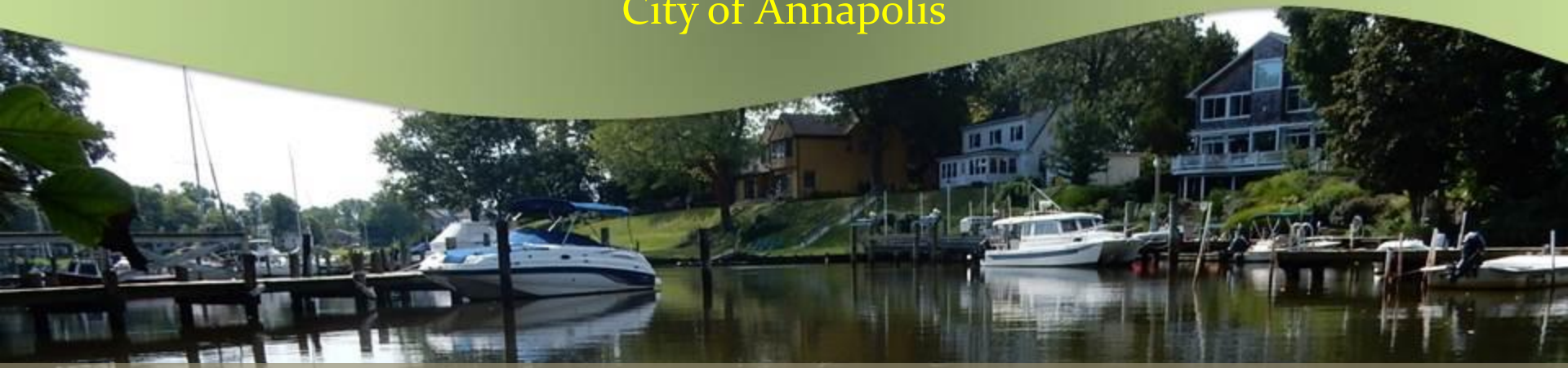
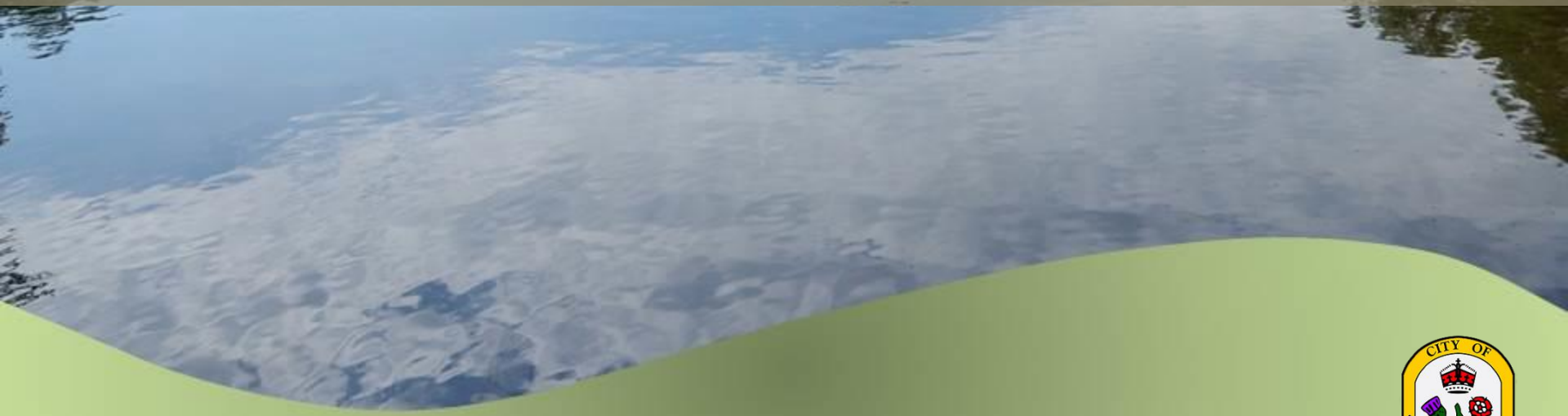
City Council Meeting
City of Annapolis



