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Initial Decision Points

Vermont Stormwater Management Manual Update, Meeting #2

Shelburne, Vermont Town Office

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STONE ENVIRONMENTAL INC

Horsley Witten Group
Sustainable Environmental Solutions

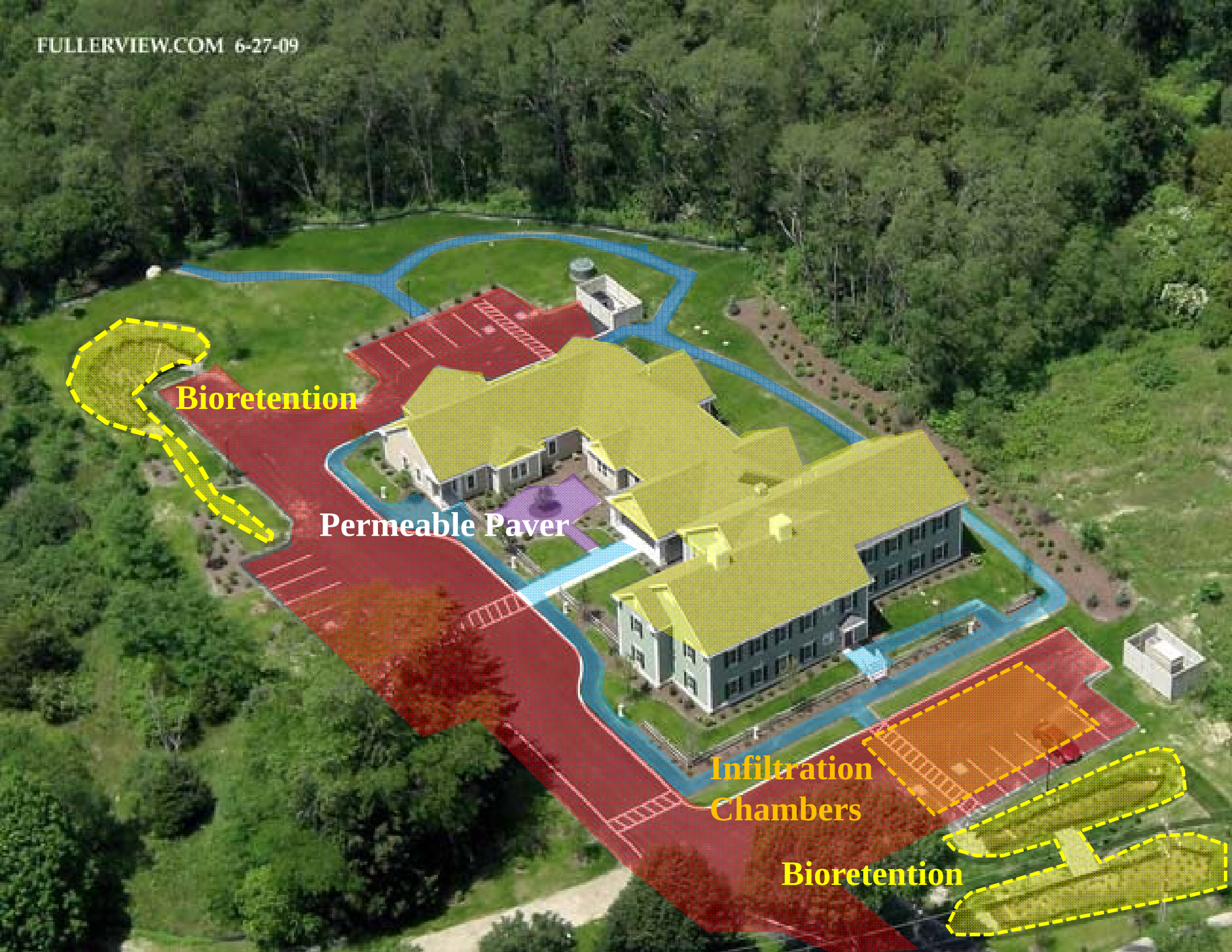
Adamant Accord
Meeting Facilitation and Mediation Services

