



Using GIS for NPDES Decision Making

2013 Esri Mid-Atlantic User Conference



Maryland
Transportation
Authority

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Introductions

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Agenda

- § Who is the Maryland Transportation Authority?
- § What are the primary drivers for NPDES?
- § How does GIS help in day-to-day activities?

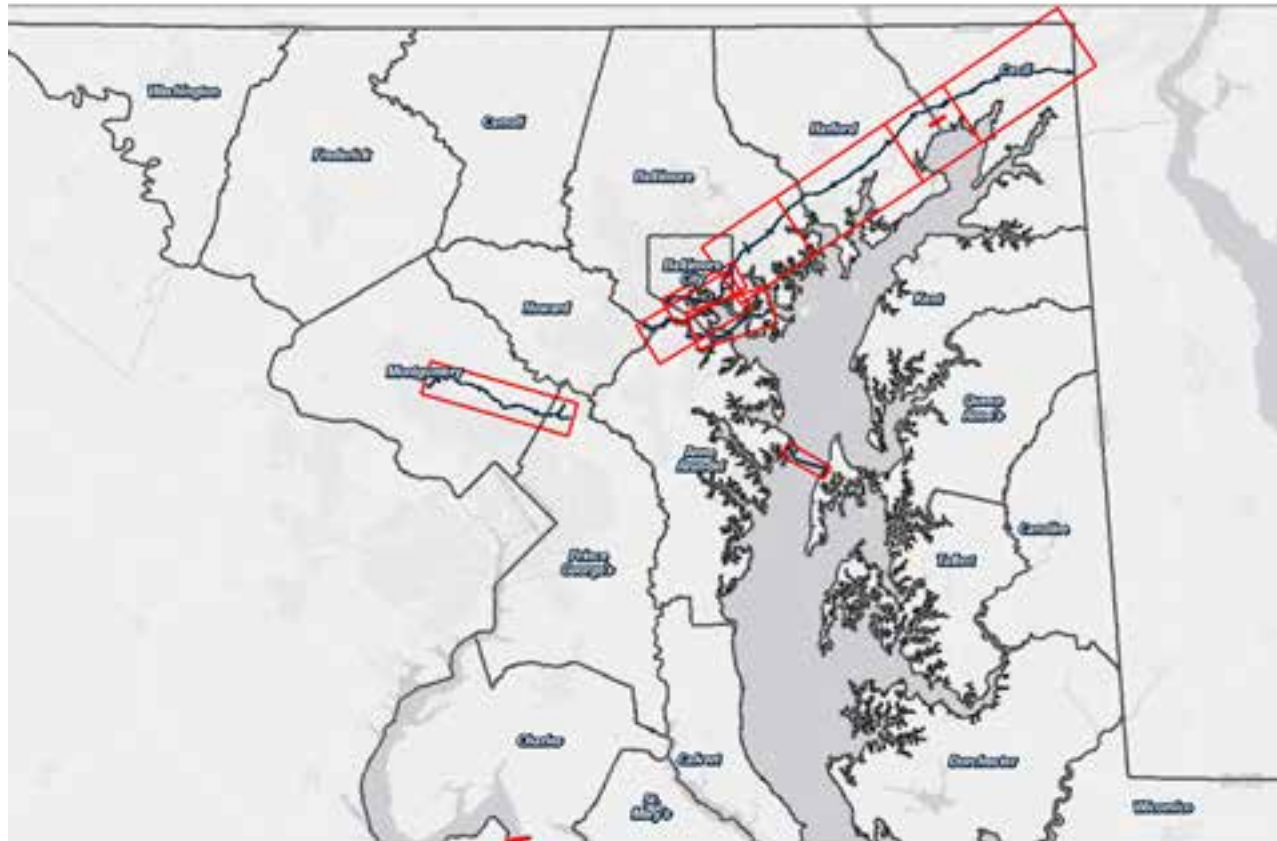


About MDTA

- § Provide safe + efficient transport via tolled highways, bridges & tunnels
- § State agency in an environmentally progressive state
- § Self funded with a Governing Board
- § Linear & highly impervious, close proximity to Chesapeake Bay
- § Two recent mega roadway projects triple stormwater infrastructure
- § More coming due to Chesapeake Bay Restoration (TMDLs)
- § Comply with stormwater NPDES permits



