

# A Requirements Analysis to Develop a GIS to Track Best Management Practices (BMPs) for Talbot County's Watershed Implementation Plan (WIP)

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Presented By: John O'Brien



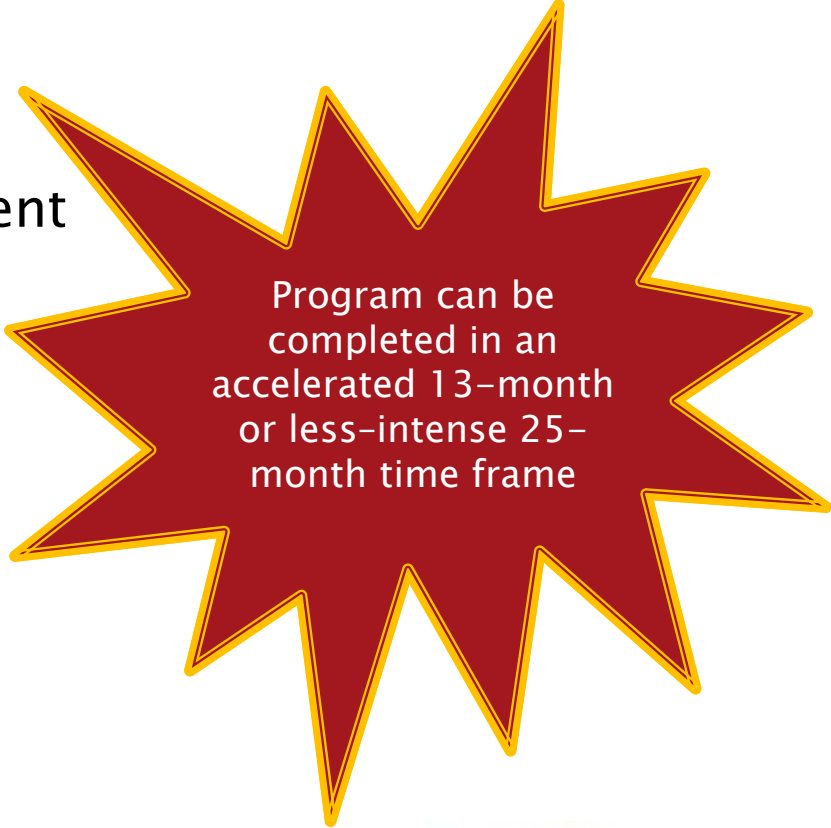
# MSGISM Program at Salisbury University

The Master's of GIS Management program at Salisbury University is targeted at “those skilled in GIS problem-solving but who lack the management experience necessary to advance in their career as well as those working professionals who could/did not acquire a GIS background as part of their primary training. It is designed to meet both groups’ needs while they continue to hold their position in their chosen field”.

# MSGISM Program at Salisbury University

## Courses:

- ▶ Advanced GIScience
- ▶ Public Administration
- ▶ Database Processing & Management
- ▶ UMUC Elective
- ▶ GIS & Public Administration
- ▶ Managing GIS
- ▶ *GIS Coop Experience*
- ▶ Leadership in GIS Organizations
- ▶ Project Management
- ▶ Capstone GIS Seminar



Program can be  
completed in an  
accelerated 13-month  
or less-intense 25-  
month time frame

# Purpose of the GIS Coop Experience

- ▶ The GIS Coop Experience is a directed field study program which provides the students with an opportunity to apply GIS skills acquired in the classroom to real-world projects in the community.
- ▶ Students are under the supervision of an advisor from the GIS faculty and have peer reviewers while participating in a project for a business or government agency.
- ▶ If the student is already employed, arrangements will be made with the employer to conduct the Coop Experience as part of the student's regular duties.

# Co-op Project Process

- ▶ Identification of an organization to work with and a project.
- ▶ Development of a project proposal.
- ▶ Approval by advisor.
- ▶ Letters of support from organization.
- ▶ Project planning.
- ▶ Project execution (*One semester: January – May*).
  - Peer review process along the way.
  - Bi-weekly status reports.
- ▶ Final report.