Initial Decision Points

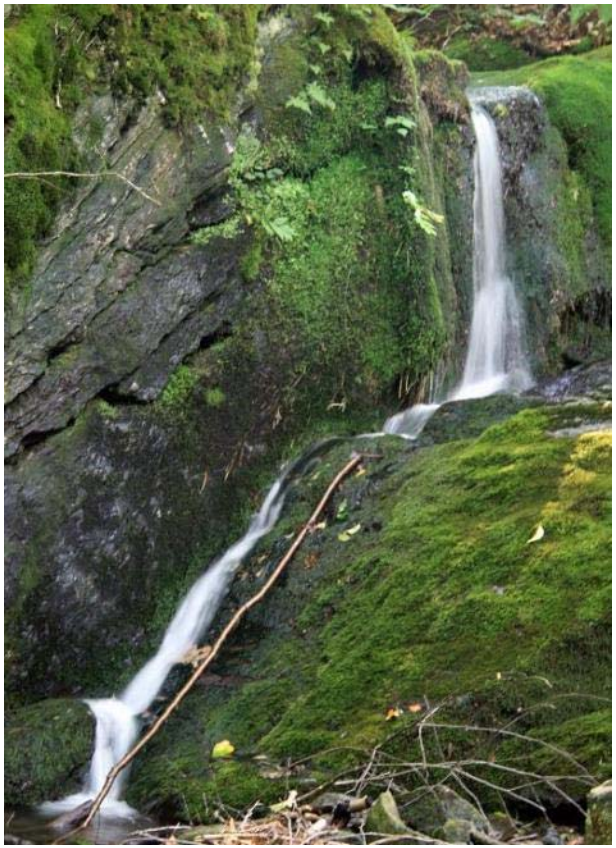
1. What, if any, “feasibility test” should be included in the runoff reduction standard?
2. Is the current WQv standard (e.g., 90% rule, applied uniformly state-wide) the appropriate reduction volume in terms of achieving sediment and nutrient removal, and in terms of feasibility?
3. Is the existing formula for calculating WQv sufficient for addressing conversion of undeveloped land to pervious land uses (e.g. lawn)?
4. How will water quality and channel protection requirements be applied on sites where less than 100% of the WQv and/or CPv is addressed via runoff reduction?
5. Should a continuous simulation modeling option be included in VSMM?

Determining RRv Feasibility

- Should there be a feasibility component?
- What “tests” should be included for determining if compliance with RRv is infeasible?
  - Are there standard site constraints that would automatically give you an out?
  - Soil hydrologic soil group?
  - Soil testing?
  - Existing and proposed slopes?
  - Redevelopment/existing impervious cover?
  - Zoning density allowances/requirements?


FULLERVIEW.COM 6-27-09
Bioretention
Permeable Paver
Infiltration
Chambers
Bioretention