MDTA's Footprint



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NPDES Requirements

§ NPDES Phase II MS4 General Permit

- § Covers Toll Highways + Campuses

- § Renewal pending in 2014 and includes Chesapeake Bay TMDLs

§ NPDES Industrial Discharge General Permit

- § Maintenance Facilities + Truck Weigh Stations

- § Renewal pending in 2014 and includes Chesapeake Bay TMDLs

§ Manage stormwater Best Management Practices (BMPs) & drainage systems ≤ 36 "

§ Interface with Office of Maintenance and Structures Division (drainage structures ≥ 36 "

NPDES Requirements

§ Inventory

- § Best Management Practices (BMPs)
- § Drainage & Treatment Areas
- § Impervious Areas (IA)

§ Management Programs

- § Construction Erosion & Sediment Control
- § Tri-annual BMP Inspections
- § Illicit Discharge Detection
- § Annual Facility Inspections

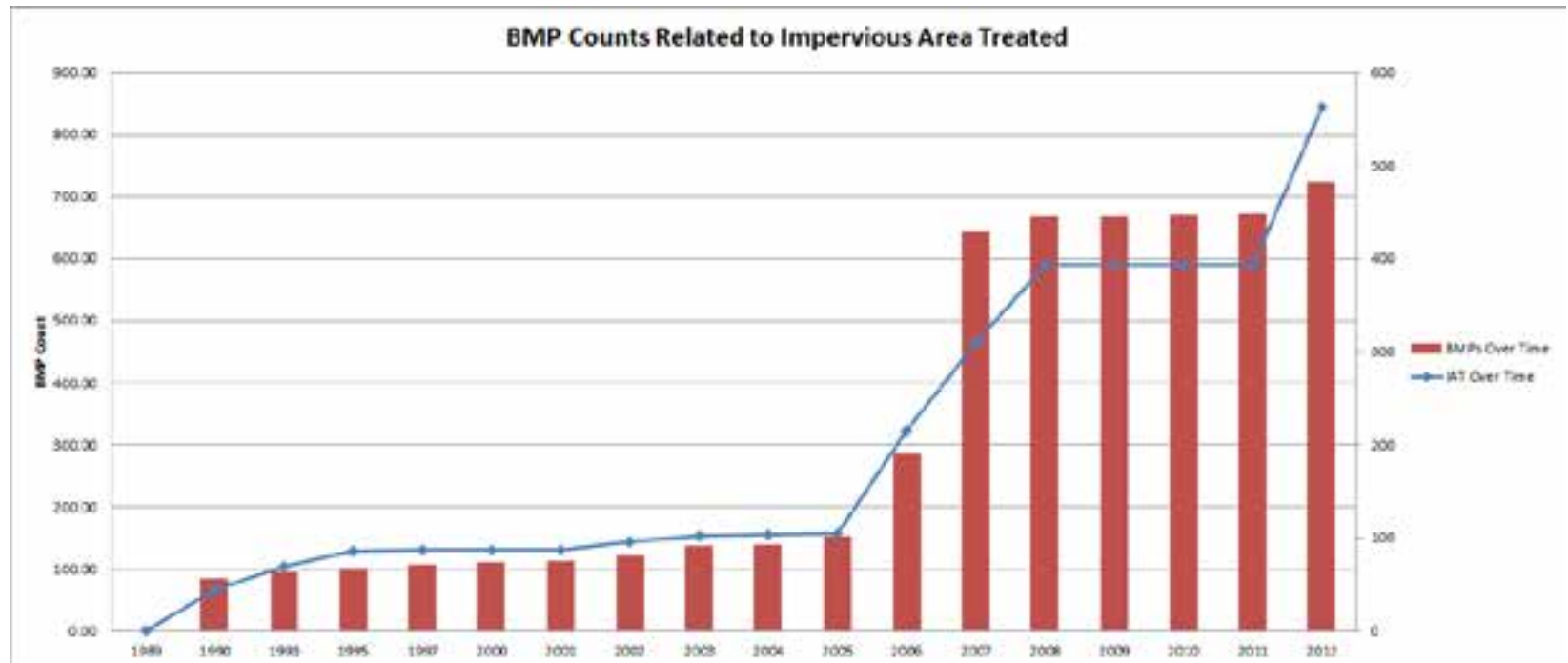
§ Bay TMDL Stormwater Retrofits

- § Treatment of pre-2002 IA
- § Watersheds of Bay Tributaries



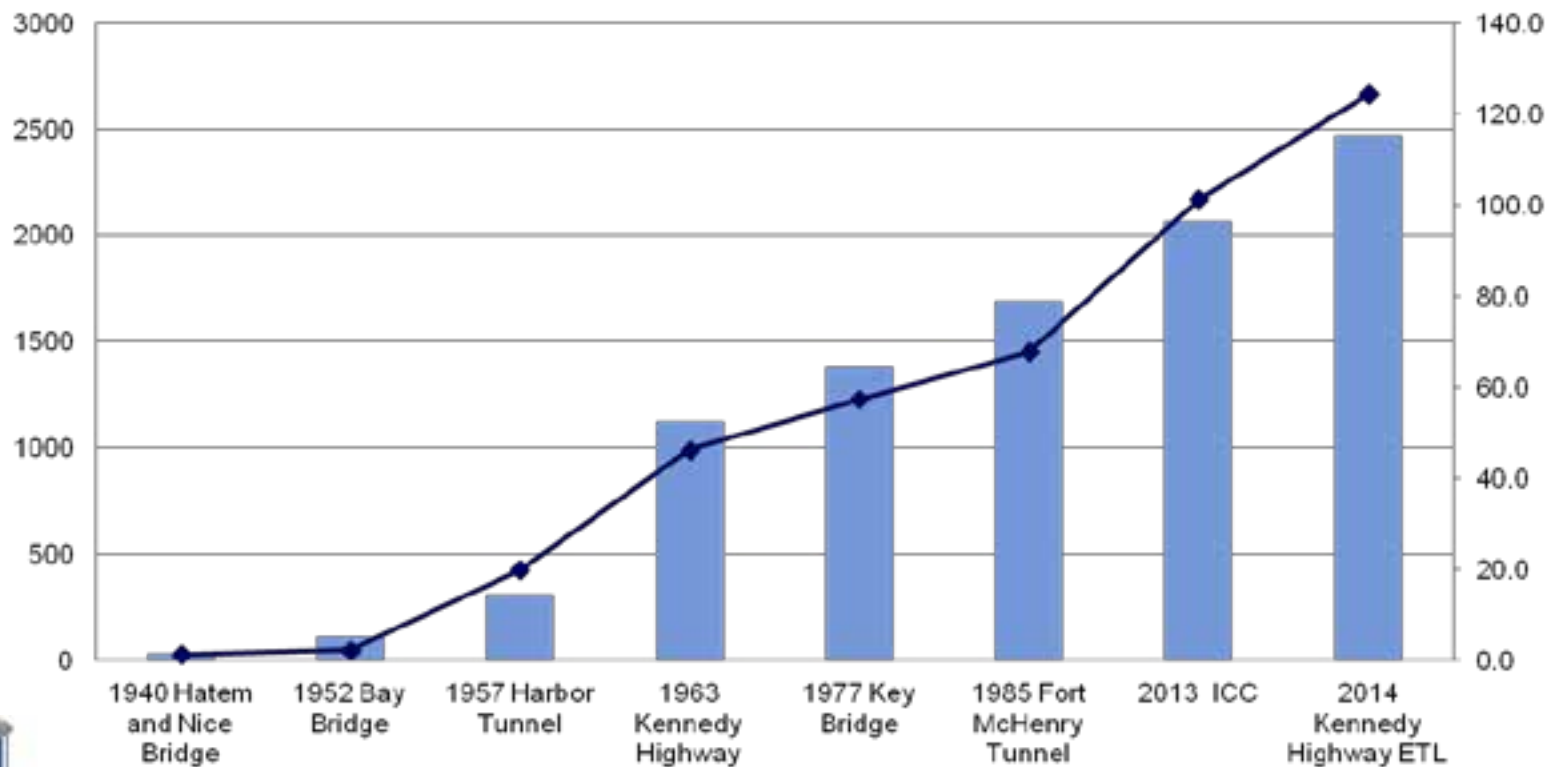
NPDES Drivers

§ Rapid increase in BMP Inventory and Treated Impervious Areas since 1990s



NPDES Drivers

§ Rapid increase in SDs inventory and Impervious Areas Drained since 1940's



NPDES Drivers

§ Asset Management—Current

- § **Avoid disruption to transportation**
- § Inspect for stability & performance
- § Work Orders: corrective & emergency
- § Develop routine maintenance work orders
- § Inventory & inspect new assets before transfer from construction projects
- § Publish stormwater infrastructure MDTA-wide

