MARYLAND
DEPARTMENT OF THE ENVIRONMENT

Maryland's Stormwater, Sediment Control and Dam Safety Program

Stormwater Management Update

MDE

Stormwater Management Act of 2007

- **Requires implementation of Environmental Site Design (ESD) to the maximum extent practicable**

- **ESD: “using small-scale stormwater management practices, nonstructural techniques, and better site planning to mimic natural hydrologic runoff characteristics and minimize the impact of land development on water resources”**

Stormwater Regulation Changes 2000 vs. 2009

2000	2009
Nonstructural practices create incentive for environmentally friendly designs Intended to encourage planning for stormwater early in design	ESD to the MEP Approvals required during 3 phases of project design Stormwater planning now required to during concept design
Move from flood control to water quality Filtering practices (WQv) and control of frequent events (1- year, Cpv) BMP design criteria based on water quality performance (80 TSS/40 P)	Small scale ESD practices are required for minimum 1” of rainfall ESD criteria based on replicating hydrology for “ woods in good condition” (about 2.7” rainfall)
Water quality for redevelopment 20% reduction in impervious area On-site or Off-site BMPs Alternatives	Water quality for redevelopment 50% impervious area reduction On-site or off-site BMPs Alternatives

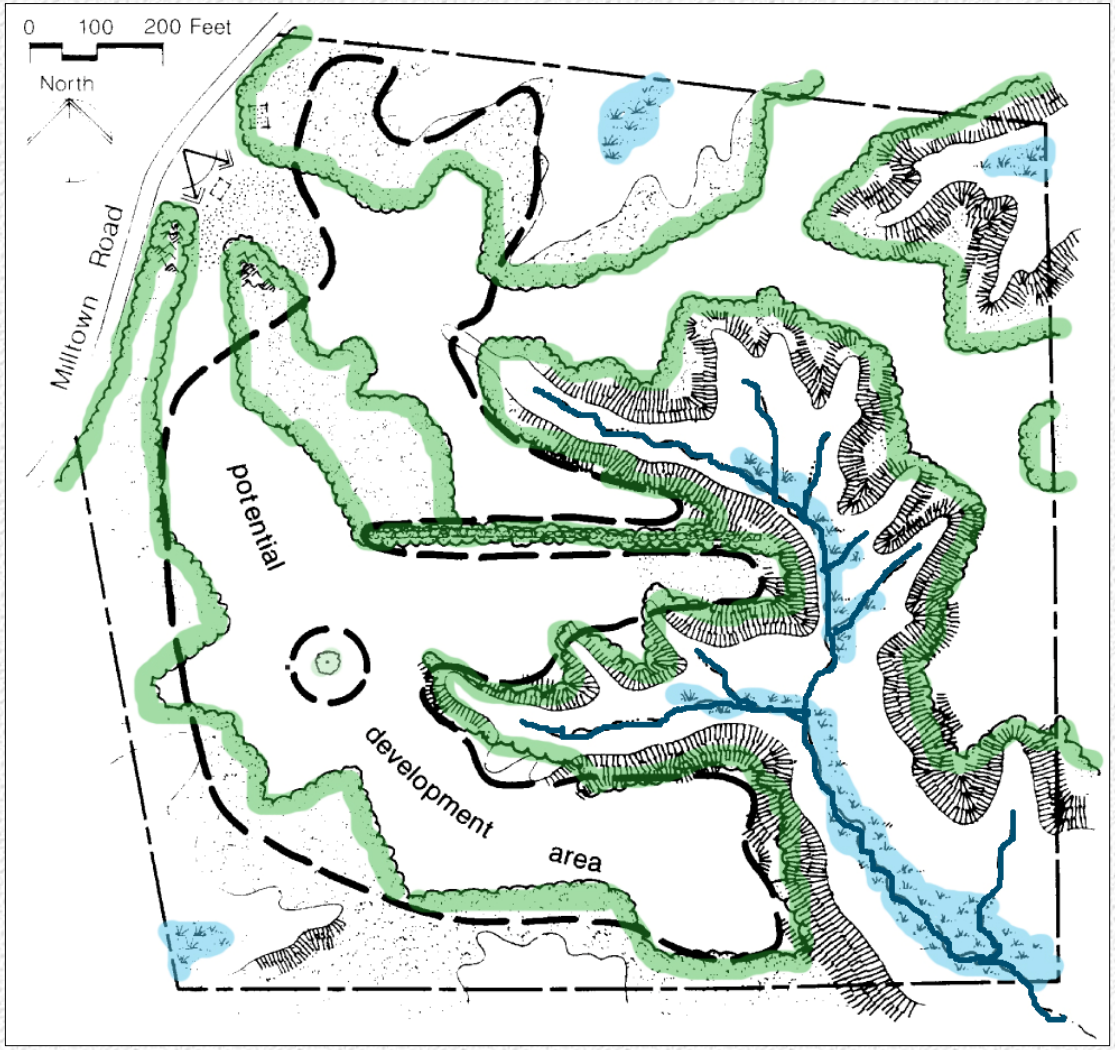
ESD Planning Techniques

- **Concept Phase**
  - Natural Resource Inventory and Protection
  - Implement Site Design Techniques to Minimize Impervious Area
  - Integrate ESD Practices into the Landscape
  - Using Natural Drainage Pathways for Stable Conveyance
- **Site Development Phase**
  - Examine Use of Alternative Surfaces
  - Use of Nonstructural Practices
  - Integrate E & S Design into Plan
- **Final Design and Approval Phase**
  - ESD to MEP