Bedrock – great for waterfalls, not for RRv

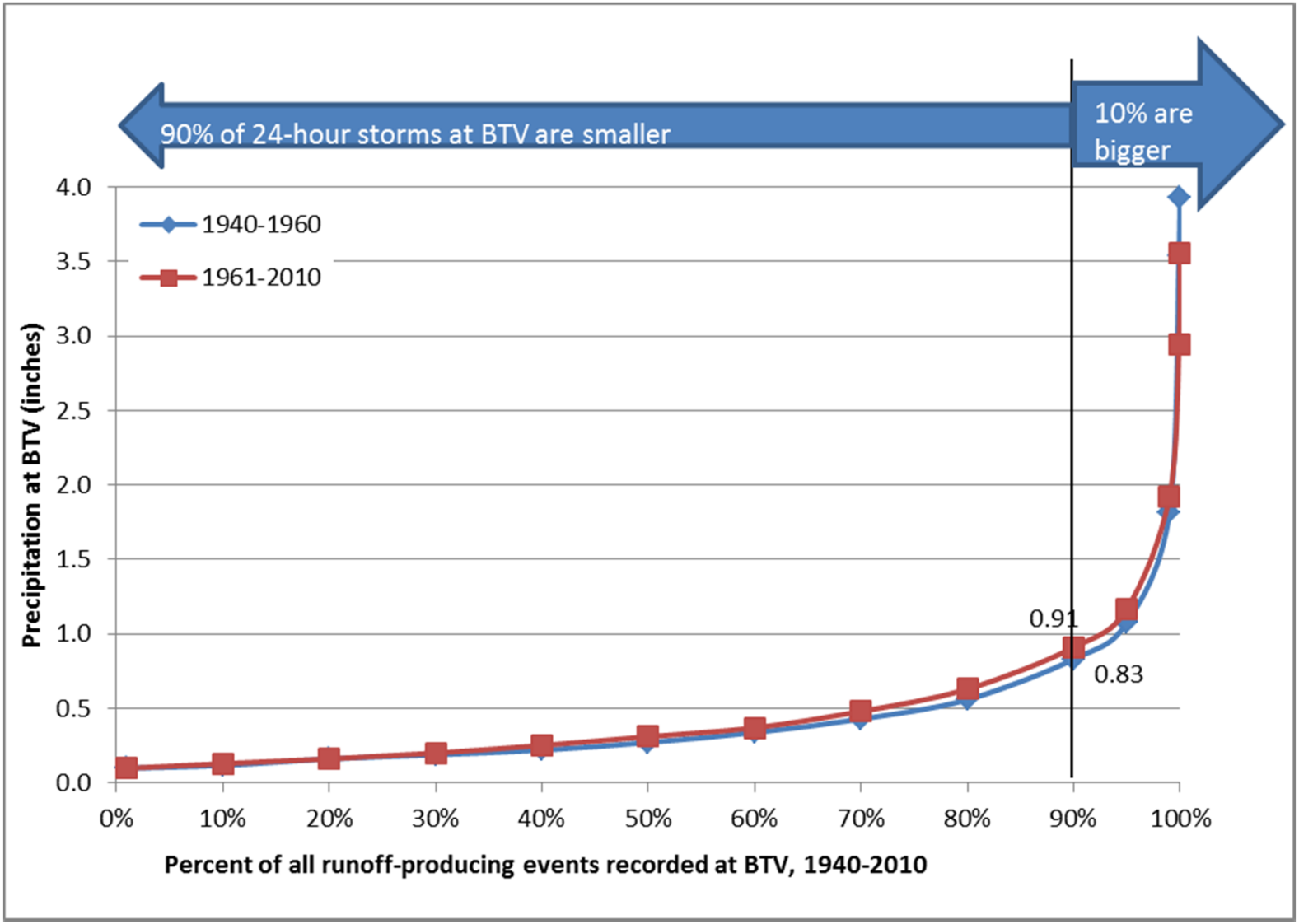


UVM example. What happens when want to redevelop and construct parking lot, 80% IC, on top of bedrock and meeting RR target is not feasible?

Another Look at the WQv

- In order to meet in-stream water quality standards and classifications, it is necessary to provide some level of stormwater treatment.
  - The WQv attempts to capture and treat the majority pollutants in stormwater runoff, while maintaining a reasonable cost for stormwater treatment practices.
- Is the WQv standard (e.g., 90% rule, applied uniformly state-wide) the appropriate reduction volume in terms of achieving sediment and nutrient removal, and in terms of feasibility?
  - Is 90% capture good enough? Do we need to modify this or do more (e.g., 95% capture)?
  - Is the 90% / 0.9 inch standard representative of current climatic conditions?
  - Is a uniform state-wide standard (e.g., 0.9 inches of rainfall) appropriate?

Is 90% Capture Enough?



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Is 0.9” Representative of Current Climatic Conditions?

Summary of percentile calculations for 24-hour precipitation events at BTV

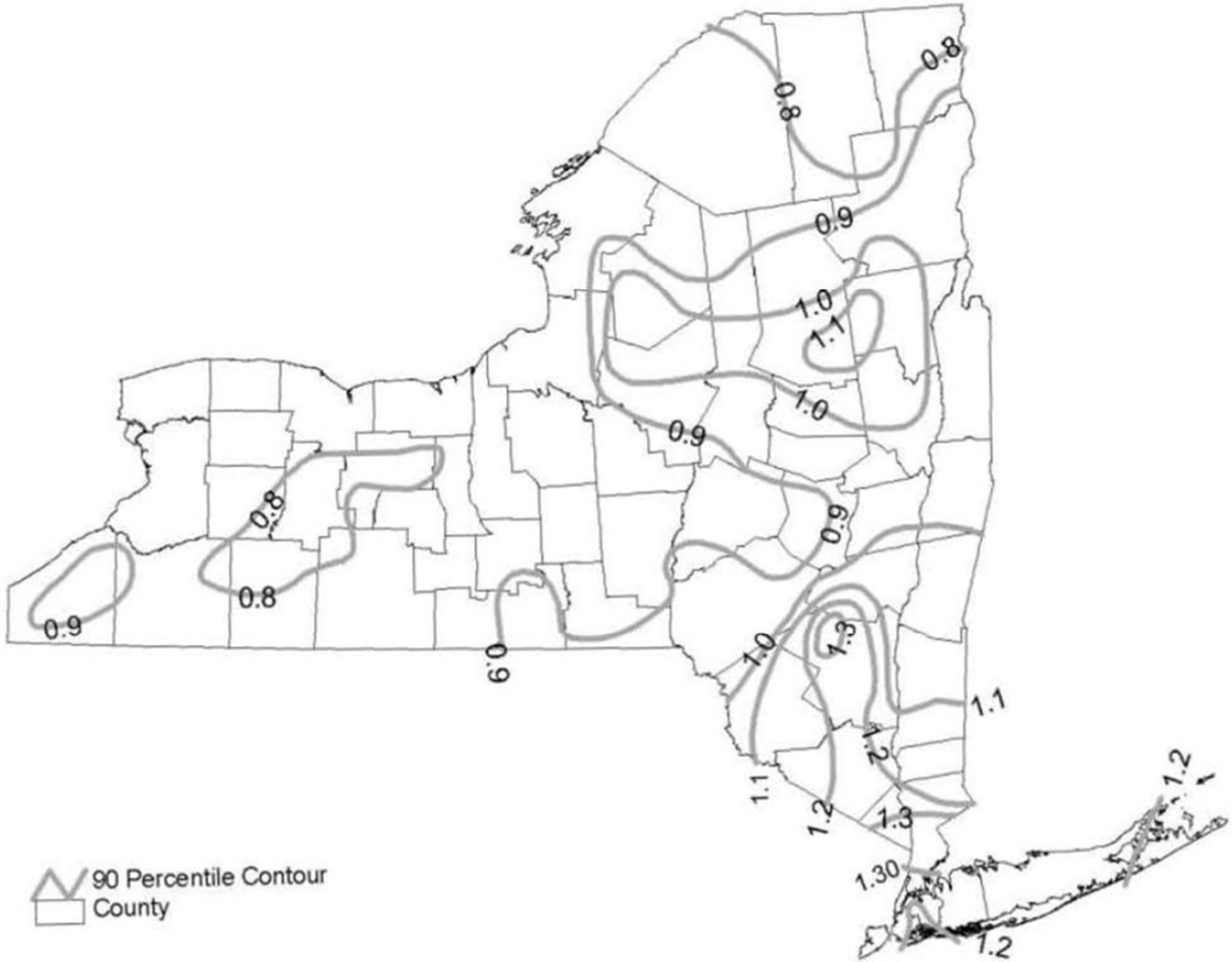
Percentile	1940-1960	1961-2010	1982-2012	1992-2012
0.01	0.10	0.10	0.10	0.10
0.1	0.12	0.13	0.13	0.13
0.2	0.16	0.16	0.16	0.16
0.3	0.19	0.20	0.20	0.20
0.4	0.22	0.24	0.25	0.26
0.5	0.27	0.30	0.31	0.31
0.6	0.34	0.36	0.37	0.37
0.7	0.43	0.46	0.48	0.48
0.8	0.56	0.60	0.63	0.64
0.9	**0.83**	**0.84**	**0.91**	**0.95**
0.95	1.08	1.09	1.17	1.18
0.99	1.82	1.75	1.92	1.97
0.999	3.54	2.54	2.95	2.96
1	3.99	3.62	3.62	3.62