# Environmental Concern Inc.

- ▶ EC headquartered in St. Michaels, Maryland, is a 501(c)3 public not-for-profit corporation.
- ▶ EC has been dedicated to improving water quality and enhancing nature's habitat through the restoration, creation and enhancement of wetlands, native species horticulture, and a structured education and outreach program since 1972.



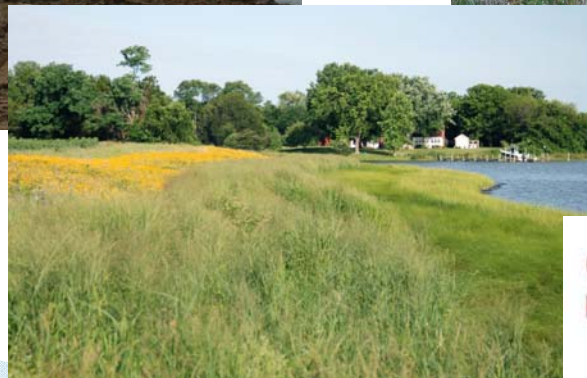
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# Environmental Concern Inc.

- ▶ EC has restored more than one thousand wetland acres, in the Chesapeake Bay Watershed.
- ▶ EC has designed, permitted, created and planted, monitored and maintained hundreds of wetland habitats, including tidal and nontidal wetlands, wetland and stream buffers, bio-retention and bio-infiltration facilities, schoolyard wetlands, meadows and vegetated stormwater management facilities, many of which are located in Talbot County.

EC has worked on numerous BMP projects with Talbot County and has an excellent working relationship with the county staff.



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# Talbot County's Need

- ▶ Talbot County is one of many small non-regulated county governments that have been making numerous efforts to reduce nutrient and sediment inputs to the Chesapeake Bay.
- ▶ Best Management Practices (BMPs) is the term used to describe the methods, procedures, and technology utilized to reduce these inputs.
- ▶ Accurate tracking and accounting of these BMPs is extremely important for estimating current and future nutrient and sediment loads.
- ▶ While Maryland Department of Environment (MDE) is requiring that local jurisdictions keep track of the BMPs for the Watershed Implementation Plans (WIPs), there has been limited progress in the implementation of a tracking system within Talbot County.
- ▶ Talbot County recognized the need and importance of tracking BMPs; however, they did not have the resources or funds to fully investigate *what* they needed to track and *how* they needed to track it.
- ▶ In addition, with all of the different agencies tracking different, but sometimes overlapping practices, the task of figuring out exactly what needed to be tracked and how, was daunting





# Talbot County's Need

- ▶ Talbot County indicated that they would like to develop and implement a GIS-based tracking system for the BMPs within the county's watersheds.
- ▶ Without any clear guidance and with a multitude of different agencies developing separate tracking tools, it was clear that the current status of BMP tracking for the WIPs needed to be thoroughly researched.
- ▶ In addition, a comprehensive needs assessment was crucial before any planning and development could occur for the county's GIS tracking system.



# Co-op Project: Objectives



The following objectives were defined for this project:

1. Analysis and documentation of historic BMP tracking systems in Maryland.
2. Analysis and documentation of current BMP tracking systems in Maryland.
3. Improved coordination of tracking systems for BMPs between organizations.
4. Documentation and verification of BMP data availability.
5. Analysis and documentation of the county's current GIS system.
6. Recommendations for development of a GIS tracking system for BMPs in Talbot County that can be implemented this fiscal year.