§ Asset Management—Future

- § Life cycle approach
- § Assess trends in Level of Service
- § Evaluate BMPs for cost effectiveness:
\$/BMP à \$/Treatment Area à \$/Pollutant Removal
- § Implement routine/cyclical maintenance
- § Proactive rehabilitation/replacement



Before Remediation

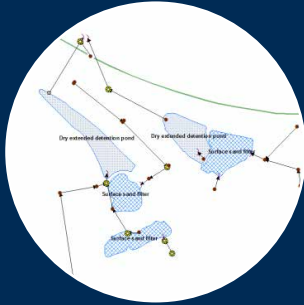


Remediation On-going



Remediation Complete

NPDES GIS



Inventory



Inspection



Remediation



User Access



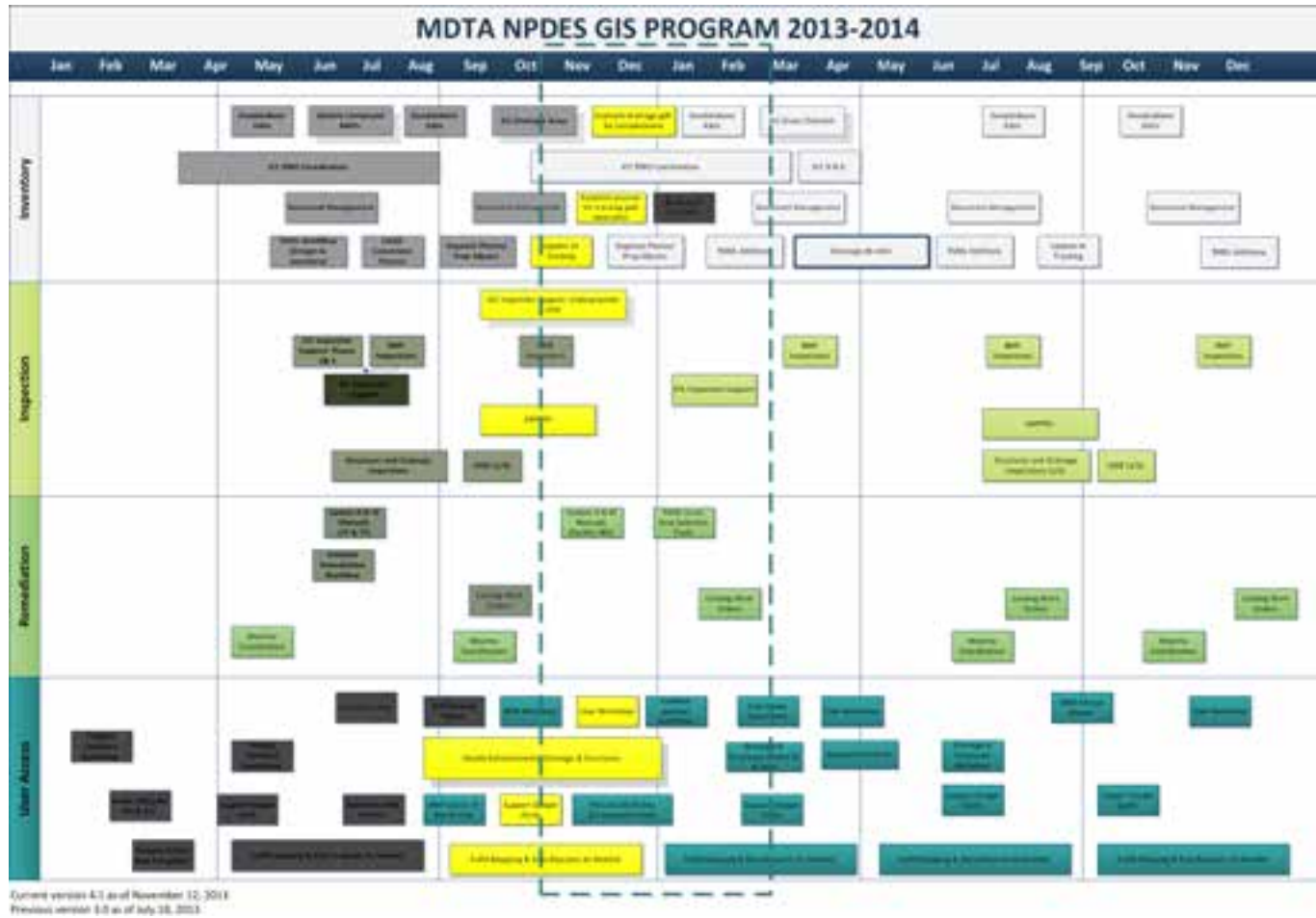
Overall Asset Management/System Preservation



