Please note this Powerpoint presentation is for informational purposes only and not meant for publication. Please contact Jennifer Walls for further information regarding the information that was presented.

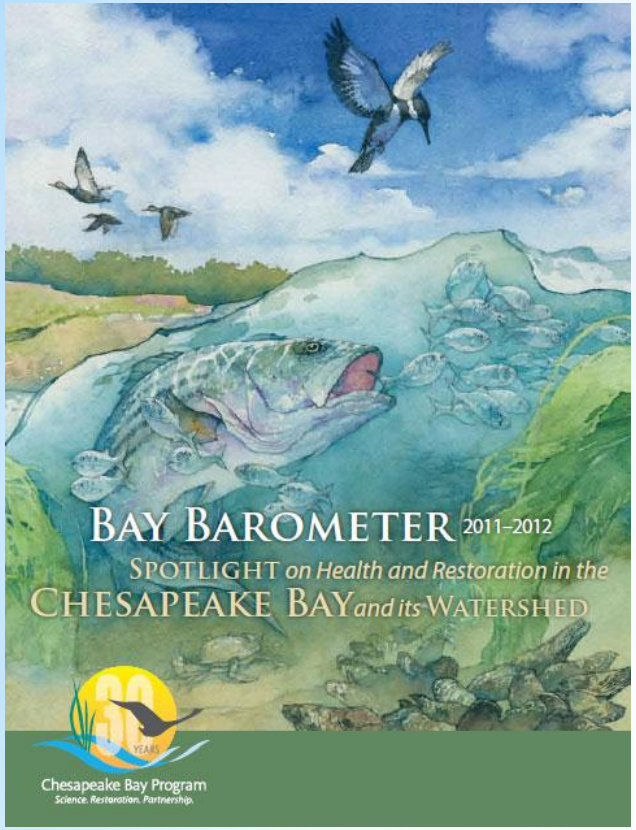
Jennifer Walls, Principle Planner
DNREC, Division of Watershed Stewardship
Jennifer.Walls@state.de.us
302-739-9939

3/5/2013

Delaware's Chesapeake Bay Communities:

Action Today for Tomorrow's Healthy Water

Delaware Department of Natural Resources and Environmental Control



Source: Chesapeake Bay Program Bay Barometer, 2011-2012.

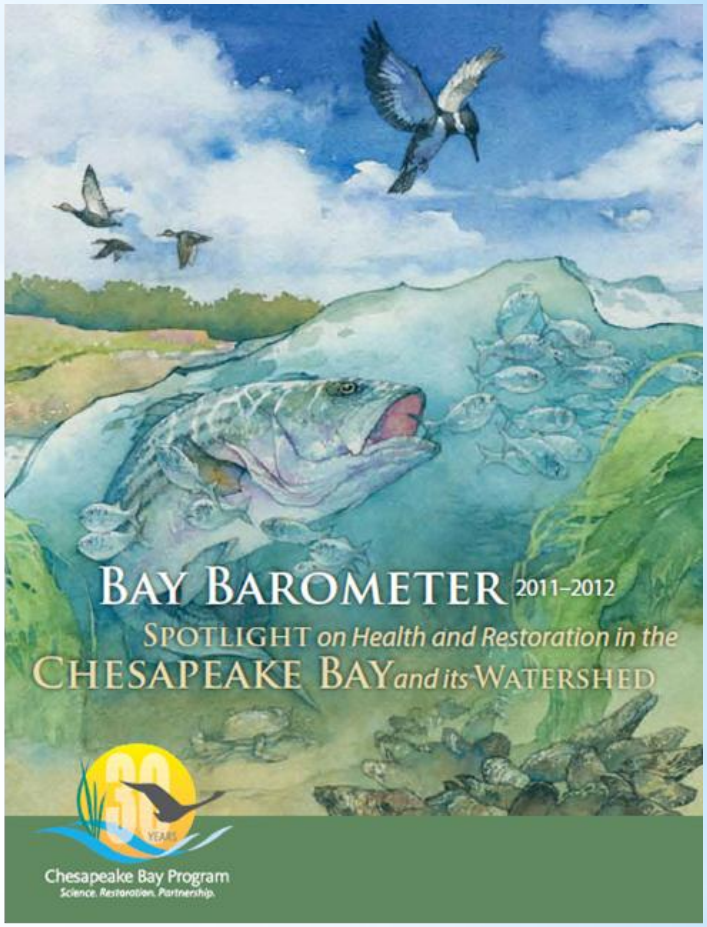
We are making progress toward meeting the Bay's Total Maximum Daily Load (TMDL), or "pollution diet."

* Nitrogen loads to the Bay decreased by 15.67 million pounds
* Phosphorus loads to the Bay decreased by 0.9 million pounds
* Sediment loads to the Bay decreased 396 million pounds

* Bay-wide Progress

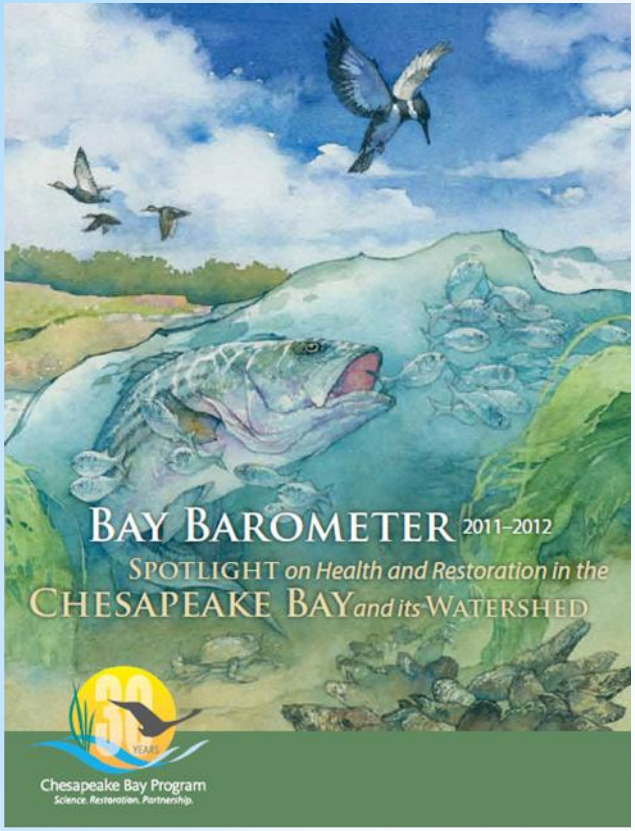
With the combined efforts of the six states which have portions falling within the Chesapeake Bay Watershed, there has been some major restoration accomplishments:

* Increased 240 miles of forested buffers, largely planted by rural landowners.
* 148 more miles of streams were opened for use by migratory fish to reach necessary spawning grounds.
* 15 new public access sites opened, giving people access to the water.
* More than 8 million acres of land have been preserved since 2000.



Source: Chesapeake Bay Program Bay Barometer, 2011-2012.

* Bay-wide Progress

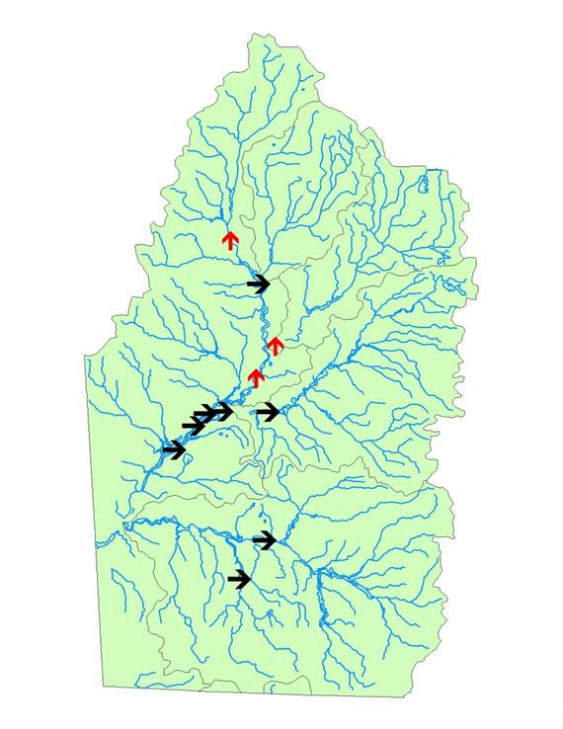


Source: Chesapeake Bay Program Bay Barometer, 2011-2012.

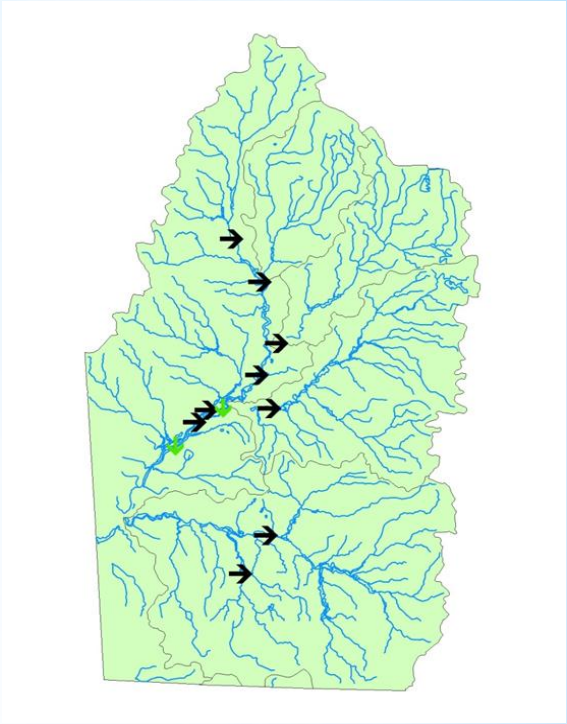
In return for our efforts, the Bay gives us signs of resilience and hope:

* Grass beds are surviving some of the major storms we've seen over the past couple years and grasses in the mid-Bay are experiencing dramatic increases.
* The Bay's once threatened Rockfish population is stable and above target.
* The adult female crab population, though down, is still within sustainable range, and there's news of the highest number of juveniles since 1993.
* Early indications are that the 2012 dead zone was the smallest since 1985.

