Chesapeake Bay Total Maximum Daily Load (TMDL) Action Plan: Credit Determinations

Staff Presentation to the Environmental Policy Commission

January 24, 2022

Chesapeake Bay Cleanup Efforts

Impaired: nitrogen, phosphorus, and sediment

- Creates: algal blooms, fish kills, dead zones, human health threats

Voluntary Measures

- Bay Agreements and Tributary Strategies

Legislative Efforts

- Clean Water Act / Bay Act

,2010: Developed by US Environmental Protection Agency for 6 states and DC

- Watershed implementation plans, reasonable assurances, and consequences

State Watershed Implementation Plans and 2-Year Milestones

- WIP Phase I (2010), WIP Phase II (2012), WIP Phase III (2019), WIP Phase IV (2025?)

2013: Urban Stormwater – Municipal Separate Storm Sewer System (MS4) permits

- Regulatory "Special Conditions" require Action Plan and annual progress reporting

Sources/Usage: Public Domain.

MODIS image of Chesapeake Bay area after Tropical Storm Lee, September 2011. (Public domain.)

Bay Pollutant Loads and Clean Up Goals

Pollutant Load Reductions (MS4 Permit Special Conditions)*		**Pollutant Total (lbs./yr.)**		
		Total Nitrogen	Total Phosphorus	Total Suspended Solids
2009 Existing Pollutant Loads (Baseline)		*97,810*	*7,172*	*4,704,400*
Phase I (2013-2018)	5%	380	50	43,100
Phase II (2018-2023)	35%	2,670	352	301,700
Phase III (2023-2028)	60%	4,560	603	517,200
Total Pollutant Reductions Required	**100%**	**7,597**	**1,004**	**861,937**

*Internal Strategic Plan goal to exceed early requirements to meet the later ramp up

City's Bay TMDL Action Plan Strategies

- Regional (Pond) Facilities and Retrofits
- Retrofits on City Property and Rights-of-Way
- Street Sweeping and Catch Basin Cleaning
- Tree Planting, Land Use Change, Forest Buffers
- Urban Stream Restoration
- Nutrient Trading and Bi-Lateral Trading