Stormwater Management Inventory and Watershed Improvement Plan



AECOM

September 17, 2015

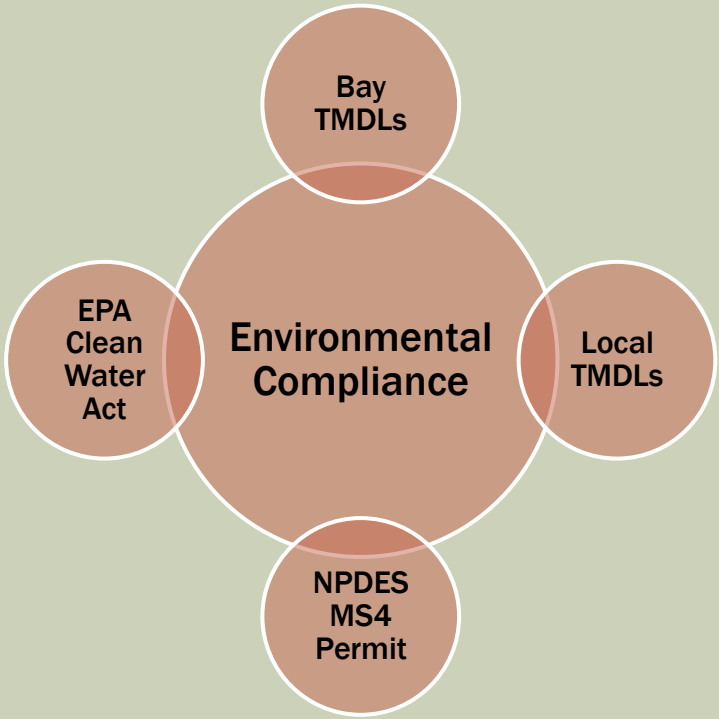
CITY OF ANNAPOLIS

Overview

- Regulatory Background
- Stormwater Management Inventory and Watershed Improvement Plan
  - Stormwater Management Inventory
  - Improvement Plan
- Other Considerations

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, 2003
- Additional requirements to meet the Chesapeake Bay TMDL compliance
  - Treatment of 20% untreated impervious areas

NPDES MS4 Six Minimum Control Measures:

1. Education and Outreach
2. Public Involvement and Participation
3. Illicit Discharge Detection and Elimination
4. Construction of Site Stormwater Runoff Control
5. Post-Construction Stormwater Management
6. Pollution Prevention and Good Housekeeping

