

Recent Stormwater Advancement/ Applications in New England: Not Sure it's the Latest and Greatest, but...



NEMO
University 007

Portland, ME

September 29, 2010



From the Scale of a State Program to the Size of the Underdrain Pipe - (its all stormwater)



- Rhode Island Prepares to “Require” LID;
- A Zero Discharge Project on Cape Cod;
- 14” to Groundwater;
- The Gravel Wetland Emerges as a Versatile Retrofit; and
- Shopping Mall Retrofit in the Charles River Watershed.



2010 Rhode Island Stormwater Management Manual

RHODE ISLAND STORMWATER DESIGN AND INSTALLATION STANDARDS MANUAL

FINAL DRAFT - APRIL 2010



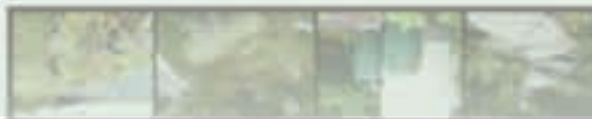
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RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL
MANAGEMENT AND



COASTAL RESOURCES MANAGEMENT COUNCIL



Horsley Witten Group, Inc.



Minimum Standard 1

LID Site Planning and Design Strategies

- First of 11 standards
 - Required to the maximum extent practicable
 - Compliance will be phased-in over time
 - 10 site planning and design objectives that fall into the 3 main categories (ARM)
 - Based on documentation of efforts - Checklist in Appendix A



LID Strategies and Associated Methods	Method incorporated? (check one)			If no or N/A, you must document why the method is not feasible or not applicable at your site and include a description of proposed alternatives.
	Yes	No	N/A ¹	
Work with the Natural Landscape Conditions, Hydrology, and Soils The stormwater management system mimics natural predevelopment hydrology to retain and attenuate runoff in upland areas.				
The postdevelopment time of concentration (Tc) should approximate the predevelopment Tc.				
The travel time throughout individual lots and areas is approximately constant.				
Flow velocity in areas that are graded are kept as low as possible to avoid soil erosion				
Soil compaction has been minimized				
Site is designed to locate buildings, roadways and parking to minimize grading (cut and fill quantities)				
<u>Reduce the Impacts</u> Reduction of Roadway Area				Applicants must provide local municipal requirements for each strategy listed under "Reduce the Impacts"
Reduction of Sidewalk Area				
Reduction of Driveway Area				
Reduction of Cul-de-Sac Area				
Reduction of Building Footprint				

LID Site Planning and Design Checklist

F. Work with the Natural Landscape Conditions, Hydrology, and Soils

Not Applied or N/A. Use space below to explain why:

Select from the following list:

- Stormwater management system mimics pre-development hydrology to retain and attenuate runoff in upland areas (e.g., cuts and fills limited and BMPs distributed throughout site; trees used for interception and uptake).
- The post-development time of concentration (t_c) should approximate pre-development t_c .
- Flow velocity in graded areas as low as practicable to avoid soil erosion (i.e., slope grade minimized). Velocities shall not exceed velocities in Appendix B, Table B-2.
- Plans show measures to prevent soil compaction in areas designated as Qualified Pervious Areas (QPAs) for better infiltration.
- Site designed to locate buildings, roadways and parking to minimize grading (cut and fill quantities)
- Other (describe):

Explain constraints and/or proposed alternatives in space below:

2. Strategies to Reduce the Impacts

Reduce Impervious Cover

Not Applied or N/A. Use space below to explain why:

Select from the following list:

- Reduced roadway widths
- Reduced driveway areas
- Reduced building footprint
- Reduced sidewalk area
- Reduced cul-de-sacs
- Reduced parking lot area
- Other (describe):

Explain constraints and/or proposed alternatives in space below:

Standard #3: Water Quality Criteria (WQ_v)

Stormwater treatment practices designed to:

- Capture prescribed treatment volume of 1 inch per impervious acre;
- Achieve pollutant removal of
 - 85% total suspended solids (TSS);
 - 30% total phosphorus (TP);
 - 30% total nitrogen (TN);
- Practices with proven track record are presumed to meet WQ_v when they are sized and design properly and maintained in accordance with O&M requirements.