Source: National Climatic Data Center online climate data directory for station USW00014742

Accessed at http://www.ncdc.noaa.gov/oa/climate/climatedata.html, March 15 2013.

Is a Uniform State-wide Standard Appropriate?

Figure 4.1 90% Rainfall in New York State (NYSDEC, 2000)



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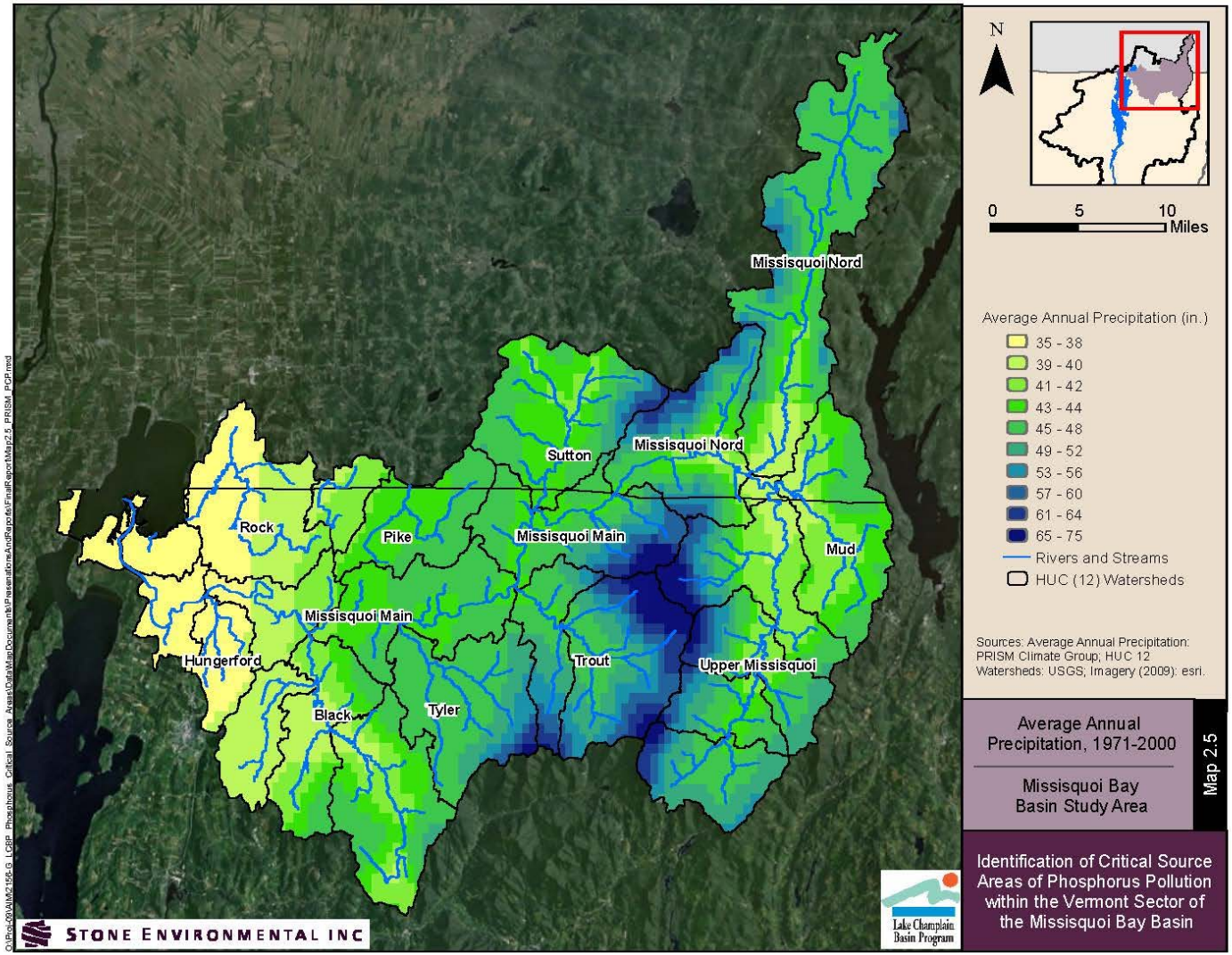