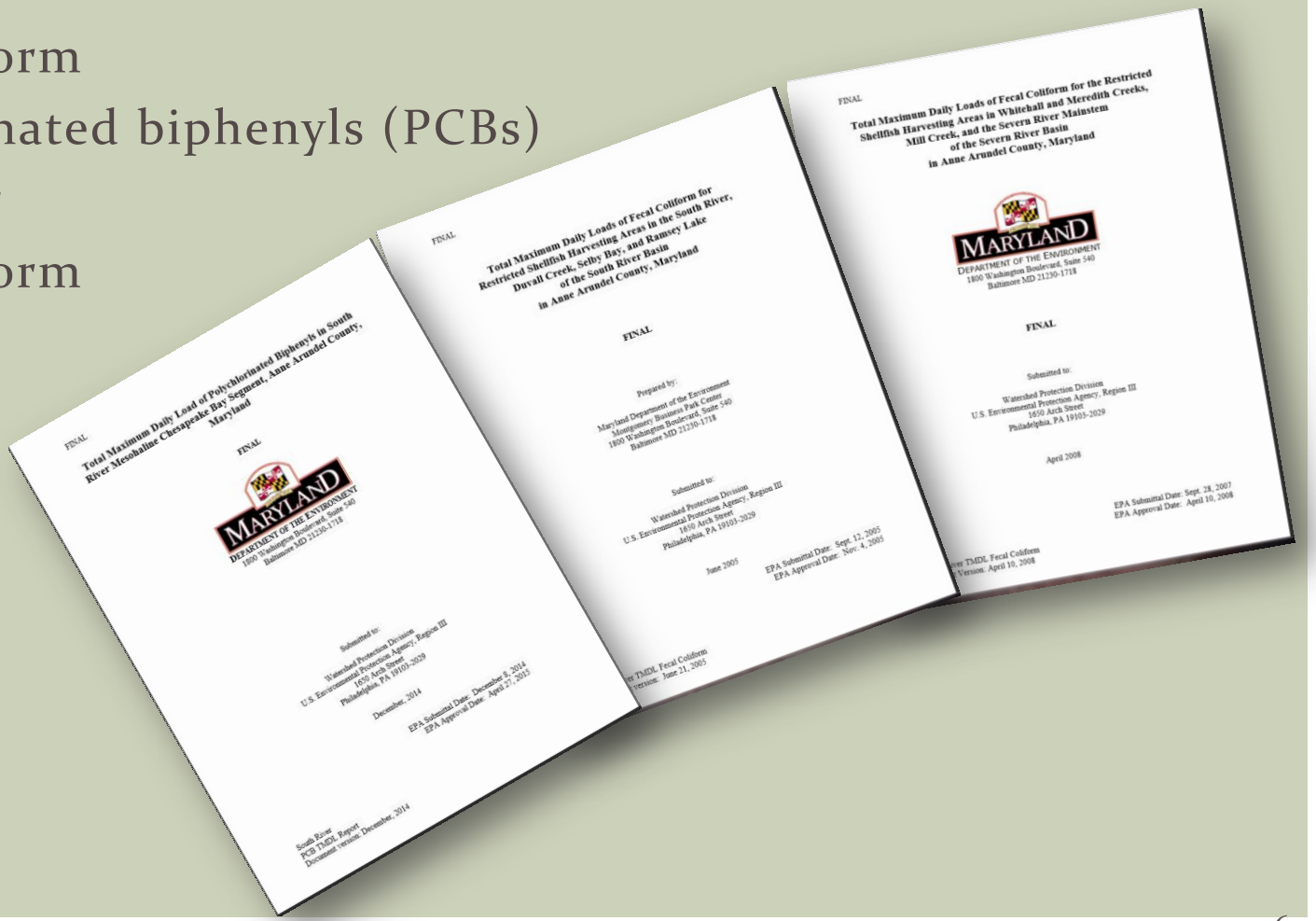
Chesapeake Bay TMDLs

- 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

Local TMDLs

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



City of Annapolis

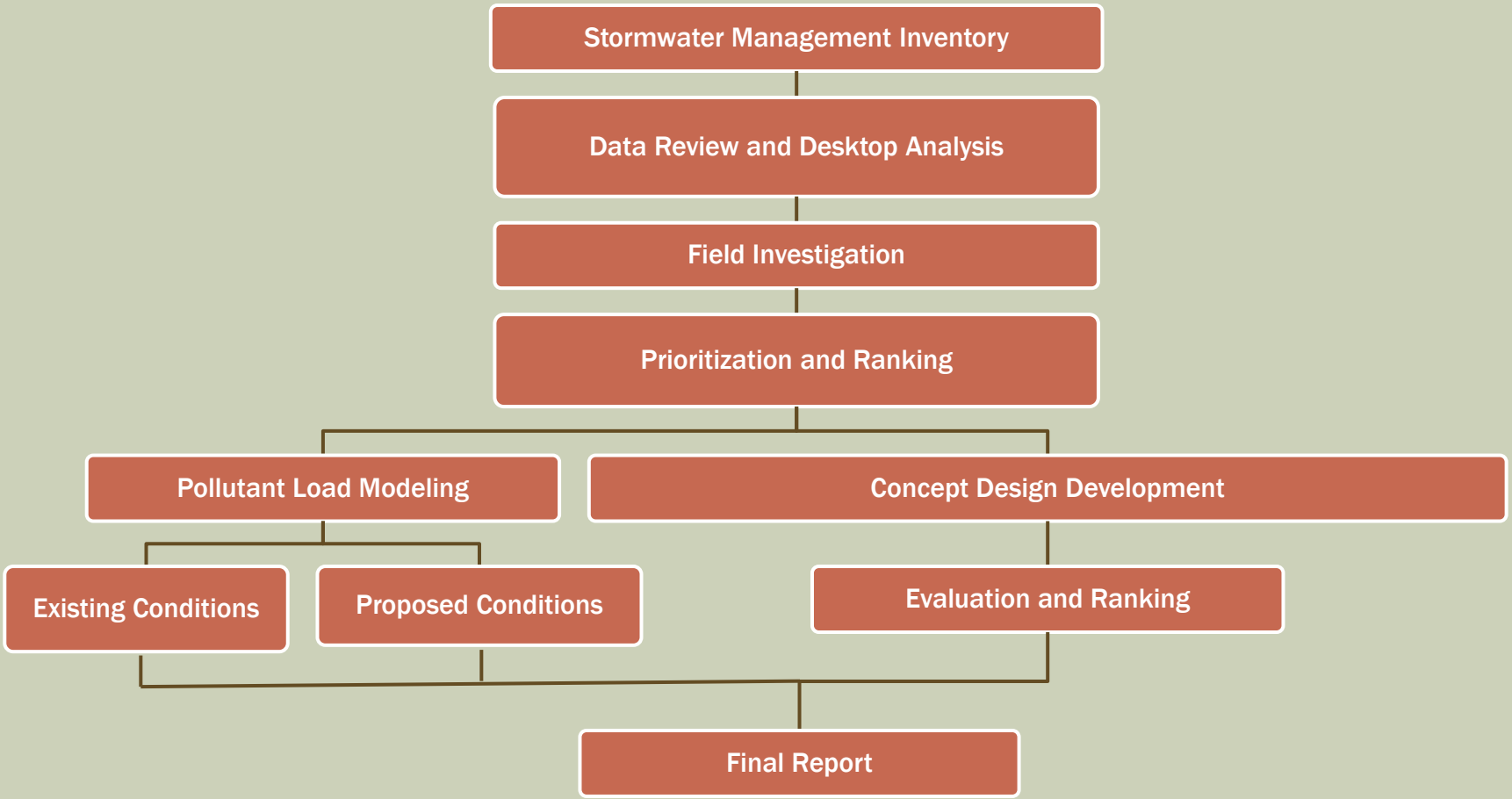
- 12 sub-watersheds
- 15 miles of natural streams
- 38.5 percent impervious
  - Residential neighborhoods
  - Commercial and industrial areas
  - Institutional properties
  - State and County roads

