Stormwater Concerns and Solutions
Low Impact Development for Water Conservation and Sustainable Management

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Shaping the Future of Your Community Program

Working in the state’s fastest developing regions to provide community leaders and concerned citizens with tools and support to chart a more sustainable future

www.massaudubon.org/shapingthefuture
Rethinking Stormwater – Waste vs. Resource

- Unsustainable Water and Land Use
- Climate Changes in Hydrologic Patterns
- Conserving Water Resources
  - Conservation Design, LID
  - Restoration
Losing Ground: Beyond the Footprint

Patterns of development and their impact on the nature of Massachusetts

Fourth Edition of the Losing Ground Series

Mass Audubon
Protecting the Nature of Massachusetts

James DeNormandie
Claire Corcoran, Editor and Writer

John J. Clarke,
Director of Public Policy and Governmental Relations
May 2009
Bigger Houses on Bigger Lots = More Sprawl

- 47,000 acres of natural land was developed between 1999-2005
- 87% of the land lost is due to residential development
- Lot size increased 47% from 1970 – 2004
Costs of Sprawl

Infrastructure maintenance:
- Pavement maintenance
- Stormwater

Large lawns, heavy water use

Energy intensive

Community and quality of life issues

Water quality and recharge

Loss of forests and farmlands
Biological Category (BC) categorizes the existing biological conditions of Massachusetts' flowing water habitats, using fish communities as a surrogate for aquatic habitat integrity.

The USGS fish and habitat study (SIR 2011-5193), established a relationship between August flow alteration and biological integrity.

Percent alteration of August median stream flow is based on subbasins established in the USGS Mass Water Indicators (MWI) Report (SIR 2009-5272) with 2013 data revisions.

July 25, 2013
Climate Change Paradox

More Floods

More Droughts

Mass Rivers Alliance 2009
Land Use and Water Conservation

- Natural landscapes absorb rainfall during storm events, decreasing flooding, and filter the air and our drinking water.

- Compact development and land conservation keeps forested and natural (water and carbon absorbing) lands intact.

- Trees provide shade, reduce heat islands.

- Preservation of forested land near headwater streams is particularly important for conserving our surface and groundwater resources.
Hydrologic Budget

Precipitation → Evapotranspiration

Stream

Recharge

Aquifer
Hydrologic Budget

- Evapotranspiration
- Precipitation
- Pumping Well
- Septic System
- Road w/ Catchbasin
- Stream
- Recharge
- Aquifer
- Horsley Witten Group
Prioritize Protection:
Important habitat and Green Infrastructure

Prioritize Development:
Concentrate near infrastructure and away from important natural resources

Planning Ahead for Growth and Development

Regional Plans – Toolkit for Implementing
• Priority Protection Areas
• Priority Development Areas
Low Impact Development (LID) and Conservation Design
Protect Natural Green Infrastructure

- Environmentally sensitive site planning process – maintain and mimic natural hydrology
- Shorter and narrower roads – less impervious surface
- Reduced clearing and grading – preserve natural water absorbing and filtering capacity
- Prevent flood damage, protect wetland buffers and floodplains
- Reduce lawns, less irrigation water consumption
- Provide open space and trails for people and nature
- Support high quality of life and property values
Better Site Design of Roadways & Driveways

• Narrower streets
• Alternative cul-de Sachs
• Shared driveways
LID Stormwater Management Techniques

• Rain Barrels and Cisterns / Water Re-use
• Stormwater Planters, Tree Planting
• Permeable Paving
• Open Channels
• Bioretention
• Stormwater Wetlands
• Green Rooftop Systems
• Vegetative Buffers
• Infiltration
Rain Barrels and Cisterns
Runoff Reduction & Water Conservation

• Downspouts directed to tanks or barrels
• Excess diverted to drywell or rain garden
• Landscape irrigation, toilet flushing, other non-potable uses

Cisterns at Mass Audubon’s Habitat Wildlife Sanctuary in Belmont, used to irrigate the property’s formal landscaped areas
Rain Gardens and Bioretention Applications

- Parking lot islands
- Median strips
- Residential lots
- Office parks
Bioretention Applications

- Urban retrofits
- High-density areas
Dry Well Infiltration of Roof Runoff

Disconnection of Rooftop Runoff to Vegetated Swale
Green Roofs

- Stormwater Runoff absorption/collection
- Reduced flooding of and damage to urban streets
- Interior heating and cooling benefits of 10 degrees or more
- Air purification
- Recreational amenity
- Improved aesthetics
- Extended roof life, estimated at 40 years
Rain Garden
CONCORD RIVERWALK
Conservation Way, Westford
Providing Habitat for Fish and other Aquatic Life

brook trout (*Salvelinus fontinalis*)

- Flowing, clean water year round
- Cool temperatures, shade

Ipswich River flowing and dry, D. Armstrong, USGS
Mosquitoes and Stormwater

Stormwater catch basins and detention ponds are prime mosquito breeding habitat.

Reduce municipal maintenance costs and mosquitoes with Low Impact Development.
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