

What's the Fuss About
Stormwater . . . It's All
Just Rain, Right?

Stormwater Primer

- Is Stormwater a problem?
- How does Stormwater become a problem?
- What are the Stormwater rules in Massachusetts?
- Where are Stormwater rules heading?
- What is “LID”?
- What are Stormwater BMPs?

Stormwater Impacts



- Urban
Runoff

Stormwater Impacts



- Charles River Dam Algae Bloom

Stormwater Impacts



- Storm Drain in Muddy River Basin

Stormwater Impacts



- Ipswich River Fish Kill

Stormwater Impacts



- Spring 2006
Flood in
Lowell

Stormwater Impacts



- Water Quality Impairment

Why Stormwater?

- Single largest source of water pollution statewide
- ~60% of water contamination for impaired waters is caused by excess bacteria and phosphorus
- ~50% of watersheds don't have enough water in summer
- Direct relationship to "Impervious Cover"
- NO TREATMENT provided in stormwater collection systems

Relationship Between Impervious Cover and Stream Quality

Impervious Cover Model

Good

Sensitive

Fair
Stream
Quality

Poor

Impacted

Damaged

Severely Damaged

10%

25%

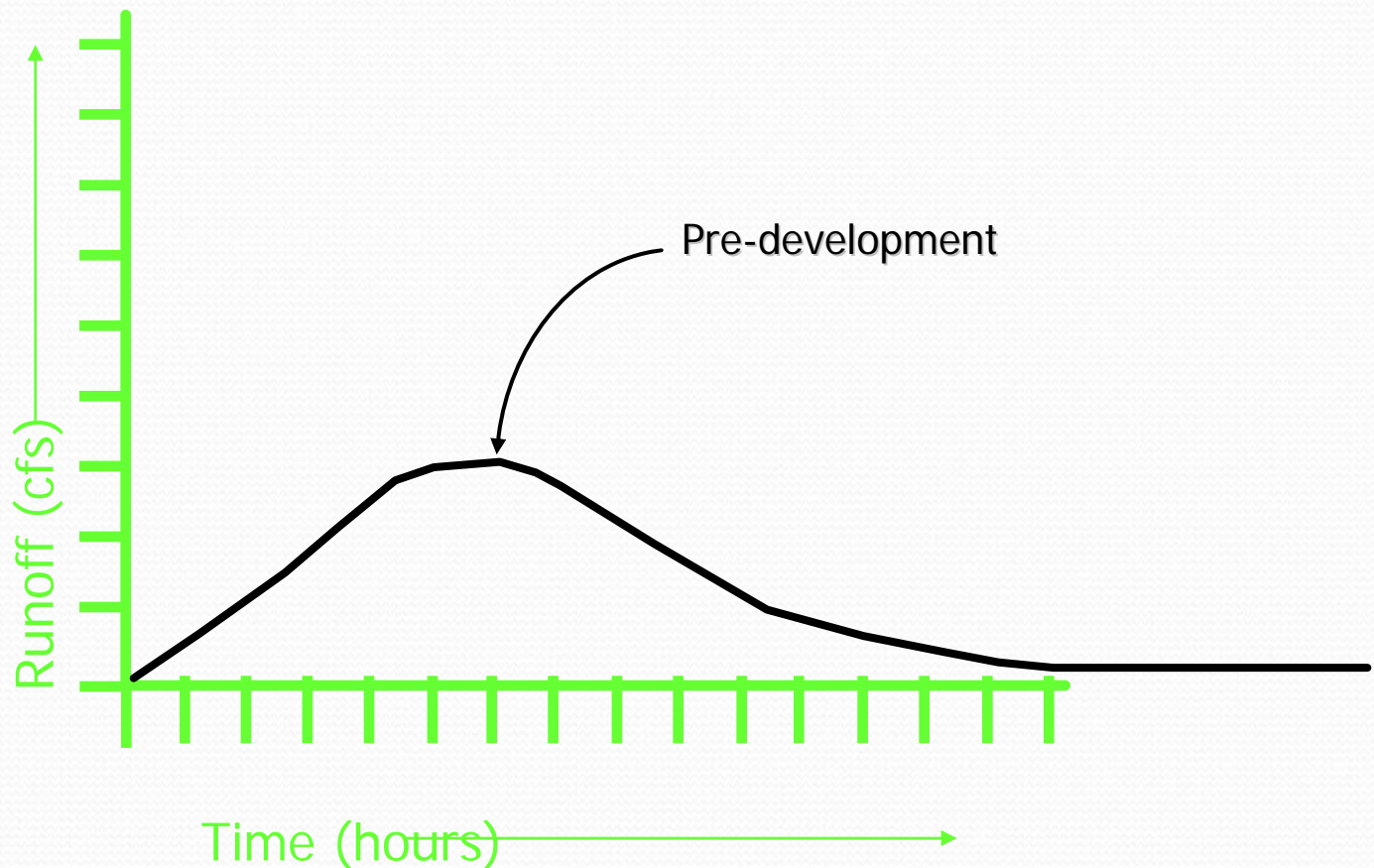
40%

60%

100%

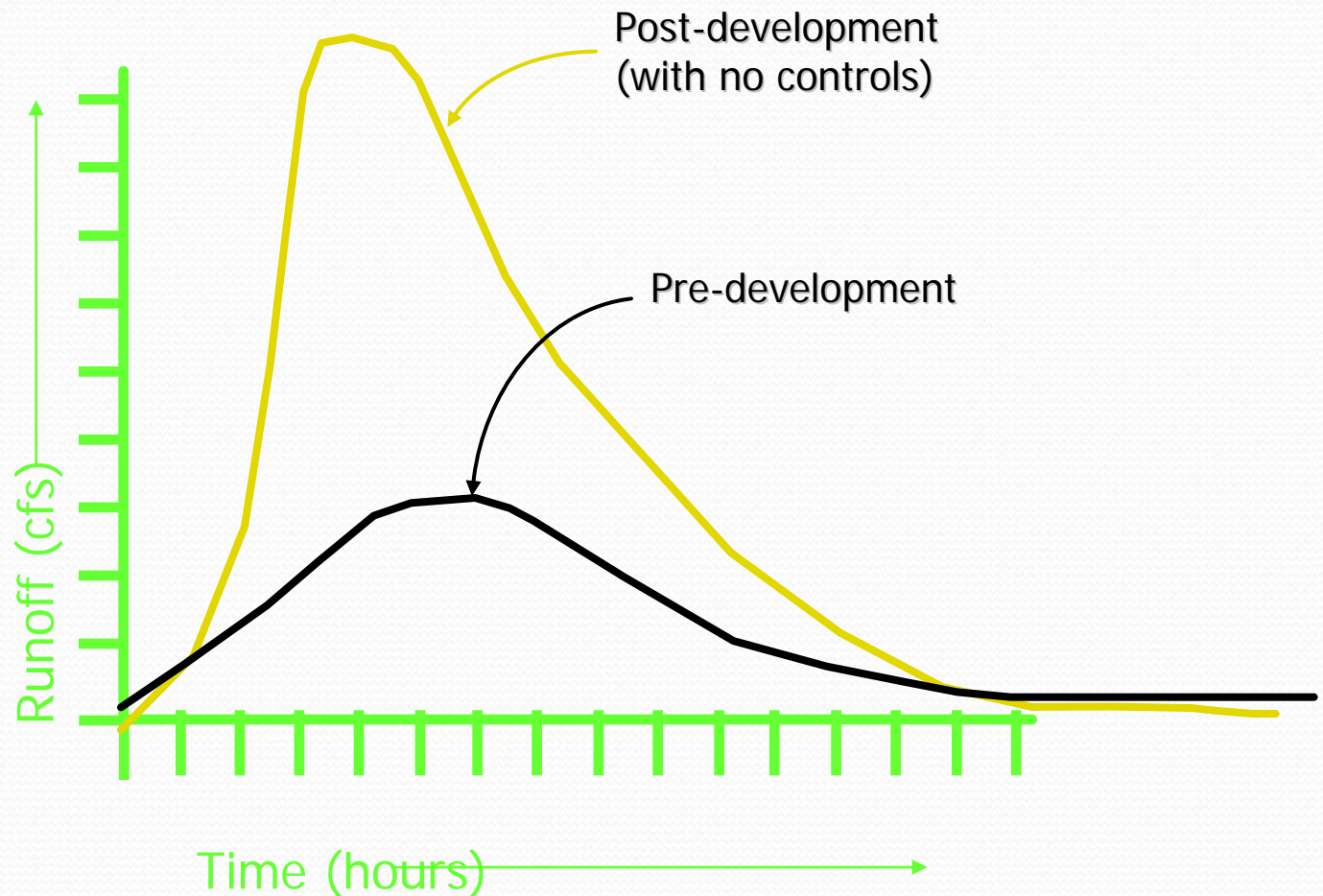
Watershed Impervious Cover

How Development Alters Stream Flows



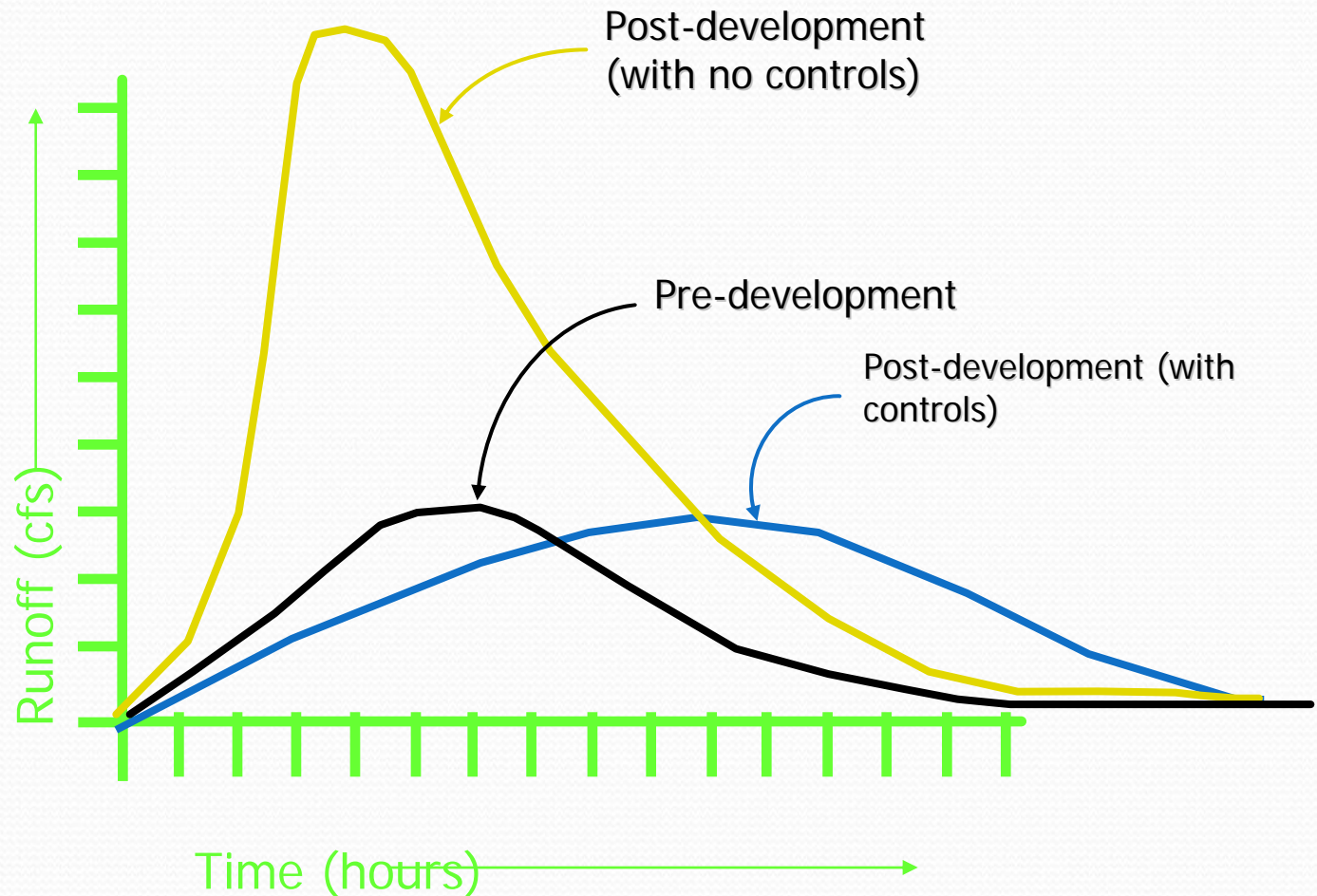
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ENSR*

How Development Alters Stream Flows



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How Development Alters Stream Flows



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What Pollutants are in Stormwater?

- Nutrients
 - Phosphorus and Nitrogen
 - e.g., Fertilizers, leaves
- Sediments
 - e.g. Clay, silt and sand
- Pathogens/Bacteria
 - e.g. animal and human feces
- Chemicals
 - e.g. cleaners, pesticides, motor oil

What Harm Comes from Stormwater?

- Affects plants and animals
 - Algae blooms harm human uses and cause oxygen depletion that can suffocate plants and animals
 - Bacteria make it unsafe for swimming or boating
 - Litter releases toxins as it breaks down
- Increased runoff and increased speed of runoff erodes and changes streams and impacts wetlands
- Piping water out of the watershed reduces flow to streams and aquifers

