Watershed Restoration through Low Impact Development Retrofits in an Urban Environment: Does it Work?
Acknowledgements:

NHDES
The City of Dover
UNHSC:
Victor Hlas
Robert Roseen
What’s the big deal?
Where are we today?

- Point-source technology based standards have largely been successful.
- Water quality-based standards (nonpoint source) have been difficult to achieve and enforce.

Chesapeake Bay

Population

8.2%

Land Conversion

25%
Land Conversion in the Great Bay

Percent Impervious

UNH earth systems research center (GRANIT)/ PREPP
Impact of Impervious Cover

Adapted from Schueler
Effects of Urbanization on Stream Quality at Selected Sites in the Seacoast Region in New Hampshire, 2001-03, USGS 2005
14 Stark, Hanson, Goldstein, Fallon, Fong, Lee, Kroening, and Andrews, 2000
Counterbalancing Development with Management Strategies

**Counterweight Options**

**Development & Regulatory**
- Regulations
- LID
- LID Retrofit
- Stormwater Utilities

**Conservation/Restoration**
- Land Conservation
- Natural Resource Buffer Protection
- IC Reduction
- LID Planning

Degree of Development

Least Protected  Most Protected
## Berry Brook Watershed Overview

### Impervious Surfaces

<table>
<thead>
<tr>
<th>Surface</th>
<th>Area (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Watershed</td>
<td>185</td>
</tr>
<tr>
<td>Pervious</td>
<td>129.4</td>
</tr>
<tr>
<td>Asphalt Roads</td>
<td>14.3</td>
</tr>
<tr>
<td>Asphalt Driveways</td>
<td>12.4</td>
</tr>
<tr>
<td>Compacted Soil</td>
<td>1.0</td>
</tr>
<tr>
<td>Parking Lots</td>
<td>7.0</td>
</tr>
<tr>
<td>Rooftops</td>
<td>17.6</td>
</tr>
<tr>
<td>Other Asphalt</td>
<td>1.7</td>
</tr>
<tr>
<td>Other (decks, patios)</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Impervious Total</strong></td>
<td><strong>55.3 (30%)</strong></td>
</tr>
</tbody>
</table>

Source: Adapted from Mapping Impervious Surfaces in the Berry Brook Watershed Complex, Systems Research Center, August, 2011.
Part of the Solution – Watershed approach all communities can access
Inside Slow Sand Filter
Demolition
Wetland Outlet Structure
Construct Aa Step-Pools
Walls at Tightest Floodplain
Berry Brook

EIC Reduction Target Rates for Berry Brook, Dover, NH

- 2011 (16.9 Ac/yr)
- IC Target

Impervious Cover

Berry Brook

EIC Reduction Target Rates for Berry Brook, Dover, NH

- 2011 (16.9 Ac/yr)
- 2012 (7.1 Ac/yr)
- IC Target
- Future Reductions

Impervious Cover

2011 2012 2013 2014 2015
Flow Duration Curves by Time Period

- PreLID-BB_Station
- PostLID-BB_Station

Average Daily Flow per Watershed Area (cfs/ac)
Interim Results

• EIC is approximating predevelopment hydrology – we are moving toward hydrologic transparency!
• Data supports the use of EIC in general as a predictor of watershed health (strong for hydrology, developing for chemistry and aquatic health)
• Need more monitoring
• IC disconnection as a surrogate for water quality seems to be a very effective measure
Questions?
up-to-date code

2013 Model Regulations

MODEL STORMWATER STANDARDS FOR
COASTAL WATERSHED COMMUNITIES

Prepared by the University of New Hampshire Stormwater Center and
The Rockingham Planning Commission
December 2012

New Hampshire
Coastal Watershed
Commons

### Zero-cost controls

<table>
<thead>
<tr>
<th></th>
<th>TSS (lbs)</th>
<th>TP (lbs)</th>
<th>TN (lbs)</th>
<th>Recharge MG</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 year</td>
<td>477,739</td>
<td>1,623</td>
<td>16,061</td>
<td>596</td>
</tr>
</tbody>
</table>
Cap – Cut - Balance

• Cap IC with updated regs requiring LID
• Cut IC through redevelopment requirements
• Balance IC through targeted municipal retrofit strategies