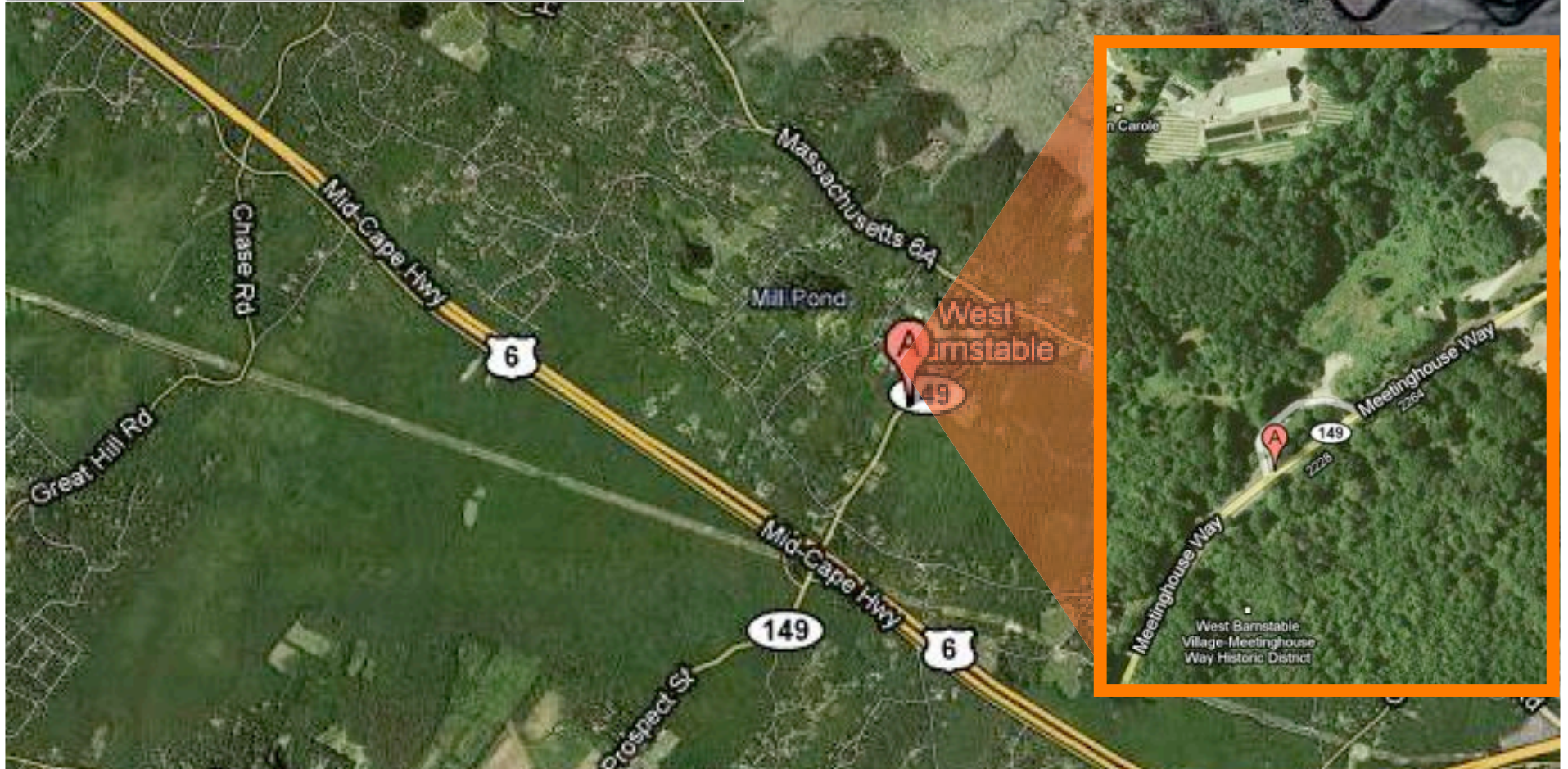
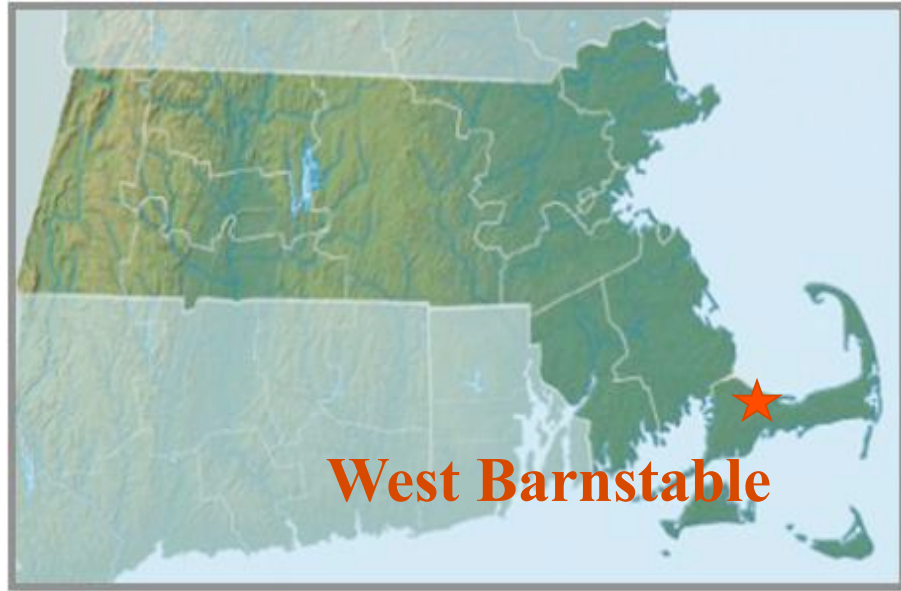