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NPDES GIS Activities



NPDES GIS - Inventory

§ Stormwater BMPs

- § Footprints, drainage areas
- § Attributes
- § Status: Planned, Proposed, New, Existing

§ Storm Drains

- § Conveyances, structures, drainage areas, key attributes
- § Working towards proper flow direction

§ Impervious Area

§ All Features

- § Related Documents
 - § Vicinity & Site maps
 - § Design plans & reports
 - § As-Built documents
 - § Inventory photos
 - § MOT plan

The screenshot displays a software interface titled "BMP INVENTORY". It features a central data table with columns for various attributes. To the right, there are several summary statistics panels, including one for "Total Inventory Features" and another for "Total Inventory Features by Status". The interface is designed for data management and reporting.



NPDES GIS - Inventory

- § Refine inventory to support evolving user needs
 - § Expanding database design
 - § Data enhancements
- § Rapid expansion of inventory emphasized need for aggressive “house keeping”
- § Inventory is foundation for inspections, operation, maintenance, & reporting



Linked stormwater features

NPDES GIS - Inspection

§ Stormwater BMPs

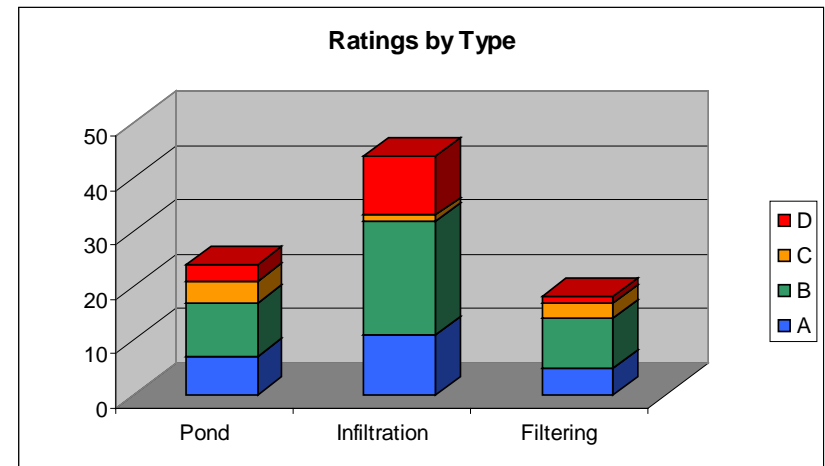
- § Maximum 3-year cycle, more frequent for specific types
- § Inspect newly constructed as part of As-Built certification
- § Inspect after remediation to log improved condition rating
- § Maintenance facilities require annual investigation
- § Long-term monitoring

§ Storm Drains

- § Illicit discharge detection
- § Drainage investigations

§ Maintenance Facilities

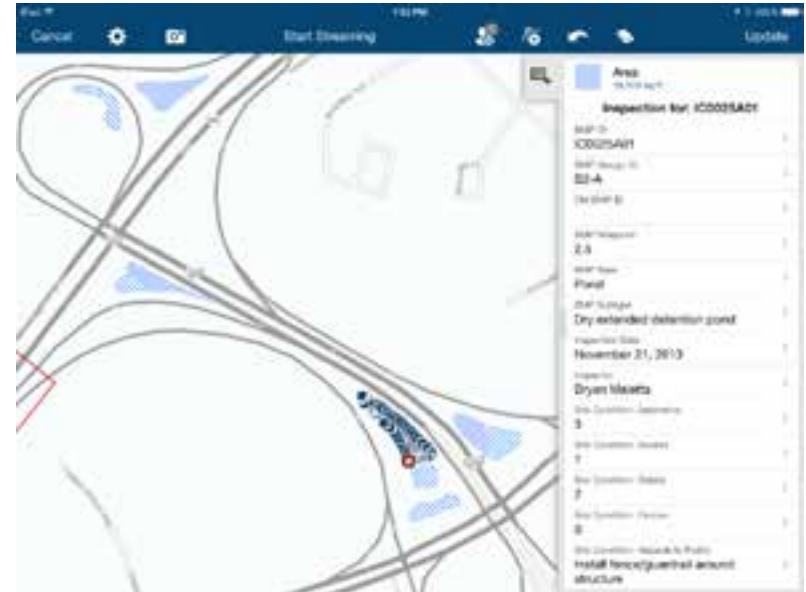
- § Site drainage
- § Materials / Waste handling
- § Pollution Prevention training