Site Mapping/Fingerprinting

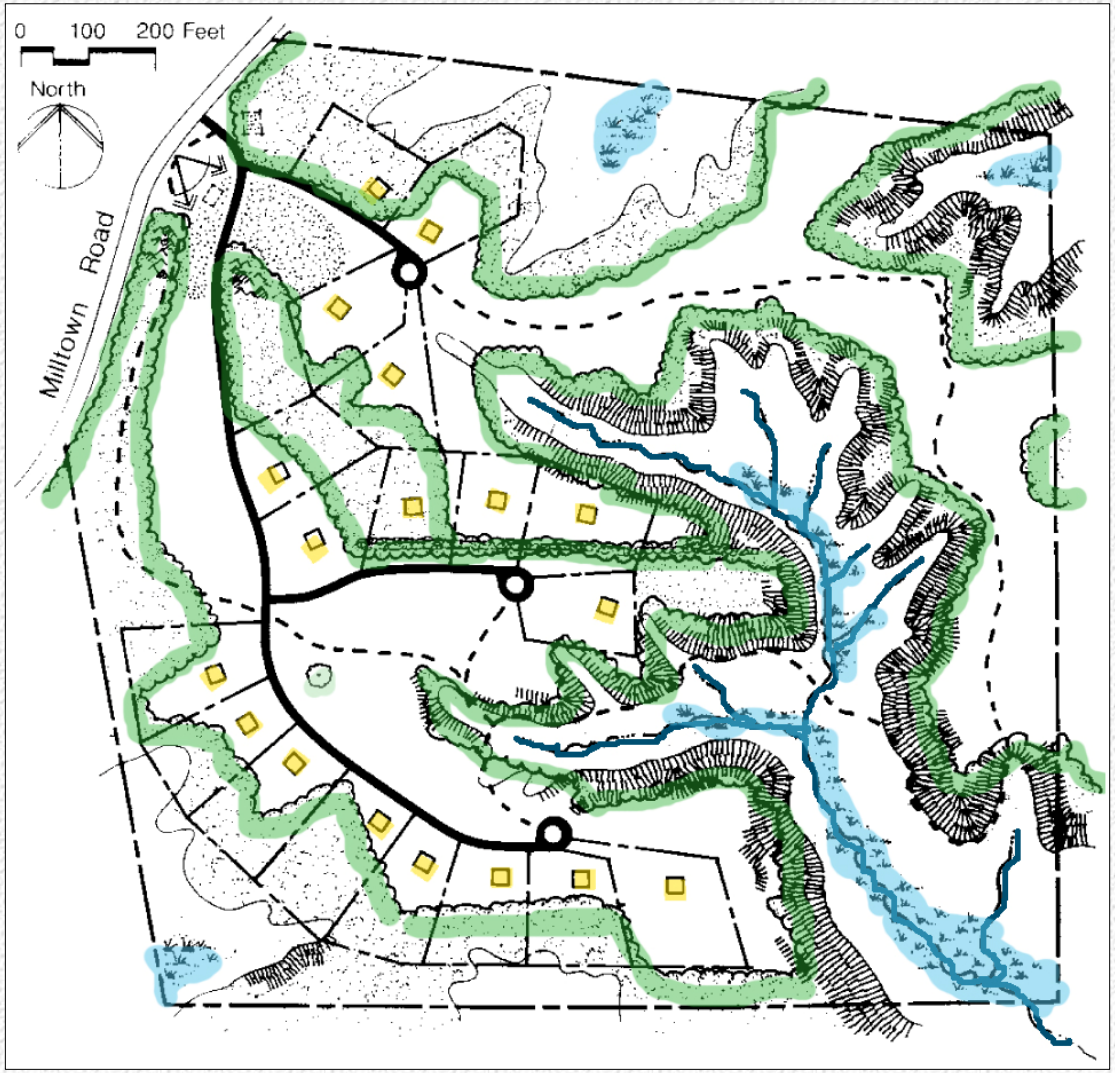
Natural Area Preservation
Minimize Clearing and Grading

Site Mapping/Fingerprinting



Courtesy of Natural Lands Trust

Site Development Layout



Courtesy of Natural Lands Trust

Site Development Layout

ESD Techniques to Minimize Imperviousness

Clustered Development

Shared Driveways

Cul-de-sac Island

Site Development Layout

ESD Techniques to Minimize Imperviousness

Permeable Pavers in Residential and Commercial Development

Impervious Cover Reduction

Site Development Layout

Integrate ESD Practices into the Landscape

Rooftop Disconnections in Commercial and Residential Development

New ESD - BMPS

- Nonstructural BMPs (New Chapter 5)
  - Expanding and Enhancing Buffers
  - Reducing Imperviousness
  - Alternative Surfaces
    - Green Roofs
    - Permeable Pavements
  - Micro-Scale Practices
    - Rainwater Harvesting
    - Submerged Gravel Wetlands
    - Landscape Infiltration
    - Infiltration Berms
    - Dry Wells
    - Micro-Bioretention
    - Swales
    - Enhanced Filters