Acceptable Practices that meet Water Quality Treatment Requirements

- Wet Vegetated Treatment Systems (WVTS)
- Stormwater Infiltration Practices
- Permeable Paving
- Filtering Systems-Bioretention
- Green Roofs
- Open Channel Systems

Detention Ponds/Extended Detention Ponds/Wet Ponds/
Hydro-dynamic separators/Filter Strips don't meet the
minimum criteria



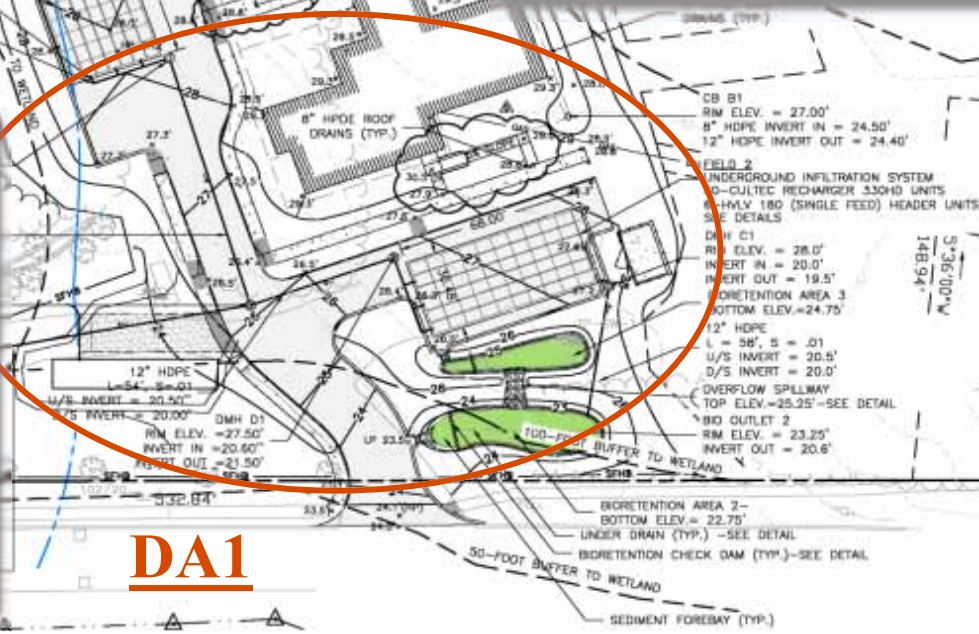


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Site Design



Stormwater Design





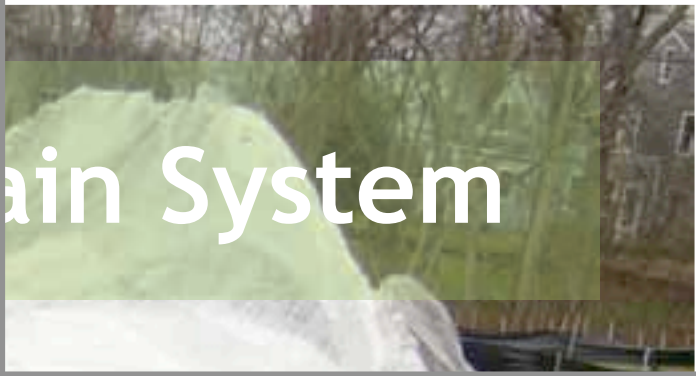
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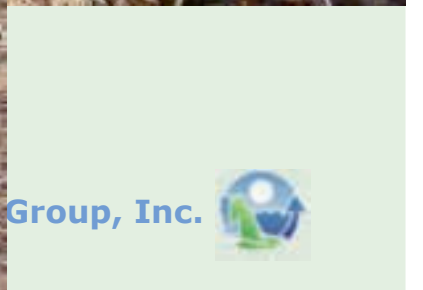




Site Constraints

- Freshwater wetlands in the immediate vicinity of the project;
- Located within Wellhead Protection Area (Zone II)
- High groundwater elevations and relatively flat terrain across the site; and
- A high visibility site and organization with a mission to preserve natural areas and provide public education on topics including protection of natural resources.





Group, Inc.









Bare Hill Pond Watershed

- Bare Hill Pond - 321 acres
 - Former sheep meadow
 - Eutrophication problems
 - Phosphorous/Noxious Plant TMDL
- Bare Hill Pond Watershed Management Committee
- Harvard Village Center - 90 acres
- Town Swimming Beach





Site Constraints

- Freshwater wetlands in the immediate vicinity of the project;
- Mixed drainage system (both surface runoff and pipes);
- High groundwater elevations/ledge;
- Both flat and steep terrain across the various sites; and
- Highly visible, utilized sites (kids).



