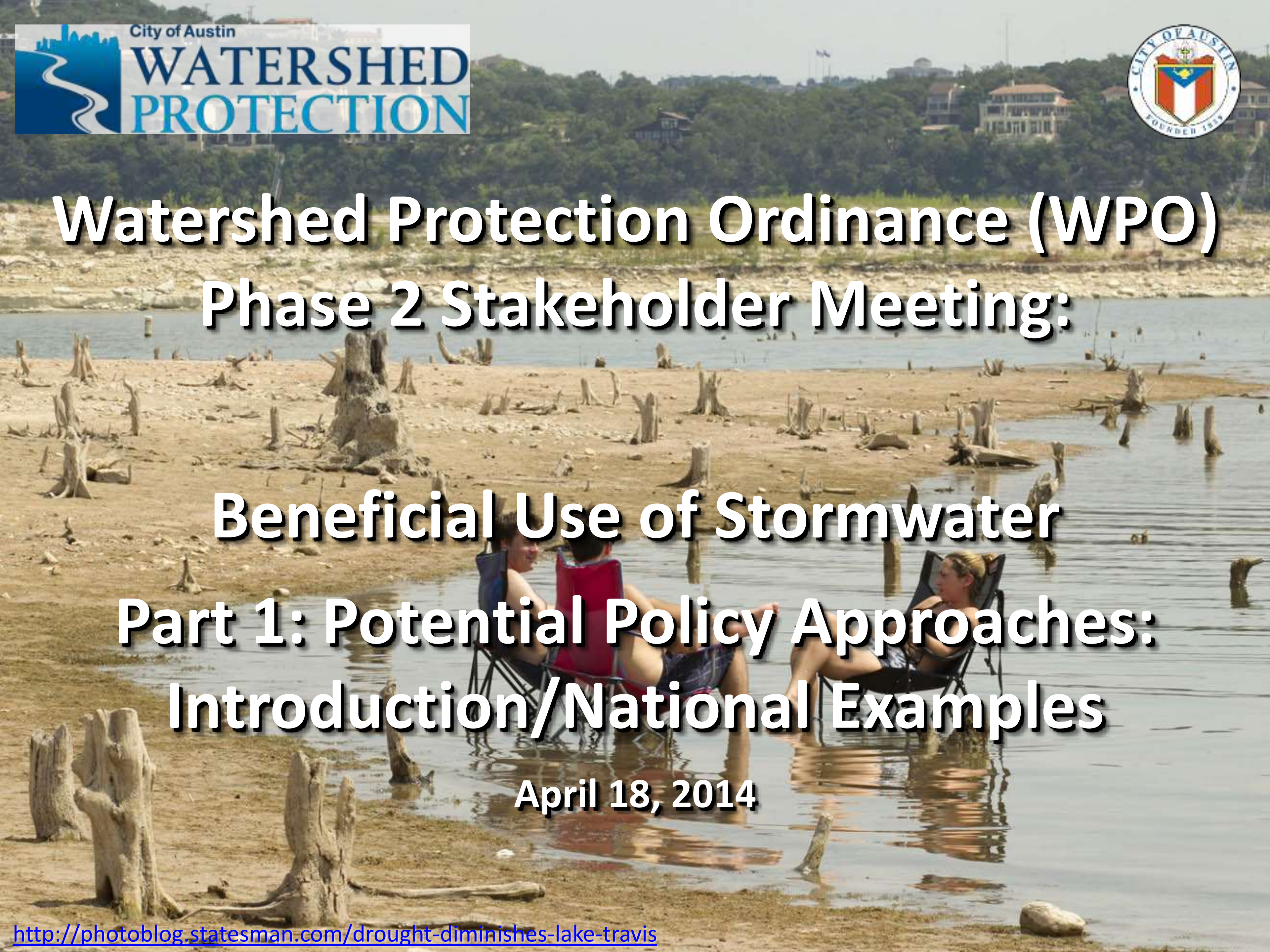

City of Austin WATERSHED PROTECTION

Watershed Protection Ordinance (WPO) Phase 2 Stakeholder Meeting:

Beneficial Use of Stormwater

Part 1: Potential Policy Approaches: Introduction/National Examples

April 18, 2014

http://photoblog.statesman.com/drought-diminishes-lake-travis

Agenda

- Stormwater management vision
- Why water management matters
- Maryland regulatory model—and how it compares with Austin's regulations
- EPA Requirements for federal projects
- Discussion
- Next steps

Stormwater Management Vision

- Imagine Austin Comprehensive Plan
  1. Compact & Connected: accommodate growth
  2. Green infrastructure: integrate nature into the city
  3. Sustainably manage our water resources
- WPO: Beneficial Use of Stormwater
  - Retain/infiltrate water on-site for baseflow, pollutant removal, vegetation
  - Capture rainfall conservation/reduce potable water use
- EPA/Maryland (and at least 5 other states)
  - Maintain predevelopment hydrology to the "maximum extent practicable," including (some) retention on-site

How We Manage Water Matters

LCRA video of Lake conditions, March 10, 2014
http://www.youtube.com/watch?v=hmbIt7kzU1U

How We Manage Water Matters

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Tremendously dry start to 2014 intensifies drought

January, February inflows lower than in 2011

The severe drought gripping Central Texas shows little sign of relenting in 2014.

In parts of Central Texas, January and February rain totals are among the lowest ever recorded. As a result, the amount of water flowing into the Highland Lakes the first two months of 2014 was even lower than the first two months of 2011, a year that had the lowest total inflows in history.

Only 8,444 acre-feet flowed into the Highland Lakes in February 2014, roughly 10 percent of February's historical average. February 2011 inflows were about 19 percent of average.

This followed January inflows of 11,813 acre-feet, about 18 percent of January's historical average. January 2011 inflows were about 33 percent of average. Read more.

LCRA seeks public comment on 2014 Water Conservation Plan

LCRA is updating its water conservation plan, as it is required to do every five years. The 2014 Water Conservation Plan includes water conservation strategies for LCRA's municipal, irrigation and industrial firm water contracts, as well as LCRA's agricultural irrigation operations and LCRA's power plants. LCRA welcomes review and comments on the 2014 plan through April 4, 2014. The plan is expected to be considered for adoption at the April 16 meeting of the LCRA Board of Directors. Comments may be submitted through this online form. Read more.

How full are the lakes?