Residential Landscape Planters

Residential Raingardens

Anne Arundel County


Worcester County

Micro-scale Treatment Systems

Worcester County

University of Maryland, Prince Georges County

Streetscape Projects

MARYLAND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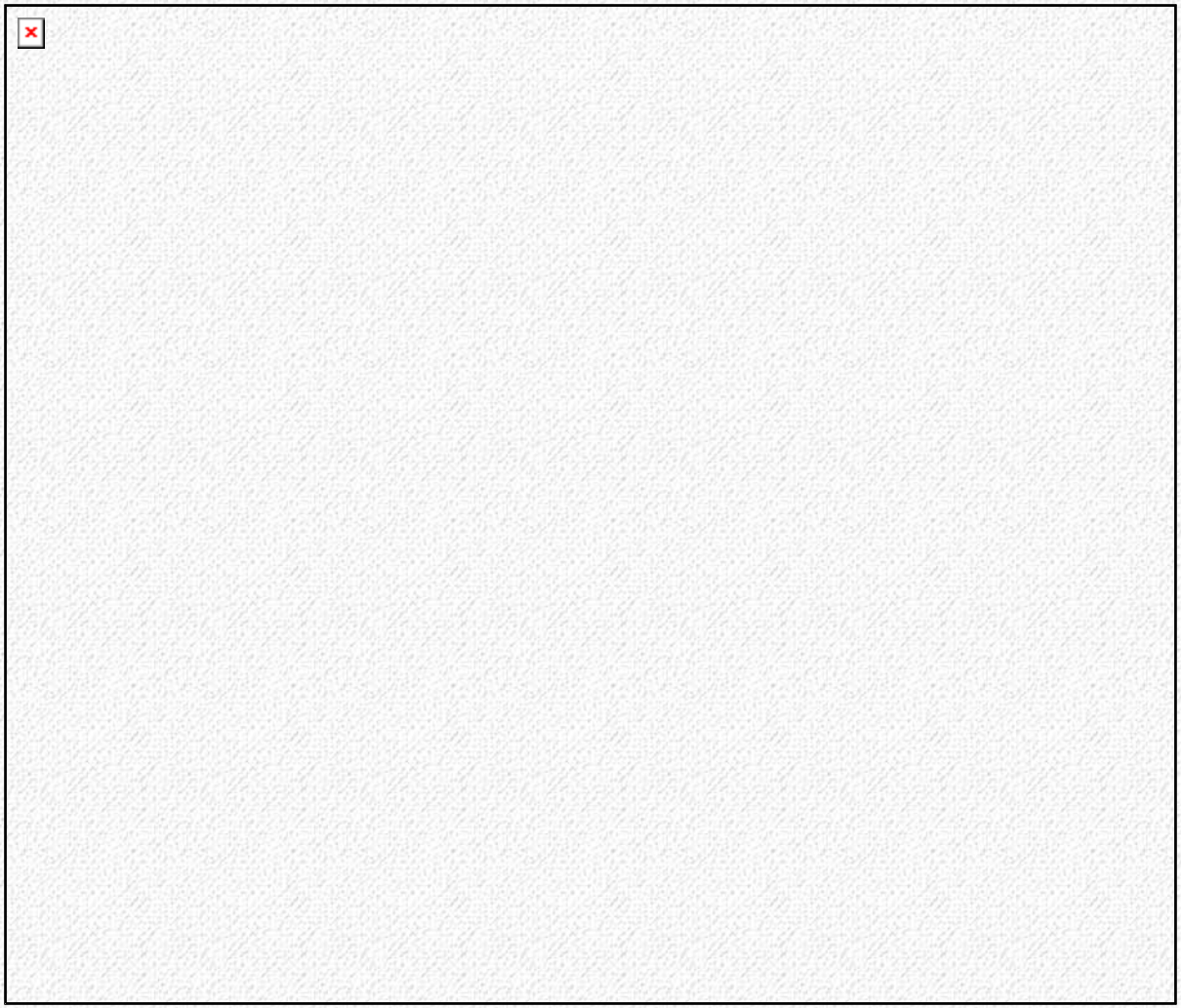


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Addressing the Unified Sizing Criteria

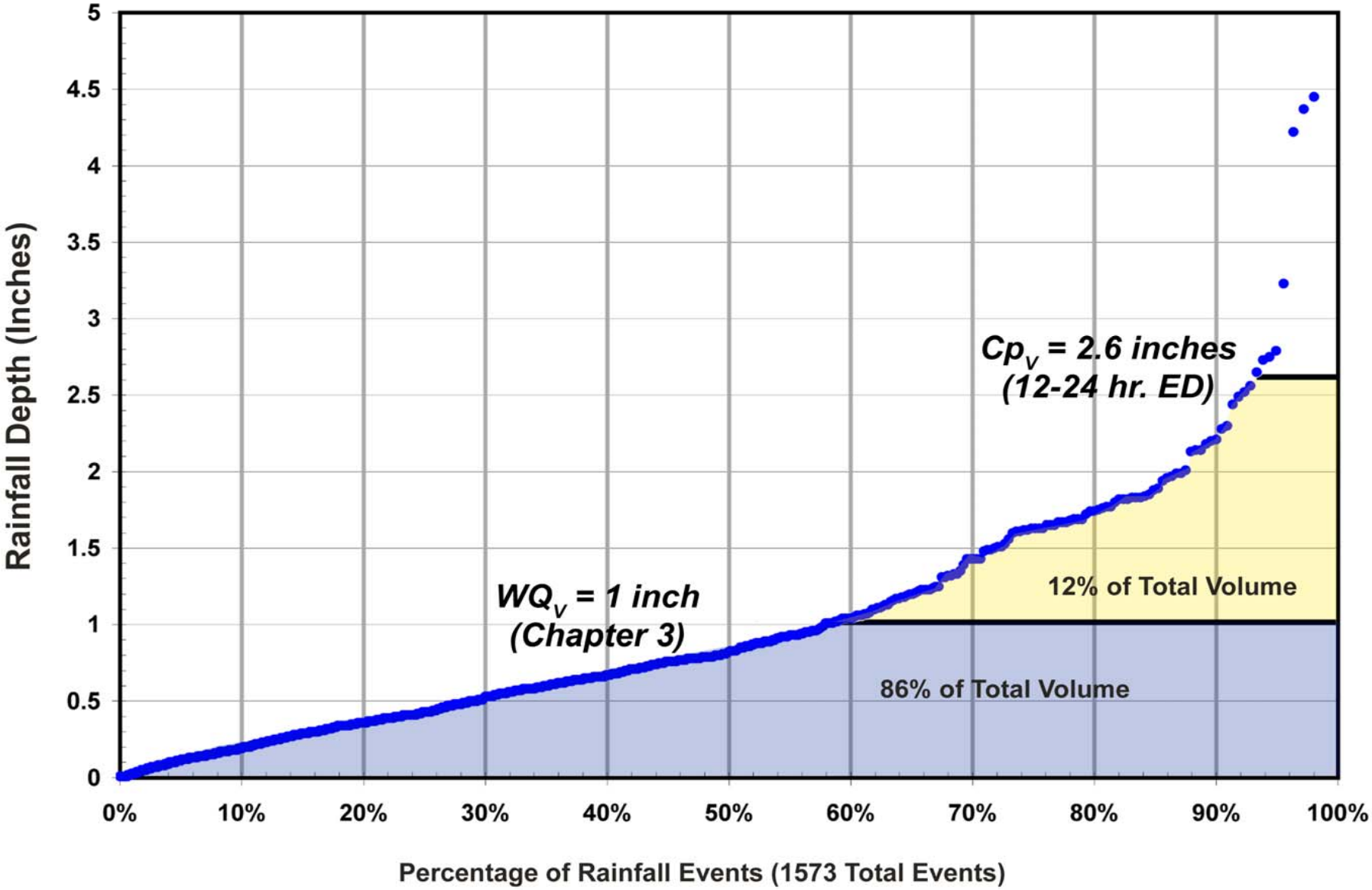
Water Quality Volume (WQ_v):