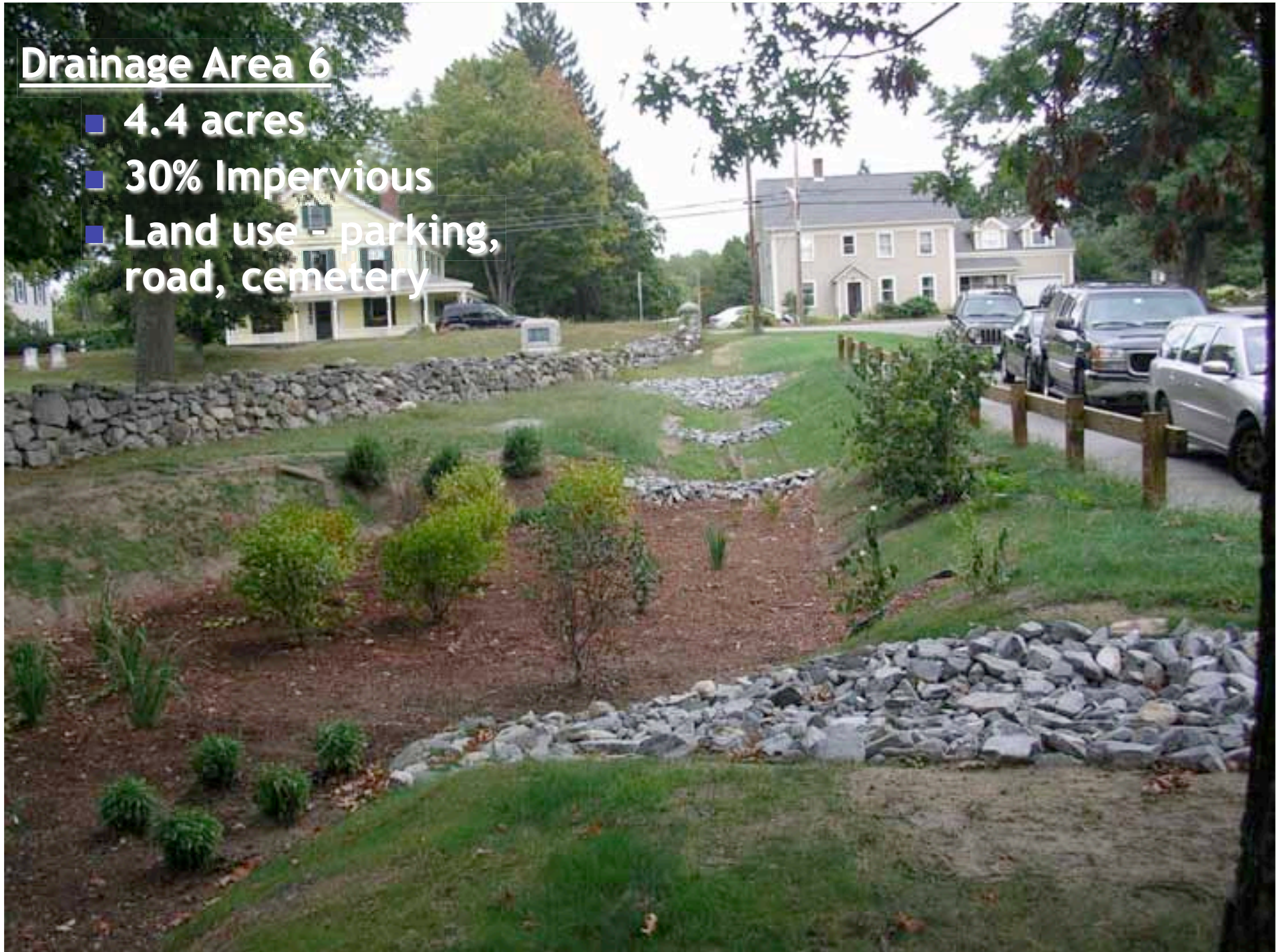
Retrofit Options

- Bioretention Areas
- Dry Swales
- Gravel Wetland

Retrofit
Assessment

Drainage Area 6

- 4.4 acres