*Bay-wide Progress



Total Nitrogen Trends in the Nanticoke Watershed



Total Phosphorus Trends in the Nanticoke Watershed

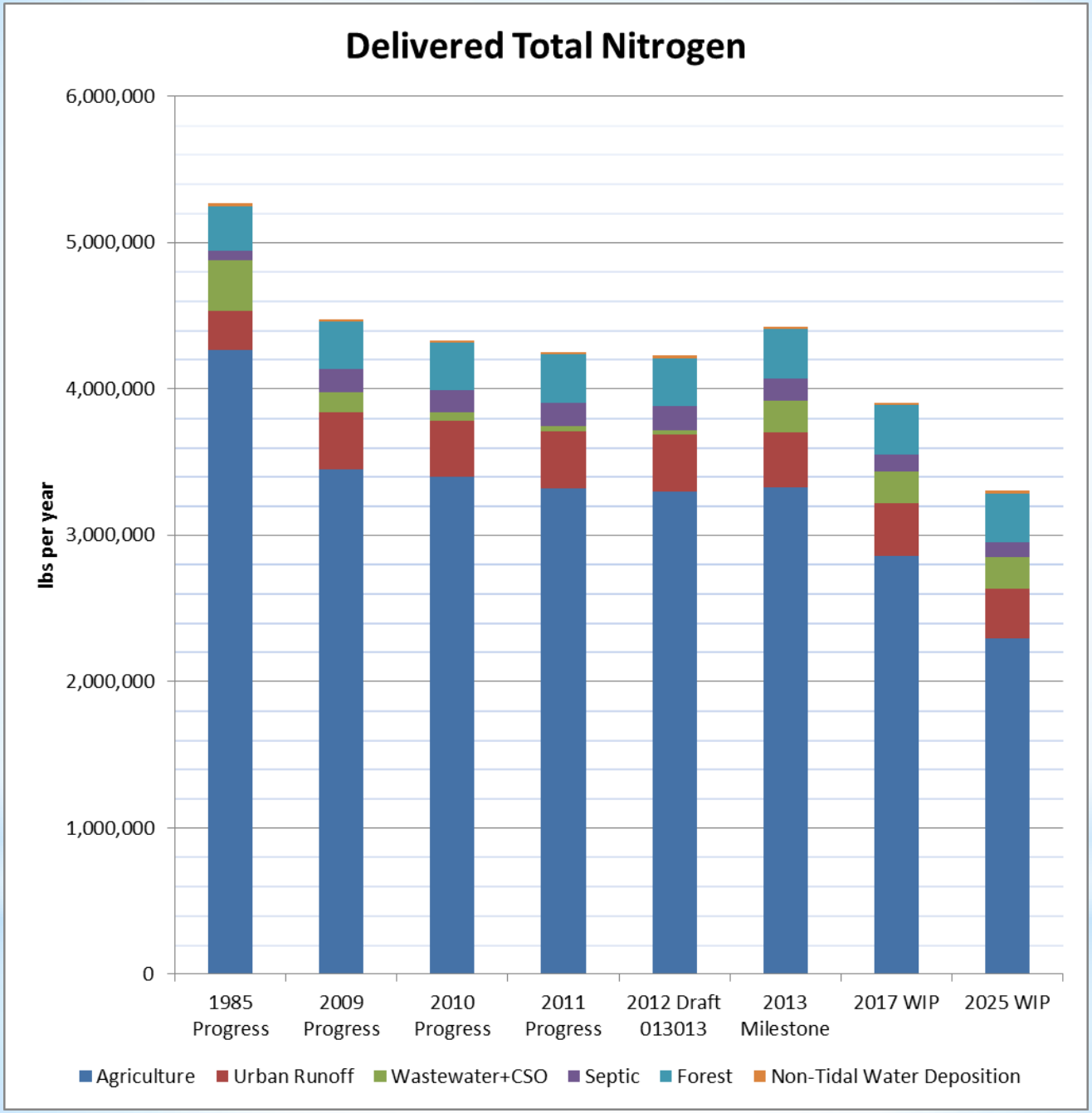
*Current Water Quality Trends

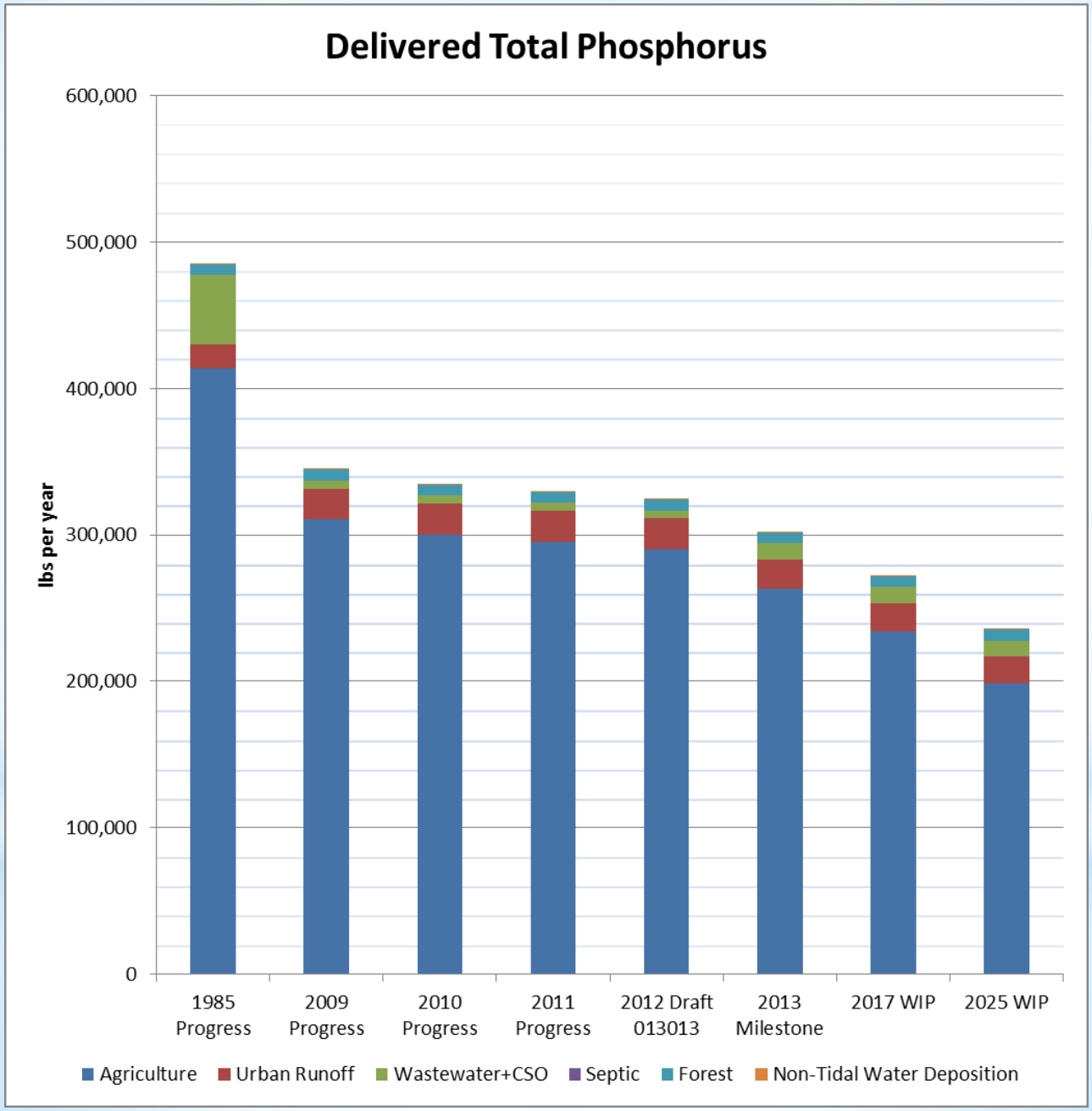
*Delaware Progress Highlights

* Proposed new/revised regulations for industrial stormwater, sediment and stormwater, wastewater and CAFOs
* Developed local planning tools
* Master Plan in Bridgeville/Greenwood
* Set Urban Tree Canopy goals in Blades, Georgetown, and Greenwood
* Ongoing technical assistance for grant funding
* Drafted new BMP manual for industrial stormwater

Pollutant Controls, Practices, and Actions	Progress through 2011	2012 Progress Run 013013	2013 Target
Agriculture			
Cover Crops (acres/yr)	48,061	49,322	36,809
Cropland Irrigation Management (acres)	0	0	75,000
Grass Buffers (acres)	743	774	1,659
Forest Buffers (acres)	2,226	2,226	3,185
Wetland Restoration (acres)	588	1,499	1,145
Urban Runoff			
Biorention Practices (acres)	35	62	38
Wet Ponds & Wetlands (acres)	5,750	6,466	5,956
Septic			
Septic Connections (systems)	1	5	477
Wastewater + Combined Sewer Overflow			
Wastewater Facilities Meeting Water Quality Standards in Chesapeake Bay (Cumulative number and percentage of facilities)	0 / 0%	0/0%	2 / 50%

*Milestone Progress 2012


Delivered Total Nitrogen
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
lbs per year
1985 Progress
2009 Progress
2010 Progress
2011 Progress
2012 Draft 013013
2013 Milestone
2017 WIP
2025 WIP
Agriculture
Urban Runoff
Wastewater+CSO
Septic
Forest
Non-Tidal Water Deposition


Delivered Total Phosphorus
600,000
500,000
400,000
300,000
200,000
100,000
0
lbs per year
1985 Progress
2009 Progress
2010 Progress
2011 Progress
2012 Draft 013013
2013 Milestone
2017 WIP
2025 WIP
Agriculture
Urban Runoff
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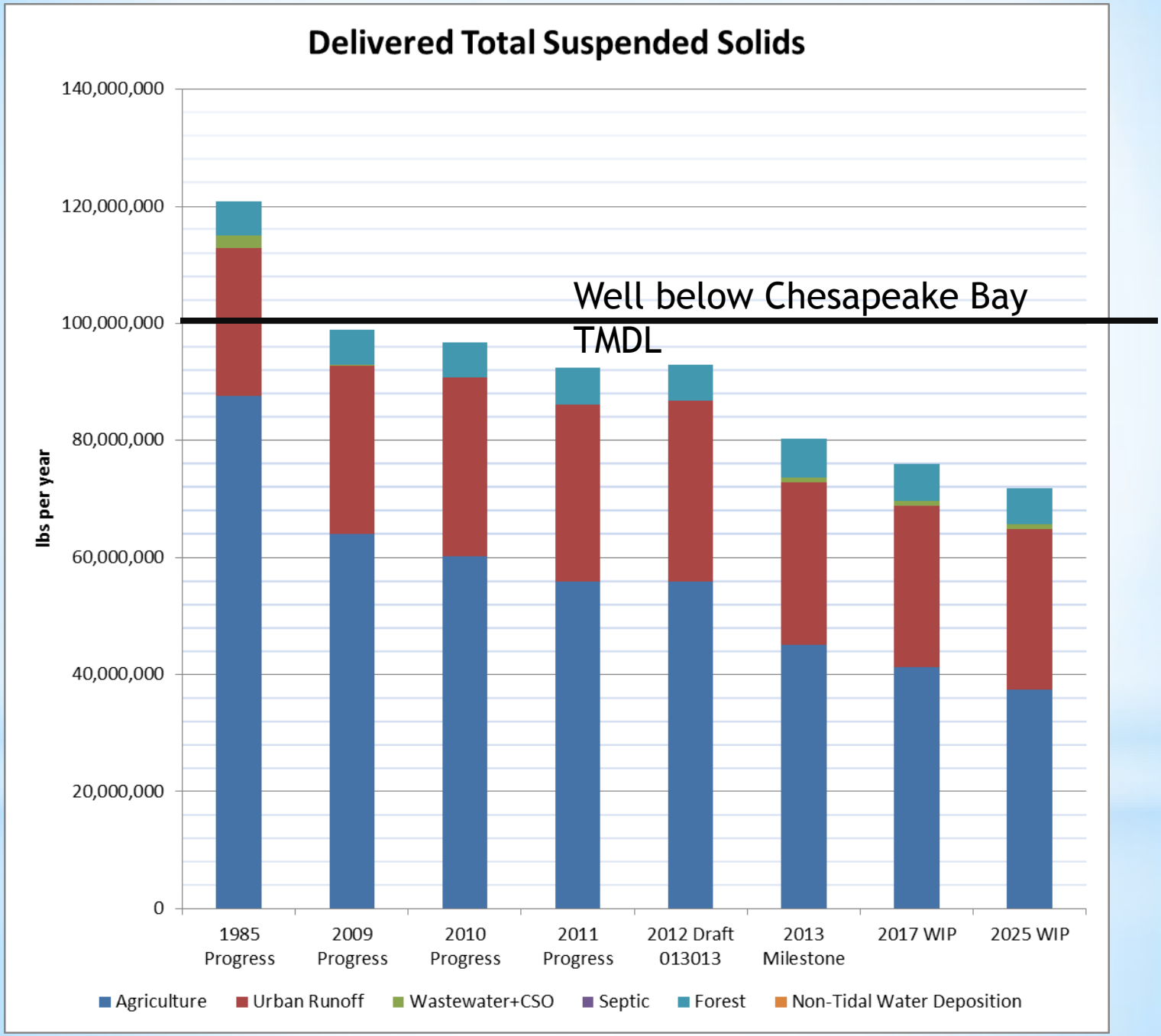

Delivered Total Suspended Solids
140,000,000
120,000,000
100,000,000
80,000,000
60,000,000
40,000,000
20,000,000
0
lbs per year
Well below Chesapeake Bay TMDL
1985 Progress
2009 Progress
2010 Progress
2011 Progress
2012 Draft 013013
2013 Milestone
2017 WIP
2025 WIP
Agriculture
Urban Runoff
Wastewater+CSO
Septic
Forest
Non-Tidal Water Deposition

*Stormwater

Revised proposed regs to be published by 4/1/13 with a hearing on 4/23/13

Revision of state Sediment and Stormwater regulations - emphasize green technologies, in-lieu fee to partially offset new development (2013)

Update Industrial Stormwater regulations (starting 2012)

Renewal of DelDOT/New Castle County municipal stormwater permit (MS4) - only such permit in watershed at this time (2013)

Stormwater retrofits - while not a large focus in our WIP, several projects have been identified and we are working with local governments and partners to plan and implement projects in Seaford, Bethel, Laurel, and Greenwood

Proposed revised statewide regulations include new inspection requirements, performance standards, and advanced treatment for new and replacement systems within 1,000 feet of Chesapeake tidal waters and wetlands

Eliminate a minimum of 6,295 systems by 2025

Proposed regs under review, another workshop and public hearing expected Spring 2013

*Onsite Wastewater

Laurel Wastewater Treatment Plant Upgrade - 2007

* Major treatment plants include Bridgeville, Laurel, Seaford and Invista
* Permitted nutrient loads will be reduced under DE's plan
* Plants may be required to upgrade to higher levels of nutrient removal or find alternative disposal methods

*Wastewater Systems

What is planned for 2013?