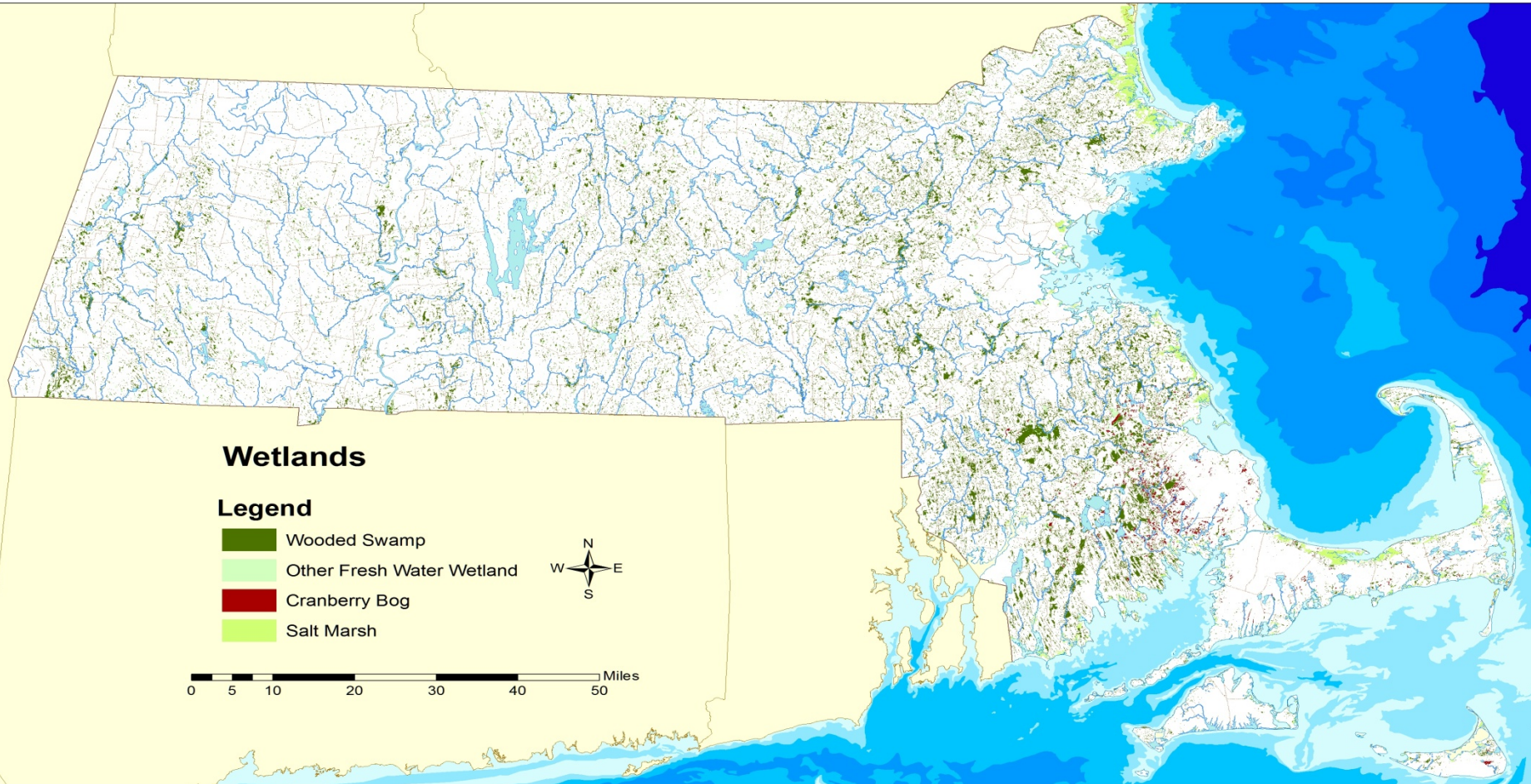
Why Stormwater?

- We have sensitive areas to protect . . .
 - Wetlands
 - Water Supplies
- And sensitive areas with problems.
 - Stressed Basins – not enough water
 - Impaired Waters – too much pollution