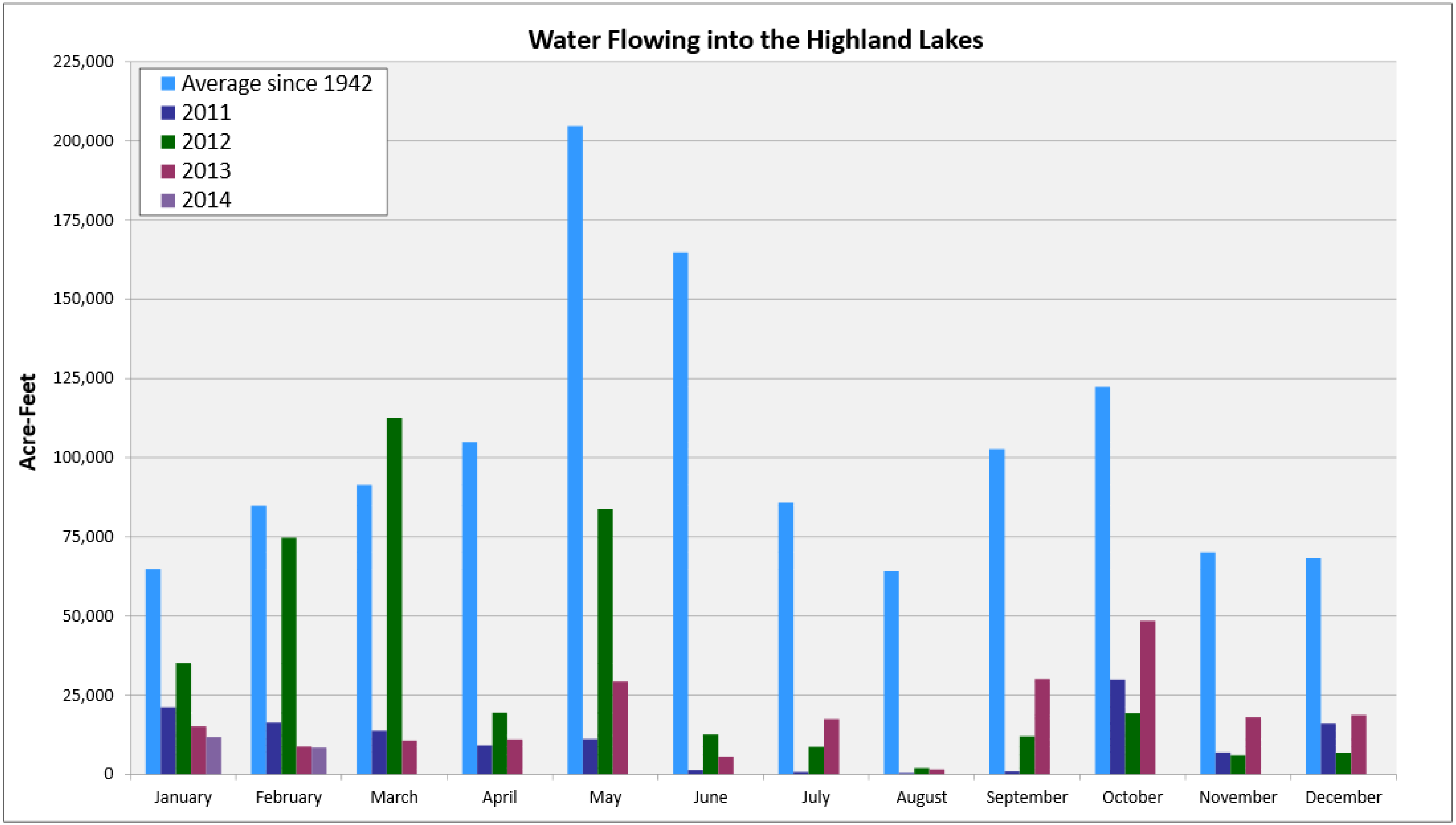
Update:

37%

POTENTIAL NEW WATER RATES
GET INVOLVED

SUBSCRIBE TO THE DROUGHT E-NEWSLETTER

Source: LCRA. http://www.lcra.org/Pages/default.aspx



Period: January-February (in acre-feet)	
Period Average:	149,537
2011:	37,464
2012:	109,878
2013:	23,909
2014:	20,257