* Promulgate Regulations for Stormwater and Waste Water
* Continue Master planning efforts in Laurel and Seaford
* Complete stormwater retrofit projects in Seaford and Greenwood
* Sewer study for Bethel
* Continue to develop and refine tools for BMP and offset tracking, reporting and verification.
* Continue BMP implementation efforts on Public Lands
* Stormwater planning projects in Bethel and Laurel
* NPDES permits for Bridgeville and Invista
* Continue issuing CAFO permits.
* Develop a Nutrient Offset Program

CREDITS

ALL NEW NUTRIENT AND SEDIMENT LOADINGS MUST BE OFFSET

For example, the developer of a subdivision who can't meet stormwater and onsite wastewater targets on his site could pay a fee, perform an offset project nearby in the watershed, or buy credits from a nutrient "bank."

*Nutrient Offset Program

*Consequences of missing goals

We have developed contingencies for each sector

Missing goals could mean increased and direct regulation by EPA of

- Industrial, municipal wastewater
- Municipal stormwater systems
- Agricultural operations

And/or redirection of federal funds

Remember, the ultimate goal is cleaner waters.

* Path forward

- Implement the WIP!
- Assess progress annually
- Compare to 2 Year Milestone Goals
- Adaptive management

We have to reduce the amounts of pollutants - nitrogen and phosphorous – in the watershed

Consequences of missing targets in 2017 and 2025 could be much more expensive to taxpayers than working together now

There are some relatively low-cost measures we can take to help meet goals

. . . And Delaware citizens value clean water and clean waterways!

*Why We Need to Work Together

*Questions

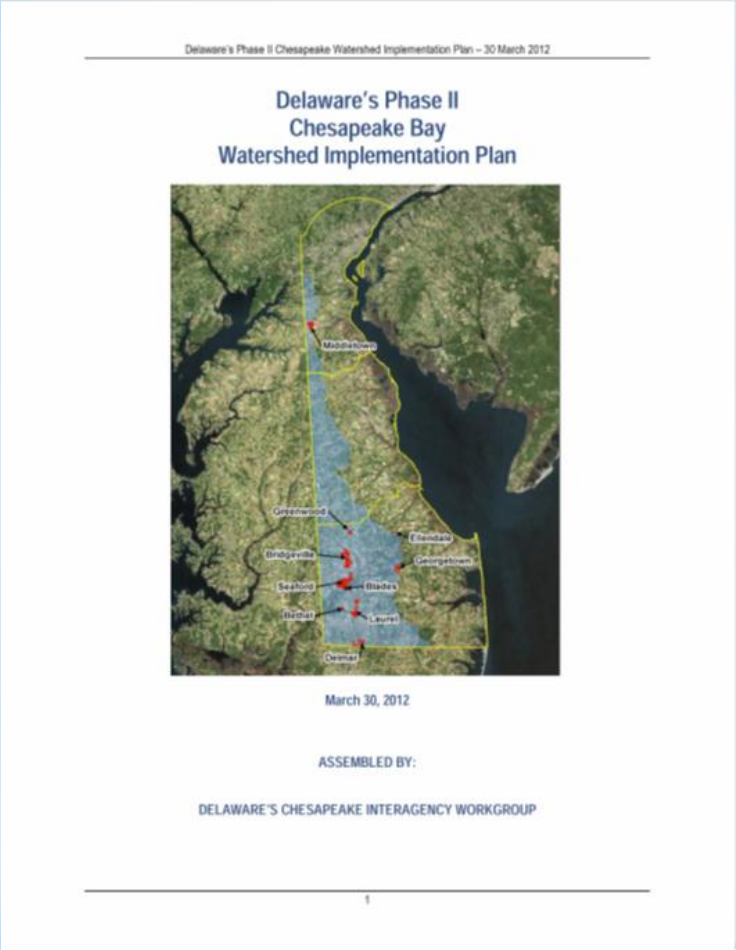
Jennifer Walls (Jennifer.Walls@state.de.us)

Marcia Fox (Marcia.Fox@state.de.us)

DNREC Watershed Assessment Section

302-739-9939

http://de.gov/cheswip



Delaware's Phase II Chesapeake Watershed Implementation Plan – 30 March 2012

Delaware's Phase II
Chesapeake Bay
Watershed Implementation Plan

March 30, 2012

ASSEMBLED BY:

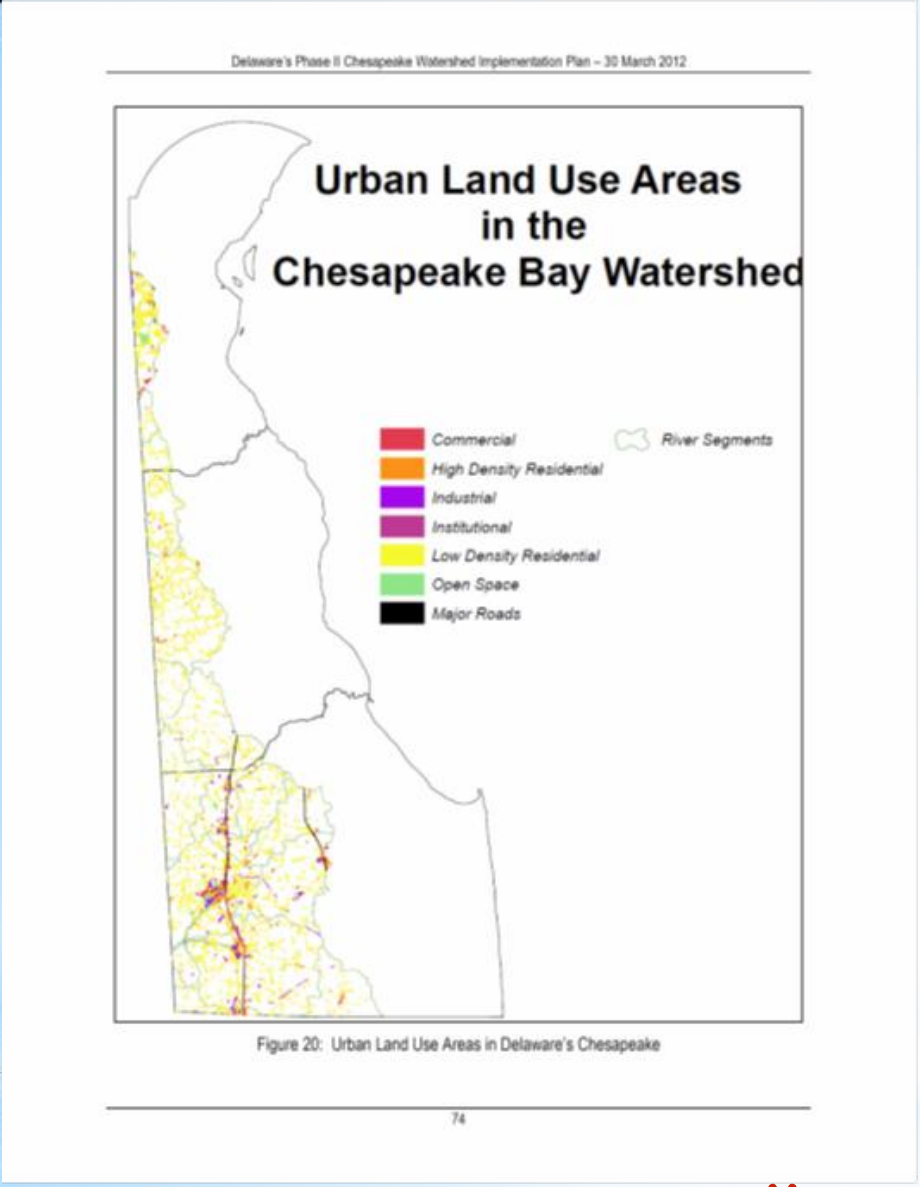
DELAWARE'S CHESAPEAKE INTERAGENCY WORKGROUP

1

*Delaware WIP, Phase II

Urban Sector Update

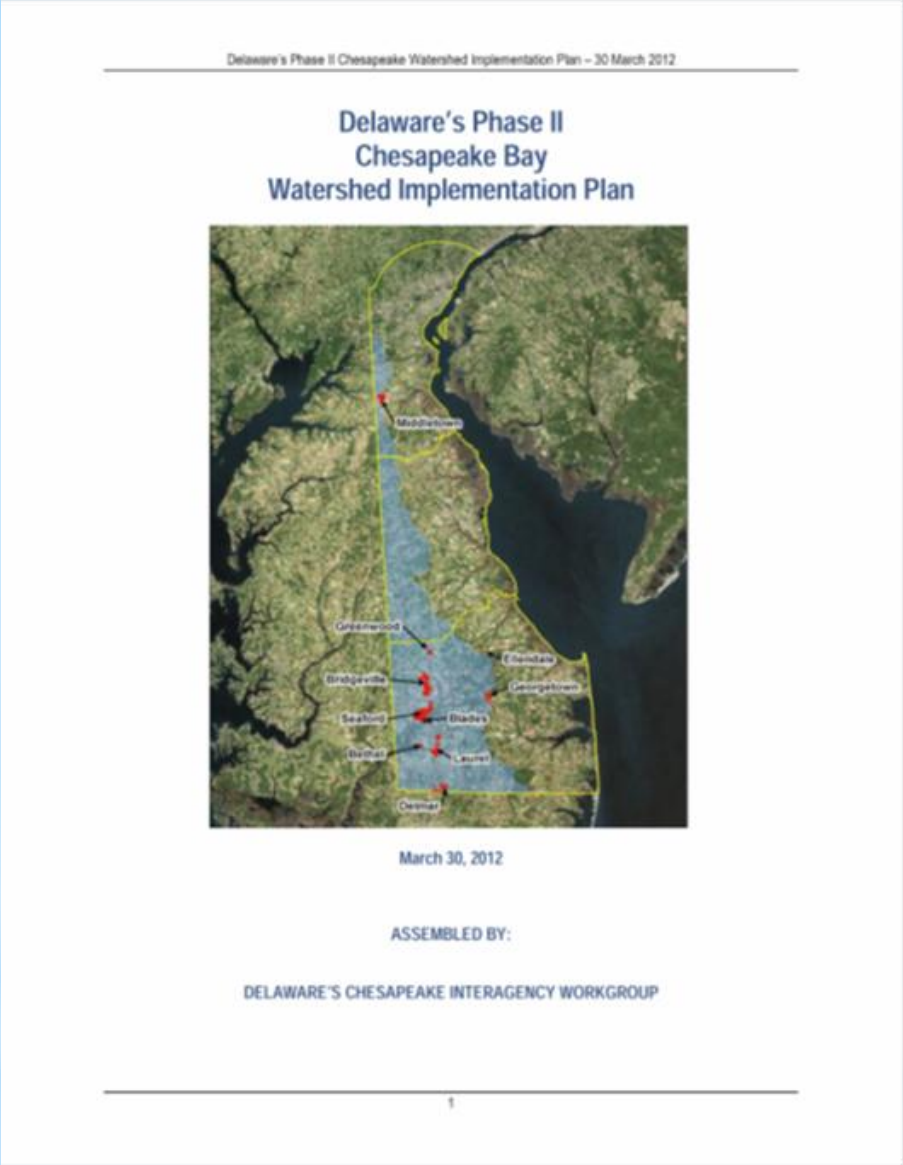
Presented by:
Randy Greer, PE
DNREC, Sediment & Stormwater Program