# Co-op Project: Phases



The project was broken into four phases:

1. Project Planning
2. Investigation of Current Tracking System/  
Present System Analysis
3. Needs Analysis
4. Requirements Analysis

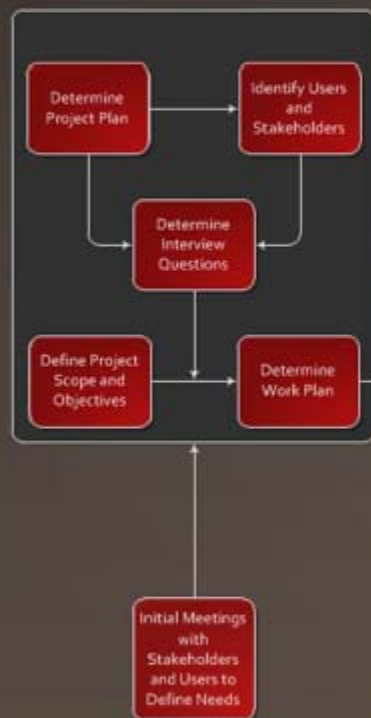




# REQUIREMENTS ANALYSIS METHODOLOGY FOR DEVELOPING A GIS TO TRACK BEST MANAGEMENT PRACTICES (BMPs)



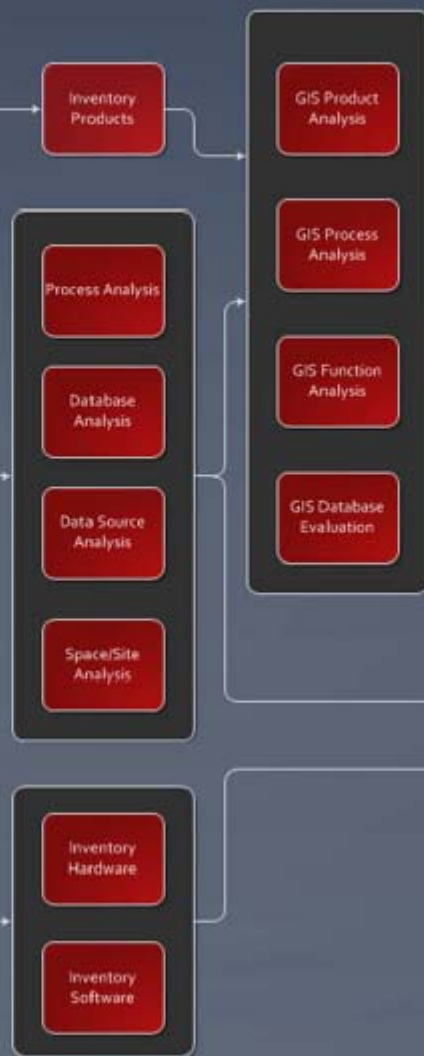
## PROJECT PLANNING



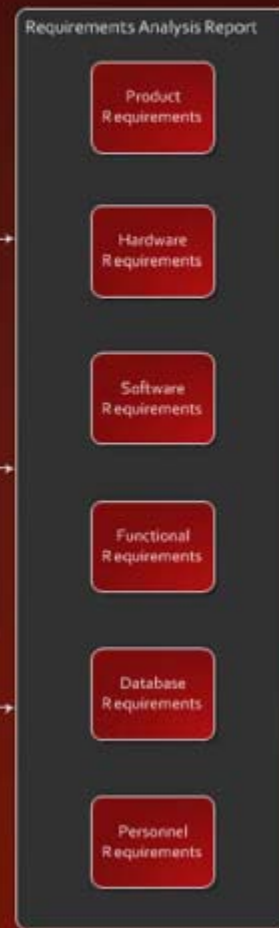
## PRESENT SYSTEM ANALYSIS



## GIS NEEDS ANALYSIS



## REQUIREMENTS DOCUMENTATION







# Project Planning



This phase was a preparation for the requirements analysis which defined the project scope and objectives, identified the participating users, established a method for collecting the data, selected the team for performing the requirements, and developed a work plan strategy.





# Present System Analysis



- ▶ This phase investigated the current tracking system.
- ▶ It looked at the current environment by taking inventory of the hardware, software, data, functions, organizational structure and integration.
- ▶ A traditional bottom-up approach was chosen. This approach began by interviewing the operating personnel and direct users of the applications and then worked up, which gave a “quick and dirty” look at the different tracking systems that were out there, as well as helped to determine the direct needs of the tracking system for the county.
- ▶ In addition to interviewing the users and stakeholders for this project at Talbot County, other counties and organizations who had implemented similar systems or applications to track BMPs were interviewed.