Tracking Condition Rating

NPDES GIS - Inspection

- § Piloting ArcGIS Online solution for BMP inspections
- § Evaluate potential for expansion beyond BMP Inspections



NPDES GIS - Remediation

§ Stormwater BMPs

- § Corrective Remediation
- § Routine / Cyclical Maintenance
- § Rehabilitation
- § Enhancement
- § Abandon

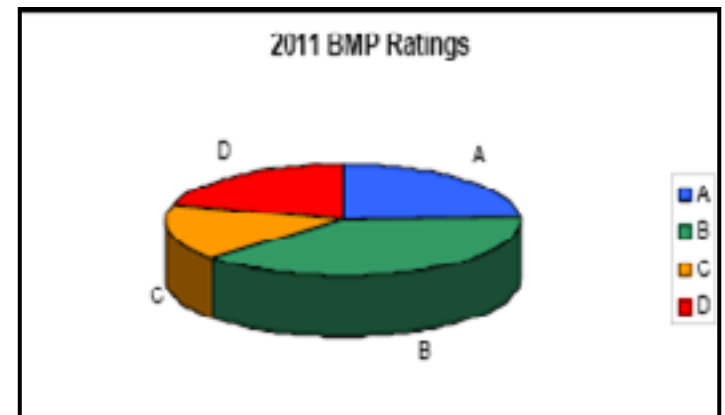
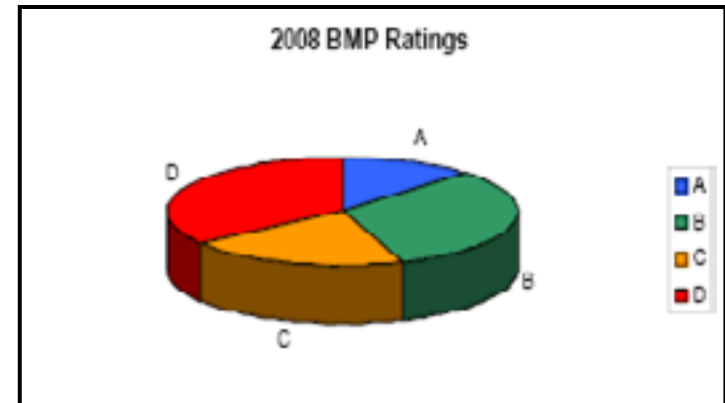
§ Storm Drains

- § Illicit discharge elimination
- § Corrective Remediation
- § Routine / Cyclical Maintenance
- § Rehabilitation
- § Enhancement