- Delaware portion of CB drainage is ~10% Urban
- Of that 10%:
  - 81% LD Residential
  - 5% HD Residential
  - 5% Commercial
  - 3% Industrial
  - 2% Open Space
  - 2% Roads
  - 1% Institutional
- Approx. 4% impervious
- Of that 4%, roads make up 33%

Delaware WIP, Phase II

Urban Sector Update



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March 30, 2012

ASSEMBLED BY:

DELAWARE'S CHESAPEAKE INTERAGENCY WORKGROUP

1

*Strategy to Fill Gaps

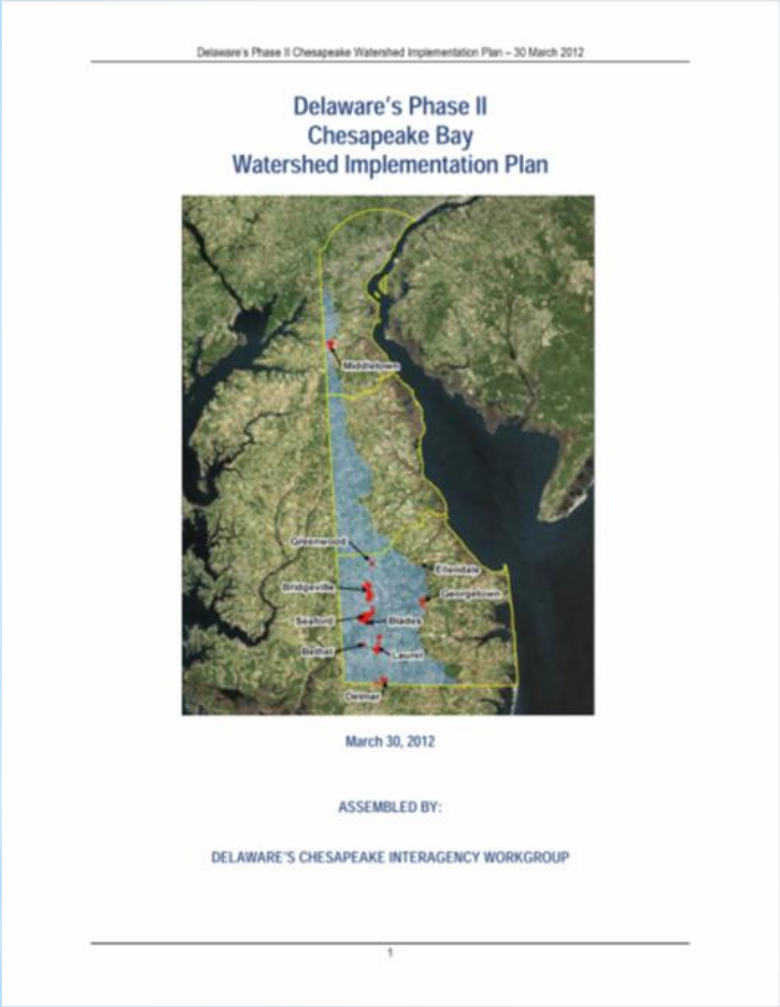
- *Update Delaware Sediment & Stormwater Regulations (DSSR)

*Delaware WIP, Phase II

Urban Sector Update

Timeline for Revisions to DSSR

* April 1, 2013: Delaware Register
* April 23, 2013: Public Hearing
* July 2013: Promulgation
* January 2014: Effective Date



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ASSEMBLED BY:

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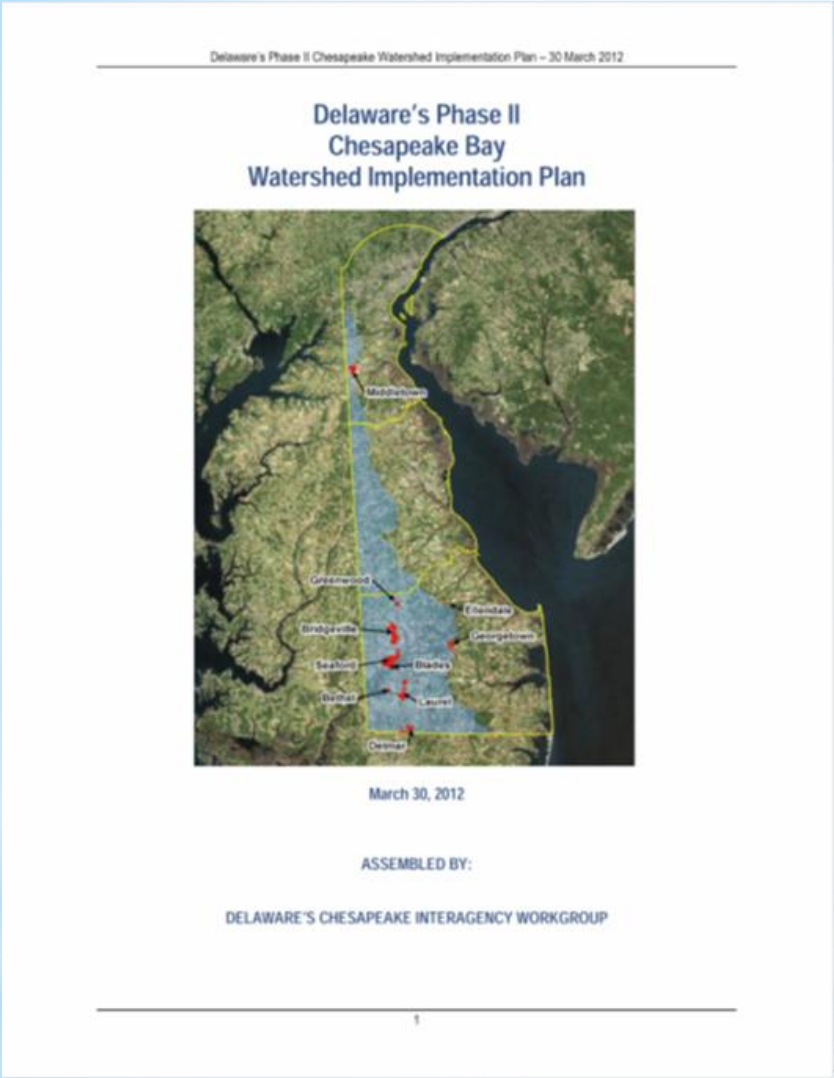
- **Strategy to Fill Gaps**
  - Update Delaware Sediment & Stormwater Regulations
  - City of Seaford SW Retrofits Project

Delaware WIP, Phase II

Urban Sector Update



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March 30, 2012

ASSEMBLED BY:

DELAWARE'S CHESAPEAKE INTERAGENCY WORKGROUP

1

*Strategy to Fill Gaps

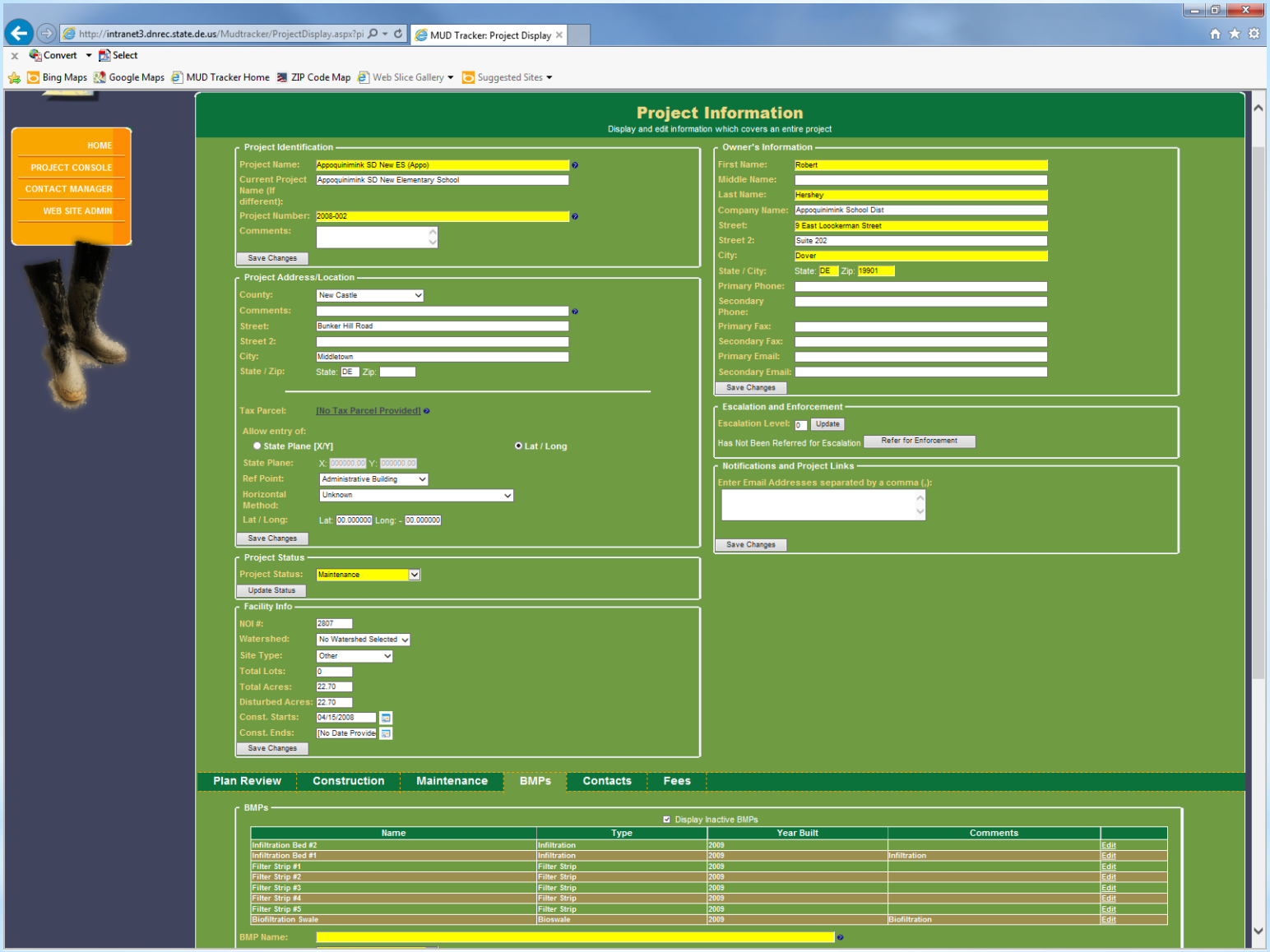
- *Update Delaware Sediment & Stormwater Regulations
- *City of Seaford SW Retrofits Project
- *Update SW BMP database