Path to Achieve Regulatory Compliance

Project Goals

- Comply with regulatory requirements including the 20% impervious area reduction
- 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
- Pdfs

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

ArcGIS 10.1 Database

Microsoft Excel

PDF

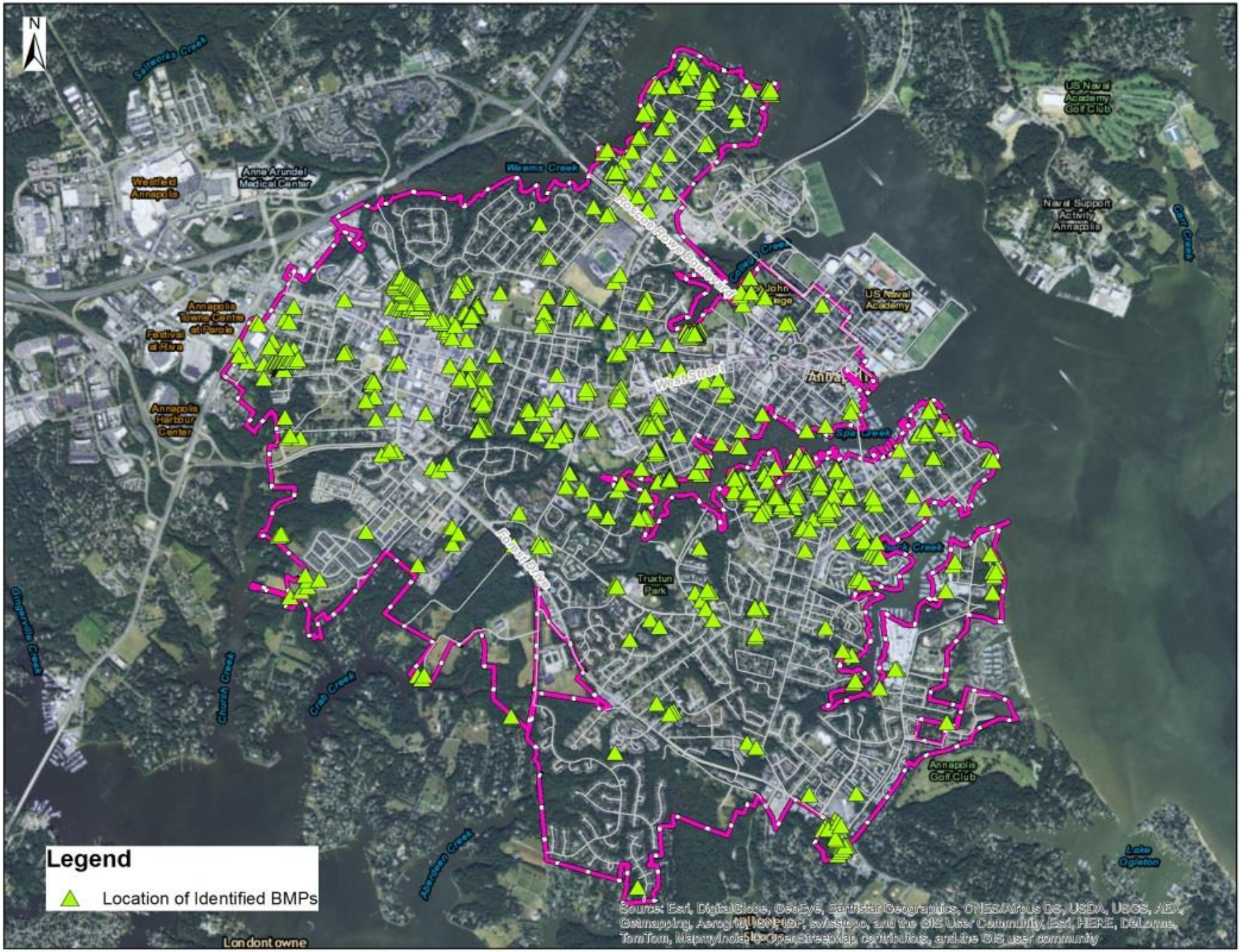
Stormwater Management Inventory

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)