§ Maintenance Facilities

- § Stormwater Pollution Prevention

§ Identify BMPs & SDs that are candidates for improvements



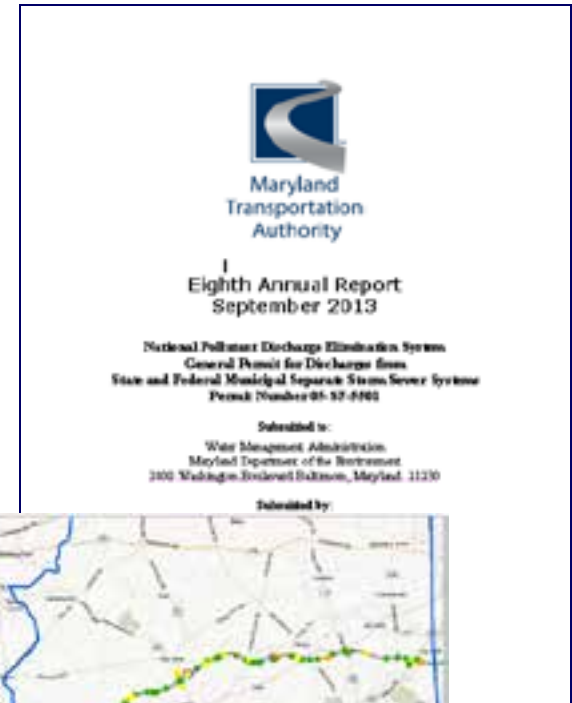
NPDES GIS - User Access

- § Data is collected for different reasons, but all interrelates
- § Return data to users in a value added format; cross referencing avoid duplication
- § Google Earth Enterprise > broad publication to view
- § ArcGIS Desktop to add/edit/view
- § Migrating to accessibility using ArcGIS Online



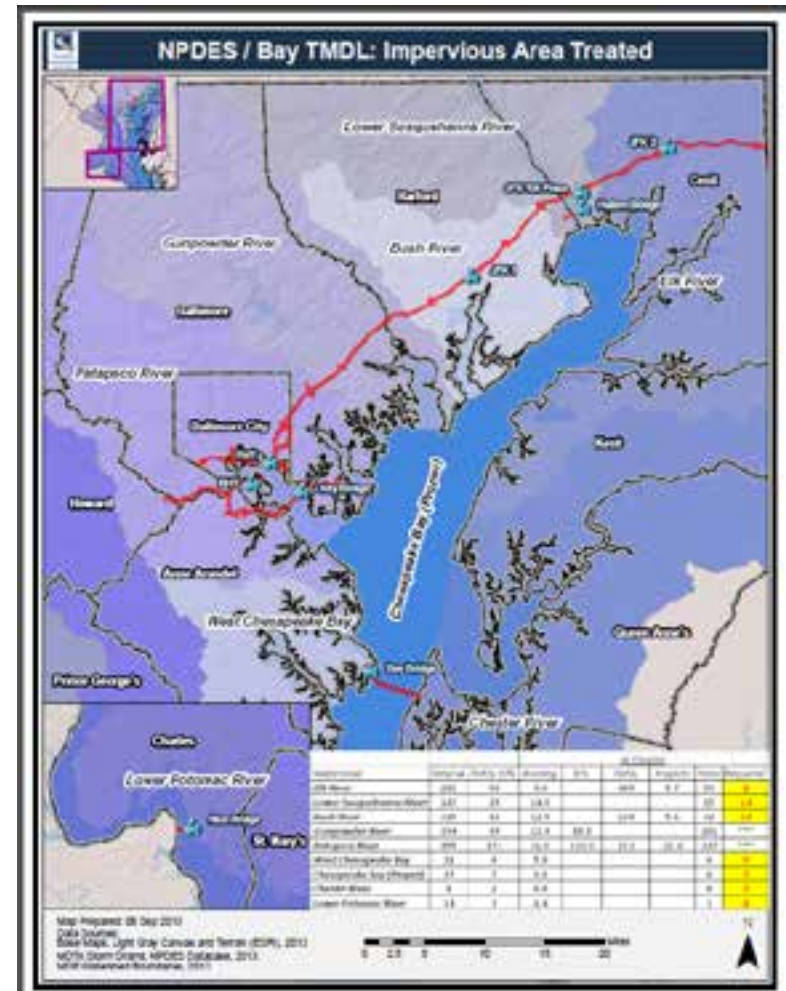
NPDES GIS - Case Study: MDE Annual Report

- § Use the GIS to readily produce tables and graphics quantifying compliance activities
- § Use the Annual NPDES Report as an opportunity to test/refine our work flows for data collection & management



NPDES GIS - Case Study: IAT by Watershed

- § Evaluate Impervious Area Treated at the watershed level
- § Developed model to evaluate aggregate numbers by watershed, permit type and phase



NPDES GIS - Case Study: Infiltration Trench Evaluations

- § Inspect existing BMP infiltration trenches for performance and stability
- § Evaluate for opportunities to upgrade treatment



Closing

- § Meet NPDES compliance for today & tomorrow
- § Keep up with burgeoning inventory
- § Plan / Track inspection & maintenance activities
- § Leverage data to improve/optimize O&M and designs/construction
- § Asset Management approach to ensure compliance while maintaining cost-effective infrastructure
- § Ultimately helps broader issues such as Chesapeake Bay



Chesapeake Bay:
Economic - Environmental –
Cultural Resource