Stormwater Management Inventory and Watershed Improvement Plan

City of Annapolis

Environmental Matters Committee Session

October 18, 2016

The City of ANNAPOLIS Maryland

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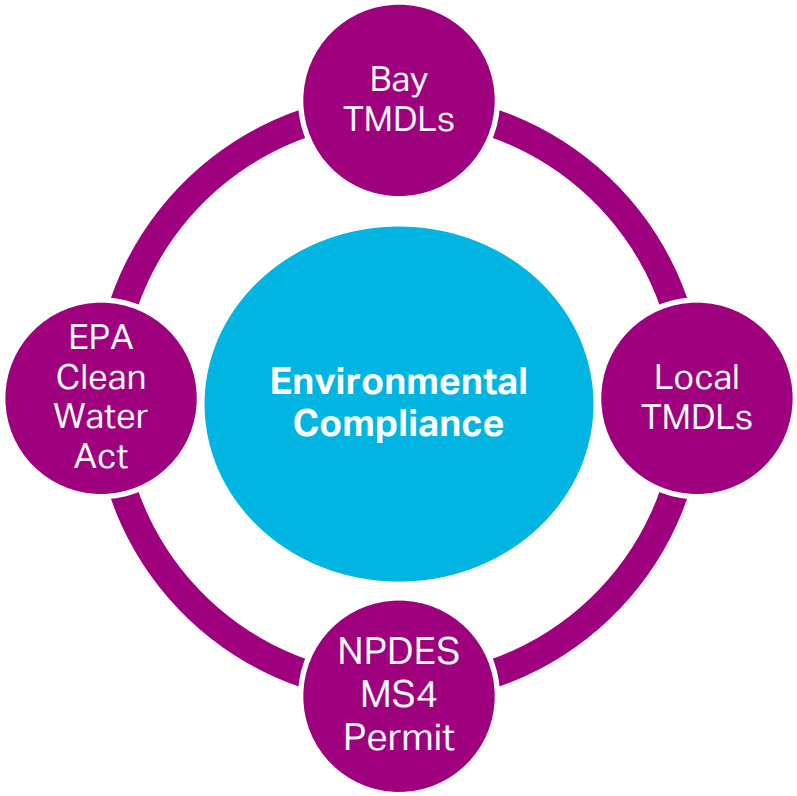
Overview

- Regulatory Background
- Stormwater Management Inventory and Watershed Improvement Plan
  - Stormwater Management Inventory and Database Development
  - Field Investigation and Identification of Proposed Projects
  - Pollutant Load Modeling
  - Development of Concept Designs
  - Evaluation and Ranking of Proposed Projects
  - Final Report Recommendations
- Funding to Meet the Regulatory Requirements

Regulatory Drivers

- Upcoming National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit
- Chesapeake Bay Total Maximum Daily Loads (TMDLs)
- Local TMDLs
- U.S. Environmental Protection Agency (EPA) Clean Water Act



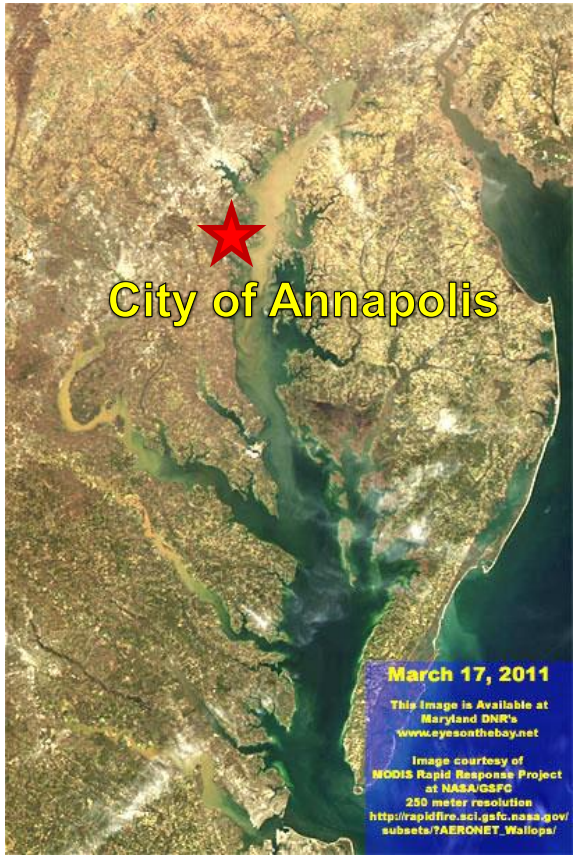
NPDES MS4 Permit Requirements

- A Phase II community
- Current permit expired April 14, 2008

NPDES MS4 Six Minimum Control Measures

Chesapeake Bay TMDLs

- TMDL established by EPA in 2010 for:
  - Sediment
  - Nitrogen
  - Phosphorus
- Target reductions for 2025
  - 25% less nitrogen (TN)
  - 24% less phosphorus (TP)
  - 20% less sediment (TSS)
- Target reductions for 2017
  - 60% of 2025 target reductions to be achieved



City of Annapolis Baseline Loads (2010)		
Area (acres)	Total Nitrogen (lbs/year)	Total Phosphorus (lbs/year)
4,533	43,390	5,440