Stormwater Management Inventory

Stormwater Management Facility Type	Total	Stormwater Management Facility Type	Total
Bioretention	48	Infiltration Trench	162
Bio-Swale	4	Landscape Infiltration	15
Detention Structure	6	Micro-Bioretention	23
Disconnection of Non-Rooftop Runoff	24	Oil Grit Separator	10
Disconnection of Rooftop Runoff	64	Other	5
Dry Swale	7	Outfall Stabilization	1
Dry Wells	140	Permeable Pavements	37
Enhanced Filters	1	Rain Gardens	137
Extended Detention - Wetland	1	Rainwater Harvesting	12
Extended Detention Structure, Dry	4	Reinforced Turf	1
Forestation on Pervious Urban	4	Sand Filter	5
Grass Swale	8	Shoreline Management	2
Green Roof Extensive	3	Stream Restoration	1
Impervious Surface Elimination (to pervious)	2	Underground Filter	2
Infiltration Basin	2	Wet Pond	6
Infiltration Berms	2	Wet Pond - Wetland	2


N
Spa Creek
Weems Creek
Truxtun Park
Legend
Location of Identified BMPs
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Esri, HERE, DeLorme, TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

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 Reconnaissance

- 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

Desktop Analysis

65 opportunities identified from desktop analysis

Field Reconnaissance

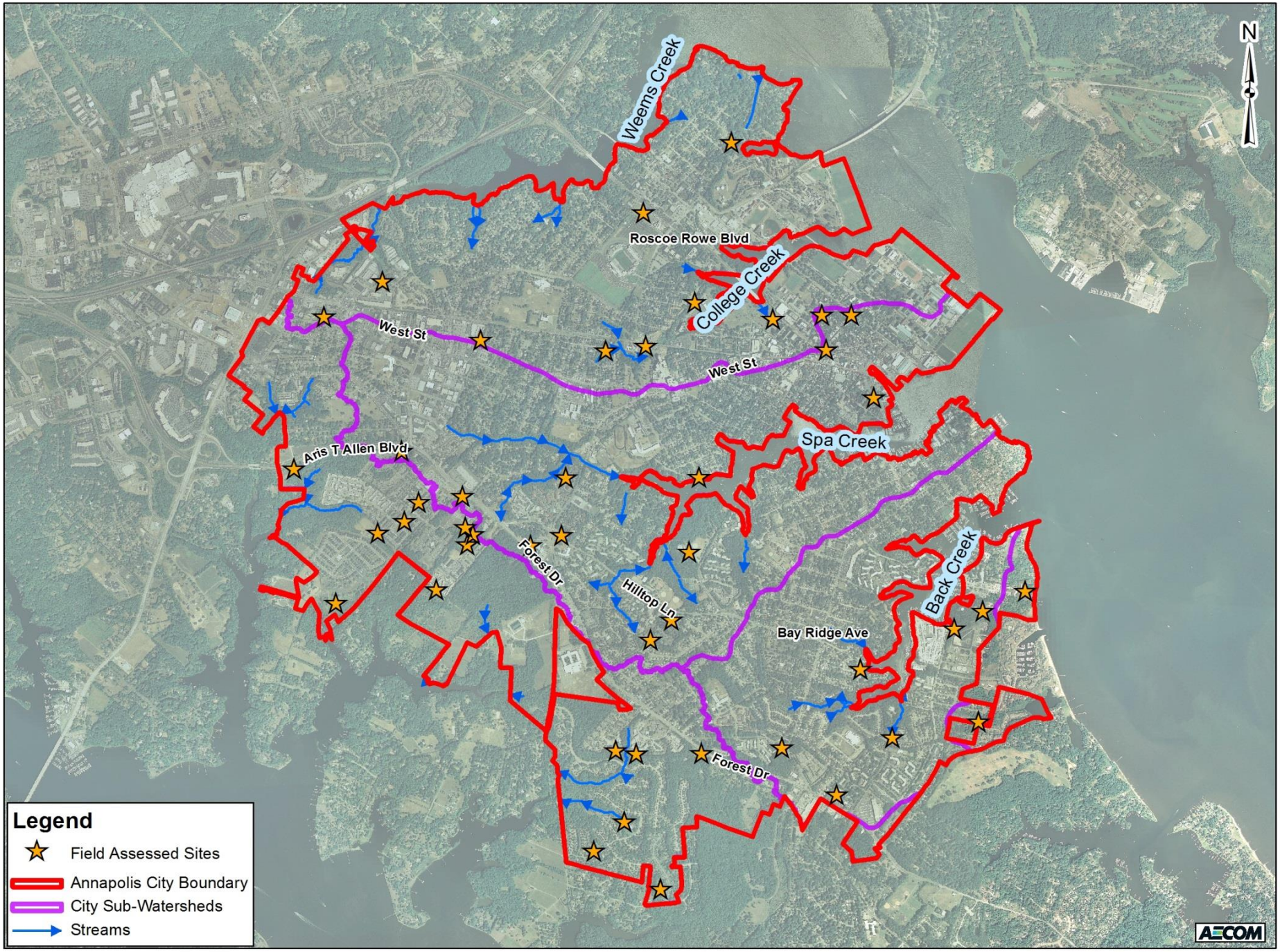
3 sites inaccessible

17 sites not considered for stormwater improvements

7 new sites identified in field

52 Stormwater management opportunities identified

- 20 Retrofits of existing BMPs
- 32 New BMPs

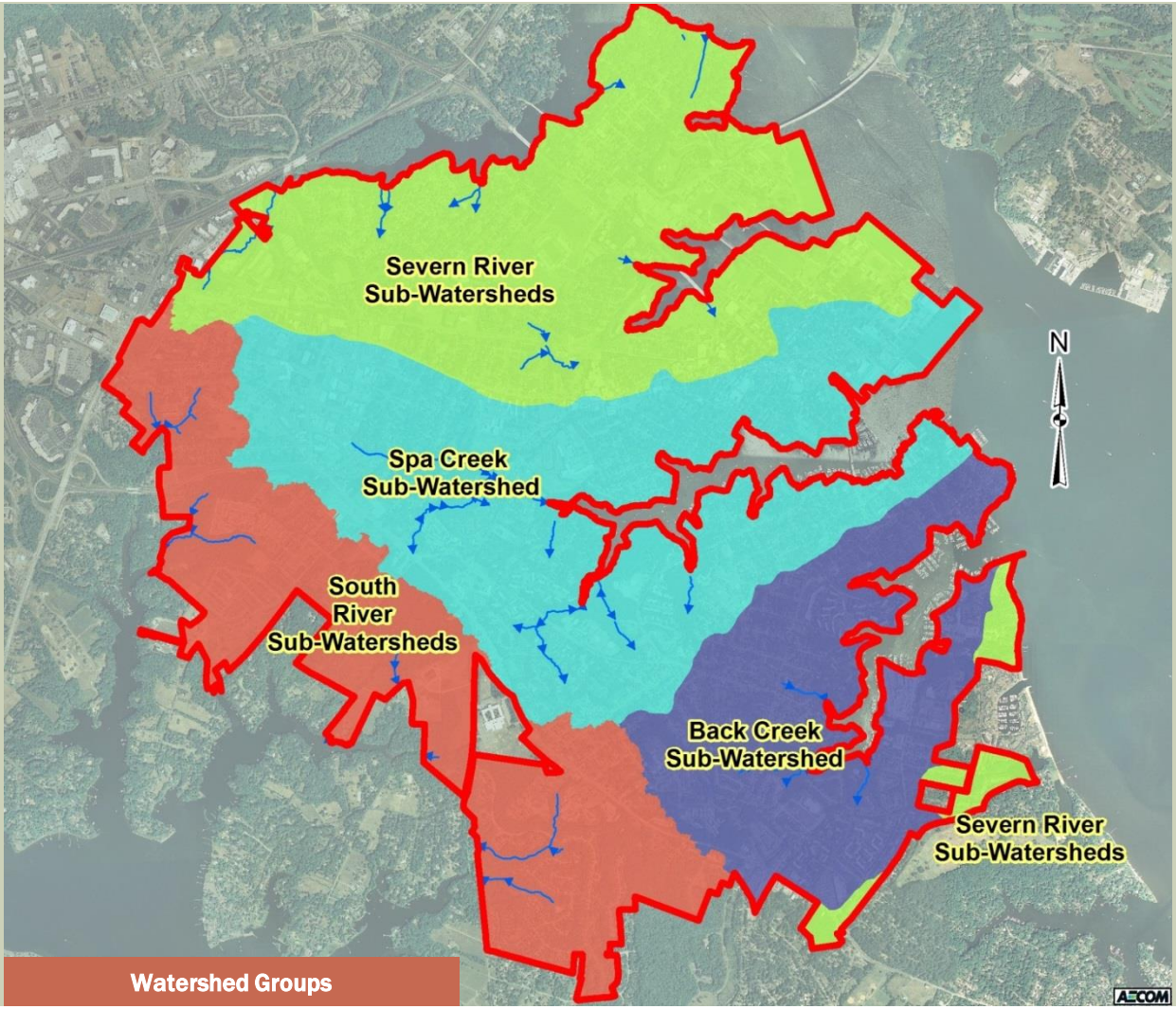

N
Weems Creek
Roscoe Rowe Blvd
College Creek
West St
West St
Aris T Allen Blvd
Spa Creek
Forest Dr
Hilltop Ln
Back Creek
Bay Ridge Ave
Forest Dr
Legend
Field Assessed Sites
Annapolis City Boundary
City Sub-Watersheds
Streams
AECOM