- Nonstructural practices (Old Chapter 5) are encouraged
- Structural practices (Chapter 3) must meet minimum standards (80%TSS / 40%TP)

Channel Protection Storage Volume (Cp_v):

- 12 or 24 hour extended-detention of 1-year storm
- Dry ED Ponds typically used

BWI-Thurgood Marshall Airport Rainfall (1996 - 2008)

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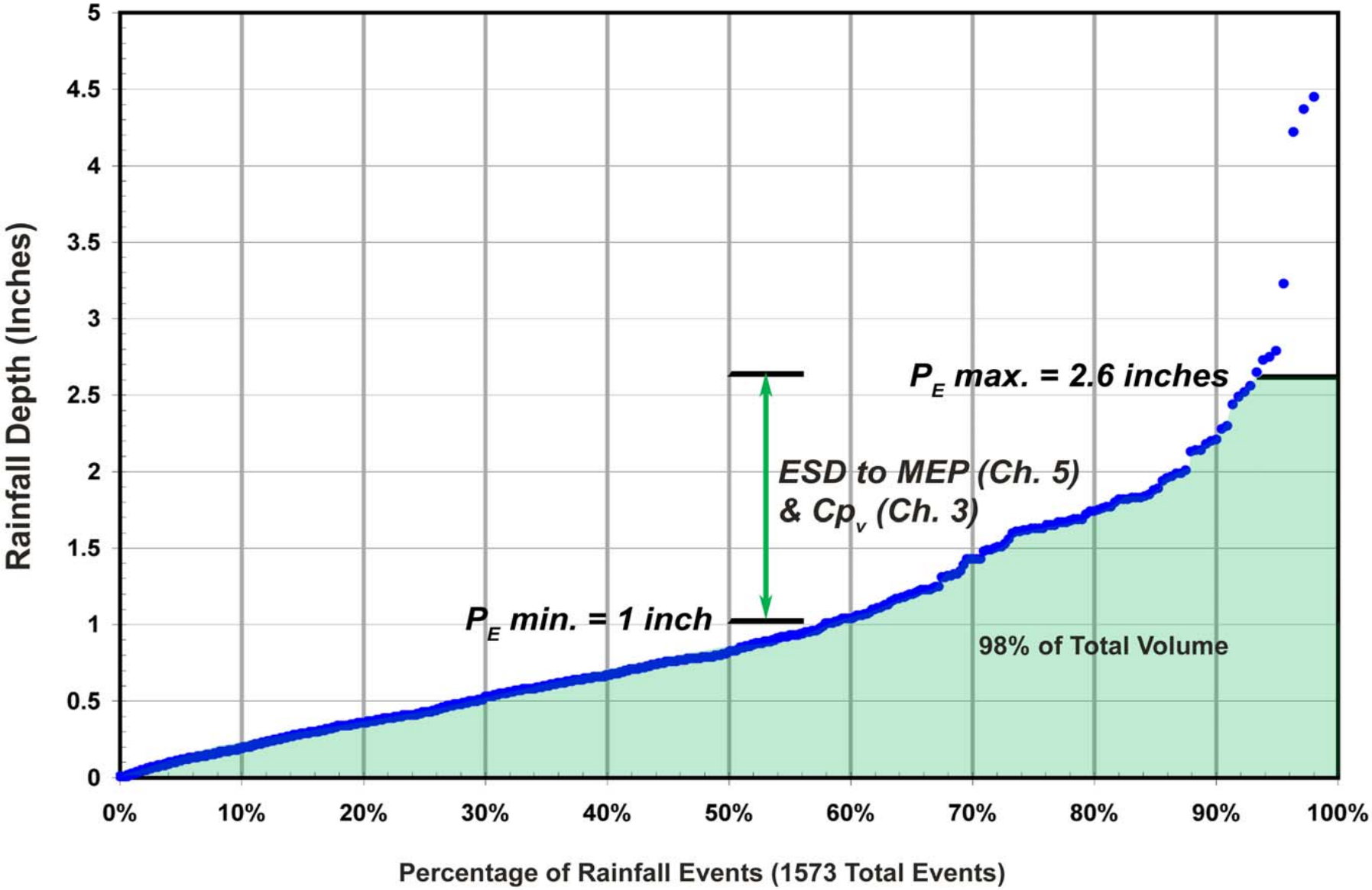
ONE WAY

Design Requirements

- One predevelopment standard - "woods in good condition" – for all sites
- ESD targets (MEP) based on replicating wooded conditions
- ESD used to address Cp_v
- WQ_v & Re_v as a minimum standard
- Flexible sizing criteria (.2" – 2.6"); practices may be used in series to meet targets

BWI-Thurgood Marshall Airport Rainfall (1996 - 2008)

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Claytor Community Center

Site Data:

- **Area - 3.0 Acres**
- **Drainage Area – 3.0 Acres**
- **Soils – 100% B (Silt Loam or Loam)**
- **Impervious Area – 1.9 Acres (63.3%)**
- **Existing Conditions:**
  - **80% Meadow / 20% Woods**
  - **RCN – 57**