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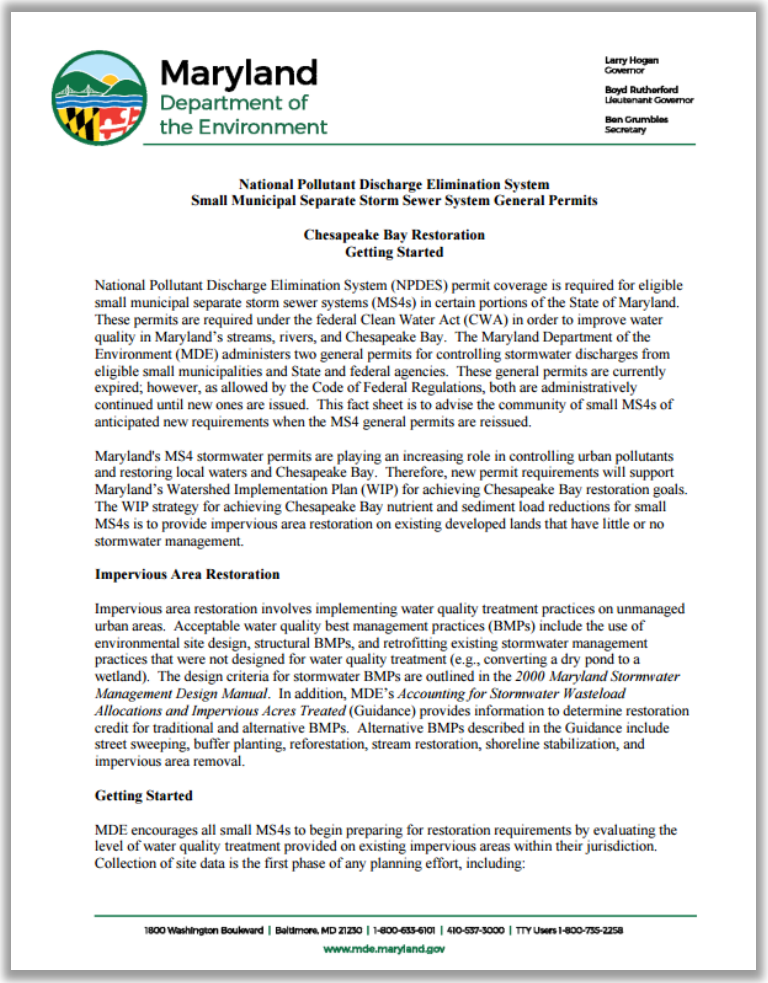
Upcoming NPDES MS4 Permit Requirements



Maryland
Department of
the Environment

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Governor

Boyd Rutherford
Lieutenant Governor

Ben Grumbles
Secretary

National Pollutant Discharge Elimination System
Small Municipal Separate Storm Sewer System General Permits

Chesapeake Bay Restoration
Getting Started

National Pollutant Discharge Elimination System (NPDES) permit coverage is required for eligible small municipal separate storm sewer systems (MS4s) in certain portions of the State of Maryland. These permits are required under the federal Clean Water Act (CWA) in order to improve water quality in Maryland's streams, rivers, and Chesapeake Bay. The Maryland Department of the Environment (MDE) administers two general permits for controlling stormwater discharges from eligible small municipalities and State and federal agencies. These general permits are currently expired; however, as allowed by the Code of Federal Regulations, both are administratively continued until new ones are issued. This fact sheet is to advise the community of small MS4s of anticipated new requirements when the MS4 general permits are reissued.

Maryland's MS4 stormwater permits are playing an increasing role in controlling urban pollutants and restoring local waters and Chesapeake Bay. Therefore, new permit requirements will support Maryland's Watershed Implementation Plan (WIP) for achieving Chesapeake Bay restoration goals. The WIP strategy for achieving Chesapeake Bay nutrient and sediment load reductions for small MS4s is to provide impervious area restoration on existing developed lands that have little or no stormwater management.

Impervious Area Restoration

Impervious area restoration involves implementing water quality treatment practices on unmanaged urban areas. Acceptable water quality best management practices (BMPs) include the use of environmental site design, structural BMPs, and retrofitting existing stormwater management practices that were not designed for water quality treatment (e.g., converting a dry pond to a wetland). The design criteria for stormwater BMPs are outlined in the *2000 Maryland Stormwater Management Design Manual*. In addition, MDE's *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated* (Guidance) provides information to determine restoration credit for traditional and alternative BMPs. Alternative BMPs described in the Guidance include street sweeping, buffer planting, reforestation, stream restoration, shoreline stabilization, and impervious area removal.

Getting Started

MDE encourages all small MS4s to begin preparing for restoration requirements by evaluating the level of water quality treatment provided on existing impervious areas within their jurisdiction. Collection of site data is the first phase of any planning effort, including:

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- Additional requirements to meet the Chesapeake Bay TMDL compliance
  - Treatment of 20% untreated impervious areas