*Delaware WIP, Phase II

Urban Sector Update

*Delaware WIP, Phase II

Urban Sector Update



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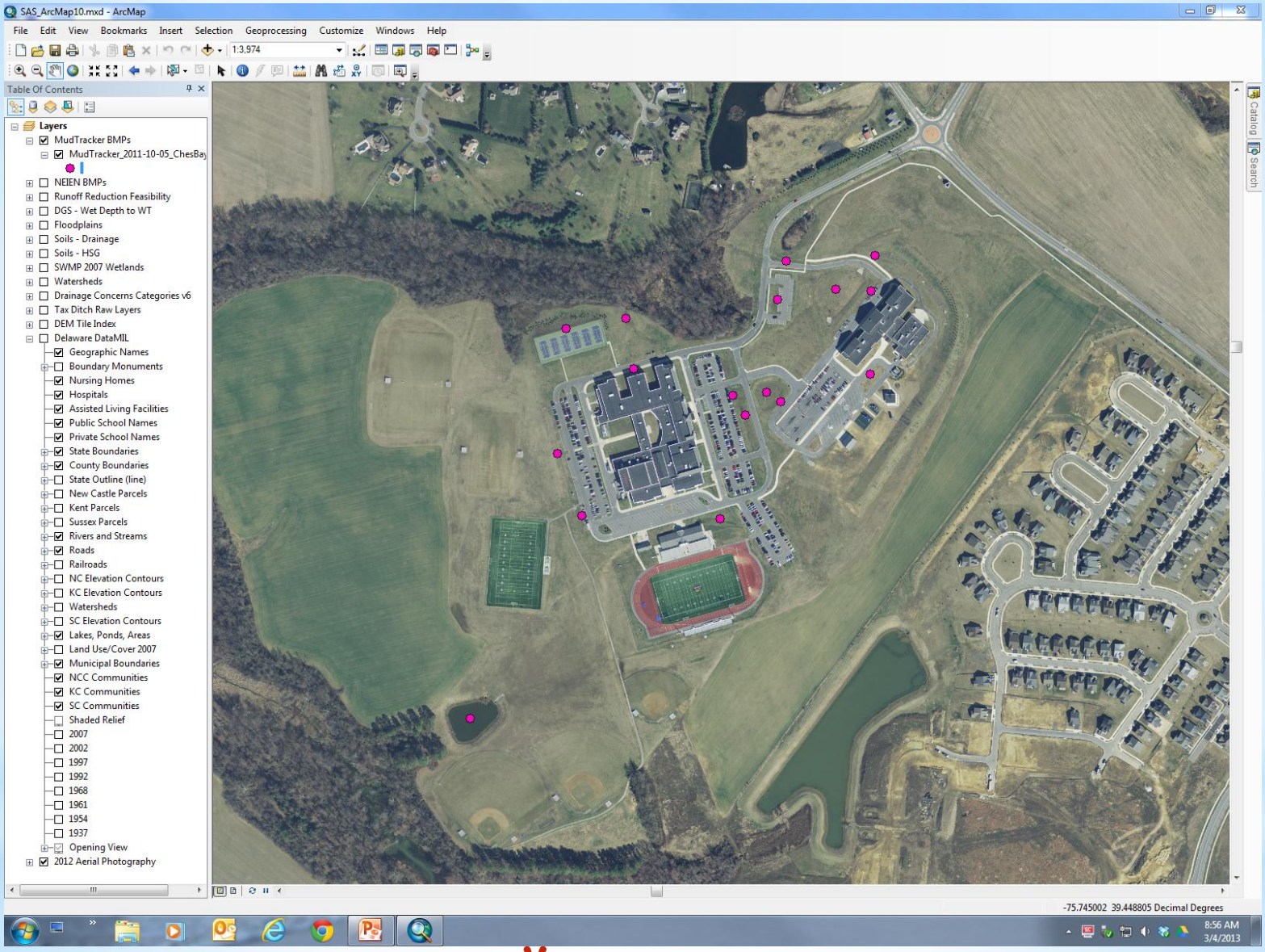
Urban Sector Update



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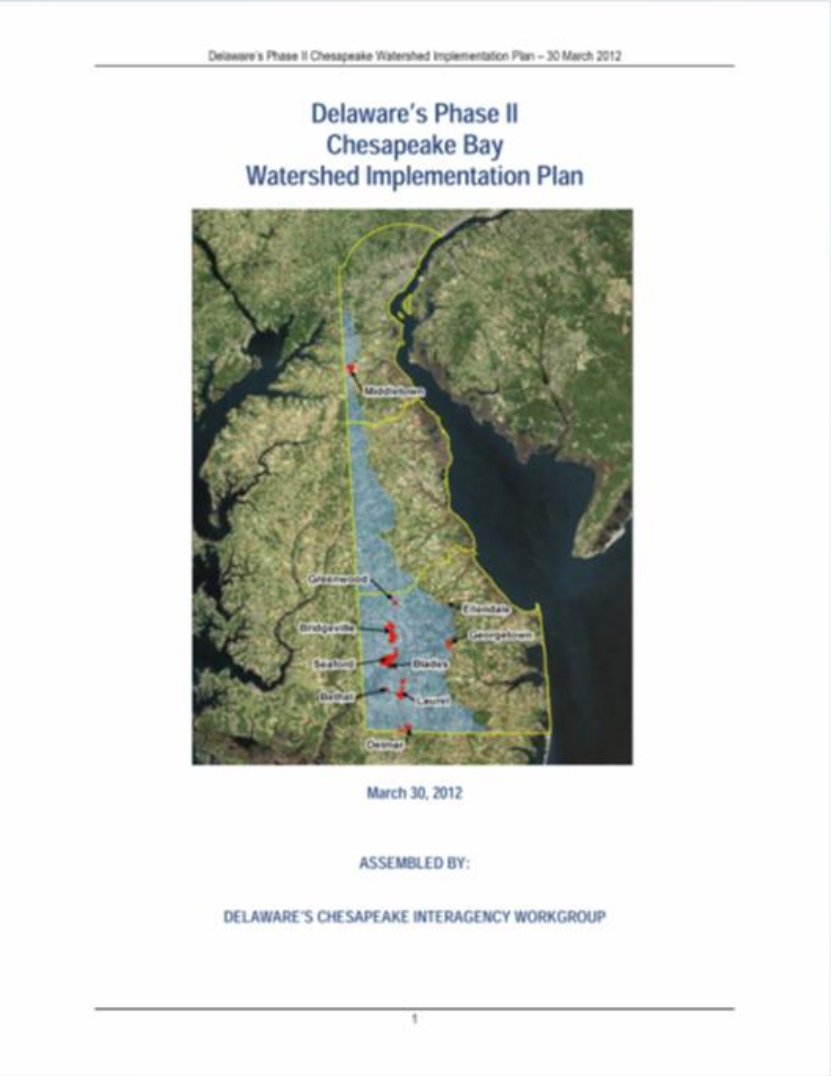
Urban Sector Update



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March 30, 2012

ASSEMBLED BY:

DELAWARE'S CHESAPEAKE INTERAGENCY WORKGROUP

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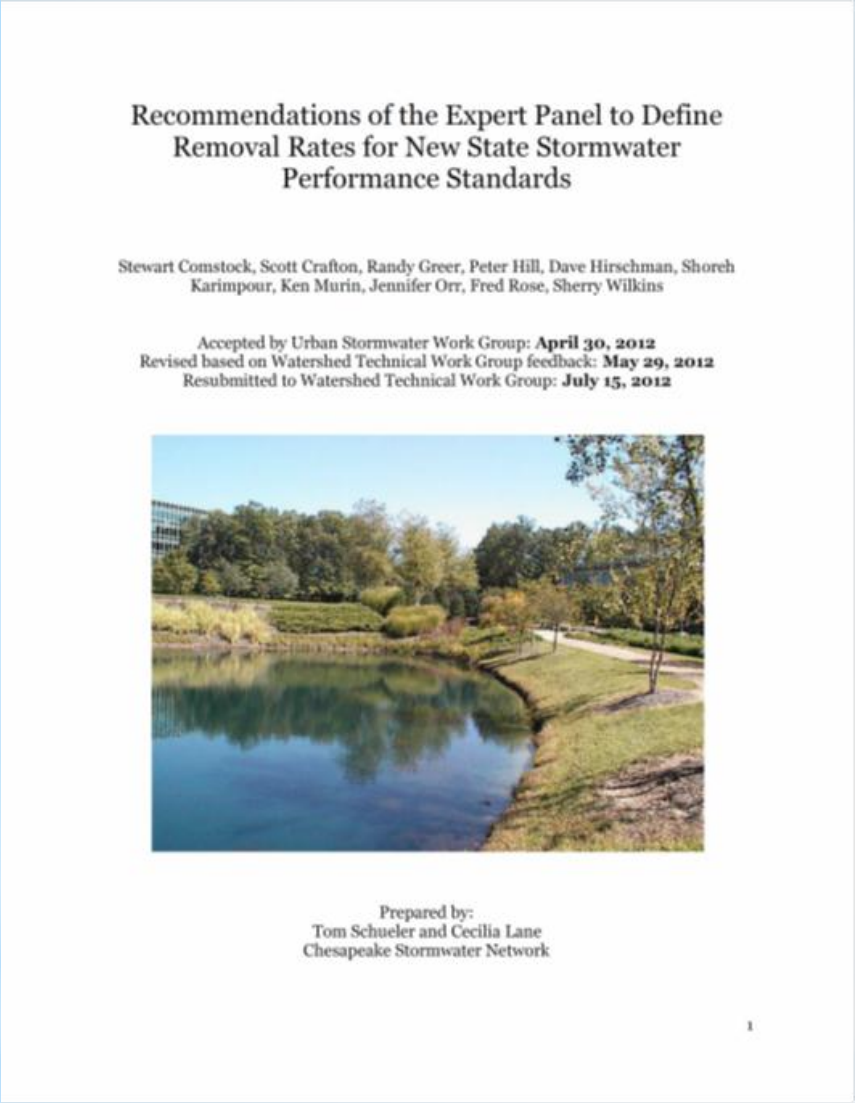
- **Strategy to Fill Gaps**
  - Update Delaware Sediment & Stormwater Regulations
  - City of Seaford SW Retrofits Project
  - Update SW BMP database
- **Update Urban BMP Crediting in CB Model**

Delaware WIP, Phase II

Urban Sector Update



Recommendations of the Expert Panel to Define Removal Rates for New State Stormwater Performance Standards

Stewart Comstock, Scott Crafton, Randy Greer, Peter Hill, Dave Hirschman, Shoreh Karimpour, Ken Murin, Jennifer Orr, Fred Rose, Sherry Wilkins

Accepted by Urban Stormwater Work Group: **April 30, 2012**
Revised based on Watershed Technical Work Group feedback: **May 29, 2012**
Resubmitted to Watershed Technical Work Group: **July 15, 2012**

Prepared by:
Tom Schueler and Cecilia Lane
Chesapeake Stormwater Network

1

- **Urban Stormwater Workgroup Experts Panels**
  - New SW Performance Standards
  - Stream Restoration
  - Urban Fertilizer Mgt
  - Enhanced ESC Practices