Regional Pond Retrofit Reductions

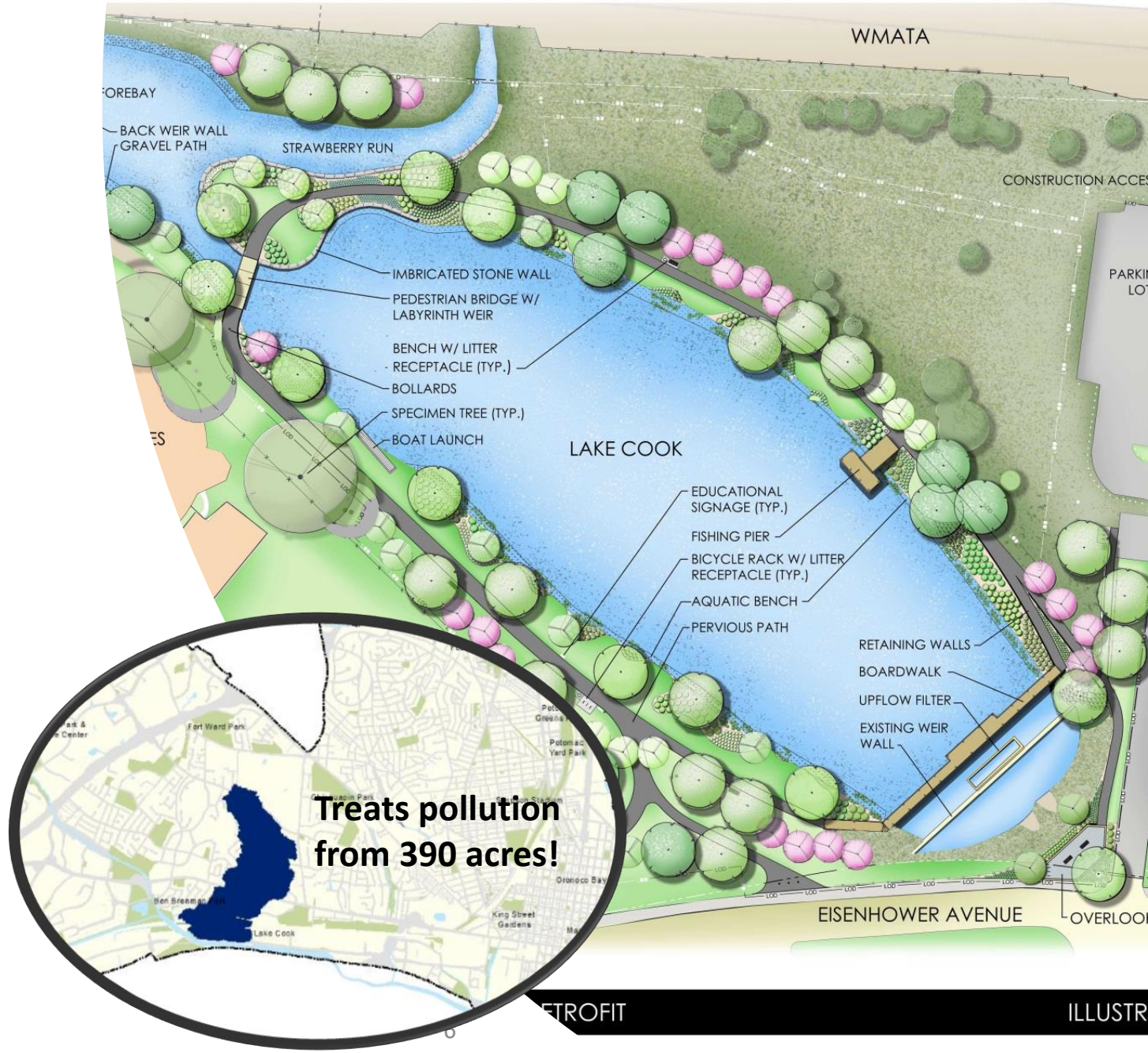
- *Feasibility Study for Retrofit of Existing Ponds and Construction of New Stormwater Ponds, 2014*
  - Identified potential retrofit and new pond locations
  - Developed concept design scenarios
  - Evaluated concepts
  - Provided recommendations
    - Lake Cook and Ben Brenman
- Bay TMDL Action Plan
  - *Installing new facilities to treat stormwater and retrofitting existing facilities originally installed with the primary purpose of addressing stormwater quantity to enhance their ability to improve water quality.*

Reduction Strategy	TN (lbs/yr)	TP (lbs/yr)	TSS (lbs/yr)	Estimated Cost[1]
Lake Cook Retrofit	1,587	163.3	131,334	$4.5M
Ben Brenman Pond Retrofit	946.4	151.3	87,734	$3.75M
Total	**2,533.4**	**314.6**	**219,068**	**$8.25M**

[1] *Includes funds from SLAF grants*

Region Pond Retrofit: Lake Cook

- Increased fishing opportunities
- Removed invasive plant species
- Diverse mix of new vegetation
- Enhanced habitat
- Wildlife viewing and recreational amenities
- Educational signage
- Received $1.8M in state matching grant funding
- Completed early 2019