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Pervious, Developed Lands

- Is the existing formula for calculating WQv sufficient for addressing conversion of undeveloped land to pervious land uses (e.g. lawn)?
  - Does there need to be a more of a distinction between classes of pervious surface (lawn vs. trees)?
  - Does more attention need to be given to soil restoration?
  - Are there ways to create stronger incentives for keeping trees within the WQv calculation?

Soil Restoration

- Used to restore soil porosity and permeability and improve infiltration rates that were adversely affected (e.g., compacted) during site construction/earth disturbance
  - *Iowa:* Soil management plan (SMP) is created for each new development, which typically requires deep tillage as part of the final grading. Tillage depth is inversely related to the amount of green space on the site post-construction
  - *New York:* soil restoration or modification of curve number is a REQUIRED practice
  - *Seattle, WA:* at project completion all new construction sites must meet post construction soil quality and depth requirements, including a minimum 8-inch depth of compost amended soil or imported topsoil placed in all areas of the project site disturbed during construction

Tree Credits

- Broad categories of tree credits:
  - Individual tree/site-scale
  - Watershed-scale
- Does it make more sense to base credits on the urban forest as a whole rather than per individual tree, and to set minimum size distribution and species standards for the forest as a whole?
  - While specific goals for ideal forest cover percentage vary geographically, and in the literature and municipal UTC plans, a common minimum goal is 40% UTC in urban areas, 65% UTC in the overall watershed and 70% tree cover in riparian buffer zones.

Tree Credits – Site-Scale Examples

- Sacramento, California
  - Offers credits for new or existing 'interceptor trees' A portion of impervious cover underneath tree canopy may be subtracted from the site impervious cover as follows:

    New deciduous trees = 100 ft2

    New evergreen trees = 200 ft2

    Existing trees = ½ the existing canopy

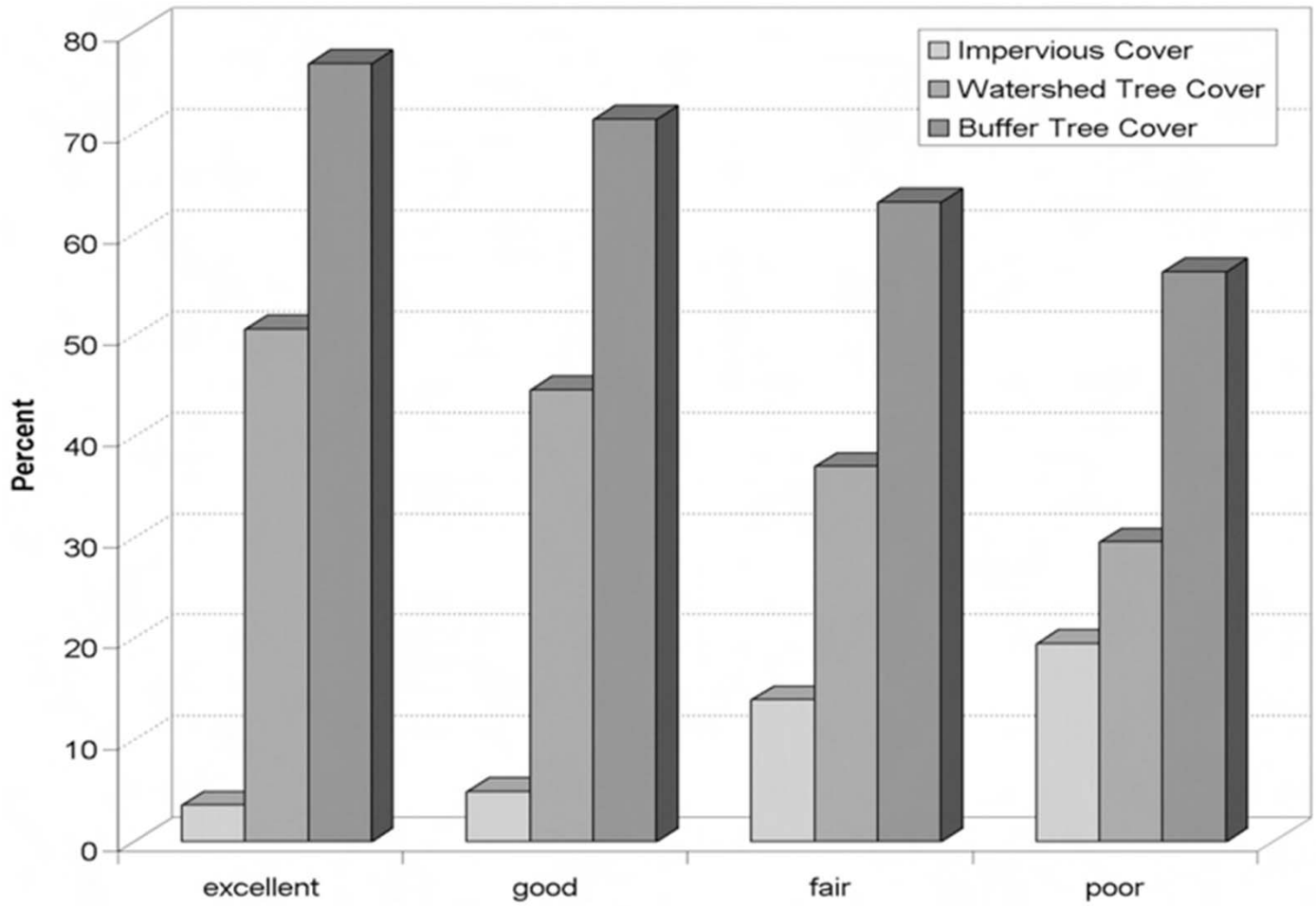
- Pine Lake, Georgia
  - Offers credits to help meet site runoff requirements and are determined based on size class of tree:

    Trees < 12" DBH = 10 gallons/inch

    Trees > 12" DBH = 20 gallons/inch

Tree Credits – Watershed-Scale

Goetz et al. (2004) looked at mid-Atlantic stream health rankings and their correlation with watershed impervious cover, forest cover, and riparian buffer cover (30 m on either side of the stream).



Stream Health Rankings and Land Cover. Goetz et al. 2004.

What if 100% RRv Cannot Be Met at a Site?

- What happens to WQv and CPv?
- Treat and release remaining volumes same as before?
- Limit treatment options to specific, high-performing BMPs?