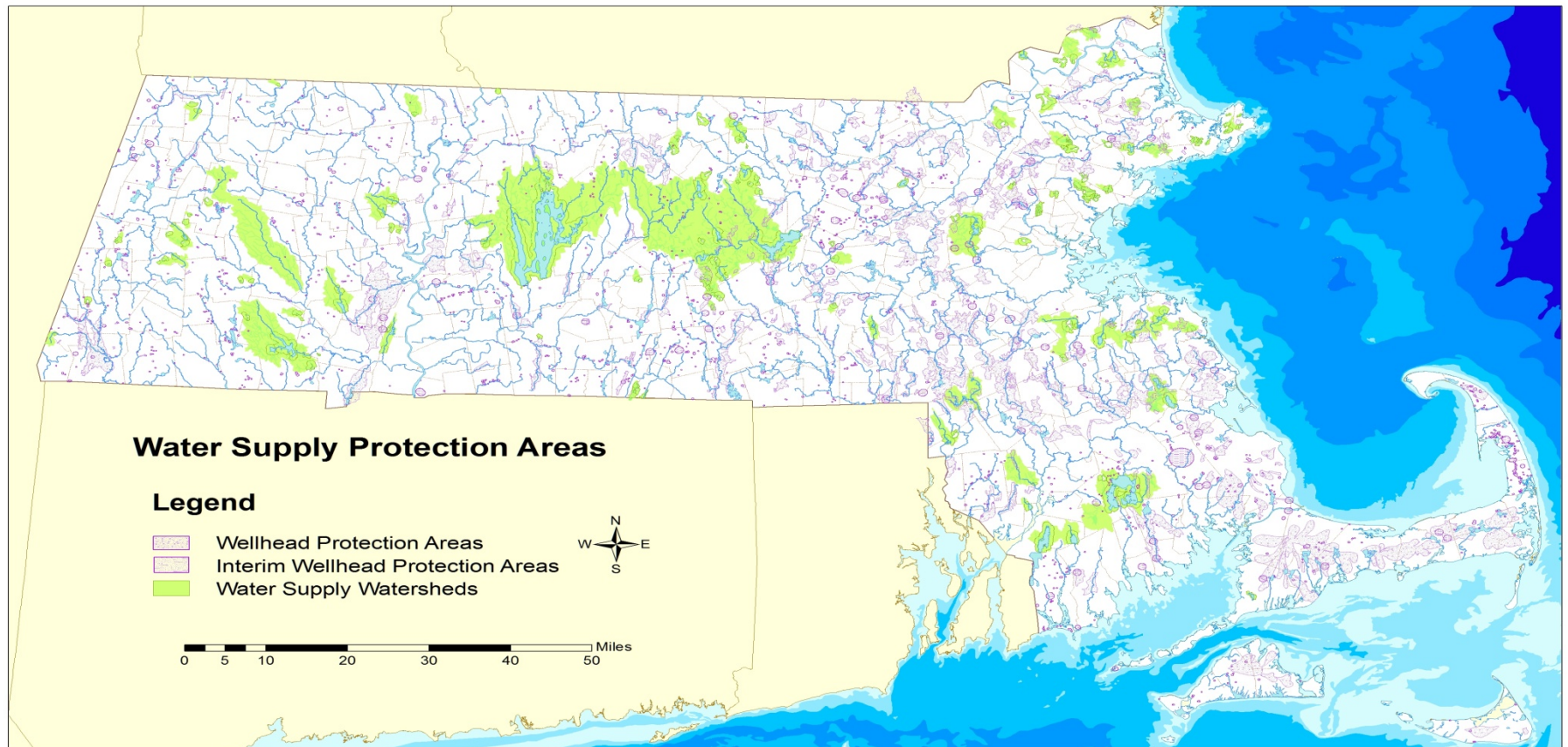
Sensitive Areas

- Wetlands
 - ~ 4% of state is wetlands
- Water Supply Areas
 - ~ 20% of the state within water supply protection areas
- Stressed Basins
 - ~40% of state
 - basins with lowest flows in MA
- Impaired Waters
 - ~ 75% of assessed lakes impaired
 - ~ 70% of assessed rivers impaired
 - in all 27 Massachusetts watersheds