# Present System Analysis

## Interviews:



Organization/Agency	Individuals	Date
Talbot County	Sandy Coyman, <i>Planning Officer</i>	*February 19 <sup>th</sup>
Talbot County	Martin Sokolich, <i>Long Range Planner</i>	*February 19 <sup>th</sup>
Talbot County	Mark Cohoon, <i>GIS Manager</i>	*February 19 <sup>th</sup>
Talbot County	Bill Wolinski, <i>Sanitary District Engineer</i>	*March 1 <sup>st</sup>
University of Maryland's Sea Grant Extension	Jennifer Dindinger, <i>Regional Watershed Specialist</i> Amy Scaroni, <i>Regional Watershed Specialist</i>	*February 2 <sup>nd</sup>
Eastern Shore Regional GIS Cooperative (ESRGC)	Dr. Michael Scott, <i>Director</i> Erin Silva, <i>Senior GIS Analyst</i> Molly Griffin, <i>GIS Analyst</i>	February 27 <sup>th</sup>
Maryland Department of the Environment (MDE)	Gregorio Sandi, <i>Natural Resources Planner</i>	March 8 <sup>th</sup>
Center for Watershed Protection (CWP)	Sadie Drescher, <i>Watershed Researcher &amp; Planner</i> Lisa Fraley McNeal, <i>Research Specialist</i> Reid Christianson, <i>Water Resources Engineer</i>	March 8 <sup>th</sup>
Chesapeake Stormwater Network (CSN)	Tom Schueler, <i>Executive Director</i> Cecilia Lane, <i>Stormwater Coordinator</i>	March 8 <sup>th</sup>
Eastern Shore Land Conservancy (ESLC)	Laura Sanford, <i>Land Protection Specialist</i> Megan D'Arcy, <i>Stewardship Manager</i>	March 7 <sup>th</sup>
Anne Arundel County DPW	Richard Fisher, <i>Watershed Model Administrator</i>	March 22 <sup>nd</sup>
Chesapeake Bay Program Office (CBP)	Matt Johnston, <i>Scientific &amp; Technical Advisory Committee Coord.</i>	March 22 <sup>nd</sup>
Upper Eastern Shore Regional WIP Workshop	Lee Currey, <i>Director, MDE</i> John Rhoderick, <i>Resource Conservation Operations, MDA</i> Jim George, <i>Water Quality &amp; Protection, MDE</i> Jen Raulin, <i>Restoration Finance and Policy, DNR</i> Gregorio Sandi, <i>Natural Resources Planner, MDE</i> Jen Dindinger, <i>Regional Watershed Specialist, UMD Sea Grant</i>	April 29 <sup>th</sup>

\* Multiple Dates



# Needs Analysis



- ▶ This phase examined the future GIS system and needs by analyzing the GIS products, processes, functions, and databases.
- ▶ In addition to interviews and meetings with key stakeholders, regulators, and other individuals and organizations involved with the WIP process, an extensive research effort was conducted to determine the requirements and processes for tracking and accounting BMPs.