Claytor Community Center

Step 1: Determine ESD Goals

A: RCN (woods in good condition) – 55

B: Target P_E – 2.0 inches

		Hydrologic Soil Group B						
%I	RCN*	P_E = 1"	1.2"	1.4"	1.6"	1.8"	2.0"	2.2"
15%	67	55						
20%	68	60	55	55				
25%	70	64	61	58				
30%	72	65	62	59	55			
35%	74	66	63	60	56			
40%	75	66	63	60	56			
45%	78	68	66	62	58			
50%	80	70	67	64	60			
55%	81	71	68	65	61	55		
60%	83	73	70	67	63	58		
65%	85	75	72	69	65	60	55	
70%	87	77	74	71	67	62	57	

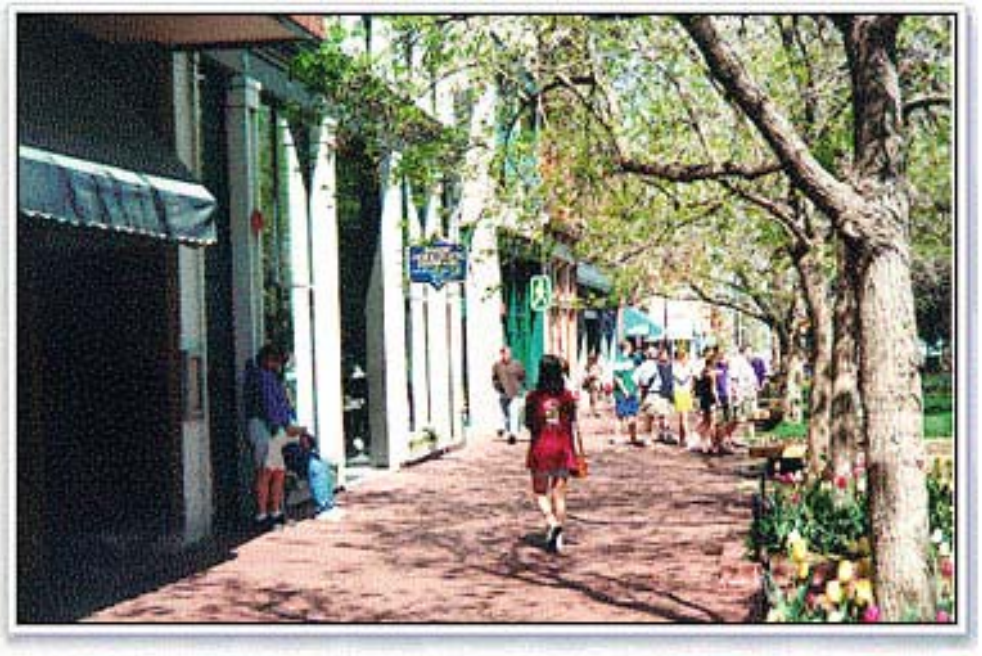
Claytor Community Center

Compute Q_E:

$Q_E = P_E \times R_V$
$= 2.0" \times (.05+.009I)$ where I = 63.3%
$= 2.0" \times 0.62 = 1.24"$

Using ESD practices to meet these targets will satisfy Re_v, WQ_v, and Cp_v. Potential practices include permeable pavements, micro-bioretention, or landscape infiltration.