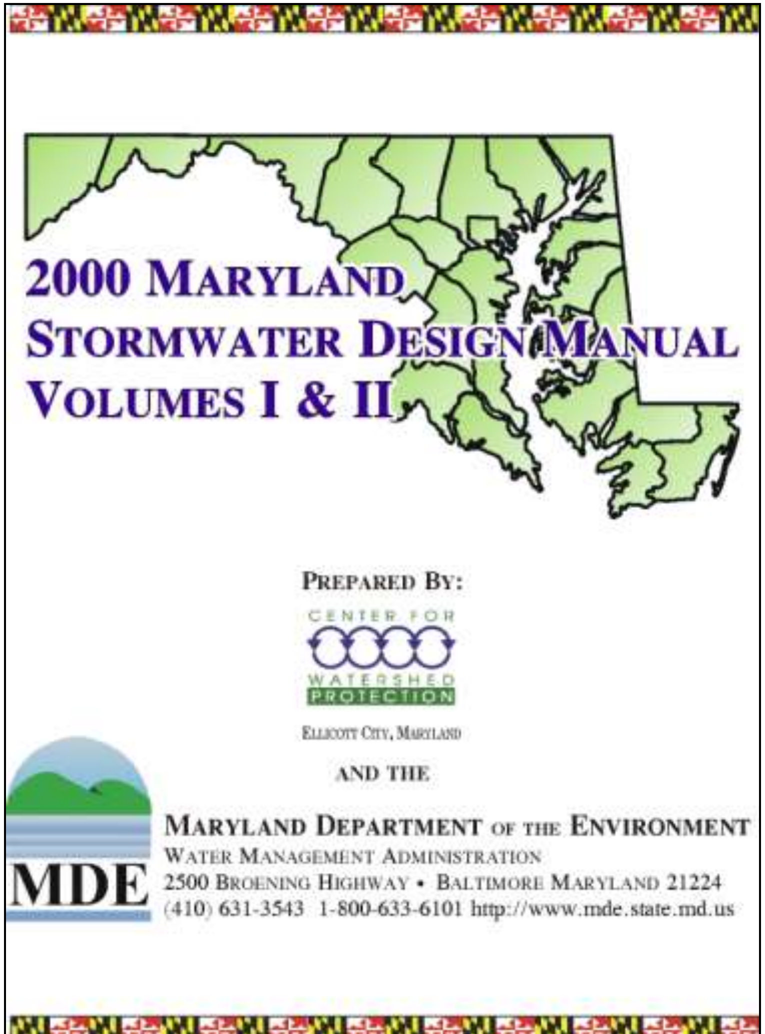
* Inflows: the estimated amount of water flowing into the Highland Lakes from rivers and streams. Data for 2014 is preliminary and subject to change.

Source: LCRA. http://www.lcra.org/water/water-supply/drought-update/Documents/InflowTotals.pdf

Challenges & Opportunities: Connecting the Dots…

1. Central Texas prone to periodic droughts
2. Droughts & heat predicted to worsen
3. Regional surface & groundwater supply finite (falling?)
4. Population growth among fastest in nation (expected to double in 30 years)
5. Natural land cover retains over 90% of avg. annual rainfall; sustains plants, creek flows, aquifers
6. Uncontrolled urbanization degrades these benefits
7. Can incorporate natural systems & rainwater storage in designs to offset water use, preserve quality of life
8. Practical methods/models already exist to accomplish

Maryland Stormwater Model



Maryland Stormwater Design Manual
(2000, updated 2009)

Unified Stormwater Sizing Criteria

Unified Stormwater Sizing Criteria: Five Volume Increments

1. Recharge / Infiltration Volume
2. Water Quality Volume
3. Channel Protection Storage Volume
4. Overbank Flood Protection Volume
5. Extreme Flood Volume