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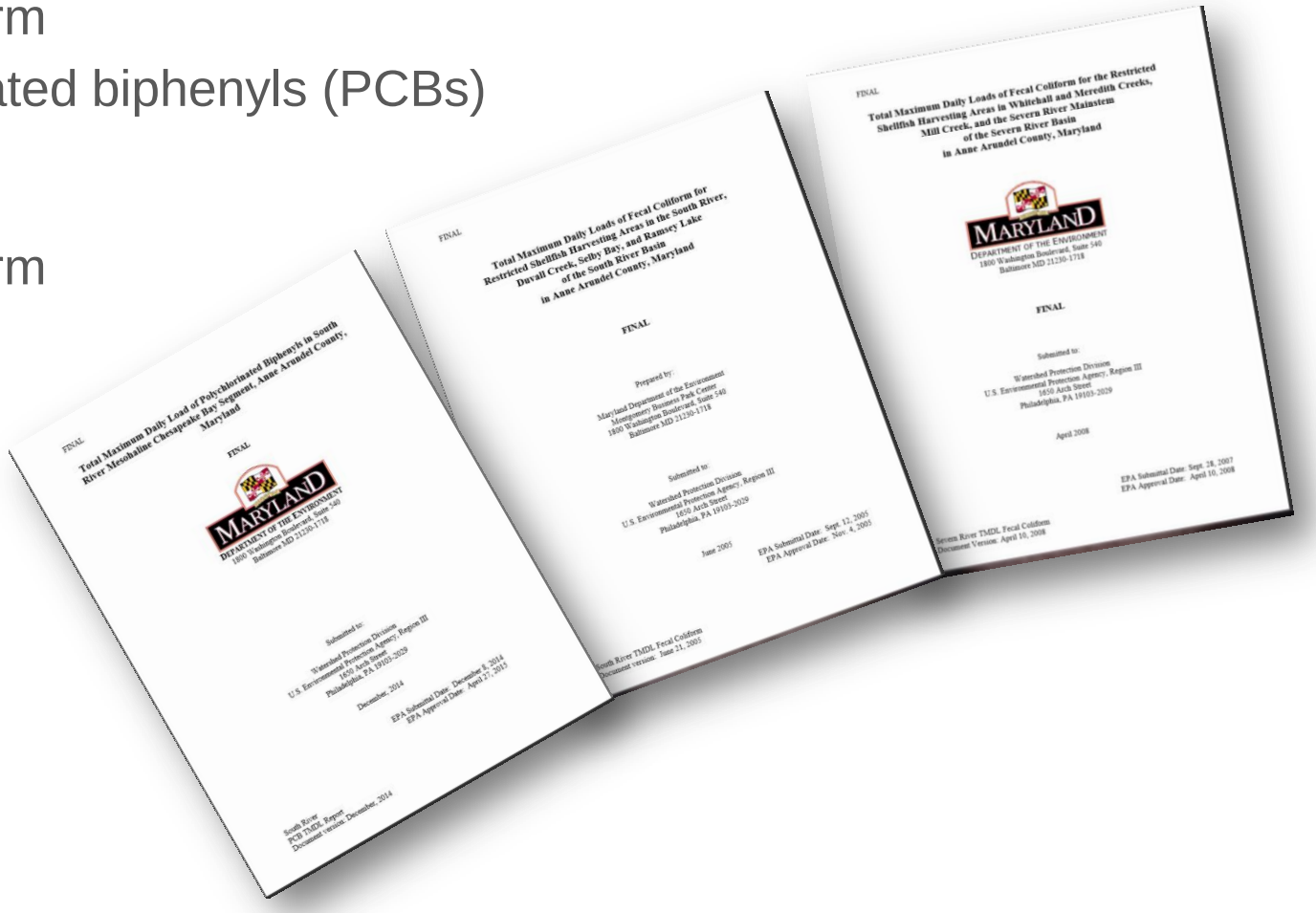
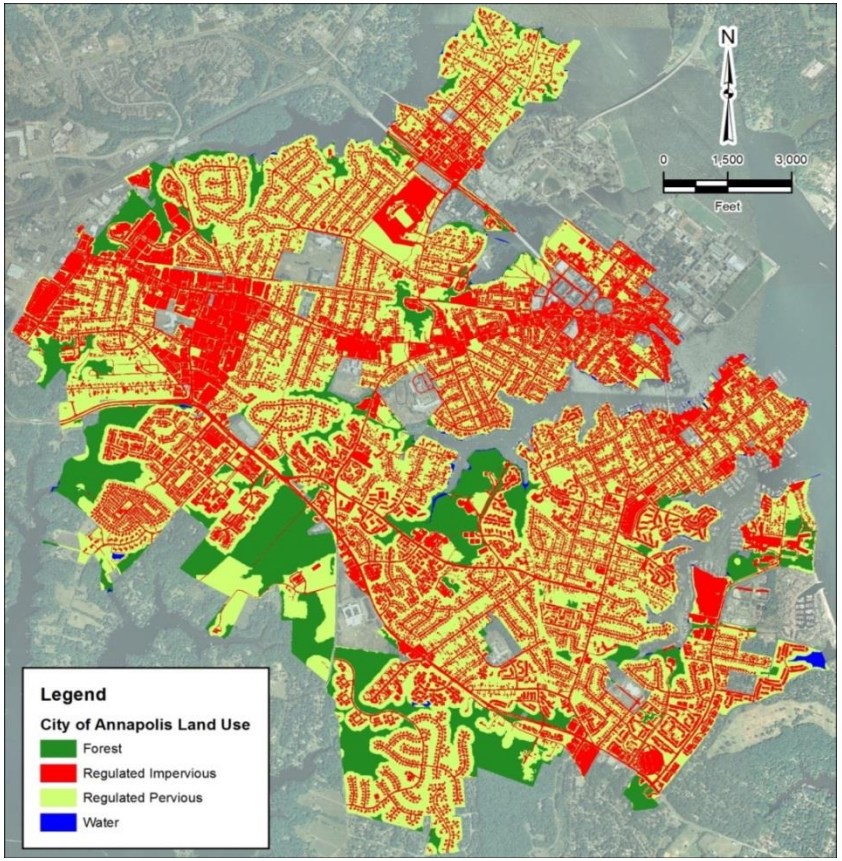
Local TMDLs

- South River
  - Fecal coliform
  - Polychlorinated biphenyls (PCBs)
- Severn River
  - Fecal coliform



City of Annapolis

- 12 sub-watersheds
- 15 miles of natural streams
- 38.5 percent impervious
  - Residential neighborhoods
  - Commercial and industrial areas
  - Institutional properties
  - State and County roads



Upcoming NPDES MS4 Permit Requirements

1,660 Acres	• Impervious area regulated under the NPDES MS4 Phase II Permit
78.7 Acres	• Impervious area treated by BMPs implemented since 2002
1581.3 acres	• Untreated impervious area
316.3 Acres	• Chesapeake Bay Restoration Requirement
30 Acres	• Impervious area treated by restoration BMPs implemented after 2006 that can be applied towards the Chesapeake Bay Restoration Credits
286.3 Acres	• Impervious area required to be treated to meet the NPDES MS4 Requirements

Chesapeake Bay Restoration Requirement	= Treatment of 20% of untreated impervious area = 20%*(1660-78.7) acres **= 316.3 acres**
Impervious area treated by restoration BMP projects implemented since 2006	= 30 acres
Additional area to be treated to meet the Chesapeake Bay Restoration Requirements	= 316.3 – 30 acres **= 286.3 acres**