Delaware WIP, Phase II

Urban Sector Update

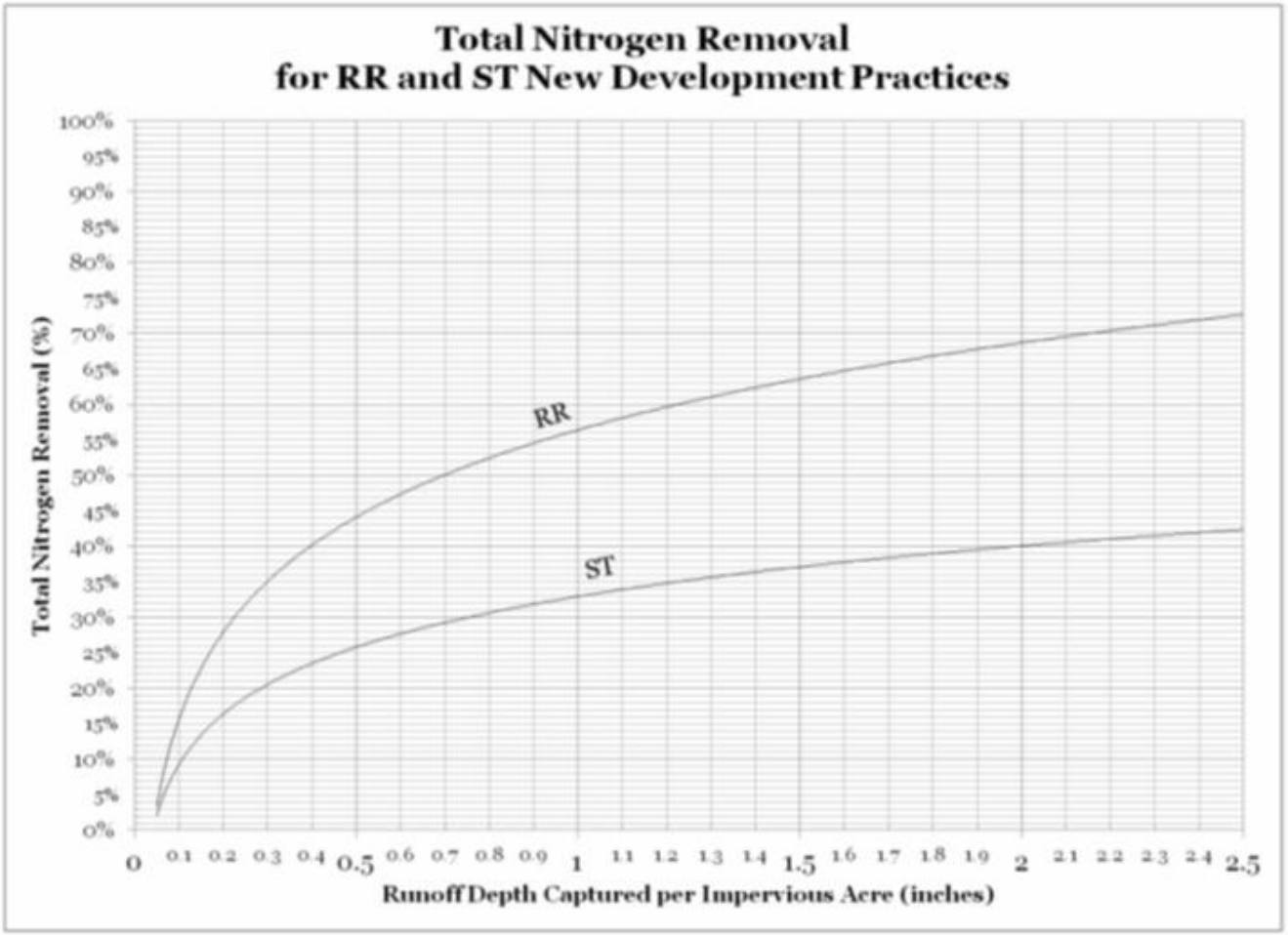


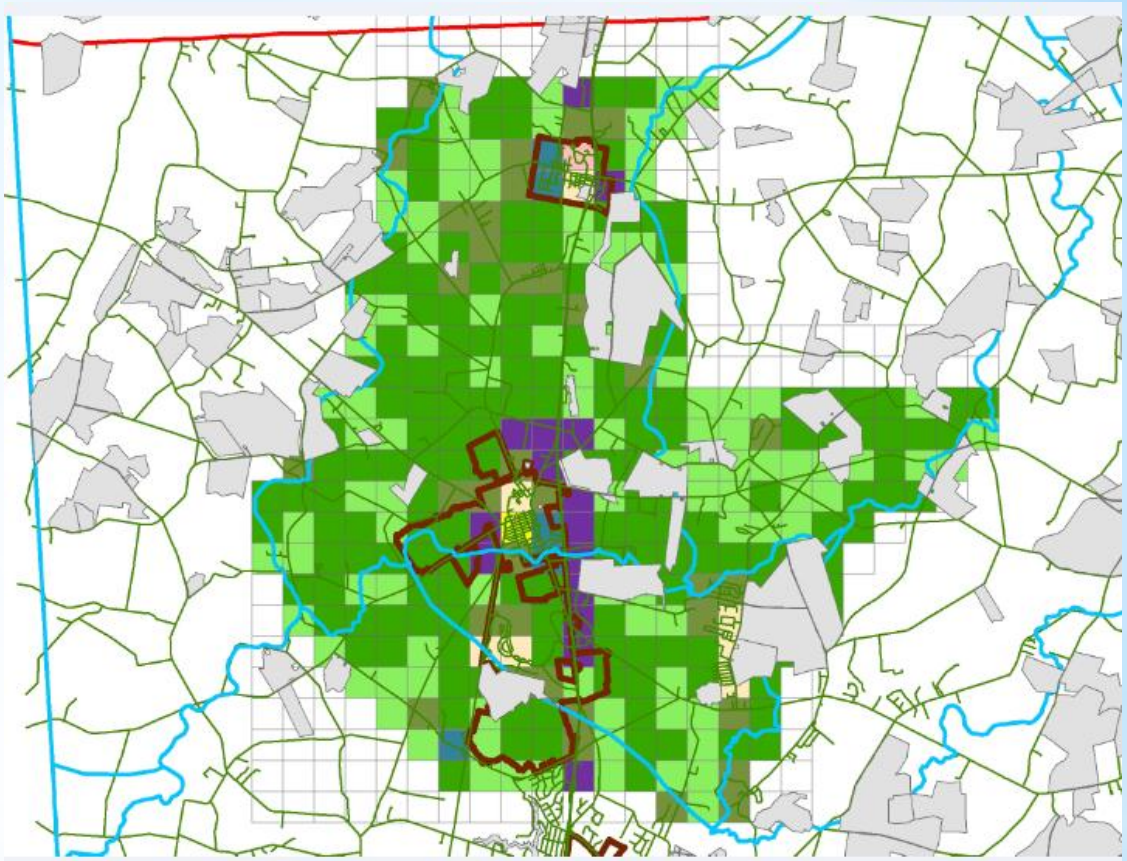
Figure 2. New BMP Removal Rate Adjustor Curve for Total Nitrogen

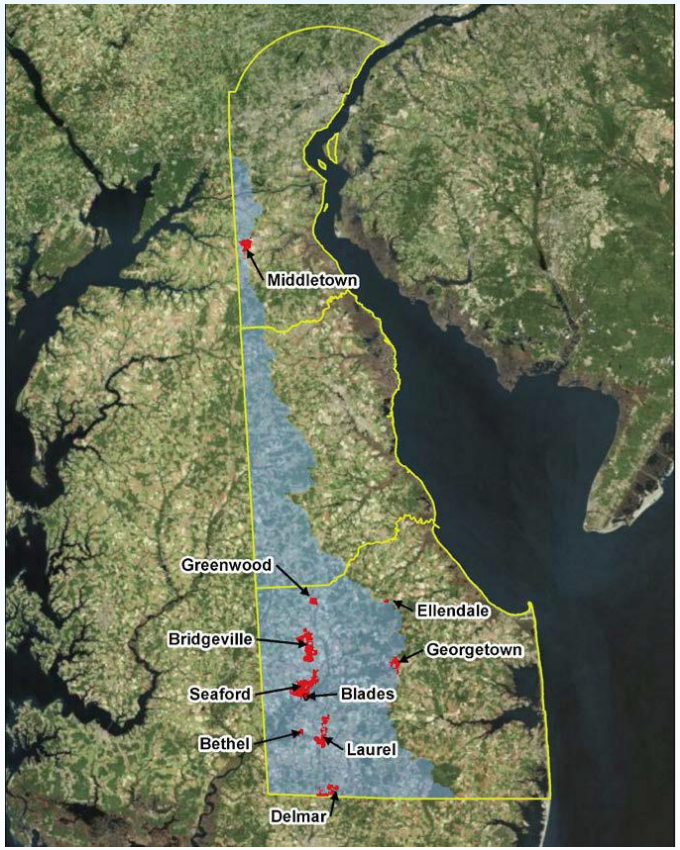
*Delaware WIP, Phase II

Urban Sector Update

*Master Planning Efforts

- *Master Planning
- *Community Viz
- *WeTable



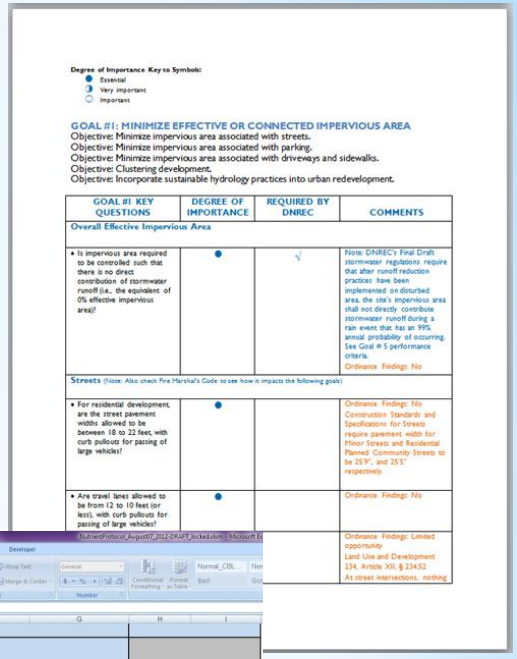


*Local Engagement in the Chesapeake Bay Watershed

TETRA TECH
Presented by:
Eugenia Hart

*Local Engagement Tasks

- Local Land Use Ordinance Review
- Urban Best Management Practice Tracking Database Template
- *Nutrient and Sediment Loading Assessment Protocol*
- Municipal and County Nutrient and Sediment Loads

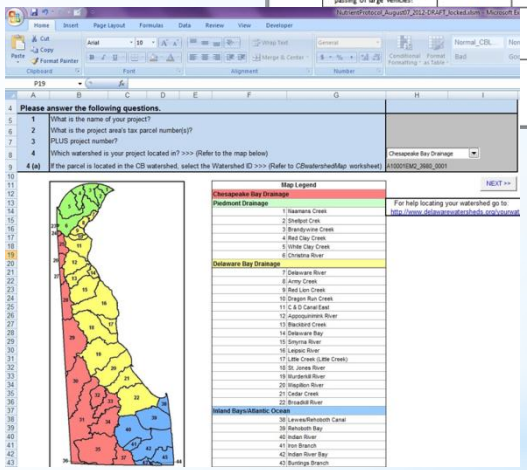


Degree of Importance Key to Symbols:
- Essential
- Very important
- Important

GOAL #1: MINIMIZE EFFECTIVE OR CONNECTED IMPERVIOUS AREA

Objective: Minimize impervious area associated with streets.
Objective: Minimize impervious area associated with parking.
Objective: Minimize impervious area associated with driveways and sidewalks.
Objective: Clustering development.
Objective: Incorporate sustainable hydrology practices into urban redevelopment.

GOAL #1 KEY QUESTIONS	DEGREE OF IMPORTANCE	REQUIRED BY DNREC	COMMENTS
Overall Effective Impervious Area			
• Is impervious area required to be controlled such that there is no direct contribution of stormwater runoff (i.e., the equivalent of 0% effective impervious area)?	●	√	Note: DNREC's Final Draft stormwater regulations require that after runoff reduction practices have been implemented on disturbed area, the site's impervious area shall not directly contribute stormwater runoff during a rain event that has an 99% annual probability of occurring. See Goal # 5 performance criteria. Ordinance Findings: No
Streets (Note: Also check Fire Marshal's Code to see how it impacts the following goals)			
• For residential development, are the street pavement widths allowed to be between 18 to 22 feet, with curb pullouts for passing of large vehicles?	●		Ordinance Findings: No Construction Standards and Specifications for Streets require pavement width for Minor Streets and Residential Planned Community Streets to be 25'9", and 25'5" respectively.
• Are travel lanes allowed to be from 12 to 10 feet (or less), with curb pullouts for passing of large vehicles?	●		Ordinance Findings: No
			Ordinance Findings: Limited opportunity Land Use and Development 234, Article XII, § 234.52 At street intersections, nothing



Please answer the following questions.

1 What is the name of your project?
2 What is the project area's tax parcel number(s)?
3 PLUS project number?
4 Which watershed is your project located in? >>> (Refer to the map below)
4 (a) If the parcel is located in the CB watershed, select the Watershed ID >>> (Refer to CBwatershedMap worksheet)

Map Legend

Chesapeake Bay Drainage
Piedmont Drainage
1: Naamans Creek
2: Shellpot Creek
3: Brandywine Creek
4: Red Clay Creek
5: White Clay Creek
6: Christina River
Delaware Bay Drainage
7: Delaware River
8: Army Creek
9: Red Lion Creek
10: Dragon Run Creek
11: C & D Canal East
12: Appoquinimink River
13: Blackbird Creek
14: Delaware Bay
15: Smyrna River
16: Leipsic River
17: Little Creek (Little Creek)
18: St. Jones River
19: Murderkill River
20: Mispillion River
21: Cedar Creek
22: Broadkill River
Inland Bays/Atlantic Ocean
38: Lewes/Rehoboth Canal
39: Rehoboth Bay
40: Indian River
41: Iron Branch
42: Indian River Bay
43: Buntings Branch

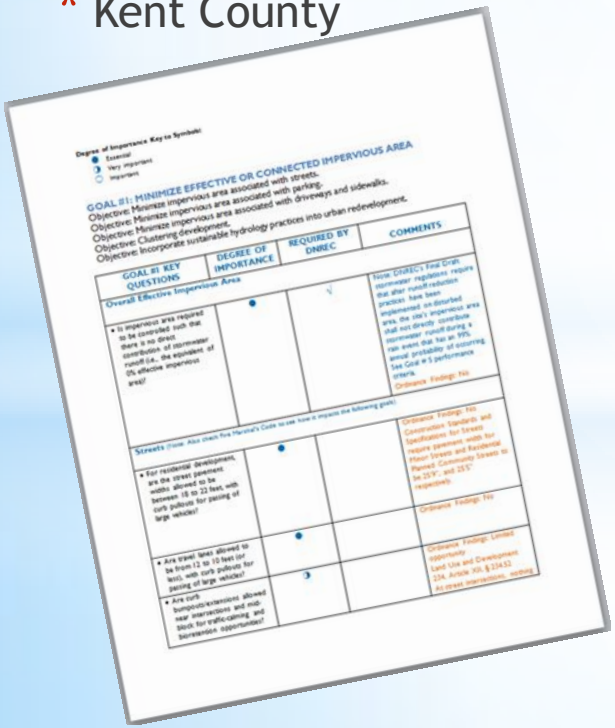
NEXT >>

For help locating your watershed go to:
http://www.delawarewatersheds.org/yourwat