Small Storm Events

↕

Very Large Storm Events

Stormwater Volume Increments

Each increment of stormwater flow requires a different level of management

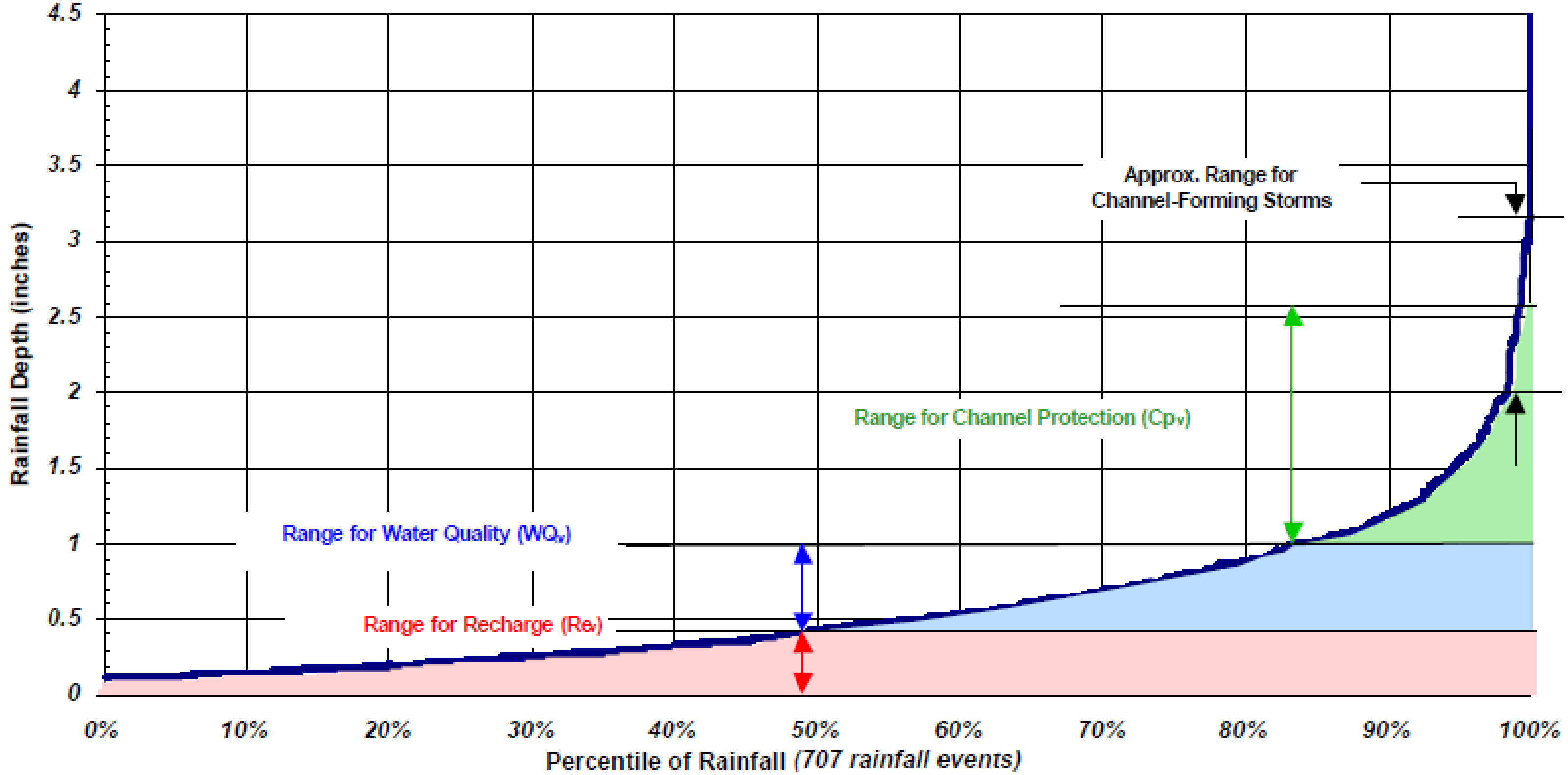
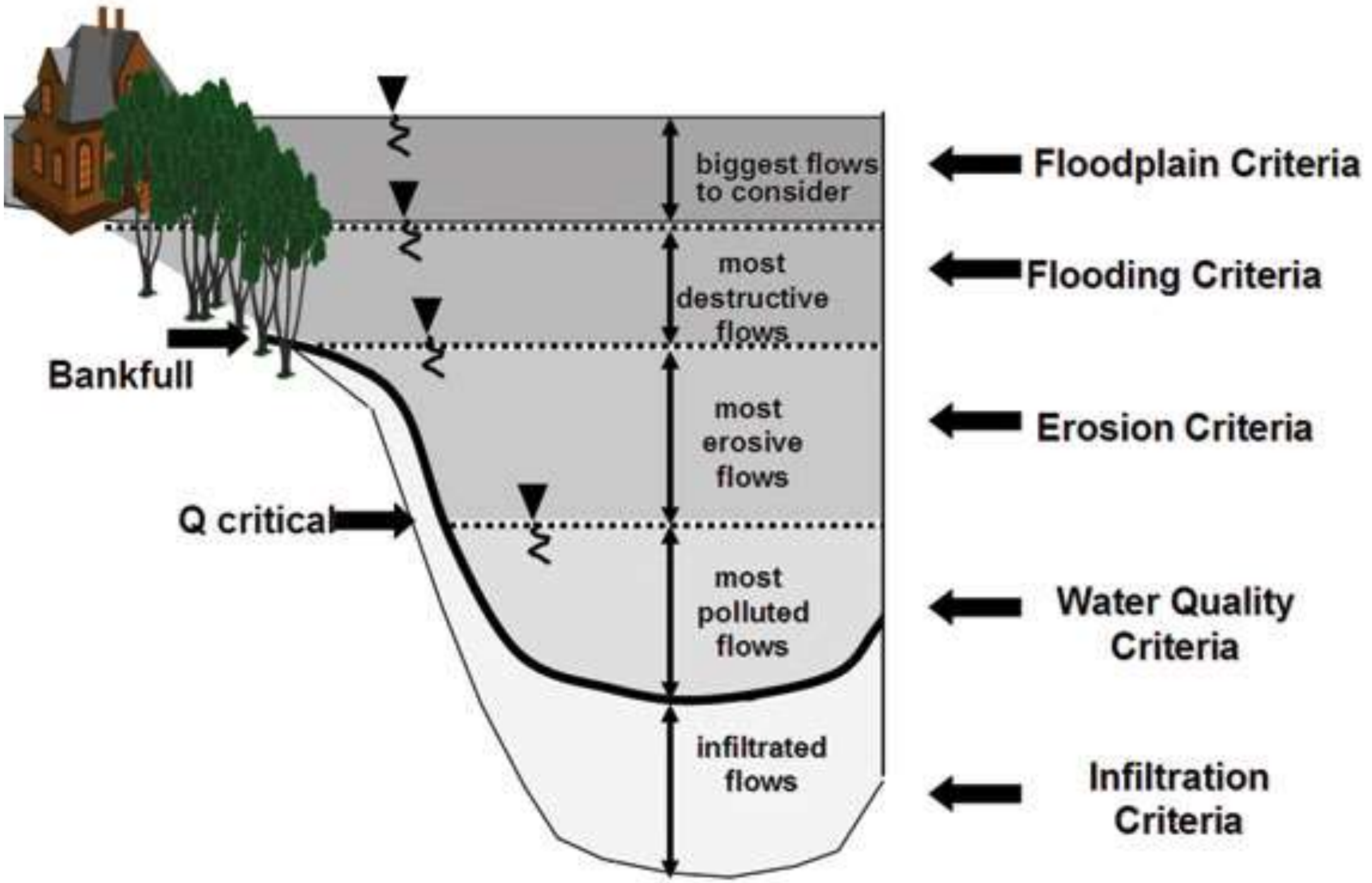