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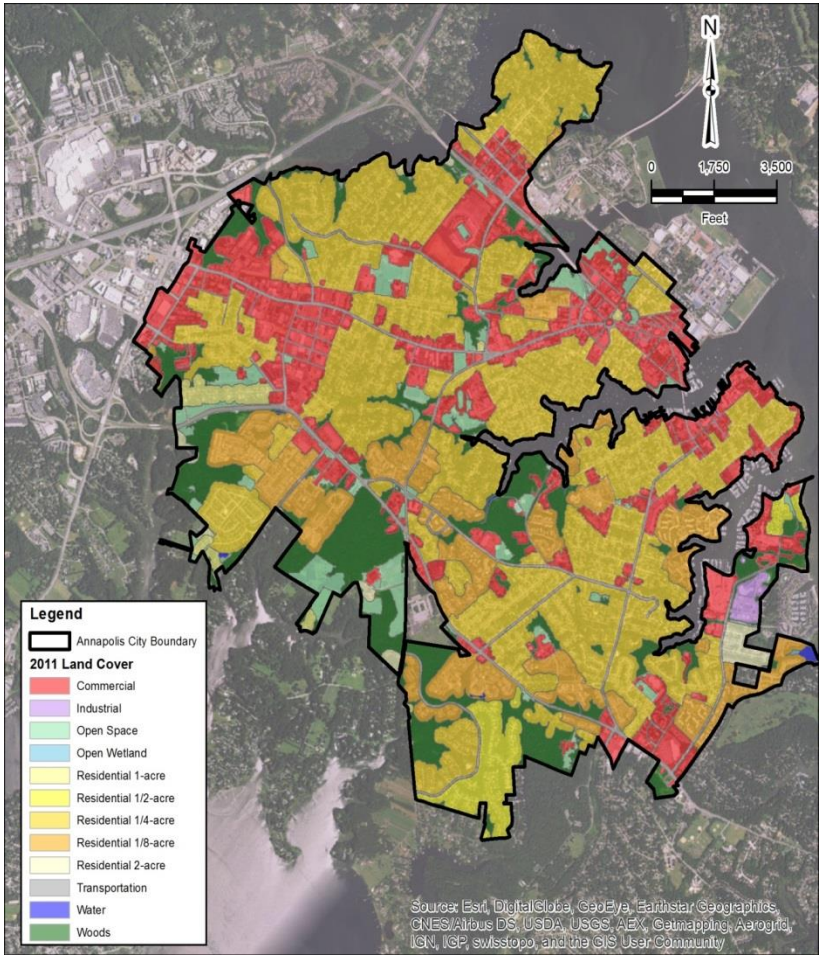
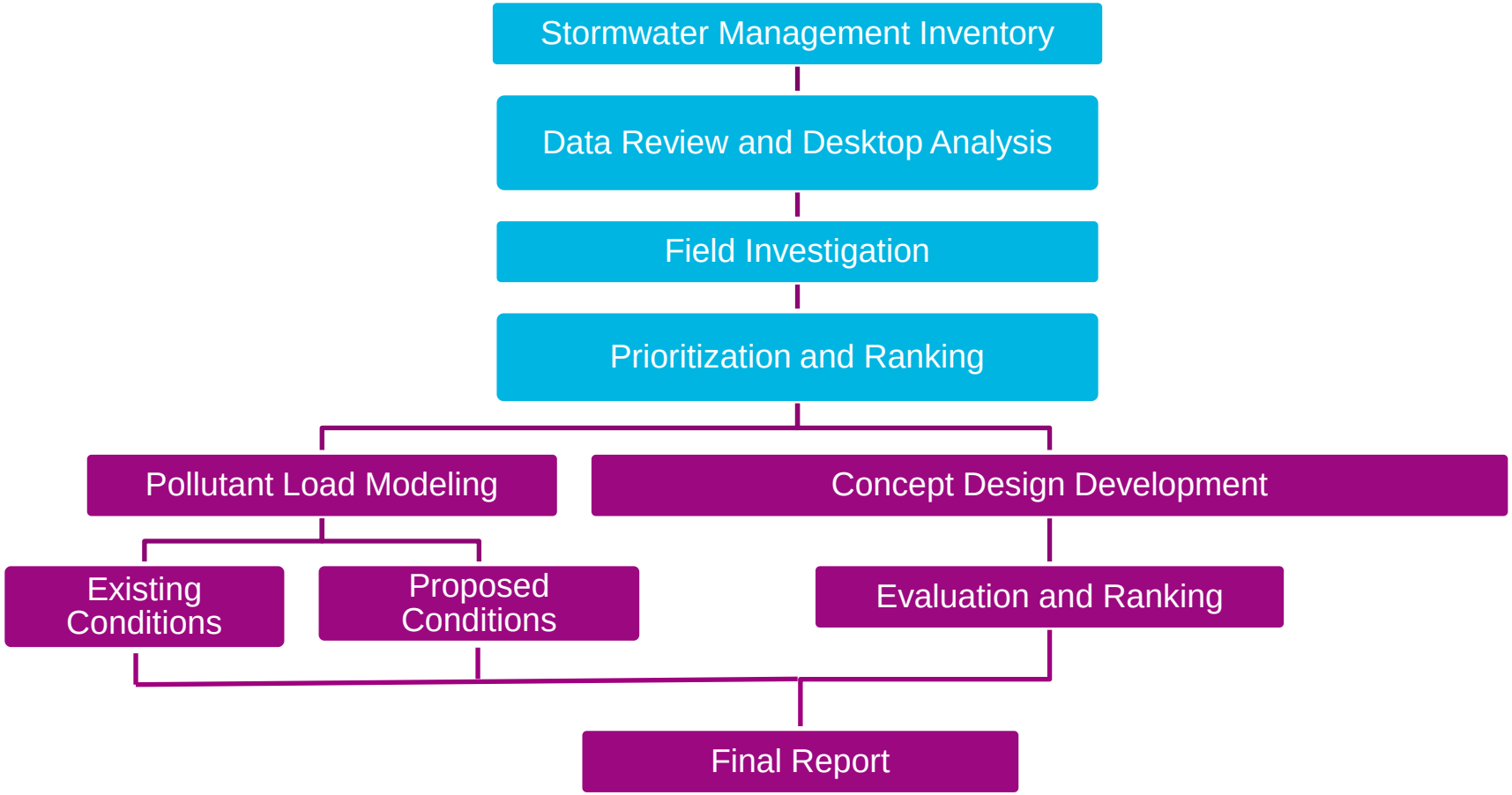
Project Goals

- **Comply** with regulatory requirements including treating 20% of the untreated impervious areas
- **Improve** water quality
- **Reduce runoff** from rain events there by reducing localized flooding
- **Improve** overall health of natural resources in the City
- **Consider** stormwater utility



Stormwater Management Inventory and Watershed Improvement Plan



Stormwater Management Inventory

Inventory existing Best Management Practices (BMPs)

Arc GIS database

Microsoft Excel

PDF

Data Collected

- Stormwater management facility type
- Location
- Approval date
- Built date
- Drainage area treated
- Impervious area treated
- Land use
- Hydrologic factors (ex. curve number, design rainfall event, water quality volume)

Summary of Inventory	
Total Number Design Plan Sets Scanned	351
Total Number of Pages Scanned	1,725
Total Number of BMPs Identified	741

Data Review and Desktop Analysis

- 65 sites identified from desktop analysis
  - 20 existing BMPs with retrofit potential
  - 45 new stormwater management options
    - City properties
    - Parks
    - Streams
    - Open areas
    - Right of Way
    - City-recommended areas

Existing wet pond near the intersection of Coybay Drive and Annapolitan Lane (BMP_07)