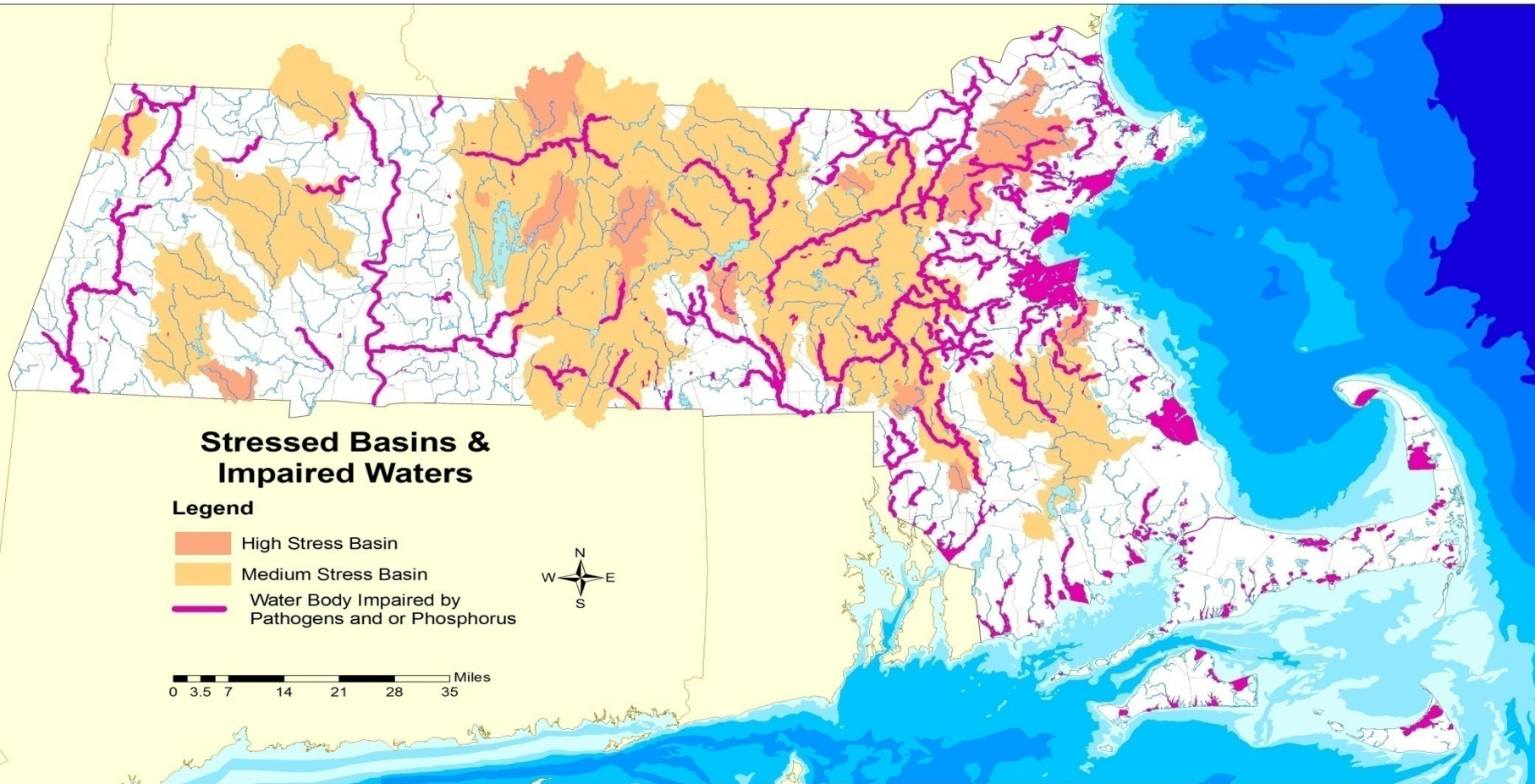
Wetlands



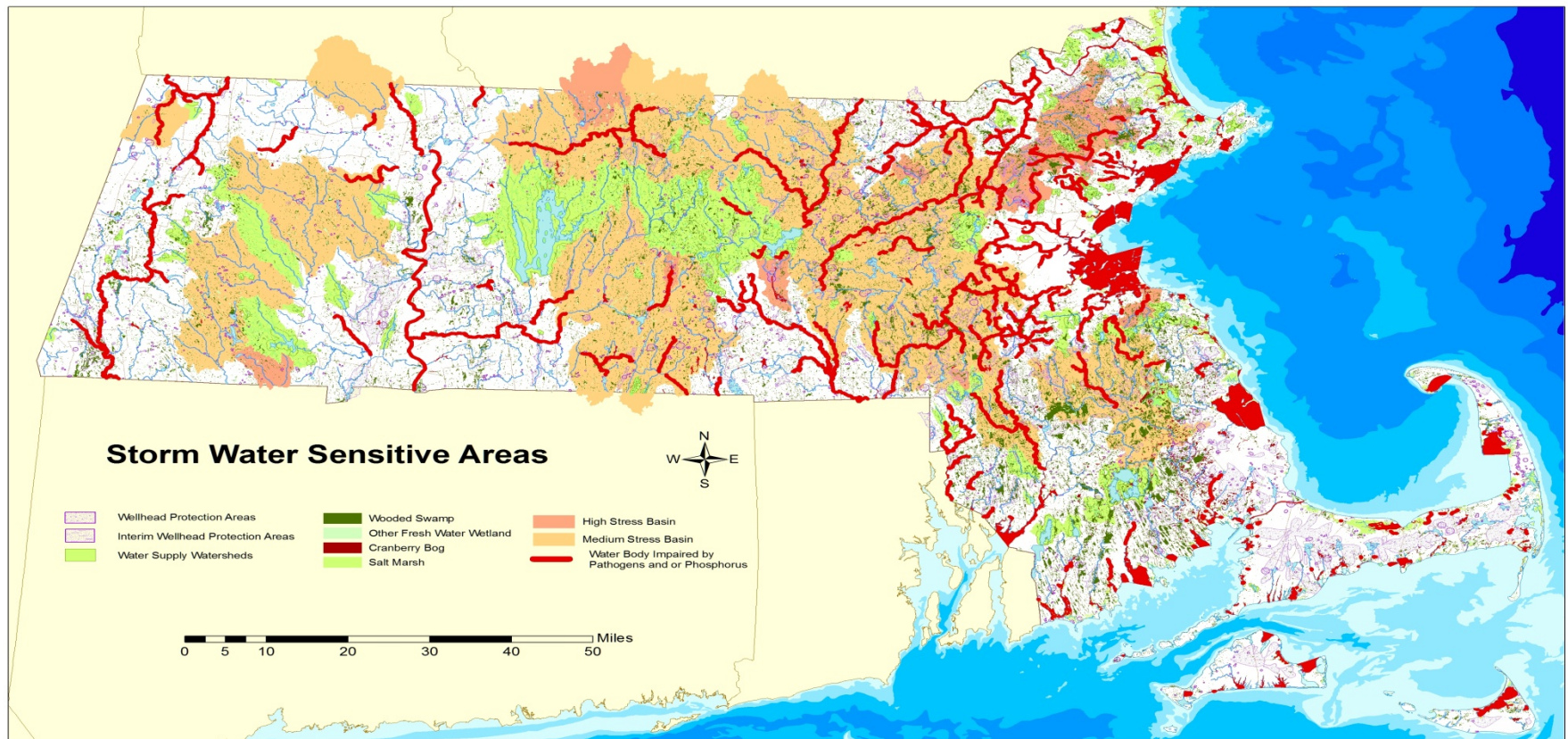
Water Supply Protection Areas



Stressed Basins and Impaired Waters



Wetlands, Water Supplies, Stressed Basins & Impaired Waters



Current Stormwater Regulations in Massachusetts

- Federal Regulations
 - Construction General Permit
 - Multi Sector General Permit
 - Municipal Separate Storm Sewer System (MS4)
 - Proposed: Residual Designation Authority
- State Regulations
 - Wetlands Regulations include the Massachusetts Stormwater Standards
- Local Bylaws