*Local Land Use Ordinance Review

10 Local Governments

* Bethel
* Blades
* Bridgeville
* Delmar
* Georgetown
* Greenwood
* Laurel
* Seaford
* Sussex County
* Kent County



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GOAL #1 KEY QUESTIONS	DEGREE OF IMPORTANCE	REQUIRED BY DNREC	COMMENTS
Overall Effective Impervious Area			
• Is impervious area required to be connected such that there is no direct contribution of stormwater runoff (i.e., the equivalent of 0% effective impervious area)?	•	√	Note: DNREC's Final Draft stormwater regulations require that other runoff-reduction practices have been implemented on disturbed area, the only impervious area that not directly contribute stormwater runoff during a rain event that has an 99% annual probability of occurring (see Goal #5 performance criteria. Ordinance Findings: No.
Streets (Note: Also check Fire Marshal's Guide to see how it impacts the following goals)			
• For residential development, are the street pavement widths allowed to be between 18 to 22 feet, with curb pullouts for passing of large vehicles?	•		Ordinance Findings: Yes. Construction Standards and Specifications for Sussex Specifications for Sussex requires pavement width for Planned Community Streets to be 22.5', and 25.5' respectively.
• Are travel lanes allowed to be from 12 to 10 feet (or less), with curb pullouts for passing of large vehicles?	•		Ordinance Findings: No
• Are curb bumpouts/extensions allowed near intersections and mid-block for traffic-calming and bioretention opportunities?	◑		Ordinance Findings: Limited opportunity. Land Use and Development 234, Article XIII, § 234-53. Access exceptions, nothing

Purpose

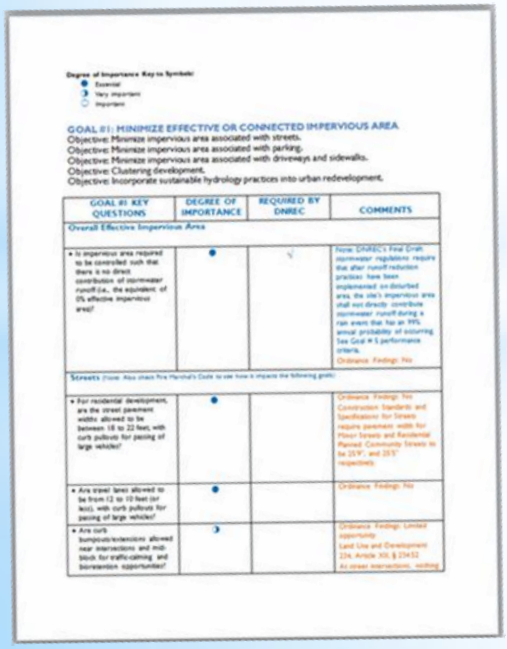
Identify any barriers to implementing the Chesapeake Bay WIP.

Goal

Help local governments identify opportunities for improving communities and allowing more techniques to address nutrient and sediment loads from new developments.

*Types of Ordinances Reviewed

* Subdivision ordinance
* Zoning ordinance
* Sedimentation and erosion control ordinance or regulations
* Onsite wastewater ordinance or regulations



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Overall Effective Impervious Area			
• Is impervious area required to be controlled such that there is no direct contribution of stormwater runoff (i.e., the equivalent of 0% effective impervious area)?	●	√	Note: DNREC's Final Draft stormwater regulations require that after runoff reduction practices have been implemented on disturbed area, the site's impervious area shall not directly contribute stormwater runoff during a rain event that has an 99% annual probability of occurring. See Goal # 5 performance criteria. Ordinance Findings: No
Streets (Cover: Also check Fire Marshal's Code to see how it impacts the following goals)			
• For residential development, are the street pavement widths allowed to be between 18 to 22 feet, with curb pullouts for passing of large vehicles?	●		Ordinance Findings: No. Construction Standards and Specifications for Streets require pavement width for Minor Streets and Residential Paved Community Streets to be 25'9", and 25'5" respectively
• Are street lanes allowed to be from 12 to 10 feet (or less), with curb pullouts for passing of large vehicles?	●		Ordinance Findings: No
• Are curb bumpouts/extensions allowed near intersections and mid-block for traffic-calming and bioretention opportunities?	◑		Ordinance Findings: Limited opportunity. Land Use and Development 22A, Article XIX, § 22A52 At street intersections, midblock

Low Impact Development (LID)

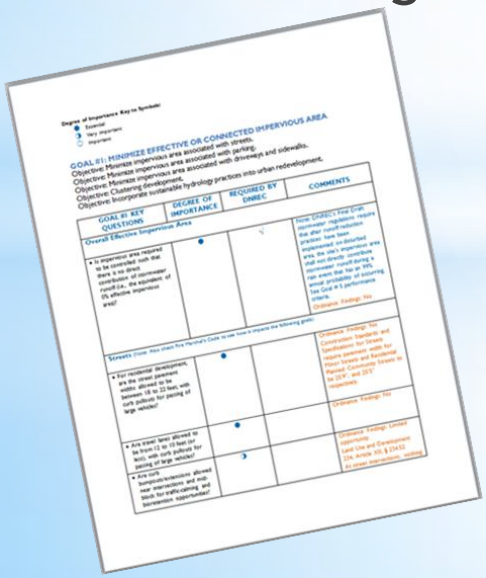
* Use landscape features that infiltrate, filter, store, evaporate, and detain runoff close to its source to imitate a site's predevelopment hydrology.

Conservation Design

* Controlled-growth that allows development while preserving open space, protecting natural wildlife habitats, and maintaining the character of rural communities.

*Practices that encourage…

1. Minimize Effective or Connected Impervious Area
2. Preserve and Enhance the Hydrologic Function of Unpaved Areas
3. Harvest Rainwater
4. Allow and Encourage Multi-Use Stormwater Controls
5. Manage Stormwater to Meet WIP and DNREC Regulations
6. Manage Construction Site Stormwater to Meet WIP and DNREC Regulations
7. Manage On-Site Wastewater Systems to Meet WIP and DNREC Regulations



Degree of Importance Key to Symbols:
● Essential
Very important
Important

GOAL #1: MINIMIZE EFFECTIVE OR CONNECTED IMPERVIOUS AREA
Objective: Minimize impervious area associated with streets.
Objective: Minimize impervious area associated with parking.
Objective: Minimize impervious area associated with driveways and sidewalks.
Objective: Clustering development.
Objective: Incorporate sustainable hydrology practices into urban redevelopment.

GOAL #1 KEY QUESTIONS	DEGREE OF IMPORTANCE	REQUIRED BY DNREC	COMMENTS
Overall Effective Impervious Area			
• Is impervious area required to be recorded, such that there is no direct contribution of increased runoff (i.e., the equivalent of 0% effective impervious area)?	●	✓	Note: Delaware's New Drop Stormwater regulations require that after runoff reduction practices have been implemented on developed sites, the site's impervious area shall not directly contribute more than 2 inches of runoff during a 2 year storm. Thus, the 2 year storm is the equivalent of assuming the Goal # 1 performance criteria. Ordinance Findings: Yes
Streets (Note: Also check the Harford County Code to see how it impacts the following goals)			
• For residential developments, are the street pavement widths allowed to be minimized (18 to 22 feet, with curb pullouts for passing of large vehicles)?	●		Ordinance Findings: The Construction Standards and Specifications for Streets requires pavement widths for minor streets and residential streets (Secondary Streets in Harford County) of 18' and 20' respectively.
• Are sidewalks allowed to be fewer (2 to 10 feet in width) with curb pullouts for passing of large vehicles?	●		Ordinance Findings: For
• Are curb turnarounds/extensions allowed near intersections and mid-block for traffic-calming and turnaround opportunities?	✓		Ordinance Findings: Limited opportunity. Land Use and Development Code, Article 165, § 224.02 (3). Article 165, § 224.02 (3) states subdivisions "shall be

*Ordinance Review Checklist

Barriers of omission –

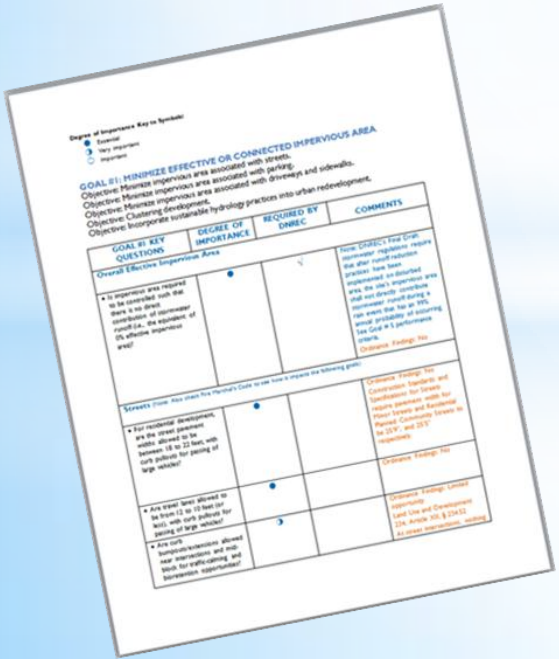
* LID techniques not expressly allowed or provided exemptions

Sediment and stormwater management –

* Reference the State of Delaware Sediment and Stormwater Regulations in subdivision ordinance

Reduce impervious area –

* Allow narrower street and right of way widths
* Allow a smaller number of parking spaces and smaller parking stalls and aisles



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Objective: Clustering development.
Objective: Incorporate sustainable hydrology practices into urban redevelopment.

GOAL #1 KEY QUESTIONS	DEGREE OF IMPORTANCE	REQUIRED BY DNREC	COMMENTS
Overall Effective Impervious Area			
• Is impervious area required to be controlled such that there is no direct contribution of stormwater runoff (i.e., the equivalent of 0% effective impervious area)?	●	✓	Note: DNREC's Final Draft stormwater regulations require that after runoff reduction practices have been implemented, on disturbed area, the site's impervious area shall not directly contribute stormwater runoff during a stormwater runoff storm event that has an 10% annual probability of occurring. See Goal #4 performance criteria. Ordinance Findings: No
Streets (Note: Also check the Manual's Code to see how it impacts the following goals)			
• For residential development, are the street pavement widths allowed to be between 18 to 22 feet, with curb pullouts for passing of large vehicles?	●		Ordinance Findings: Yes Construction Standards and Specifications for Streets require pavement width for Minor Streets and Residential Planned Community Streets to be 20.5' and 25.5' respectively.
• Are travel lanes allowed to be from 12 to 13 feet (or less), with curb pullouts for passing of large vehicles?	●		Ordinance Findings: No
• Are curb bumpouts/extensions allowed near intersections and mid-block for traffic-calming and bioretention opportunities?	◑		Ordinance Findings: Limited relationship Land Use and Development Code, Article XIII § 270-53 (A) states intersection radius