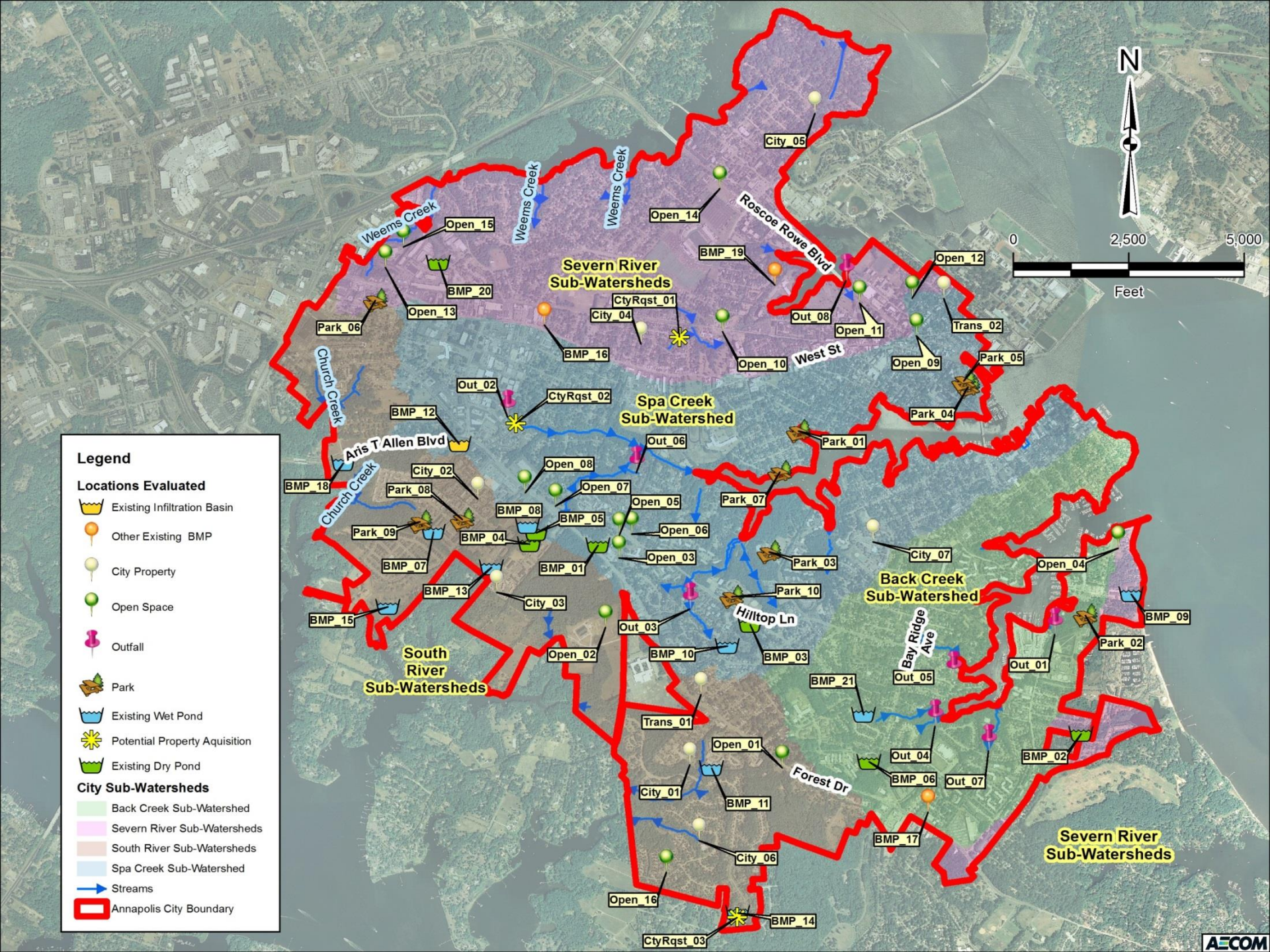
Existing grass swale west of the intersection of Spa Road and Silopanna Road (Out_06)

Field Investigation and Identification of Proposed Projects

- Stormwater opportunities identified
  - Dry/wet pond retrofits
  - New traditional stormwater management opportunities
  - Environmental Site Design (ESD) opportunities
- Alternative urban BMPs