Coming Themes

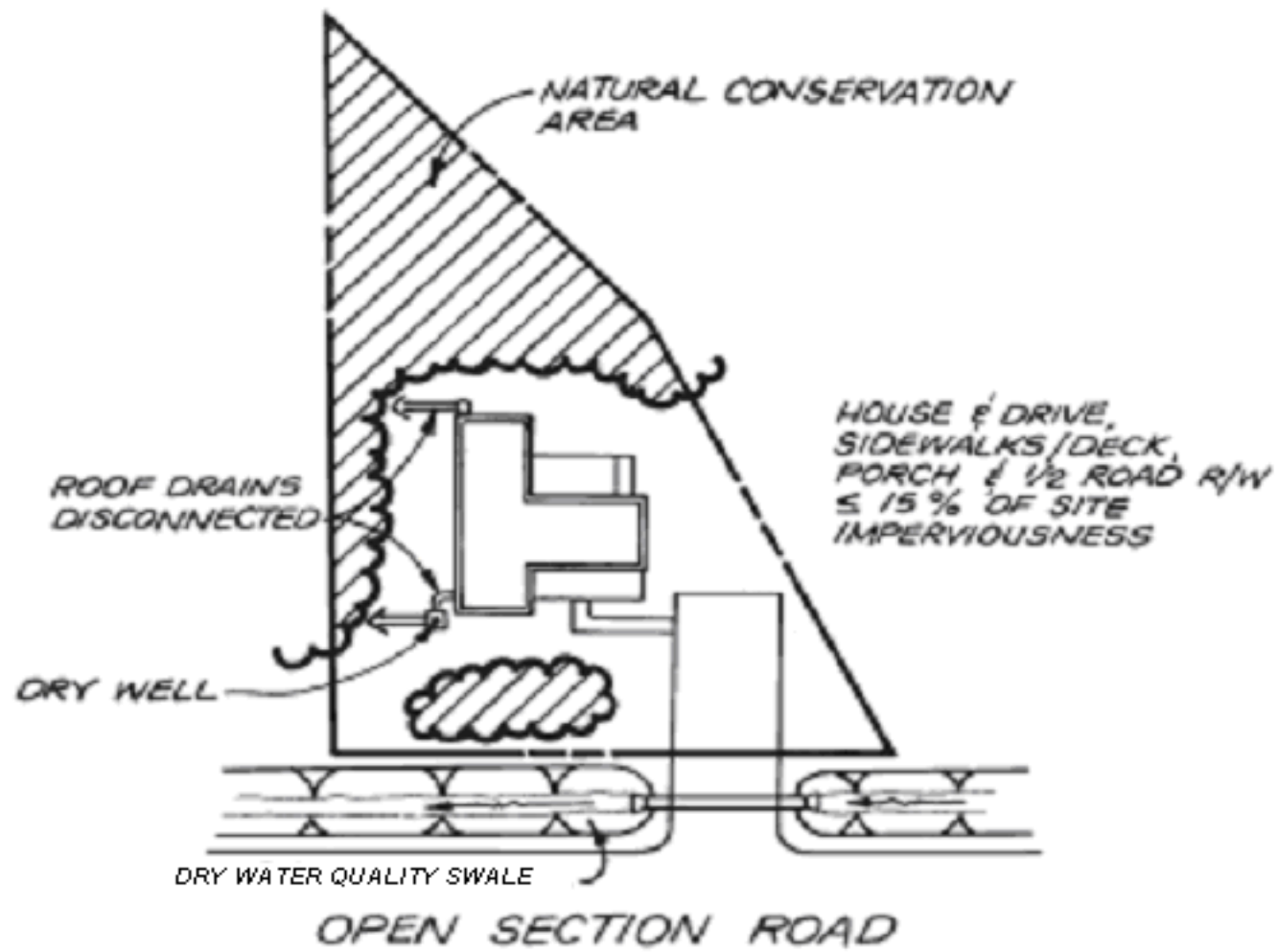
- TMDLs
 - “Total Maximum Daily Load”
 - For Specific Pollutants - Phosphorus, Bacteria, etc.
 - For Impervious Cover
- “Residual Designation Authority”
 - Federal requirement for EPA to act upon a non-point source
- Local Green/Sustainability Initiatives
- Nudging toward common set of rules: Massachusetts Stormwater Standards

Coming Themes

- Keep it On Site
 - Impervious Surface
 - 1" rules?
- From stormwater piping to distributed systems
 - Site Design
 - Pollution Prevention
 - Low Impact Development
- Funding: Stormwater Utilities?

“Low Impact Development”

- Through thoughtful site design . . .
 - Minimize creation of impervious surfaces
 - Disconnect drainage pathways
 - Increase time of concentration
- Through pollution prevention reduce pollutants' exposure to rainfall and runoff.
- Then build decentralized stormwater facilities to treat stormwater and keep it on site.