Redevelopment



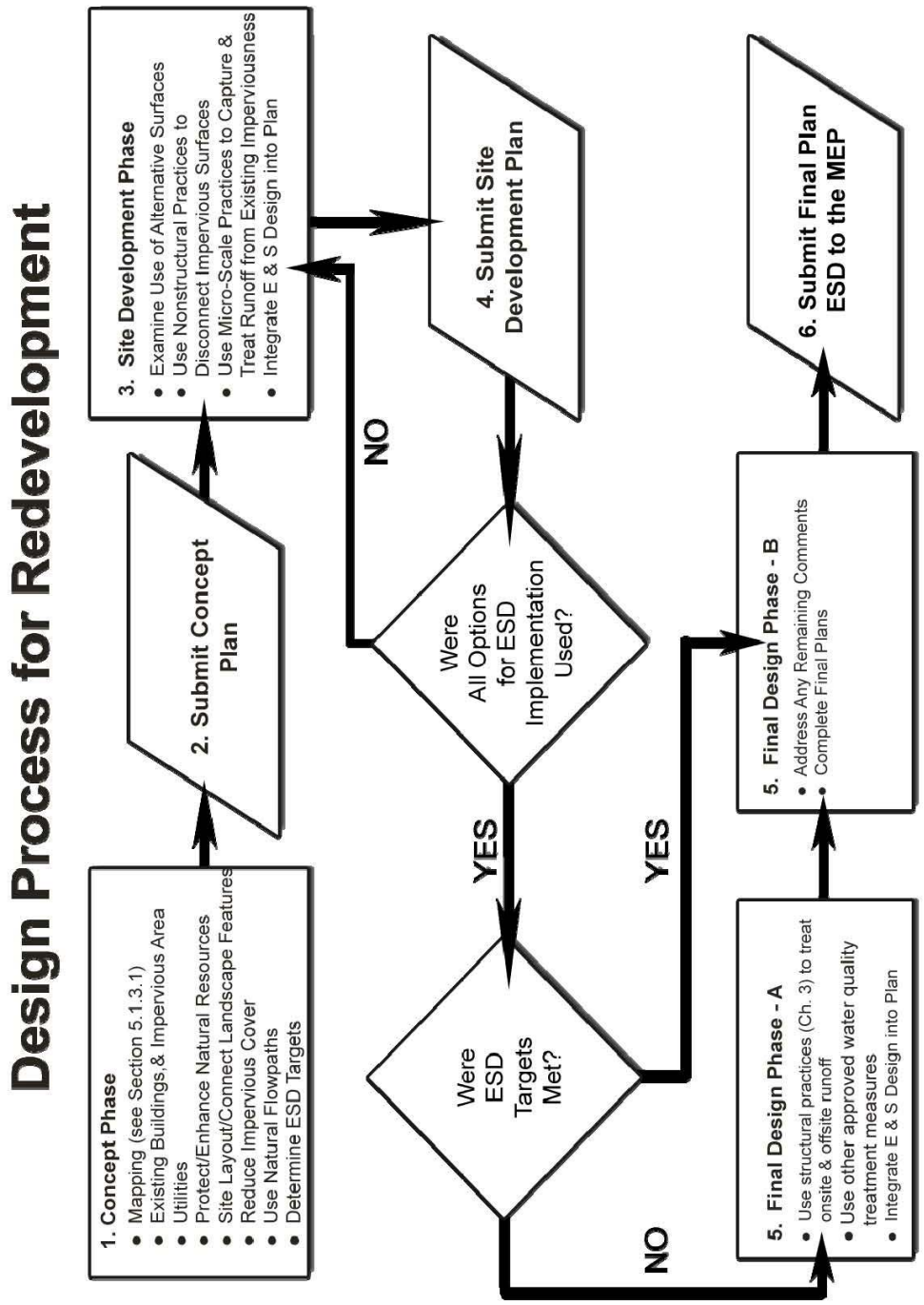


Figure 5.21 Design Process for Redevelopment

Redevelopment Policy

Require more management in less densely developed sites

1. An approving agency shall require that stormwater management be addressed according to new development requirements when existing site impervious area is less than or equal to 40%.

Determining Site %I

- **Design Manual: "the local approving agency may allow lands protected by forest preservation, conservation easements, or other mechanism to be subtracted from the total site area."**
  - **Flexibility for case by case review**
  - **Master plans and local priorities are considered during review process**
- **Promote ESD project designs:**
  - **Preserve natural areas**
  - **Reduce impervious area**
  - **Develop watershed plans**

When Existing I<40%
New Development Requirements

- Existing I = 39%, P_E = 1.8” (Table 5.3)
- ESD on sites with 61% pervious areas

Implement ESD techniques and micro-scale practices to the MEP

- Disconnections
- Sheetflow
- Minimize impervious area
- Use available landscaping for storage and treatment

North Bay Environmental Education Camp

Redevelopment in Cecil County


06/02/2008 11:58 AM

Redevelopment Policy

2. Proposed redevelopment project designs shall:

   a. Reduce existing impervious area by 50% within the LOD;

   b. Implement ESD to the MEP to provide water quality treatment for 50% of the existing impervious area within the LOD; or

   c. Use a combination a. and b.

Redevelopment Policy

3. Alternative stormwater management measures:

   a. Structural stormwater BMP;

   b. Off-site BMP; or

   c. Any combination of impervious area reduction, ESD implementation, structural practices or off-site treatment.

Redevelopment Policy

Need to keep requirements flexible and provide incentive for redevelopment

4. An approving agency may develop other policies that may include:

   a. Retrofitting existing structural BMPs;

   b. Stream restoration;

   c. Watershed management plans;

   d. Trading policies that involve other pollution control programs;

   e. Fees paid in an amount specified by the approving agency; or

   f. Other practices

Redevelopment Policy

- **Provide greater water quality treatment**
- **Flexibility and options to integrate local priorities into watershed specific goals.**
- **Redevelopment is encouraged by reduced requirements compared to new development**

Redevelopment Requirement Comparison

Impervious Area	Old Regs (20%)	New Regs (50%)	If New Development
1.0 acre existing	0.20 acre (1 inch)	0.50 acre (1 inch)	
1.0 acre proposed			1.0 acres (2.7 inch)
Volume Requirements	690 cu. ft.	1,724 cu.ft.	9,311 cu. ft.

Redevelopment Requirement Comparison

Impervious Area	Old Regs (20%)	New Regs (50%)	If New Development
0.50 acres existing	0.10 acre (1 inch)	0.25 acre (1 inch)	
0.68 acres proposed	0.18 acre (1 inch)	0.18 acre (2.7 inch)	0.68 acres (2.7 inch)
Volume Requirements	1,076 cu. ft.	2,538 cu. ft.	6,331 cu. ft.

University of Maryland School of Nursing

University of Maryland School of Nursing


Ocean City
Porous asphalt

Gateway Grande Redevelopment, Ocean City

Alternative Stormwater Management Measures

Martin Plaza Redevelopment

Baltimore County and Martin Financial Assoc.

Public – Private Partnership

WQ treatment of 85 acres of existing impervious

Stony Run Stream Restoration

December, 2006

Stony Run Stream Restoration

February, 2007

July, 2008

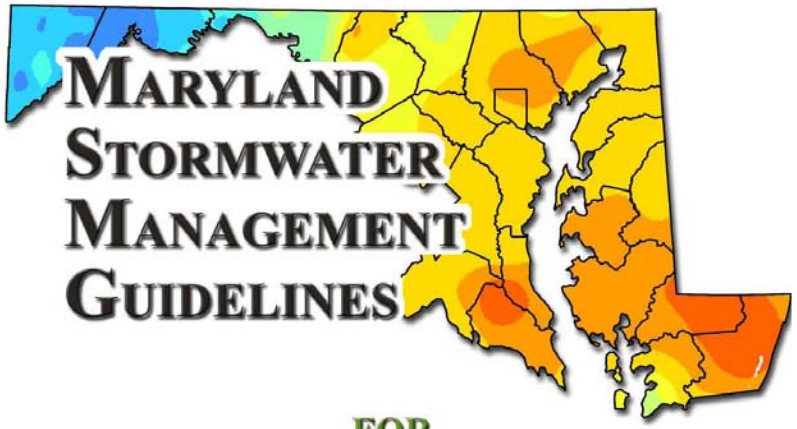
Off-Site Stormwater Management

Baltimore City School Retrofits:

Impervious area reduction

Rooftop disconnection to rain garden

Stormwater Guidelines



MARYLAND STORMWATER MANAGEMENT GUIDELINES

FOR

STATE & FEDERAL PROJECTS

APRIL 15, 2010

MARYLAND
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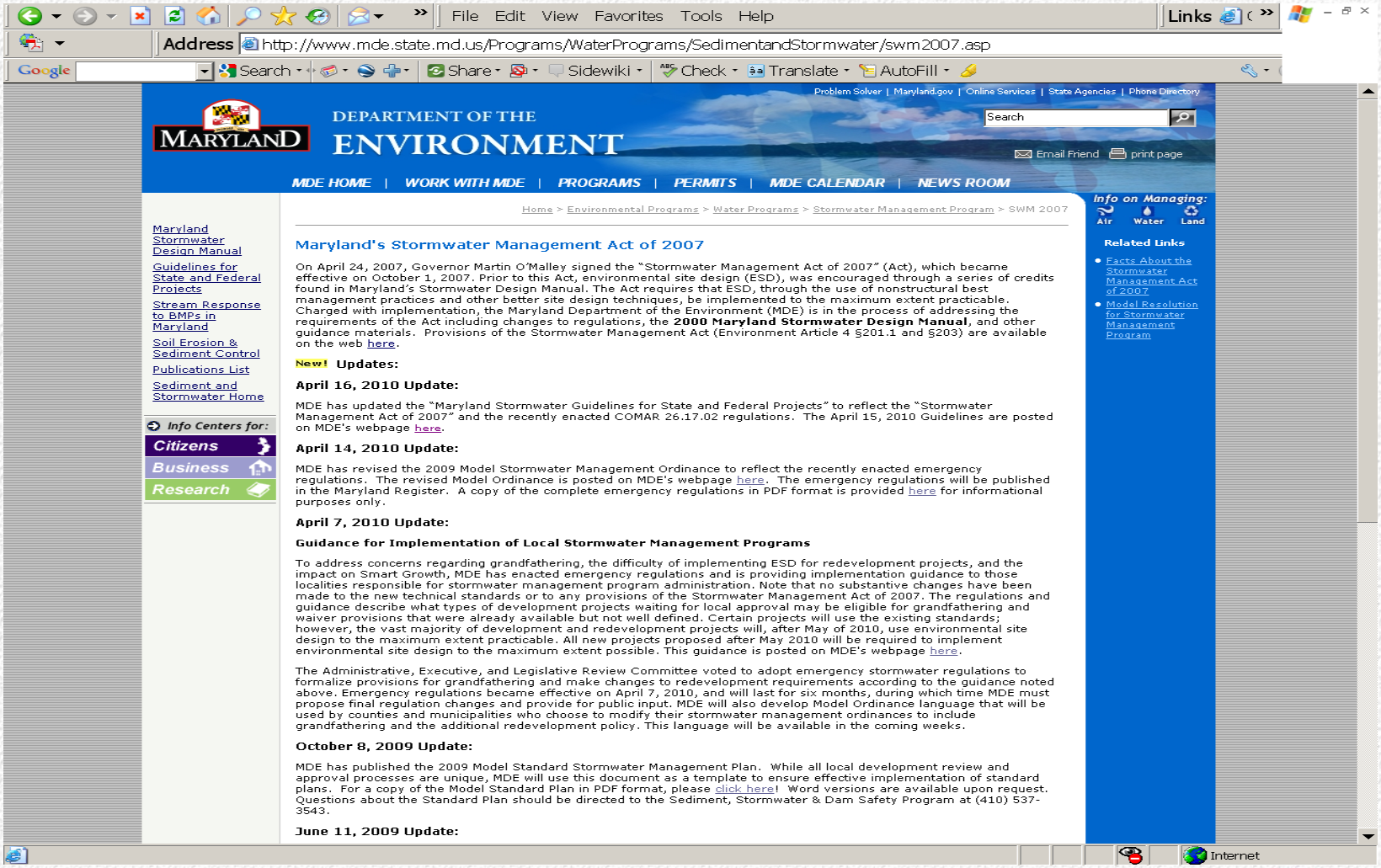

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Related Links
- Facts About the Stormwater Management Act of 2007
- Model Resolution for Stormwater Management Program

Maryland's Stormwater Management Act of 2007

On April 24, 2007, Governor Martin O'Malley signed the "Stormwater Management Act of 2007" (Act), which became effective on October 1, 2007. Prior to this Act, environmental site design (ESD), was encouraged through a series of credits found in Maryland's Stormwater Design Manual. The Act requires that ESD, through the use of nonstructural best management practices and other better site design techniques, be implemented to the maximum extent practicable. Charged with implementation, the Maryland Department of the Environment (MDE) is in the process of addressing the requirements of the Act including changes to regulations, the **2000 Maryland Stormwater Design Manual**, and other guidance materials. Provisions of the Stormwater Management Act (Environment Article 4 §201.1 and §203) are available on the web here.

New! Updates:

April 16, 2010 Update:

MDE has updated the "Maryland Stormwater Guidelines for State and Federal Projects" to reflect the "Stormwater Management Act of 2007" and the recently enacted COMAR 26.17.02 regulations. The April 15, 2010 Guidelines are posted on MDE's webpage here.

April 14, 2010 Update:

MDE has revised the 2009 Model Stormwater Management Ordinance to reflect the recently enacted emergency regulations. The revised Model Ordinance is posted on MDE's webpage here. The emergency regulations will be published in the Maryland Register. A copy of the complete emergency regulations in PDF format is provided here for informational purposes only.

April 7, 2010 Update:

Guidance for Implementation of Local Stormwater Management Programs

To address concerns regarding grandfathering, the difficulty of implementing ESD for redevelopment projects, and the impact on Smart Growth, MDE has enacted emergency regulations and is providing implementation guidance to those localities responsible for stormwater management program administration. Note that no substantive changes have been made to the new technical standards or to any provisions of the Stormwater Management Act of 2007. The regulations and guidance describe what types of development projects waiting for local approval may be eligible for grandfathering and waiver provisions that were already available but not well defined. Certain projects will use the existing standards; however, the vast majority of development and redevelopment projects will, after May of 2010, use environmental site design to the maximum extent practicable. All new projects proposed after May 2010 will be required to implement environmental site design to the maximum extent possible. This guidance is posted on MDE's webpage here.