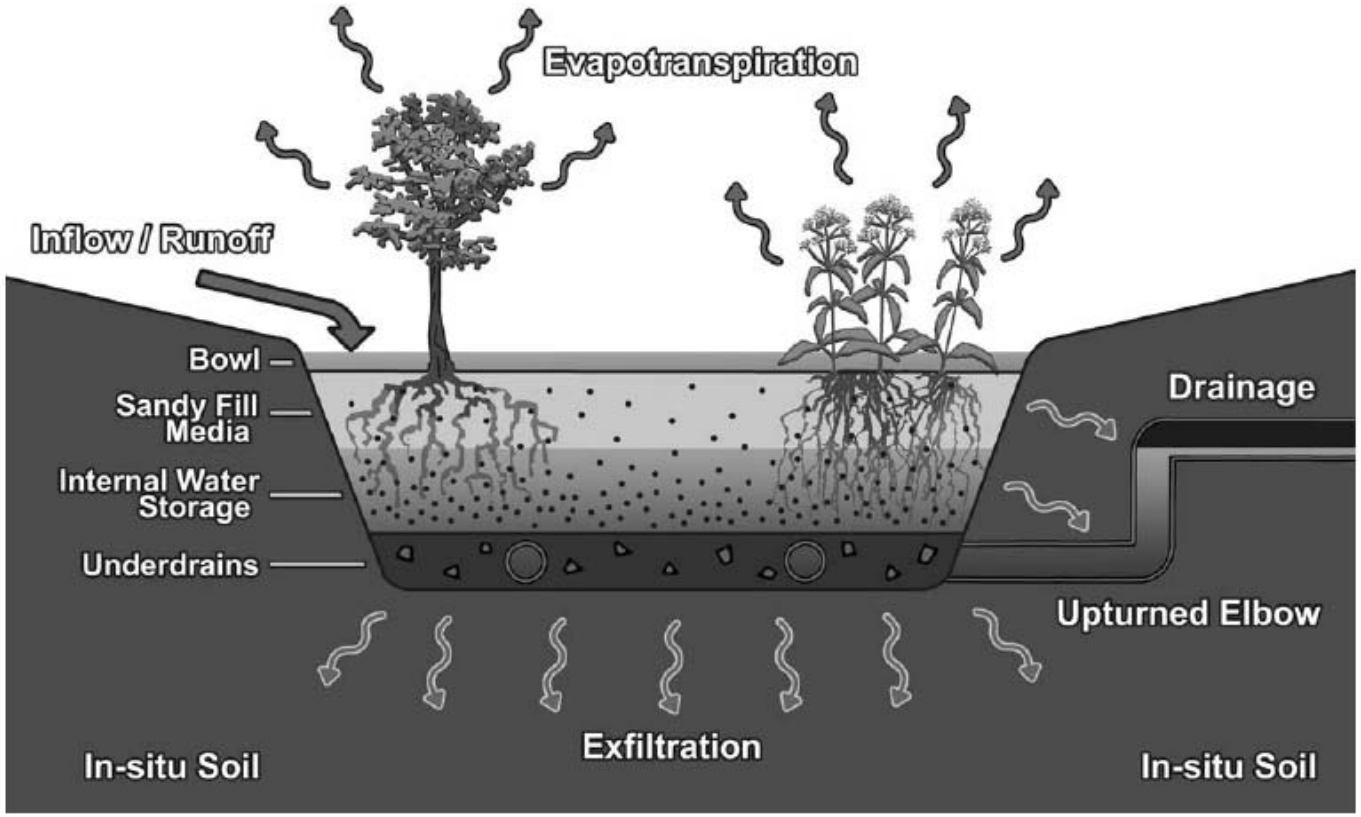


Figure 1. Schematic of a bioretention cell with an internal water storage layer.

Source: NCSU, 2009

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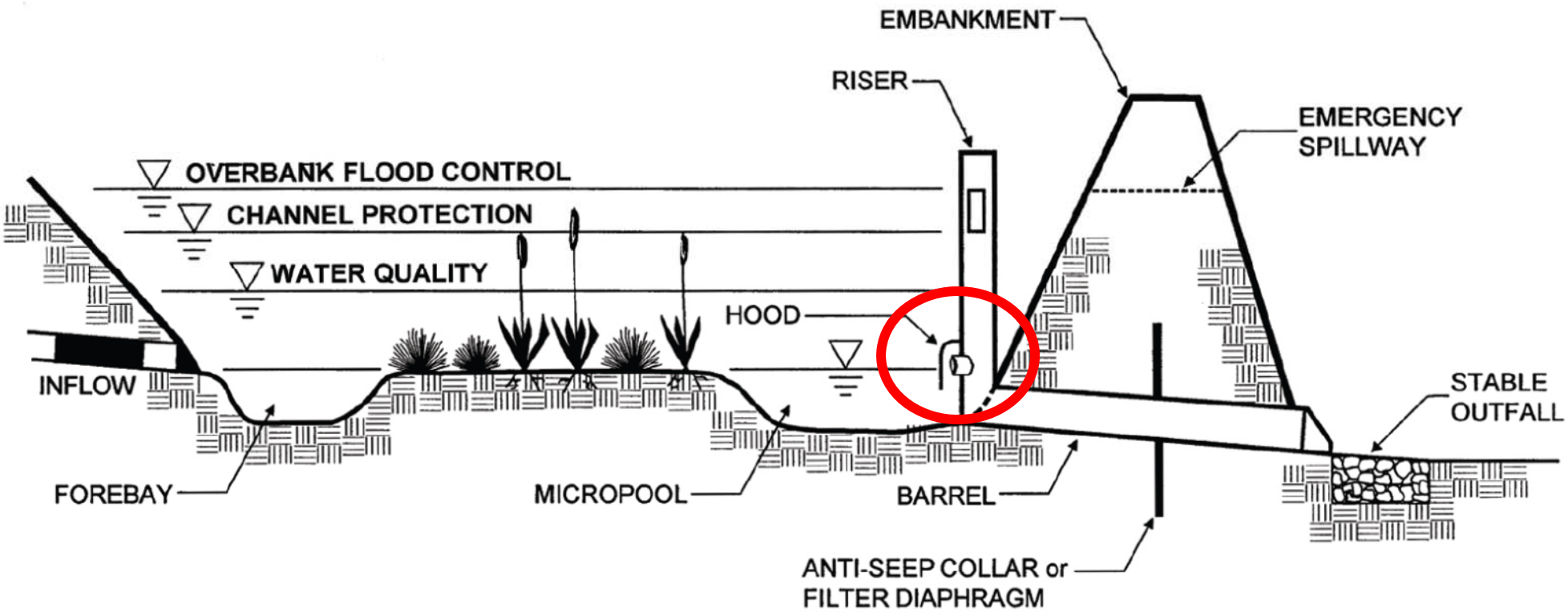
If half of CPv is met with RRv, do you only need half of a detention pond?