Potential new BMP at Truxtun Park parking lot

Potential dry pond retrofit at St. Martins Lutheran Church


N
0
2,500
5,000
Feet
Legend
Locations Evaluated
Existing Infiltration Basin
Other Existing BMP
City Property
Open Space
Outfall
Park
Existing Wet Pond
Potential Property Aquisition
Existing Dry Pond
City Sub-Watersheds
Back Creek Sub-Watershed
Severn River Sub-Watersheds
South River Sub-Watersheds
Spa Creek Sub-Watershed
Streams
Annapolis City Boundary
Severn River Sub-Watersheds
Spa Creek Sub-Watershed
Back Creek Sub-Watershed
South River Sub-Watersheds
Severn River Sub-Watersheds
Weems Creek
Church Creek
Roscoe Rowe Blvd
West St
Aris T Allen Blvd
Hilltop Ln
Bay Ridge Ave
Forest Dr
City_05
Open_14
Open_15
BMP_19
Open_12
BMP_20
Open_13
CtyRqst_01
City_04
Out_08
Open_11
Trans_02
Park_06
BMP_16
Open_10
Open_09
Park_05
Out_02
CtyRqst_02
Park_04
BMP_12
Out_06
Park_01
BMP_18
City_02
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Out_01
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Out_05
Trans_01
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BMP_06
Out_07
City_01
BMP_11
BMP_17
City_06
Open_16
BMP_14
CtyRqst_03
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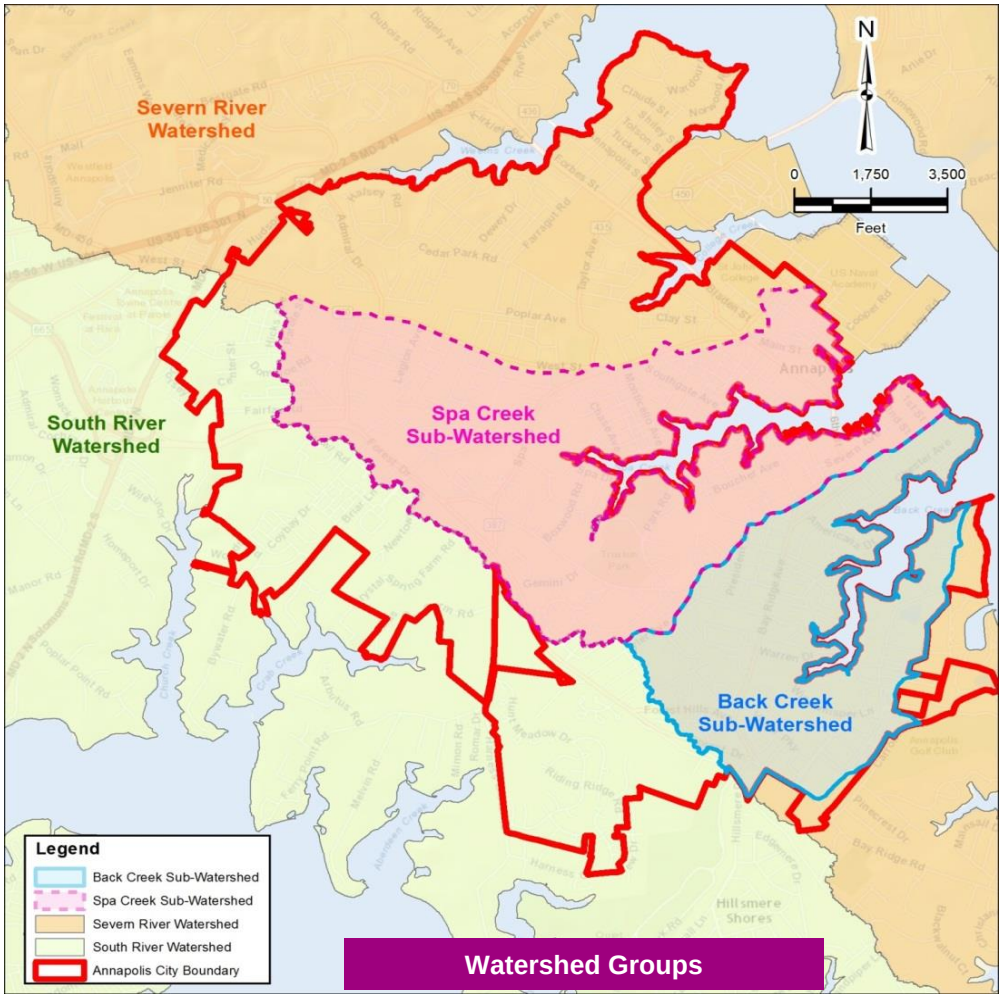
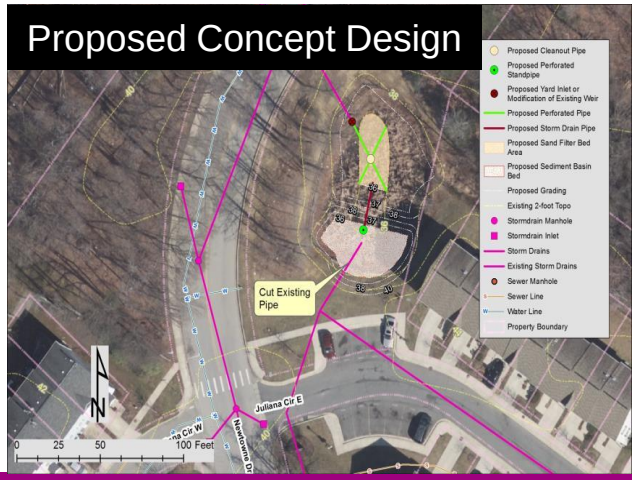
Prioritization and Ranking

Criteria

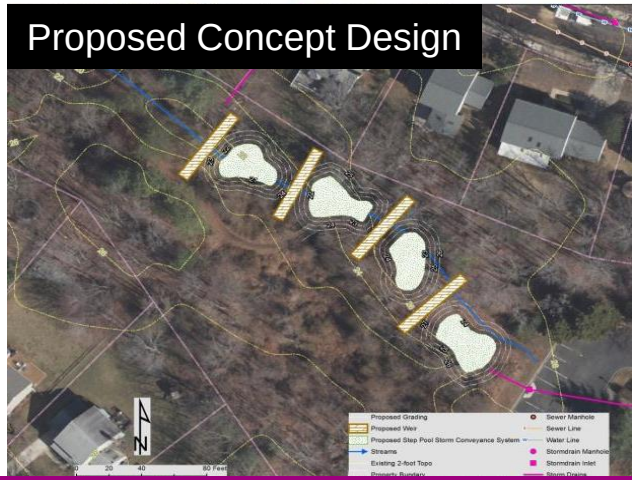
- Impervious drainage area
- Site ownership
- Site access
- Utility conflicts
- Environmental impacts of proposed solutions
- Regulatory approval
- Flooding concerns
- Anticipated project cost
- Public visibility
- Maintenance burden



Development of Concept Designs



BMP_05 - Existing pond near the intersection of Juliana Court East and Newtowne Drive



City_06 - Existing outfall Northwest of the Hunt Meadow Drive Pool Parking Lot

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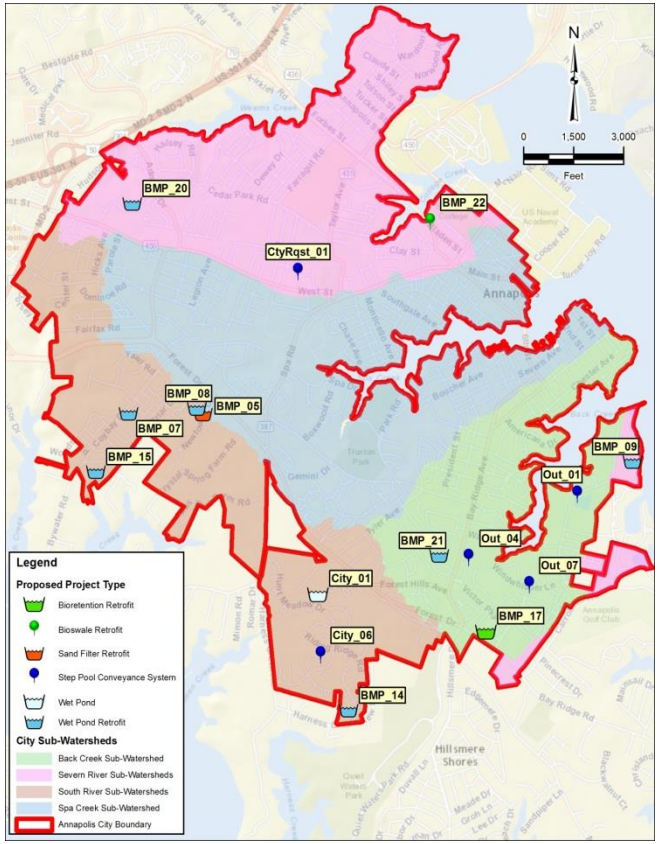
Development of Concept Designs