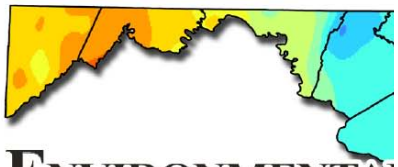
The Administrative, Executive, and Legislative Review Committee voted to adopt emergency stormwater regulations to formalize provisions for grandfathering and make changes to redevelopment requirements according to the guidance noted above. Emergency regulations became effective on April 7, 2010, and will last for six months, during which time MDE must propose final regulation changes and provide for public input. MDE will also develop Model Ordinance language that will be used by counties and municipalities who choose to modify their stormwater management ordinances to include grandfathering and the additional redevelopment policy. This language will be available in the coming weeks.

October 8, 2009 Update:

MDE has published the 2009 Model Standard Stormwater Management Plan. While all local development review and approval processes are unique, MDE will use this document as a template to ensure effective implementation of standard plans. For a copy of the Model Standard Plan in PDF format, please click here! Word versions are available upon request. Questions about the Standard Plan should be directed to the Sediment, Stormwater & Dam Safety Program at (410) 537-3543.

June 11, 2009 Update:

ESD Process & Computations



ENVIRONMENTAL
SITE DESIGN (ES
PROCESS & CON

JULY 2010

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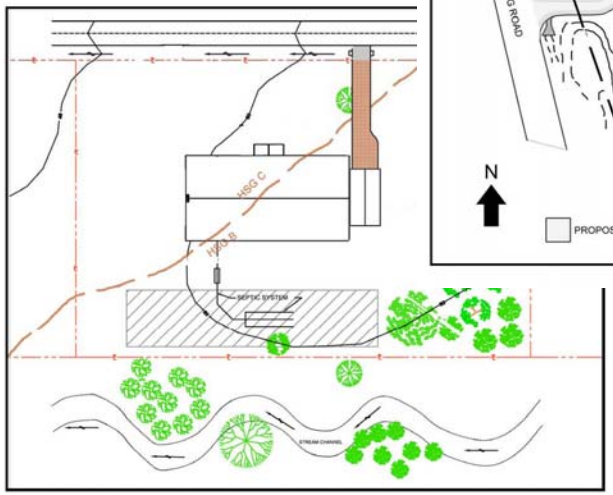
Example No. 1 – Single Family Residential Construction

The proposed project involves the construction of a house, garage, residential lot. Sketches of the existing lot and proposed work are

Concept Plan Design and Computations

The Concept Plan represents the first steps in a project's developm natural resources, initial project layout, and the preliminary design techniques. During this phase, the designer demonstrates how ESI the MEP standard. The purpose is to show the review authorities tl implementing ESD have been exhausted before proceeding with m

Figure 1. Single Family Lot – Proposed Layout



Example No. 2 – Commercial Construction

The project for this example consists of a multi-story office building and parking lot. A sketch of the proposed site is shown in Figure 4.

Figure 4. Proposed Commercial Site

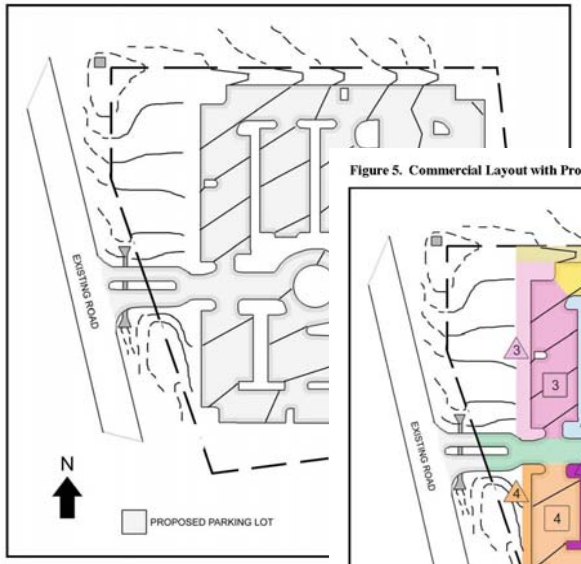


Figure 5. Commercial Layout with Proposed Drainage Areas

Table 2. Preliminary Drainage Area Information

Drainage (DA)	Impervious Area	Landscaped Area	Approx. %Site	Target ESD,
1	24,500 ft²	3,200 ft²	16%	3,950 ft³
2	20,000 ft²	1,000 ft²	12%	2,950 ft³
3	15,000 ft²	2,500 ft²	10%	2,460 ft³
4	13,000 ft²	2,000 ft²	9%	2,215 ft³
5	17,000 ft²	3,000 ft²	12%	2,950 ft³
6	5,000 ft²	300 ft²	3%	740 ft³
Building	45,000 ft²	---	26%	6,400 ft³
Open Space	---	22,740 ft²	13%	2,935 ft³
Σ	139,500 ft²	34,740 ft²	100%	24,600 ft³

MARYLAND

2010 Standards

2010 Maryland Standards and Specifications for Soil Erosion and Sediment Control

July 2010

Maryland Department of the Environment
Water Management Administration
in association with
Natural Resources Conservation Service
and
Maryland Association of Soil Conservation Districts

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What's New?

- ESD to the MEP!
- Planning and Design Section
- Stabilization Requirements
- Grading Unit
- TMDLs and Tier II, Etc.
- Revised Standard Practices
- New Standard Practices

Areas of future change …

- EPA's 280 NTU Requirement for NPDES Construction Activities (On Hold!)
- EPA's 20 acre/10 acre (2011/2014) threshold for passive controls
- Changes to Maryland Standards and Specifications for Soil Erosion and Sediment Control

Future…

- **ESD to the MEP!**
- **New Standards**
- **New Guidelines**
- **More Education and outreach – Design Examples, Workshops, etc.;**


Protecting Our Streams, Rivers...


And the Chesapeake and
Coastal Bays!


Updates are available on MDE's Website:
http://www.mde.state.md.us

MARYLAND DEPARTMENT of the ENVIRONMENT

Sediment, Stormwater & Dam Safety Program

WATER MANAGEMENT ADMINISTRATION

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