How Small is Too Small?

- Minimum low-flow orifice diameter? Some places have ~1 inch minimum; if smaller is required, criteria waived



Other Options for CPv?

- Modify other practices to handle CPv?
- Add low-flow orifice to bio underdrain; enlarge surface storage?

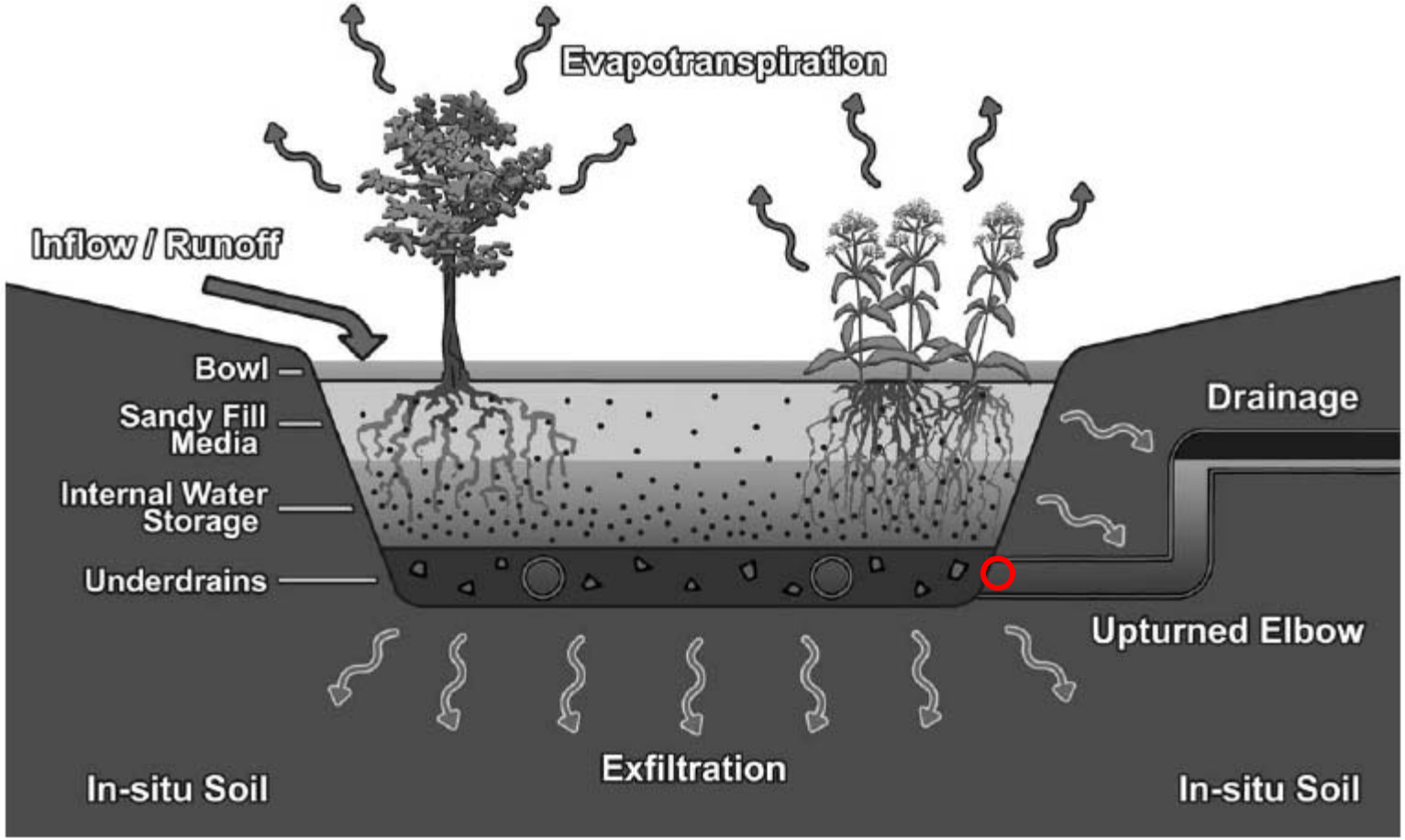


Figure 1. Schematic of a bioretention cell with an internal water storage layer.

Continuous Simulation Modeling

- Should a continuous simulation modeling option be included in VSMM?
  - Continuous simulation modeling better accounts for infiltration, evapotranspiration, depression storage, and system storage; important for simulation of green infrastructure techniques
  - Continuous simulation modeling is more labor intensive, so it is likely to see fewer applications
  - Any downsides to including as an option?
- New York provides for an “alternative WQv” calculation, where a continuous simulation model can be used to demonstrate all rainfall events less then or equal to the 95th percentile rainfall event will be captured, reduced, reused, treated, and managed on-site to prevent the off-site discharge.