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

Prioritization and Ranking



Prioritization and Ranking

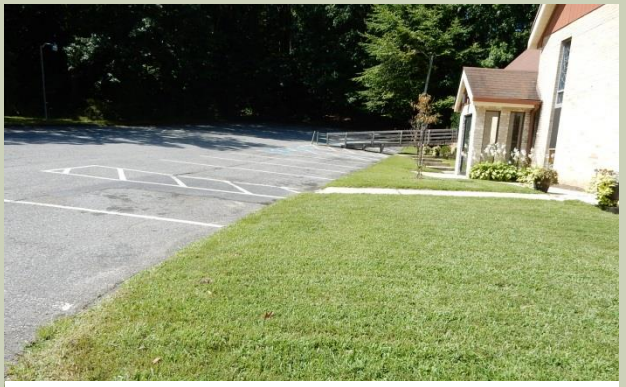
Group 1 - Spa Creek Sub - Watershed

Potential bioretention in parking lot near Pump House Road at Truxtun Park (Park_03)

Potential dry pond retrofit to sand filter near the intersection of Juliana Circle East and Newtown Drive (BMP_05)

Group 2 – Back Creek Sub - Watershed

Potential dry swale to bio-swale retrofit at the Ellen O. Moyer Nature Park (Park_02)



Potential rain garden at Mt. Moriah Church (BMP_06)

Prioritization and Ranking

Group 3 - Severn River Sub - Watersheds

Potential dry pond to infiltration basin retrofit near Blackwell Road (BMP_02)

Potential wet pond retrofit at BayWoods of Annapolis (BMP_09)

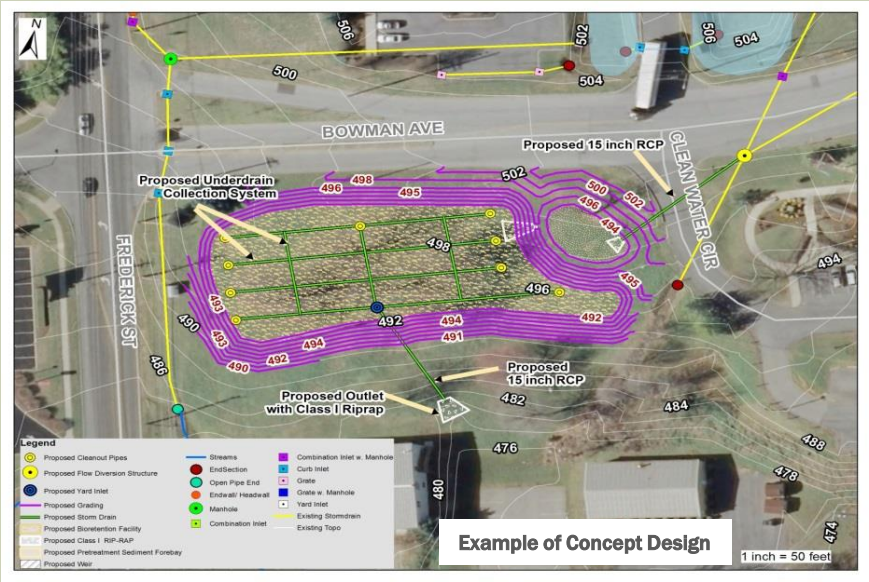
Group 4 - South River Sub - Watersheds

Potential wet pond upgrade near the intersection of Child's Point Road and Woods Road (BMP_15)

Potential wet pond retrofit at Harness Creek View Court (BMP_14)

Upcoming Project Tasks

- Community input meeting
- Pollutant load modeling
  - Existing conditions
  - Proposed conditions
- Stormwater management concepts
  - 30% design
  - Detailed cost estimate
  - Utilities impacts
  - Environmental impacts
  - Recommended maintenance
- Evaluation and ranking
  - Implementation cost
  - Impervious area credits
  - Pollutant removal
- Final report



Other Considerations

- Challenge
  - Lack of sites for BMPs
- Solution
  - Alternative urban BMPs
    - Tree planting
    - Tree box filters
    - Street sweeping
    - Impervious area removal
    - Catch basin cleaning
    - Storm drain vacuuming
    - Outfall stabilization
    - Regenerative step pool conveyance
    - Shoreline management
    - Pet waste management