- 30% Impervious
- Land use - parking, road, cemetery



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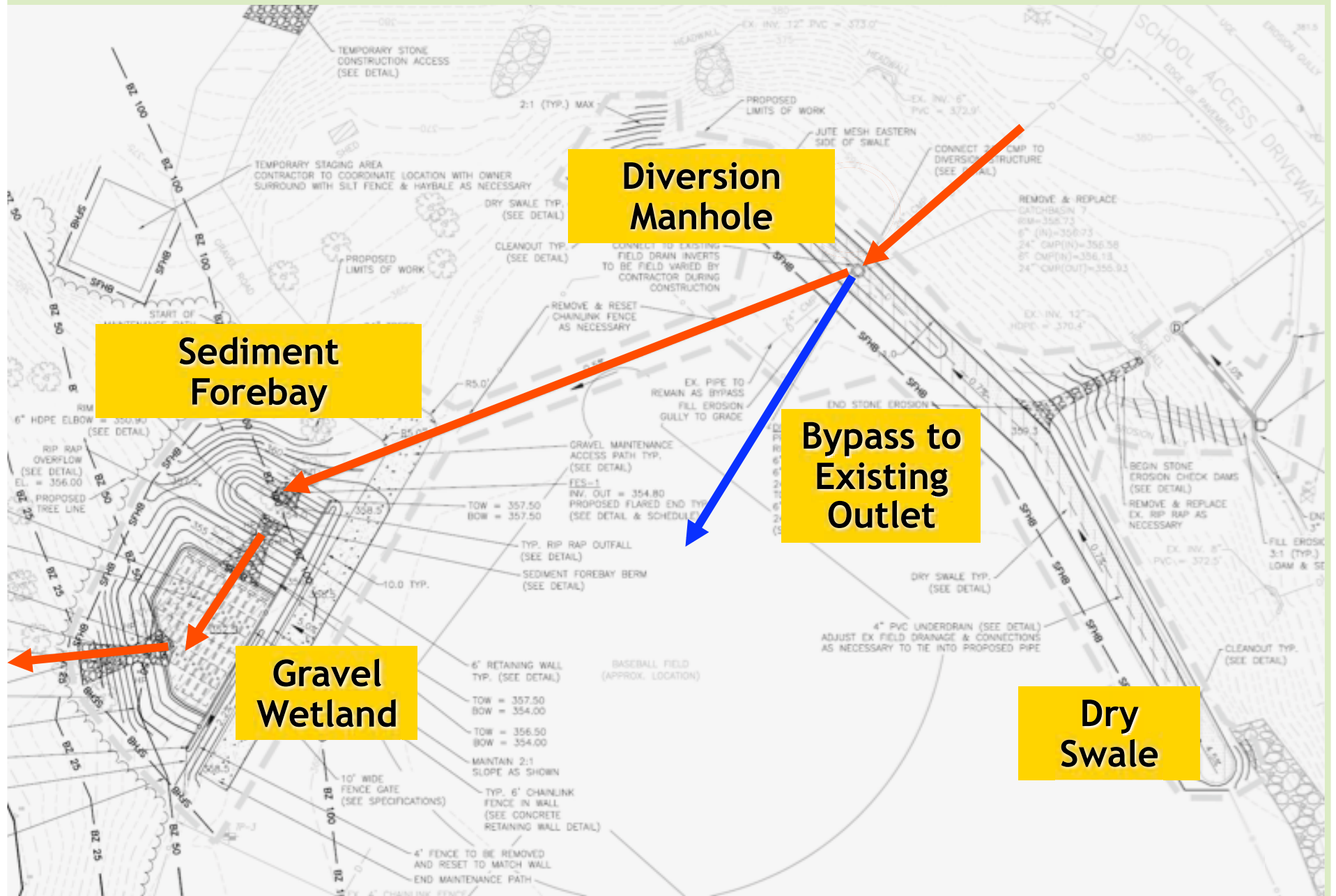
Drainage Area 3