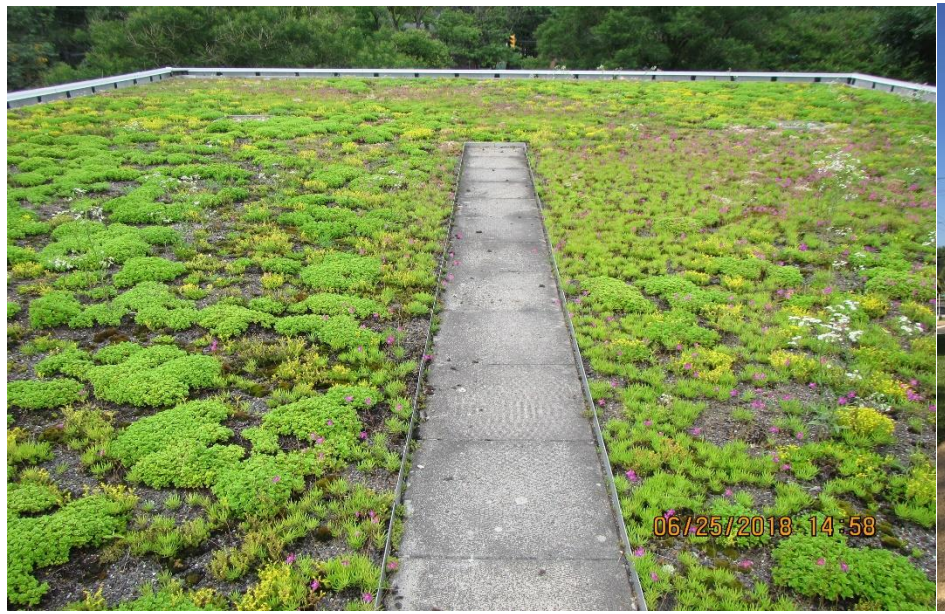


Region Pond Retrofit: Lake Cook

Regional Pond Retrofit: Ben Brenman

- Diverse mix of new vegetation
- Enhanced habitat
- Wildlife viewing
- Recreational amenities
- Educational signage
- Awarded $1.75M in state matching grant funding
- Completed 2020

City Property and Right-of-Way Retrofits



Charles Houston Rec Center

Fire Stn #206

Permeable Pavers and Bioretention Cell, 4MR Park

Completed Projects

Project	Total Treated (ac)	Impervious Treated (ac)	TN Removed (lbs/yr)	TP Removed (lbs/yr)	TSS Removed (lbs/yr)
Fire Station #206	0.55	0.55	2.66	0.40	515.38
Burke Library BMP#1	0.53	0.51	2.52	0.38	480.71
Burke Library BMP#2	0.78	0.41	2.66	0.37	299.91
Charles Barrett Elementary BMP#1	0.73	0.62	3.31	0.47	596.45
Charles Barrett Elementary BMP#2	1.62	1.38	6.42	1.05	912.24
		Totals	**17.6**	**2.7**	**2,805**

Potential City Property and Right-of-Way Retrofits

- *Retrofitting City-owned properties that are currently undertreated or not treated by stormwater quality BMPs and overtreating redevelopment.*
  - Need to explore further

Potential City Properties for Retrofit	Estimated Pollutant Reductions (lbs./yr.)		
	TN	TP	TSS
Maintenance Facility / Luckett Field	11	2	1,496
TES / Recreation Operations	8	1	1,113
Traffic Control Shop	3	1	485
ACPS Minnie Howard School	13	2	1,820
ACPS John Adams School	12	2	1,647

- *Retrofitting public streets, especially in coordination with CIP road projects where implementation is deemed feasible.*
  - Need to explore further

Potential Right-of-Way Projects	Estimated Pollutant Reductions (lbs./yr.)		
	TN	TP	TSS
Braddock Rd - North of I-395	12	2	1,547
Braddock Rd - South of I-395	27	4	3,537
King St - North of I-395	8	1	1,053
King St - South of I-395	21	3	2,480
Edsall Rd	9	1	1,078
Yoakum Pkwy	9	1	1,027

Street Sweeping and Catch Basin Cleaning

- Performed regularly to protect water quality
- Changes since made to the equipment and reduction credits
- Annual credits
- Not realistic given changes to approach

Tree Planting, Forest Buffers, Land Use Change

- Urban Tree Canopy Expansion BMP
  - Planting trees over existing turf or impervious
  - First in the February 2021 Final VDEQ Action Plan Guidance GM20-2003
  - Stackable BMP – other BMPs can be used in treated area to gain more credits
- Urban Forest Planting BMP
  - Must create forest-like condition; understory
  - ¼ acre minimum, with 50-foot width minimum (Expert Panel Report)
  - Stand alone credit per treated area
- Urban Forest Buffer BMP
  - Requires to plant along streams or bodies of water outside RPA
- State reviewing report to include in the VA BMP Clearinghouse with a target of January 2022
  - For development / redevelopment
- Land Use Change
  - Credit for converted lands to a land use with a lower associated pollutant load.