Example of Tree Planting
Source: URS/AECOM

Example of Tree Box Filter
Source: URS/AECOM

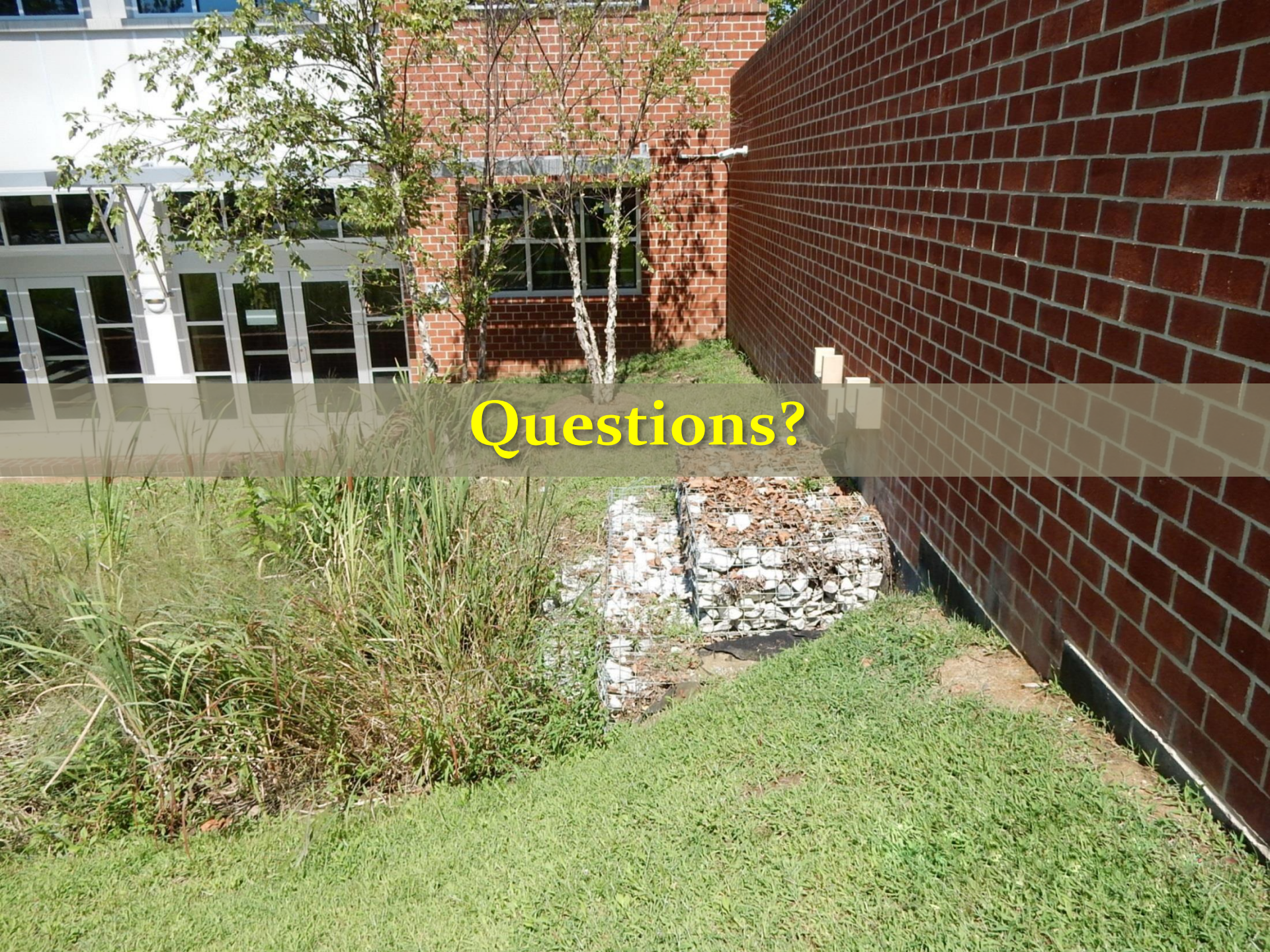
Example of Street Sweeping
Source: http://pubs.usgs.gov/sir/2007/5156/

Other Considerations

- Challenge
  - Maintenance of existing BMPs
- Solution
  - Public education and outreach
  - Volunteer opportunities

Other Considerations

- Challenge
  - Funding
- Solution
  - Stormwater utility
  - Grants
    - Chesapeake Bay Trust
    - Maryland Department of Natural Resources (MD DNR) Grants


Questions?