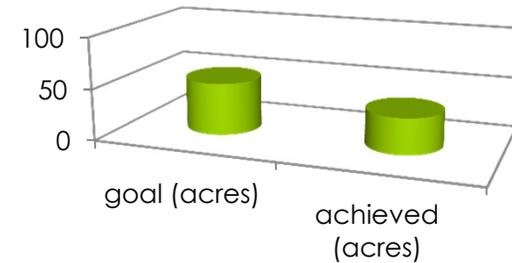
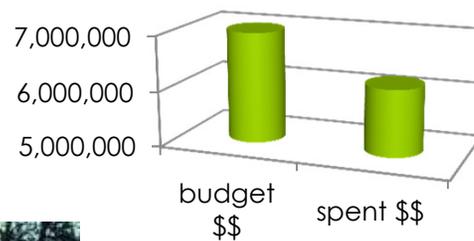
Changes

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graph TD; Review[Review/Report] --> ReviewList[Review]; Reporting[Reporting] --> ReportingList[Reporting]; ReviewList --> Issues1[Issues encountered]; ReportingList --> Issues2[Issues encountered]; Issues1 --> Changes[Changes]; Issues2 --> Changes;
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Improve

Work Plan

- Accelerate the schedule?
- Adjust the budget?
- Add in more sites?



Practices

- Adjust design standards?
- New innovations available?
- Change maintenance schedule or requirements?

Costs

- Design
- Initial Construction
- Maintenance
- Practice cost/lb

Integrating Unit SWBMP Costs with MAST Output

Planning Level Unit Cost Development for Stormwater Best Management Practices (BMPs)										
Part 4: Integrating Unit Stormwater BMP Costs with MAST Output										
Stormwater BMP	Reduction in Emissions per acre treated by each Stormwater BMP			(4) Available Acres	(5) % of Available Acres Treated (County Decision Variable)	(6) Number of Acres Treated	Cost per Impervious Acre Treated			
	(1) Nitrogen	(2) Phosphorus	(3) Sediment				County-based Costs		Lifetime Costs	
							(7) Initial Cost	(8) Average Annual Maintenance Cost	(9) Total (Over 20 Years)	(10) Annual Costs (Over 20 Years)
Impervious Urban Surface Reduction						0	\$ 146,250	\$ 885	\$ 163,957	\$ 8,198
Urban Forest Buffers						0	\$ 33,000	\$ 1,210	\$ 57,207	\$ 2,860
Urban Grass Buffers						0	\$ 23,650	\$ 870	\$ 41,057	\$ 2,053
Urban Tree Planting						0	\$ 183,000	\$ 1,210	\$ 207,207	\$ 10,360
Wet Ponds and Wetlands (New)						0	\$ 26,115	\$ 763	\$ 41,368	\$ 2,068
Wet Ponds and Wetlands (Retrofit)						0	\$ 65,998	\$ 763	\$ 81,251	\$ 4,063
Dry Detention Ponds (New)						0	\$ 44,000	\$ 1,231	\$ 68,620	\$ 3,431
Hydrodynamic Structures (New)						0	\$ 42,000	\$ 3,531	\$ 112,620	\$ 5,631
Dry Extended Detention Ponds (New)						0	\$ 44,000	\$ 1,231	\$ 68,620	\$ 3,431
Dry Extended Detention Ponds (Retrofit)						0	\$ 72,500	\$ 1,231	\$ 97,120	\$ 4,856
Infiltration Practices w/o Sand, Veg. (New)						0	\$ 63,450	\$ 866	\$ 80,770	\$ 4,039
Infiltration Practices w/ Sand, Veg. (New)						0	\$ 66,250	\$ 906	\$ 84,370	\$ 4,219
Filtering Practices (Sand, above ground)						0	\$ 54,000	\$ 1,431	\$ 82,620	\$ 4,131
Filtering Practices (Sand, below ground)						0	\$ 56,000	\$ 1,631	\$ 88,620	\$ 4,431
Erosion and Sediment Control						0	\$ 26,000	\$ 10	\$ 26,207	\$ 1,310
Urban Nutrient Management						0	\$ 61,000	\$ 31	\$ 61,620	\$ 3,081
Street Sweeping						0	\$ 6,049	\$ 451	\$ 15,079	\$ 754
Urban Stream Restoration						0	\$ 64,500	\$ 891	\$ 82,320	\$ 4,116
Bioretention (New - Suburban)						0	\$ 49,875	\$ 1,531	\$ 80,495	\$ 4,025
Bioretention (Retrofit - Highly Urban)						0	\$ 186,750	\$ 1,531	\$ 217,370	\$ 10,869
Vegetated Open Channels						0	\$ 26,000	\$ 610	\$ 38,207	\$ 1,910
Bioswale (New)						0	\$ 44,000	\$ 931	\$ 62,620	\$ 3,131
Permeable Pavement w/o Sand, Veg. (New)						0	\$ 239,580	\$ 2,188	\$ 283,347	\$ 14,167
Permeable Pavement w/ Sand, Veg. (New)						0	\$ 335,412	\$ 3,060	\$ 396,603	\$ 19,830

Table by Dennis King and Patrick Hagan 2011 and included in MAST/BayFAST

Conclusion

- Start out with a plan that relies on real data
- Carefully follow and implement the plan
- Monitor performance of plan
- Monitor performance of practices
- Evaluate and report on progress
- Improve the plan and practices

Conclusion

All of the above leads to “an approach that includes “adaptive implementation,” “a cyclical process in which TMDL plans are periodically assessed for their achievement of water quality standards”

Assessing the TMDL Approach to Water Quality Management (National Research Council, National Academy Press, 2001).

... and adjustments made as necessary

Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs (EPA Memorandum, 11/22/2002)

Questions