Urban Tree Canopy Expansion Example

Source: urbanforestry.frec.vt.edu

Trees (#)	***1,000***
Acres of Tree Canopy (acres)	***3.33***

Table 1 Loading Rates (GM20-2003)

	TN (lbs/acre/yr)	TP (lbs/acre/yr)	TSS (lbs/acre/yr)
Turf	6.61	1.51	646.73
Roads	11.7	0.95	1784.89

Table 2 Pollutant Loads calculated per 1000 trees

	TN (lbs/yr)	TP (lbs/yr)	TSS (lbs/yr)
Turf	22.03	5.03	2,155.77
Roads	39.00	3.17	5,949.63

Table 3 Reductions (GM20-2003)

	TN Reduction (%)	TP Reduction (%)	TSS Reduction (%)
Canopy over Turf	23.8	23.8	5.8
Canopy over Roads	8.5	11	7

Table 4 Credits Achieved calculated per 1000 trees

	TN (lbs/yr)	TP (lbs/yr)	TSS (lbs/yr)
Canopy over Turf	5.24	1.20	125.03
Canopy over Roads	3.32	0.35	416.47

Urban Stream Restoration

- Restoration using natural channel design methods of urban streams.
- Bay TMDL 40% Action Plan
- Proposed projects adopted in Environmental Action Plan 2040
- Lucky Run is proceeding
- Strawberry Run and Taylor Run is paused

Project	TN (lbs./yr.)	TP (lbs./yr.)	TSS (lbs./yr.)	Approx Cost (millions)	Completed
Completed Projects					
Four Mile Run Wetland	195	40	14,914	$1.8	2016
Windmill Hill	131	8	9,951	$3.6	2019

Nutrient Trading & Bi-Lateral Trading (CSO Credits)

Nutrient Trading

- Spending local funds on improvements outside of the jurisdiction
- Could include stream restoration

CSO Credits

- City along with Alex Renew, Cities of Richmond and Lynchburg; effective negotiations with VDEQ to set TMDL limits at CSO concentrations
- Credits generated by River Renew project annually
- Same rate payers and benefits local water quality; environmental
- Included in City's Bay Action Plan
- Climate change and regulatory risks associated with this approach

Credits Breakdown

				Proposed FY22 to FY 28								
Pollutant	**2028 100% Req't.**	**Reductions to Date (6/30/2021)**	**Remaining Credits due by 2028[1]**	**Landmark Develpment[2]**	**North Potomac Dev[2]**	**Estimated Annual Redev. through FY28[3]**	**Lucky Run[4]**	**ROW Retrofits[5]**	**Retrofits on City Properties[5]**	**Credits after Proposed Reductions**	**Annual AlexRenew Credits[6]**	**Credits Remaining[7]**
TN (lbs/ac/yr)	7,597	5,327	*2,270*	192	85	725	658	86	47	*477*	1,500	(1,023)
TP (lbs/ac/yr)	1,005	743	*262*	32	11	105	257	13	8	*(163)*	500	(663)
TSS (lbs/ac/yr)	861,937	595,822	*266,115*	15,014	4,969	49,266	489,818	10,722	6,561	*(310,235)*	30,000	(340,235)

1. *Based on current understanding; to be included in the 2023-2028 MS4 Permit*
2. *Current plan estimates*
3. *Approximately 15 lbs/ac/yr reduced annually through 2028; note that the annual average includes larger projects that have occurred in the past like Potomac Yard, etc.*
4. *Using default approach*
5. *From 5% Bay TMDL Action Plan development; 5 potential Right-of-Way (ROW) projects and 6 City property projects to be further evaluated with 100% Action Plan development*
6. *Planned completion to meet CSO Law by 2025; with 2026 first year of operation for calculating annual credits for that year*
7. *Based on current requirements and this discussion, would exceed current requirements*

Timeline Overview