

Greening Your Community

Cost-effective LID solutions



conserve



restore



protect



save money

#2

Fact Sheet #2: Conservation Design

Balancing Growth & Character

As our communities grow, it's important to consider the cultural and aesthetic value of the landscape. Cutting down forests and substituting expansive lawns without any mature trees sacrifices the classic charm of New England. People enjoy foliage in the fall, shade in the summer, and privacy, recreation, and walkable neighborhoods all year long.

Conservation design (CD) can offer all of these benefits along with the valuable free ecosystem services described in Fact Sheet #1 while meeting communities' development needs. Building homes closer together and preserving adjacent land for shared use creates attractive, cohesive communities where neighbors know one another and have recreational and aesthetic benefits right outside their doorstep. CD also improves property values while decreasing building costs and protecting water resources.

What is Conservation Design?

Conservation design looks at the existing characteristics in a landscape and works to protect the most important aspects during development—whether it's a historic rock wall, a scenic overlook, or a critical habitat area. Typically, at least 50% of a subdivision is permanently protected.¹

This type of development allows communities to grow while also preserving local natural resources and sense of character – at no additional cost to the community.

This fact sheet reviews how to create a conservation design and examples of successes and challenges communities have faced.

What are Green Infrastructure (GI) and Low Impact Development (LID)?

Green Infrastructure (GI) includes both natural features such as forests and wetlands as well as engineered landscapes that mimic these natural processes like a rain garden.

Low Impact Development (LID) works to preserve the natural landscape and minimize impervious surfaces to keep stormwater close to the source and use it as a resource rather than a waste product.

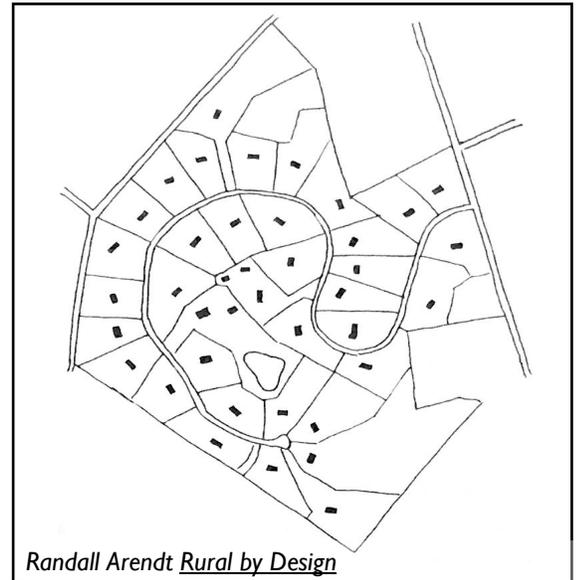
Together, LID and GI not only manage stormwater and improve groundwater supplies, but also offer many free ecosystem services including cleaner air and water, flood control, shade and energy savings, recreational opportunities, and enhanced property values and quality of life.

Preserving our existing GI is our first line of defense against climate impacts such as increased storm intensities as well as achieving long-term cost savings.



Conservation design follows a 4-part process:¹

- 1. Calculate** the traditional amount of allowed lots (removing unsuitable building areas, including wetlands)
- 2. Identify** significant natural, cultural, or historic features
- 3. Concentrate** development away from these features through flexible requirements to achieve a similar amount of lots
- 4. Preserve** permanently at least half of the land, whether for natural, agricultural, or forest use

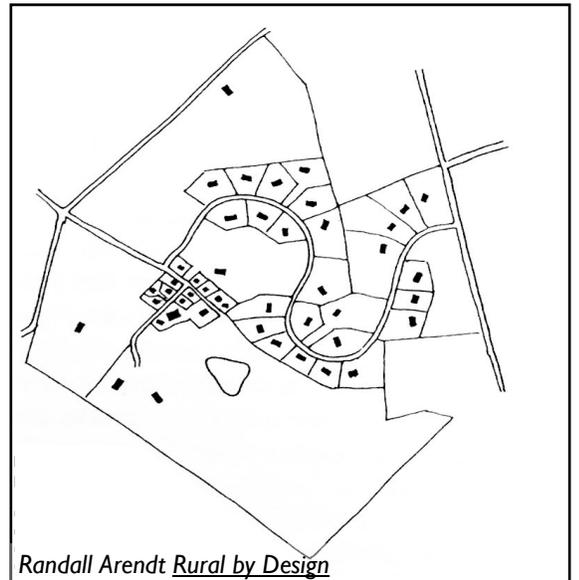


Randall Arendt *Rural by Design*

Conventional “By-Right” Design

38 units on 3+ acre lots

No open space and no preservation of rural character



Randall Arendt *Rural by Design*

Conservation Design

46 units, varied sizes:

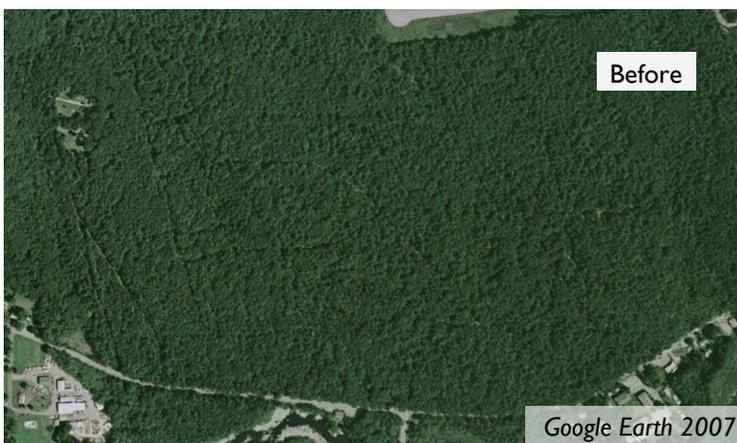
26 one-acre lots, 16-unit village, 4 units on farms
68% open space and rural character preserved

Avoid Fragmentation and Enhance Value

Many communities have already discovered the negative effects of unplanned development and losing many of the benefits from intact green infrastructure—from the classic New England village feel to reduced habitat and increased stormwater management burdens. Between 2005 and 2013, Ayer, MA ranked #1 in the state for total development per square mile at 15 acres/mi² and 9 acres/mi² of natural land converted to development.²

In comparison are three developments in Massachusetts that have successfully implemented conservation design and LID.

Below: An aerial view of Pingry Hill in Ayer before development (left) and after (right). This large lot design fragmented the landscape. Conservation design clusters homes closer together and protects a larger, more contiguous portion of the existing landscape with less roadways and other impervious surfaces.



From Theory to Practice: Conservation Design Works



Horsley Witten

Cottages on Greene – East Greenwich, RI³

Walkable, affordable neighborhoods were sparse in East Greenwich – the community had one of the highest housing values in the state and little developable land was left. However, a group of developers took a creative approach and transformed a derelict .85 acre parcel into 15 mixed affordable and market rate homes less than half a mile from the waterfront.

These 2-bedroom, 1,000 ft² “cottages” offer minimal homeowner maintenance. They are organized around a series of courts that incorporate bioswales, rain gardens, and pervious pavement in the parking lot—features that together manage stormwater on site. By incorporating small bridges across retention ponds, developers brought attention to these LID features. By reducing traditional piping and catch basins, developers also saved nearly 17% on their site design (see chart to the right for details).

| Green “LID” Alternative | Quantity | Unit | Unit Cost | Total Cost |
|------------------------------------|----------|------|-------------|------------------|
| Bioretention | 2,215 | sf | \$20.00 | \$44,300 |
| Bioswale | 430 | lf | \$15.00 | \$6,450 |
| Perforated CPP Underdrain | 350 | lf | \$15.00 | \$5,250 |
| Pavement Section (typ.) | 540 | sy | \$35.00 | \$18,900 |
| Permeable Bituminous Section | 450 | sy | \$43.75 | \$19,688 |
| Drywell | 3 | each | \$5,000.00 | \$15,000 |
| | | | | \$109,588 |
| Conventional Alternative | Quantity | Unit | Unit Cost | Total Cost |
| Catch Basin | 5 | each | \$3,000.00 | \$15,000 |
| 12” CPP | 200 | lf | \$30.00 | \$6,000 |
| Drain Manhole | 4 | each | \$4,000.00 | \$16,000 |
| Stormceptor Unit | 1 | each | \$20,000.00 | \$20,000 |
| Underground Recharge System | 1 | each | \$40,000.00 | \$40,000 |
| Pavement Section | 990 | sy | \$35.00 | \$34,650 |
| | | | | \$131,650 |
| Green alternative savings = | | | | \$22,063 |
| <i>Horsley Witten Group, Inc.</i> | | | | 16.8% |



The Pinehills

Pinehills – Plymouth, MA⁴

The Pinehills is a 3,174 acre New England village style development in Plymouth, MA that preserved over 2,000 acres. The remaining third of the property is peppered with a variety of homes including townhomes, condos, and single family – all of which are densely developed but in a quaint style that retains New England’s classic character by preserving the natural landscape and mature trees surrounding the homes.