Figure 1. Rainfall events captured and treated by the recharge (Re_v), water quality (WQ_v) and channel protection (Cp_v) volumes using 1980 to 1990 rainfall frequency records for Baltimore City

Comstock & Wallis, "The Maryland Stormwater Management Program:
A New Approach to Stormwater Design, Maryland Department of the Environment."

5 Stormwater Drainage Criteria



Andrew Reese, "Volume-Based Hydrology: Examining the shift in focus from peak flows & pollution treatment to mimicking predevelopment volumes," *Stormwater*, Sept 2009.

States using Maryland's Unified SW Sizing Criteria Model

1. Maryland (2000)
2. Georgia (2001)
3. Vermont (2002)
4. Minnesota (2008)
5. New York (2010)
6. West Virginia (2012)

All six of these stormwater manuals written by the Center for Watershed Protection.

Maryland Stormwater Requirements

Main elements that differ from Austin approach:

- Require a recharge volume be infiltrated on-site
  - Subset of water quality volume
  - Soil type dependent (A, B, C, or D hydrologic group)
- Use non-structural "Environmental Site Design" (ESD) practices to "maximum extent practicable" (MEP)
- Use structural controls "only where absolutely necessary"
- Spreadsheet to help calculate ESD practices
- Phosphorus removal focus (Chesapeake Bay concern)
- "10% rule" to address phosphorus loads
- "Concept Phase" precedes site development plan submittal

1) Recharge / Infiltration Volume

Maryland	Austin
• Infiltrated on-site with structural or non-structural controls • Considered part of total Water Quality Volume (WQV) • Based on average annual recharge rate of hydrologic soil group (HSG); multiply WQ volume by the following: HSG A = 0.38; HSG B = 0.26; HSG C = 0.13; HSG D = 0.07	No direct equivalent, but several surrogates: • Green stormwater infra. (GSI) options (rain gardens, porous pavement, rain harvesting…) • SOS Ordinance in Barton Springs Zone (retention-irrig.) • Impervious cover limits • Stream & CEF buffers • 40% buffer in Water Supply Rural watersheds

2) Water Quality Volume

Maryland	Austin
• Must capture and treat runoff from 90th percentile rainfall event • 1.0 inch multiplied by volumetric runoff coefficient (Rv): Rv = 0.05+0.009(IC) • 0.9 inches for 100% IC • Can reduce volume with non-structural (ESD) and structural practices	**"Half inch plus" WQV:** • ~ 90% avg. annual runoff volume captured • 0.5 inch plus 0.1 inches for each 10% IC above 20% IC • 1.3 inches for 100% IC **BSZ/SOS Ordinance:** • Runoff from 2-yr., 3-hr. storm captured; goal is no increase in avg. annual pollutant loads • 2.4 inches for 100% IC • ~ 98% avg. annual runoff captured

3) Channel Protection Storage Volume

Maryland	Austin
• 24-hour extended detention (ED) of the one-year, 24-hour storm event • ED volume does not meet/ is treated separately from water quality volume • May be stacked above water quality ponds • Infiltration not recommended due to large storage requirement	• "Half inch Plus" water quality controls shown by HDR study to adequately manage channel-forming flows • Wet-ponds required to provide extended detention storage • 2-year flood detention required for many developments (even where 10, 25 & 100-year storms not detained)

4) Overbank Flood Protection Volume

Maryland	Austin
• Post-dev't 10-year, 24-hour peak discharge rate may not exceed pre-development rate • Only required if local authorities have no control of floodplain development, infrastructure or conveyance system capacity design or determine down-stream flooding will occur as result of proposed development • Assume present land use conditions for off-site areas	• Same: Post-development 10-year, 24-hour peak discharge rate may not exceed pre-development rate • Required if development calculated to generate increased peak flows • Assume full build-out conditions

5) Extreme Flood Volume

Maryland	Austin
• Post-development 100-year, 24-hour peak discharge rate may not exceed pre-development rate • Assume ultimate (full) build-out conditions	• Post-development 25 and 100-year, 24-hour peak discharge rates may not exceed pre-development rates • Option to use volumetric flood detention • Assume full build-out conditions

Maryland's Environmental Site Design (ESD) Requirement

Maryland's Stormwater Management Act of 2007 requires implementation of ESDs to the "maximum extent practicable" (MEP) to ensure that structural controls are only used "where absolutely necessary." (Chapter 5, MD SW Manual)

But the authors also acknowledge: "A combination of structural and/or non-structural BMPs are normally required at most development sites to meet all five stormwater sizing criteria." (Chapter 2, MD SW Manual)

Maryland's Environmental Site Design (ESD) Requirement

5.0.3 Environmental Site Design

Definition

There are many stormwater design strategies that seek to replicate natural hydrology. Sometimes known as better site design, low impact development, green infrastructure, or sustainable site design, these strategies all espouse similar techniques. In each, a combination of planning techniques, alternative cover, and small-scale treatment practices is used to address impacts associated with development. For consistency, the Act adopts ESD as a more generic classification for use in Maryland.