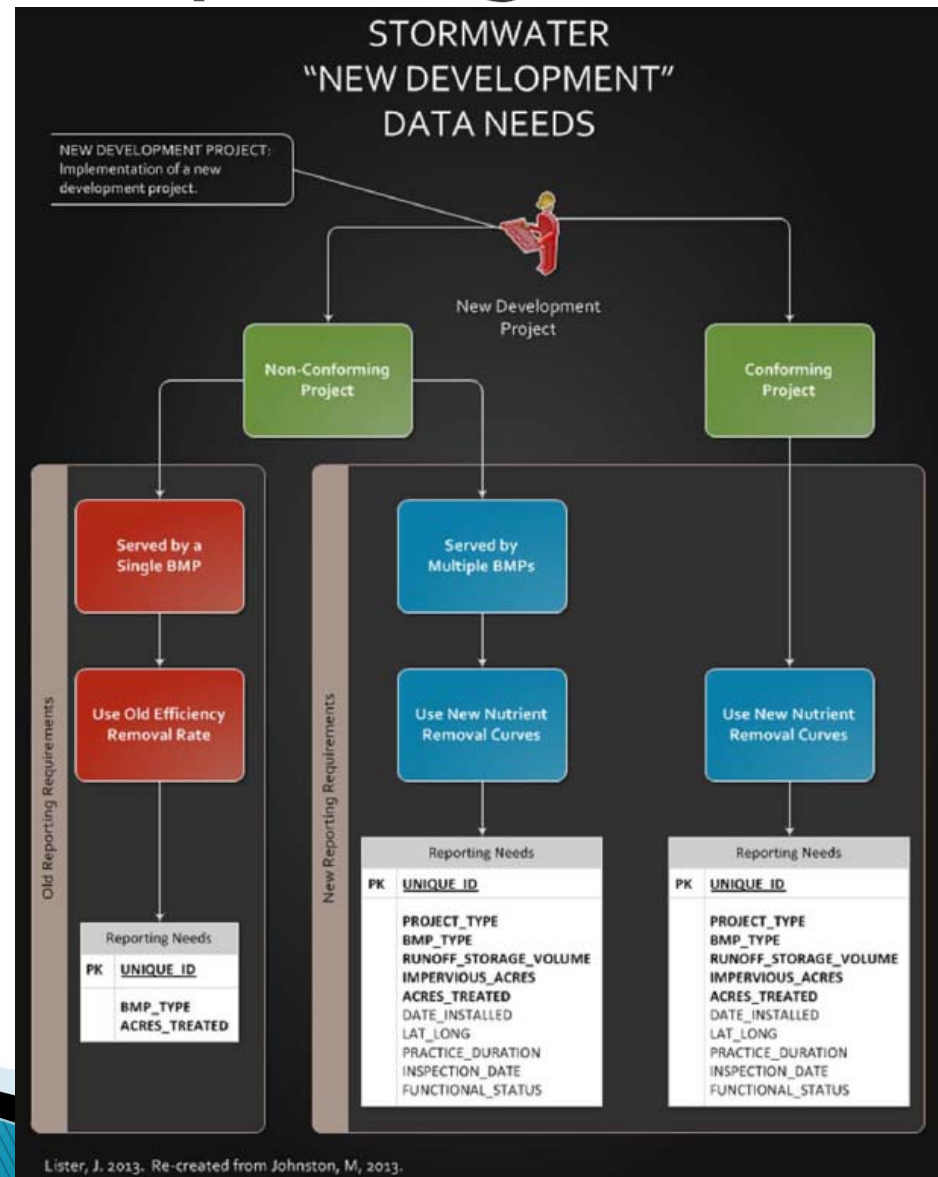
# Findings: Data Needs for Each BMP



- ▶ Unique Structure ID
- ▶ BMP Type
- ▶ Total Drainage Area/Acres Treated
- ▶ Runoff Storage Volume
- ▶ Impervious Acres
- ▶ Treatment Design (inches of rain)
- ▶ Linear Feet (stream restoration)
- ▶ Tons (street sweeping)
- ▶ Date Installed
- ▶ Location (lat/long)
- ▶ Practice Duration
- ▶ Inspection Date
- ▶ Functional Status



# Findings: Example of Reporting Needs





# Findings: Talbot County's Existing Processes



- ▶ There is no system in place to track the installation and management of BMPs at Talbot County.
- ▶ Currently, all of the BMP data that should be tracked is in either paper files or project drawings.
- ▶ The only BMPs that are being tracked to some extent are the septic denitrification system upgrades, which are being kept in a Microsoft Excel spreadsheet.
- ▶ A Master Data List was created to review the current data source, contact, data formats, update interval, and development priority for each BMP type.



# Requirements Analysis



This phase analyzed the findings in the previous two phases and then developed the necessary requirements for the organization in terms of database management and spatial data handling in a report format.