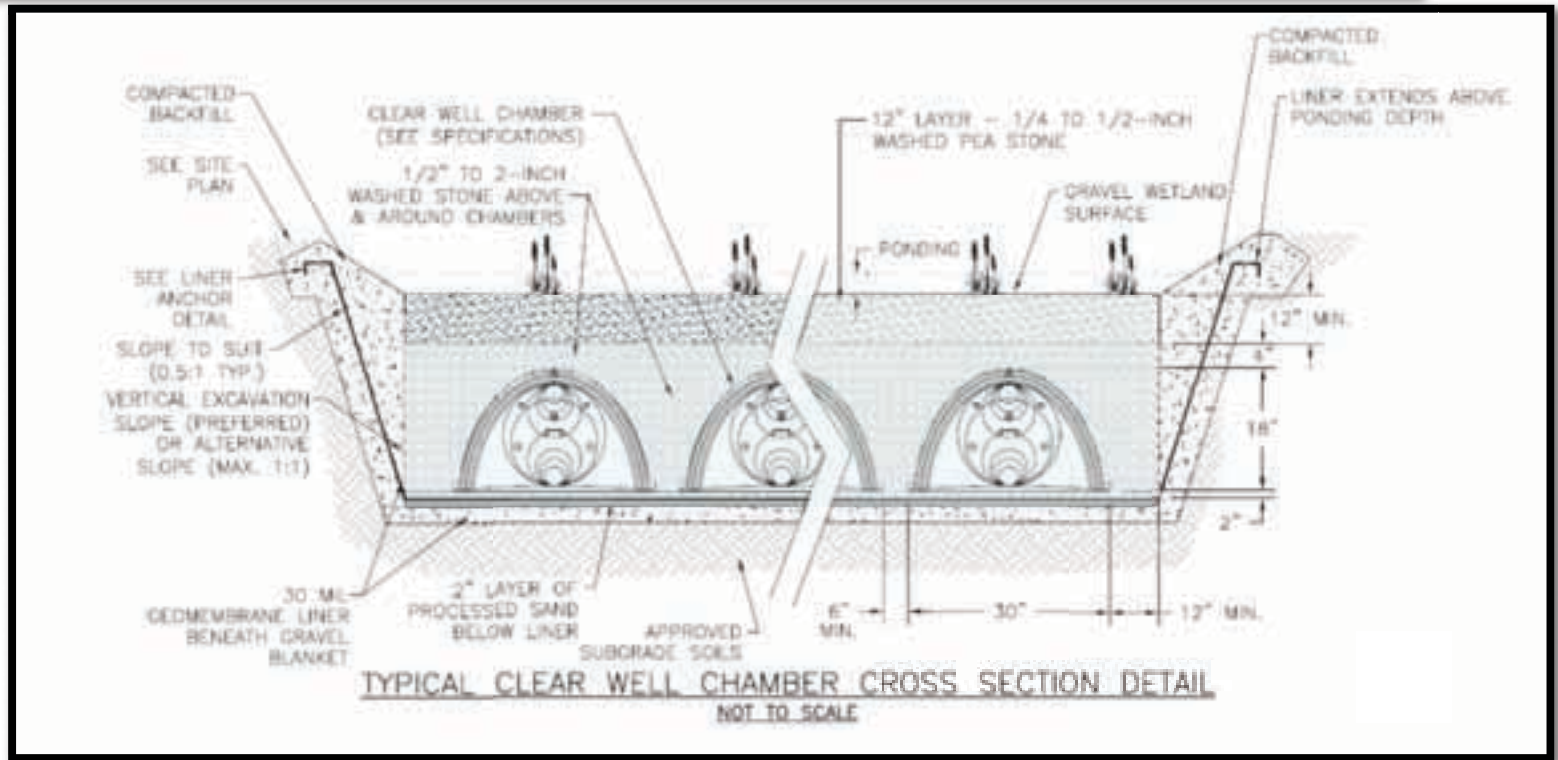
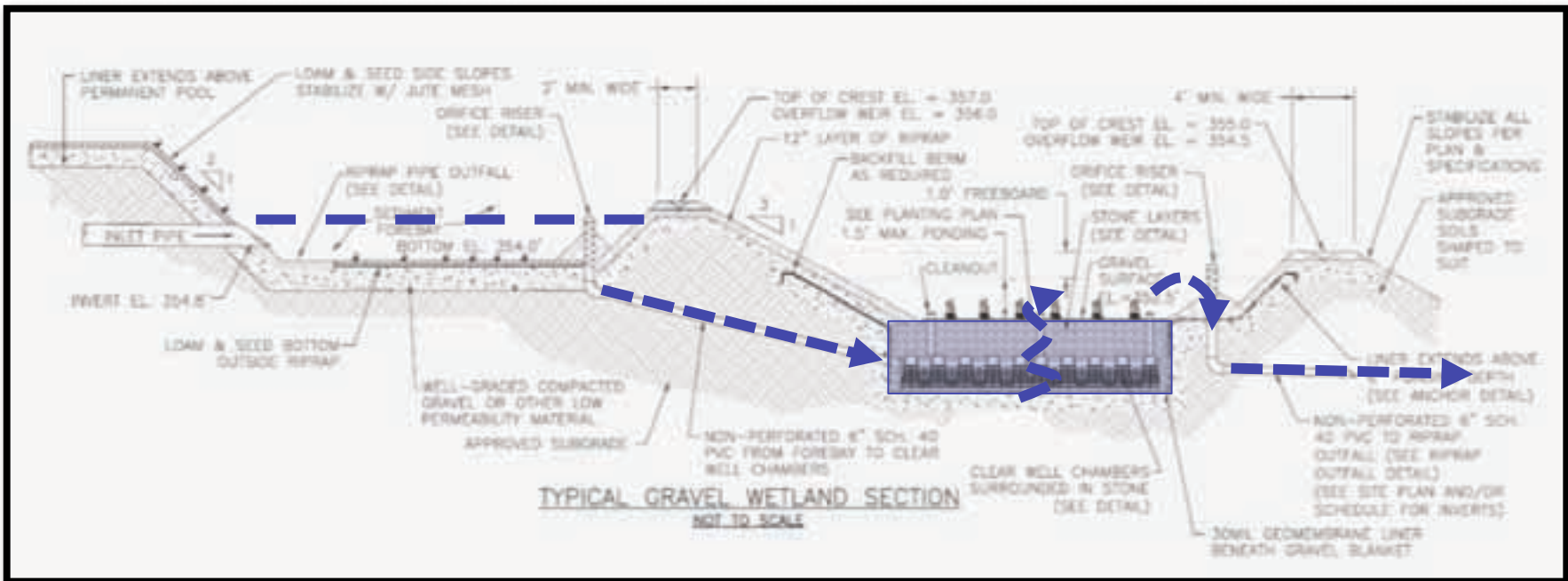
- 8.7 acres
- 20% Impervious
- Land use - parking, roads, athletic fields