*Common Barriers and Recommendations

Results of Ordinance Review

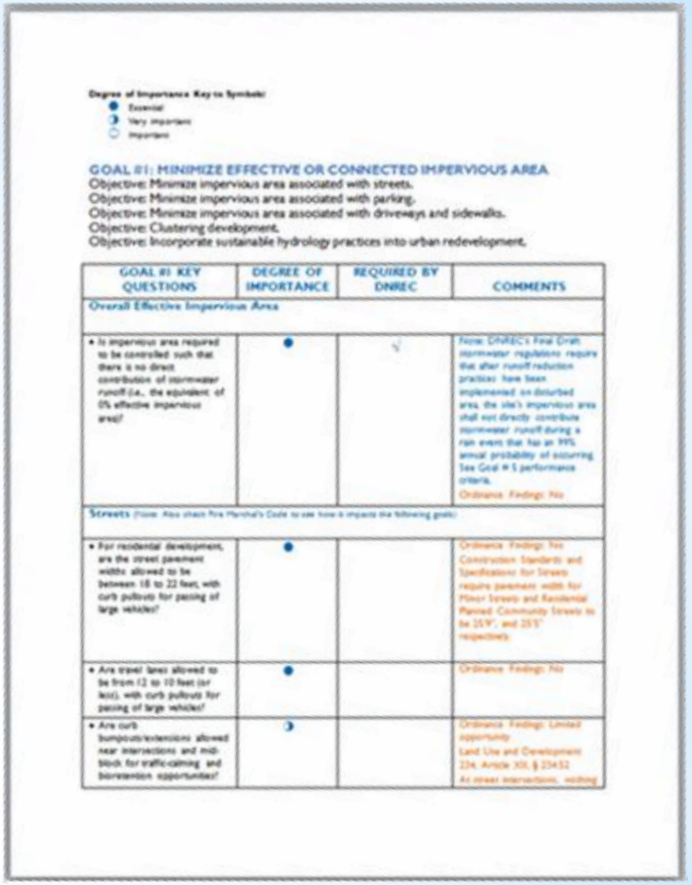
* **Ordinance Review Memo**

  Summary of the ordinance review including the identification of potential barriers and opportunities for LID and conservation design techniques

* **Model Ordinance Language Memo**

  Example code language that towns/counties can consider adopting to address the identified barriers and opportunities

* **Not Mandatory**



Degree of Importance Key to Symbols:

- ● Essential
- ◑ Very important
- ○ Important

GOAL #1: MINIMIZE EFFECTIVE OR CONNECTED IMPERVIOUS AREA

Objective: Minimize impervious area associated with streets.
Objective: Minimize impervious area associated with parking.
Objective: Minimize impervious area associated with driveways and sidewalks.
Objective: Clustering development.
Objective: Incorporate sustainable hydrology practices into urban redevelopment.

GOAL #1 KEY QUESTIONS	DEGREE OF IMPORTANCE	REQUIRED BY DNREC	COMMENTS
Overall Effective Impervious Area			
• Is impervious area required to be controlled such that there is no direct contribution of stormwater runoff (i.e., the equivalent of 0% effective impervious area)?	●	√	Note: DNREC's Final Draft stormwater regulations require that after runoff reduction practices have been implemented on disturbed area, the site's impervious area shall not directly contribute stormwater runoff during a rain event that has an 99% annual probability of occurring. See Goal # 5 performance criteria. Ordinance Findings: No
Streets (Note: Also check Fire Marshal's Code to see how it impacts the following goals)			
• For residential development, are the street pavement widths allowed to be between 18 to 22 feet, with curb pullouts for passing of large vehicles?	●		Ordinance Findings: Yes Construction Standards and Specifications for Streets require pavement width for Minor Streets and Residential Planned Community Streets to be 25'9", and 25'5" respectively.
• Are travel lanes allowed to be from 12 to 10 feet (or less), with curb pullouts for passing of large vehicles?	●		Ordinance Findings: No
• Are curb bumpouts/extensions allowed near intersections and mid-block for traffic-calming and bioretention opportunities?	◑		Ordinance Findings: Limited opportunity Land Use and Development 224, Article XIII, § 224.52 At street intersections, walking

*BMP Tracking Database Template

- *Provide BMP implementation information to CBP to get credit toward meeting the Chesapeake Bay TMDL goals
- *No current tracking and reporting system for urban BMPs in municipalities
- *Urban BMP Database Template being developed

* Bioretention
* Bioswale
* Buffers
* Detention ponds
* E & S control
* Filtering practices
* Hydrodynamic structures
* Infiltration basins and trenches
* Permeable pavement
* Public sewer connections
* Reduction of impervious surface
* Street sweeping
* Tree planting
* Urban nutrient management
* Vegetated treatment area
* Wet ponds and wetlands

* Types of BMPs

Book1 - Microsoft Excel

	A	B	C	D	E	F	G	H	I	J	K
1	BMP Name	BMP Measure Value	Hydrologic Soil Group	Underdrain	Prior Land Use	Type of Practice	End Date	Runoff Reduction or Stromwater Treatment	Retrofit Class	Runoff or Storage Volume	Impervious Area
2	Bioretention	Enter the Area Treated in acres. If area unknown, see below.	Enter soil group if known: A, B, C, D, A/B, or C/D If unknown leave blank.	Select one if known: Underdrain or No Underdrain If unknown leave blank.	Enter the prior land use code associated with your selected BMP as indicated on the *Land Uses* tab.	Indicate whether this is a New, Re-development, or Retrofit practice.	Enter the expected retirement date of the practice in M/D/YYYY format, if known.	Runoff reduction	Indicate whether any stormwater retrofits are New (new facility) or Existing (BMP conversions, enhancements, or restoration).	Enter the runoff or storage volume in acre-feet	Enter acres of impervious cover within the treated area.
3	Bioretention	Enter the Number of Systems implemented.	Enter soil group if known: A, B, C, D, A/B, or C/D If unknown leave blank.	Select one if known: Underdrain or No Underdrain If unknown leave blank.	Enter the prior land use code associated with your selected BMP as indicated on the *Land Uses* tab.	Indicate whether this is a New, Re-development, or Retrofit practice.	Enter the expected retirement date of the practice in M/D/YYYY format, if known.	Runoff reduction	Indicate whether any stormwater retrofits are New (new facility) or Existing (BMP conversions, enhancements, or restoration).	Enter the runoff or storage volume in acre-feet	Enter acres of impervious cover within the treated area.
4	Bioswale	Enter the Area Treated in Acres. If unknown see below.			Enter the prior land use code associated with your selected BMP as indicated on the *Land Uses* tab.	Indicate whether this is a New, Re-development, or Retrofit practice.	Enter the expected retirement date of the practice in M/D/YYYY format, if known.	Runoff reduction	Indicate whether any stormwater retrofits are New (new facility) or Existing (BMP conversions, enhancements, or restoration).	Enter the runoff or storage volume in acre-feet	Enter acres of impervious cover within the treated area.
5	Bioswale	Enter the Number of Systems implemented.			Enter the prior land use code associated with your selected BMP as indicated on the *Land Uses* tab.	Indicate whether this is a New, Re-development, or Retrofit practice.	Enter the expected retirement date of the practice in M/D/YYYY format, if known.	Runoff reduction	Indicate whether any stormwater retrofits are New (new facility) or Existing (BMP conversions, enhancements, or restoration).	Enter the runoff or storage volume in acre-feet	Enter acres of impervious cover within the treated area.
6	Disconnection of Rooftop Runoff	Enter the Area Treated in acres or, see below.			Enter the prior land use code associated with your selected BMP as indicated on the *Land Uses* tab.	Indicate whether this is a New, Re-development, or Retrofit practice.	Enter the expected retirement date of the practice in M/D/YYYY format, if known.	Runoff reduction	Indicate whether any stormwater retrofits are New (new facility) or Existing (BMP conversions, enhancements, or restoration).	Enter the runoff or storage volume in acre-feet	Enter acres of impervious cover within the treated area.

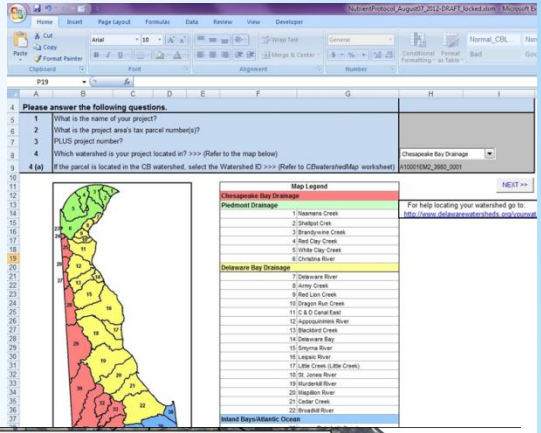
*Example

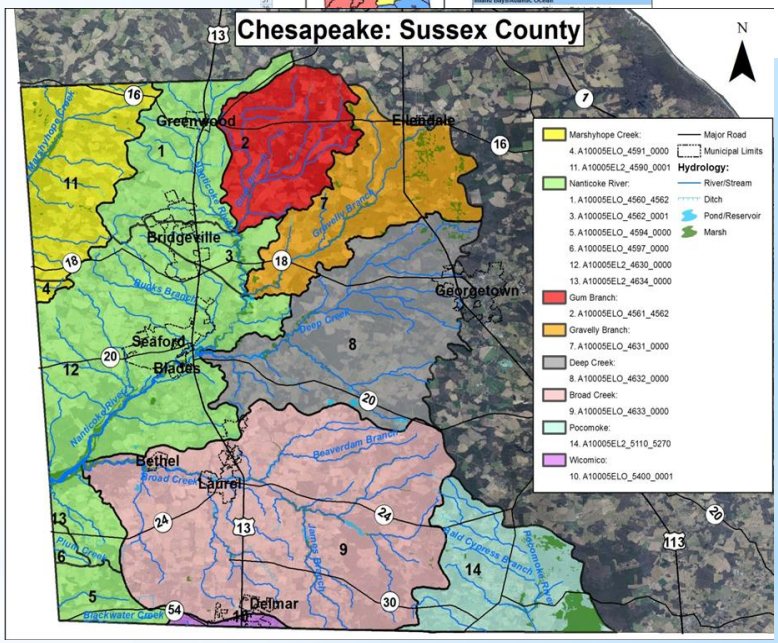
* Tool to calculate the nutrient and sediment loads for pre-and post-development land use

* Helps user determine the impact of a proposed development on water quality

* Helps quantify the types of BMPs necessary to reduce the impact of increased nutrient and sediment loads

* Online video tutorials





* *Nutrient and Sediment Loading Assessment Protocol*

Protocol User Input

- Parcel ID
- Watershed ID
- Current and proposed land use areas
- Loads from urban stormwater (DURMM)
- Number of proposed dwelling units
- Wastewater flow
- Wastewater treatment type
- Septic systems
- Pre and post-development BMPs

	A	B	C
1	Watershed =	Chesapeake Bay Drainage	
2	CB River Segment =	A10001EM2_3980_0001	
3	Subwatershed Name =	Choptank River	
4	LAND USE IN ACRES		
5		CURRENT	PROPOSED
6	Bare-construction	0.00	0.00
7	Extractive	0.00	0.00
8	Forest	50.00	50.00
9	Harvested forest	0.00	0.00
10	Hay without nutrients	0.00	0.00
11	Hay with nutrients/nutrient management	0.00	0.00
12	Alfalfa with nutrient management	0.00	0.00
13	High-till with manure/nutrient management	0.00	0.00
14	Low-till with manure/nutrient management	100.00	0.00
15	Pasture	0.00	0.00
16	Non-permitted animal feeding operations	0.00	0.00
17	Regulated Animal Feeding Operations (CAFO production area)	0.00	0.00
18	Nursery	0.00	0.00
19	Atmospheric deposition to non-tidal water		
20	Urban/Residential	0.00	100.00
21	Total	150.00	150.00
22			
23			
24	DURMM Model Inputs		
25	Land Use (acres)	CURRENT	PROPOSED
26	Urban/Residential	0.00	100.00
27			
28	Enter Percent Impervious value from DURMM	30.0%	
29			
30	DURMM Urban Load for New Development (lb/year)		
31	TN	TP	SED
32	2000.00	100.00	2000.00

Overall Loading Summary	TN	TP	SED
Pre-development Pollutant Load (lb/year)	902.8	58.2	13,480.1
Target TMDL Load (lb/year)	**689.4**	**44.7**	**10,921.4**
Post-development Pollutant Load – Without BMPs (includes Wastewater Treatment Load) (lb/year)	1,163.7	78.5	4,283.6
Post-development Pollutant Load – With BMPs (includes Wastewater Treatment Load) (lb/year)	1,162.6	78.3	4,043.8
Net Load (lb/yr) exceeding (+) or below (-) the TMDL target	+473.3	+33.6	-6,877.6

With your proposed BMPs, your proposed development meets required TMDL reduction for Sediment but NOT for TN and TP!

*Municipal and County Nutrient and Sediment Loads

* Municipal and county TN, TP, and sediment loads calculated based on DE's land use coverage and Chesapeake Bay model loading rates

* Plans to adapt the Protocol to each local government

*Questions