# Requirements Analysis



- ▶ It was determined that GIS would be an efficient and useful way to track BMPs for the county's WIP.
- ▶ Several of the potential GIS benefits include:
  - Improved efficiency in tracking BMPs.
  - Improved accuracy of BMP locations.
  - Easier quality control checks to avoid double counting of BMPs.
  - Assignment of proper pollutant delivery ratios in the Watershed Model.
  - Ability to prioritize inspections based on the proximity of the BMP to the receiving water body.
  - Ability to prioritize future BMP locations.
  - Ability to visually display BMP implementation successes to stakeholders, grant funders, and other interested parties.
  - Ability to query BMP database based on selections.
  - Ability to view the location of a BMP and identify information about the BMP.



# Requirements Analysis



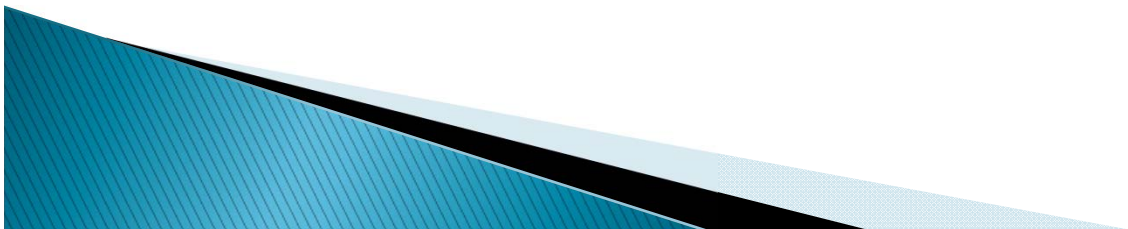
- ▶ One of the main barriers to the implementation of a GIS-based tracking system for BMPs at Talbot County is that not all staff members are proficient in using databases.
- ▶ There is a comfort level and familiarity with inputting data into spreadsheets, such as Microsoft Excel.
- ▶ Therefore, a phased approach was recommended for the implementation of Talbot County's BMP Tracking System.



# Recommendations



- ▶ The phased approach will enable the county to take small steps towards migrating from project files and site plans to a full-blown BMP spatial database and web mapping application.
- ▶ Phases will allow for quicker deployment of the BMP tracking system so that the county will be able to meet the requirements for tracking BMPs starting this fiscal year.





# Recommendations



- ▶ The proposed phases and associated tasks are:
- ▶ Phase 1: Initial Implementation
  - Task 1: Inventory of Existing BMPs
  - Task 2: Development of the GIS-based BMP Tracking System
  - Task 3: Field Verification of BMPs
  - Task 4: Updating the BMP Data based on the Field Verification
  - Task 5: Database and GIS Training for Talbot County Staff
  - Task 6: Creation of a BMP Tracking System Web Map Application
- ▶ Phase 2: Comprehensive Needs Assessment and Requirements Analysis for an Enterprise GIS





# Future



- ▶ Environmental Concern Inc (EC), Talbot County, and the Eastern Shore Regional GIS Cooperative (ESRGC) have partnered on a NFWF Small Watershed Grant for funding for the implementation of Phase 1 of this project.
- ▶ Awards will be announced in September.
- ▶ Additional partnership opportunities for Talbot County, EC, and ESRGC.
- ▶ Potential for this project to be a pilot study for other small local jurisdictions struggling with similar issues in developing BMP tracking systems.





# Acknowledgements

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Jennifer Dindinger, *UMD Sea Grant Extension Program, Regional Watershed Restoration Specialist*  
Sadie Drescher, *Center for Watershed Protection, Watershed Researcher & Planner*  
Sean Eggleston, *Talbot County, Stormwater Management Inspector*  
Rick Fisher, *Anne Arundel County, Watershed Model Administrator*  
Lisa Fraley-McNeal, *Center for Watershed Protection, Research Specialist*  
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Laura Sanford, *Eastern Shore Land Conservancy, Land Protection Specialist*  
Amy Scaroni, *UMD Sea Grant Extension Program, Regional Watershed Restoration Specialist*  
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A HUGE THANKS TO JOHN FOR PRESENTING FOR ME  
TODAY!!



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