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Gravel Wetland Plantings



Three-square bullrush (*Scirpus pungens*)



Soft rush (*Juncus effusus*)



Tussock sedge (*Carex stricta*)



Take Home

- Capital Construction Cost ~ \$100,000
(\$11,500/treated acre)
- Municipal Interests:
 - Use of field during construction;
 - Landscaping/trees impacted;
 - Aesthetics and long-term maintenance.



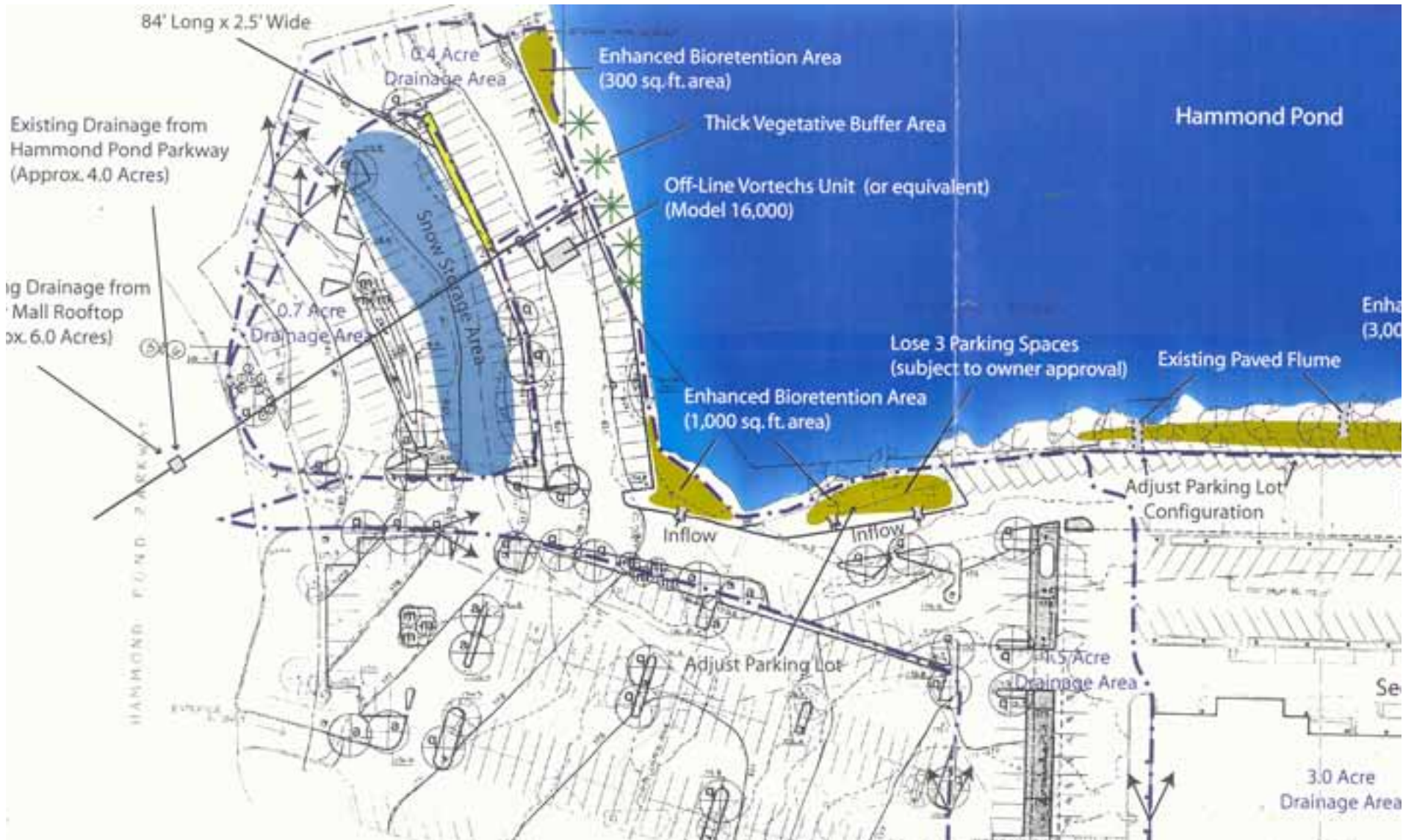
Hammond Pond: Newton, MA



50 feet 20 m

























Take Home

- Capital Construction Cost Sand Filter ~ \$70,000 (Snow Storage) over about an acre of impervious area.
- Owner/Municipal Interests:
 - Loss of parking spaces;
 - Construction and shopping;
 - Aesthetics and long-term maintenance.