16 Project Selected by the City for Development of Concept Designs

- Back Creek
  - BMP_05 - Dry Pond Retrofit to Sand Filter
  - BMP_17 - Bioretention Retrofit
  - BMP_21 - Wet Pond Retrofit
  - Out_01 - Step Pool Conveyance System
  - Out_04 - Step Pool Conveyance System
  - Out_07 - Step Pool Conveyance System
- South River Sub-watersheds
  - BMP_07 - Wet Pond Retrofit
  - BMP_08 - Wet Pond Retrofit
  - BMP_14 - Wet Pond Retrofit
  - BMP_15 - Wet Pond Retrofit
  - City_01 - Wet Pond
  - City_06 - Step Pool Conveyance System
- Severn River Sub-watersheds
  - BMP_09 - Wet Pond Retrofit
  - BMP_20 - Wet Pond Retrofit
  - BMP_22 - Grass Swale to Bio Swale Retrofit
  - CityRqst_01 - Step Pool Conveyance System



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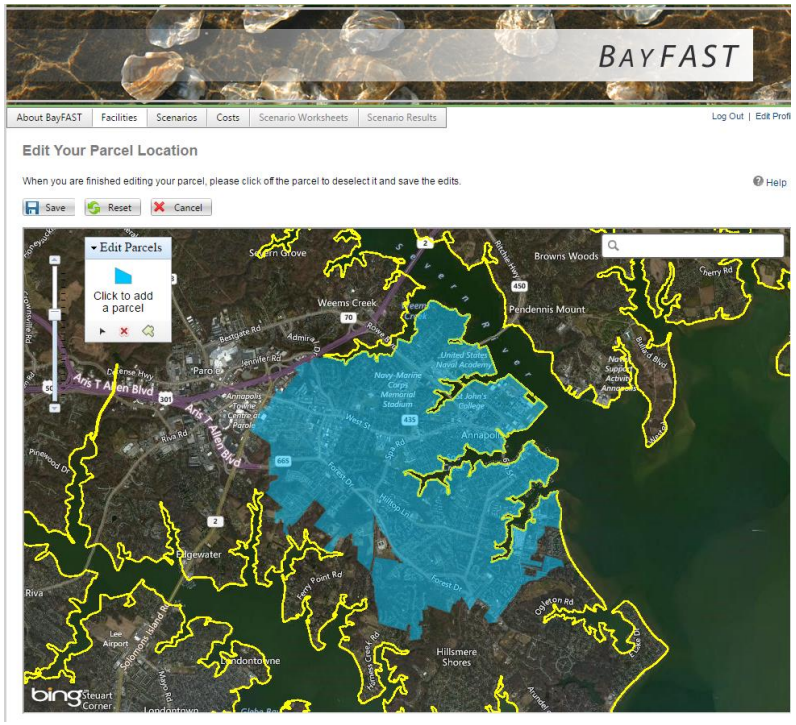
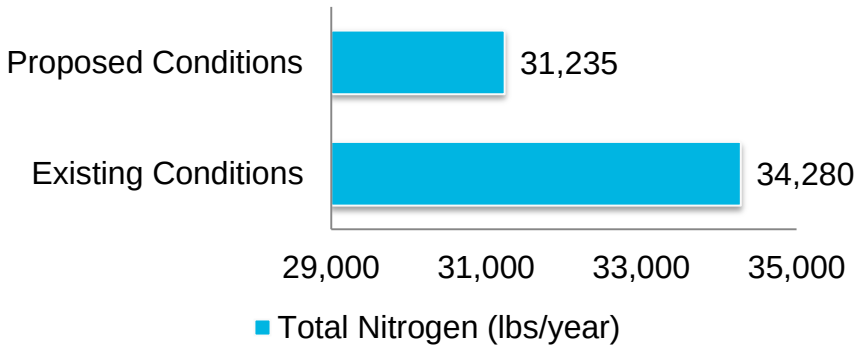
Pollutant Load Modeling

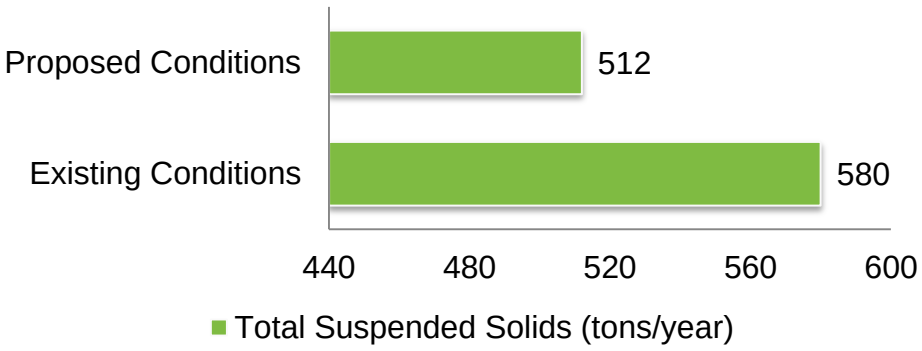
Bay Facility Assessment Scenario Tool (BayFAST)