Title 4, Subtitle 201.1(B) of the Act defines ESD as "...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." Under this definition, ESD includes:

- Optimizing conservation of natural features (e.g., drainage patterns, soil, vegetation).
- Minimizing impervious surfaces (e.g., pavement, concrete channels, roofs).
- Slowing down runoff to maintain discharge timing and to increase infiltration and evapotranspiration.
- Using other nonstructural practices or innovative technologies approved by MDE.

Source: Maryland Stormwater Manual, Chapter 5, p. 5.2. Link.

Maryland's Environmental Site Design (ESD) Options

- B • Environmental mapping prior to layout
- A • Natural area conservation (forests, wetlands, steep slopes, floodplains)
- A • Stream, wetland and shoreline buffers
- - • Permeable soil disturbance minimization
- A • Maintenance of natural flow paths across site
- - • Building layout fingerprinting to reduce clearing and grading
- B • Grading to promote sheetflow from impervious to pervious areas
- B • Needless impervious cover not created
- - • Disconnection of impervious cover maximized
- B • Potential hotspot generating areas identified for treatment
- A • Construction & post-construction stormwater controls integrated into a comprehensive plan
- - • Tree planting used at site to convert turf areas into forest

➢ **Austin has some of the same (A) or similar (B) requirements.**

EPA Guidelines for Federal Projects

Goal: Maintain/restore predevelopment site hydrology during development/redevelopment process to protect and preserve both water resources on-site and downstream.

1.88 inch rainfall for Austin

Two options:

1. Prevent offsite discharge from all rainfall events ≤ 95th percentile rainfall event to the maximum extent technologically feasible; or
2. Conduct site-specific hydrologic analysis to determine pre-development runoff conditions and quantify post-development runoff volume and peakflow discharges equal to predeveloped condition.

2009 EPA "Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act"
http://water.epa.gov/polwaste/nps/upload/eisa-438.pdf

EPA Region 4 Guidance for MS4 Participants: GSI & Quantifiable Objectives

"Although the performance standards and practices discussed in this [2009 EPA technical] guidance were developed to apply to federal development and redevelopment projects, they can serve as a useful guide for municipal systems as well. **We encourage States to replicate similar green infrastructure and quantifiable objectives in their MS4 permits**, or at least develop a plan on working towards comparable requirements. We also recognize that some MS4s may not be equipped to achieve a 95th percentile storm events, but Region 4 does expect States to use their judgment to identify in MS4 permits an alternatively appropriate, specific, and measurable threshold that **maximizes the practice of infiltration, evapotranspiration, and/or rainwater harvesting and use**." [*emphasis added*]

James Giattina, US EPA Region 4. Memo to Florida Dept. of Environmental Protection: "Expectations for Municipal Separate Storm Sewer System [MS4] permits," April 15, 2010.

Stormwater Management Vision

- Imagine Austin Comprehensive Plan
  1. Compact & Connected: accommodate growth
  2. Green infrastructure: integrate nature into the city
  3. Sustainably manage our water resources
- Mutually exclusive goals or opportunity for creativity?
- Next steps: How to (can we?) achieve a win-win solution. Chance for greatness.

WPO Phase 2 Schedule, 2014

Phase 2 Kickoff	Jan. 22
Perviousness: Introduction	Feb. 21
Perviousness: Porous Pavement (part 1)	Mar. 07
Porous Pavement (part 2), Artificial Turf & Rainwater Harvesting	Mar. 21
Rain Gardens for Single-Family Residential	Apr. 04
Beneficial Use of Stormwater: Potential Policy Approaches Introduction/National Examples	Apr. 18
New Criteria for SOS Ordinance Compliance/ECM 1.6.9	May 02
Beneficial Use of Stormwater: Follow-Up Discussion	May 30
Next Steps	TBD

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http://austintexas.gov/department/watershed-protection-ordinance