Disconnect Those Downspouts

- The Dedham survey says . . .
 - 58% of the impervious cover as connected
 - 29% could be disconnected using Low Impact Development techniques
 - That would reduce annual runoff volume by 24%
- Easier techniques include
 - Downspout extensions to lawn areas
 - Drip-line infiltration
 - Rain barrels
 - Rain gardens

Stormwater Facilities:

“Best Management Practices”

- BMPs are used routinely in Massachusetts
- Pictures of BMPs that follow illustrate
 - Examples of BMPs
 - Importance of maintenance
 - Traditional BMPs
 - Proprietary BMPs
 - Low Impact Development (LID) BMPs

Water Bans



Pollution Prevention, Marlboro



Pollution Prevention, Arlington



Pollution Prevention, Marlboro



Pollution Prevention Needed, Arlington



BMP Maintenance Needed, Plymouth



Sediment Forebay, Woburn



Extended Detention Basin, Cambridge



Infiltration Basin, Wilmington



Wet Basin, Cambridge



Constructed Stormwater Wetlands, Plymouth



Underground Detention Basin, Scituate



Proprietary BMP, Massachusetts



3. 12. 2004

Proprietary BMP, Cambridge



Rain Garden, Pembroke



Stone Filter Strip, Lee



Bioretention Cells, Wilmington



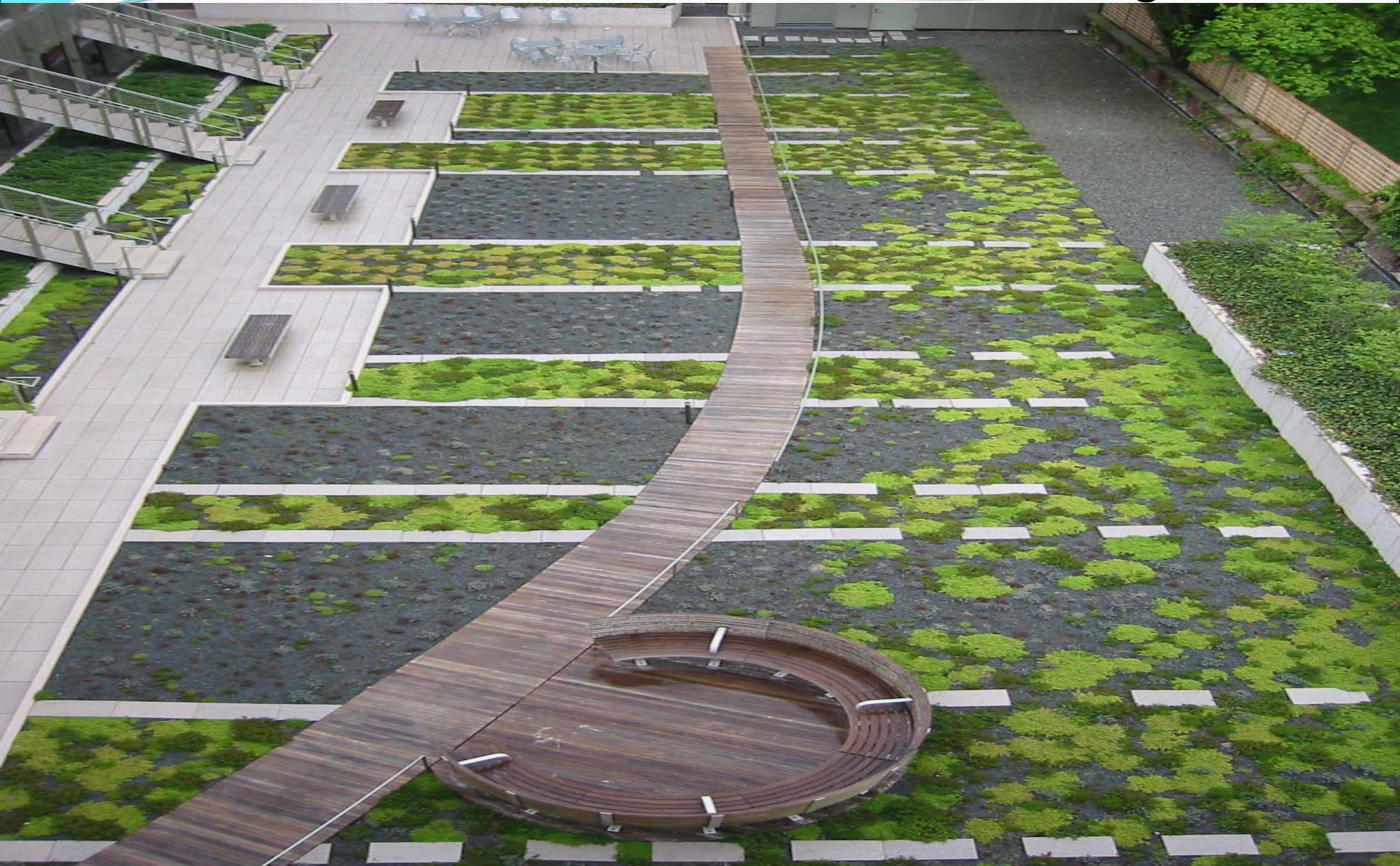
Bioretention Cell, Chestnut Hill



Permeable Pavers, Hyannis



Green Roof Roof Garden, Cambridge



Gravel Wetland Test Site, UNH