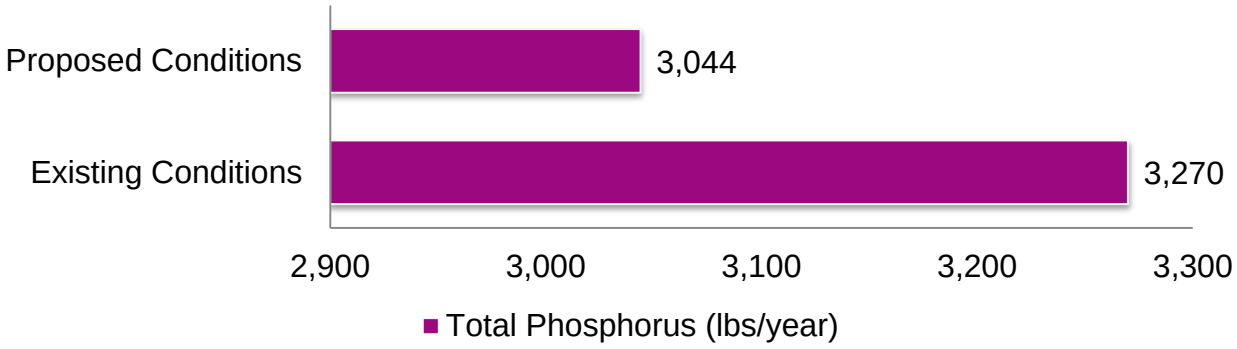
- Existing conditions inputs
  - Regulated pervious
  - Regulated impervious
  - Forest
  - Water
  - Existing BMPs
- Proposed conditions inputs
  - Regulated pervious
  - Regulated impervious
  - Forest
  - Water
  - Existing BMPs
  - Proposed BMPs



Pollutant Load Modeling



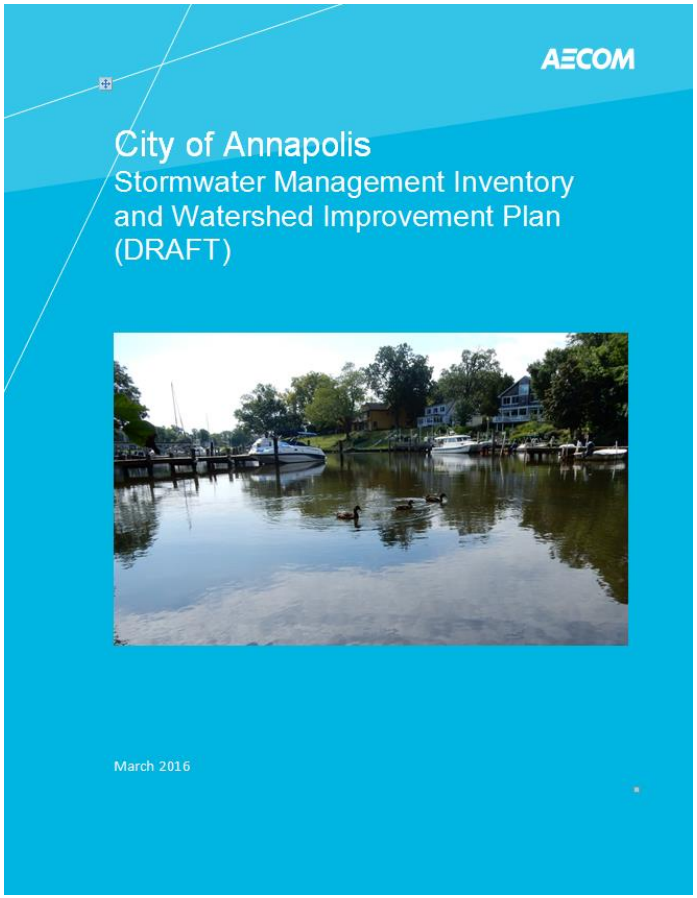




Final Report Recommendations

Strategies to meet the NPDES MS4 Phase II Permit requirements

- Implementation of structural and environmental site design (ESD) BMPs
  - Concept designs
  - Additional project recommendations
- Implementation of Alternative Urban BMPs
  - Street sweeping
  - Urban tree planting
  - Catch basin cleaning
  - Shoreline management
  - Conversion of impervious area to pervious areas
  - Pet waste management
- Continue to collaborate with local partners

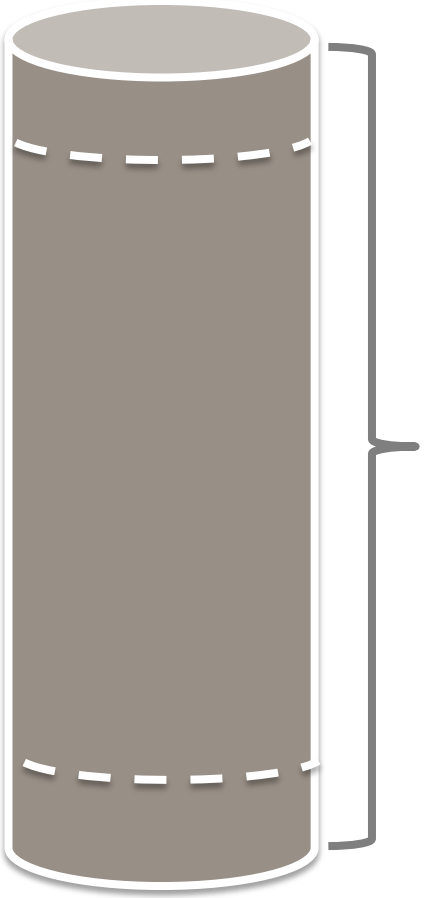


Chesapeake Bay TMDL Requirements

33.6 acres of credits needed from additional projects to meet the NPDES MS4 Phase II Permit Requirements

252.7 acres of credits from proposed concept designs

30 acres of credits from restoration BMP projects implemented after 2006



316.3 acres of impervious area need to be treated to meet the upcoming NPDES MS4 Phase II Permit

Funding Needs

Current Proposed CIP Budget for Stormwater Projects through FY 2022	$ 1.5 Million
Revenue Collected Annually from the Stormwater Utility Fee	$ 875,000
Funding Needed to Comply with the Upcoming NPDES MS4 Phase II and Chesapeake Bay TMDL Requirements	
Cost to Implement BMP Projects through 2025 (Design + Construction)*	$ 9.3 Million
Cost for Annual Maintenance of Existing and Proposed BMPs	$ 312,500

*Design and construction cost of concept design projects developed in the Stormwater Management Inventory and Watershed Improvement Plan

Potential Solutions to Meet Funding Needs

- Increase in current Stormwater Utility Fee
- Development Impact Fees/Capitalization Recovery Fee
- Cost Sharing
- Other Options
  - Community Based Public – Private Partnership (CBP3)
  - Grants and Loans
  - Clean Water State Revolving Funds
- Evaluation of Alternative Urban BMPs
  - Street Sweeping
  - Urban Tree Planting
  - Pet Waste Management

Questions?

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