Developers also preserved Old Sandwich Road, the oldest unpaved public way in continuous use in the country, and instead created new, narrow roadways that follow the contour of the existing land. They also incorporated numerous LID and green infrastructure elements into the built areas, including bioswales and rain gardens to handle on-site stormwater management. Additionally, The Pinehills incorporated 10 miles of walking trails that residents use to reach the mixed-use town center.

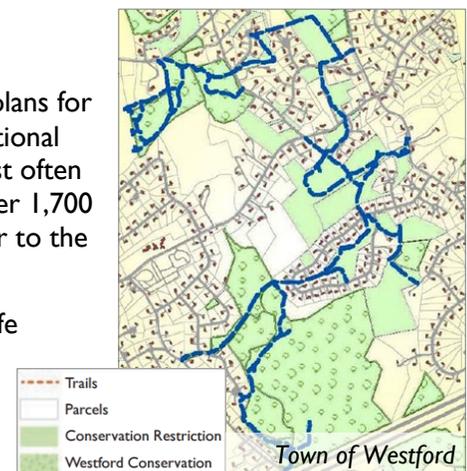
By working with the land, the developers not only saved money on clearing, grading, and piping, but also created over \$1 billion in new assessed property value for the town of Plymouth since 2001 and residents enjoy increased aesthetics, community health, and historic charm.



Westford, MA²

In 1978, the Town of Westford adopted a bylaw requiring developers to submit two plans for any proposed subdivision – one using conservation design and the other using conventional design. The Planning Board is then able to choose their preferred design, which is most often the conservation design. This early innovation has led to 48 developments creating over 1,700 acres of permanently protected land, through either conservation restrictions, transfer to the town, or application of a special overlay zoning district.

Just by adopting this bylaw, Westford has successfully protected both their local wildlife habitat and water resources as well as creating approximately 13 miles of hiking trails for public recreation—all without the town having to purchase the land themselves.



Town of Westford

Benefits

By preserving much of the natural landscape, the remaining open space continues to provide a wide host of free ecosystems services, including reduced flooding, improved public health, improved air and water quality, and more (see Fact Sheet #1).

Reducing sprawling impervious surfaces also reduces the amount of stormwater created and helps municipalities meet water management regulations. A study of a conservation subdivision in Ipswich, MA found that the preservation of open space was the driving factor in reducing peak and total runoff - even more so than installed LID features such as rain gardens and grass pavers.⁵



**\$2,500/
acre**

Savings in clearing and grading costs for conservation design. Not developing the entire parcel means not paying to clear and grade the land.⁶ Save land, save money.

47%

Savings on energy bills for residents in CDs. Trees cool homes with shade in the summer and warm homes by blocking wind in the winter.⁷

**1/4
acre lots**

Increasing development to this density offers significant cost savings for municipalities, especially rural ones. Condensing homes means fewer roadways and reduced construction and maintenance costs.⁸

**\$250,000/
mile**

Savings by narrowing a road from 28' to 20'.⁹ When the entire road is shortened for condensed development instead of sprawling, that savings grows to the millions.

30%

Property value increase of CDs over traditional subdivisions due to walkability, beautiful views, accessibility to recreation, and neighborhood feel.^{10, 11} Added perk: they also sell about 50% faster.¹⁰

**\$4,500/
acre**

Savings on maintenance each year using native grasses and natural landscaping instead of traditional turf. Installation savings are from \$4000-8000/acre.¹² Added perks: increased curb appeal and improved stormwater retention.

Learn More

See our website for more information, including guidance, tools, and document references:

www.massaudubon.org/shapingthefuture or www.masaudubon.org/LIDCost



This project was funded by an agreement (CE96184201) awarded by the Environmental Protection Agency to the New England Interstate Water Pollution Control Commission on behalf of the Narragansett Bay Estuary Program. Although the information in this document has been funded wholly or in part by the United States Environmental Protection Agency under agreement CE96184201 to NEIWPCC, it has not undergone the Agency's publications review process and therefore, may not necessarily reflect the views of the Agency and no official endorsement should be inferred. The viewpoints expressed here do not necessarily represent those of the NBEP, NEIWPCC, or U.S. EPA nor does mention of trade names, commercial products, or causes constitute endorsement or recommendation for use.