The Pinehills: A Case Study in LID

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Mass Audubon
Protecting the Nature of Massachusetts

SHAPING the Future of YOUR COMMUNITY

Shaping the Future of Your Community Program

- **Informs**, **empowers**, and **connects** people and places to create **resilient communities** through **smart development** and targeted natural resource protection.

✓Customized workshops

✓Planning advice

✓Technical assistance

SHAPING the Future of YOUR COMMUNITY

What is Low Impact Development?

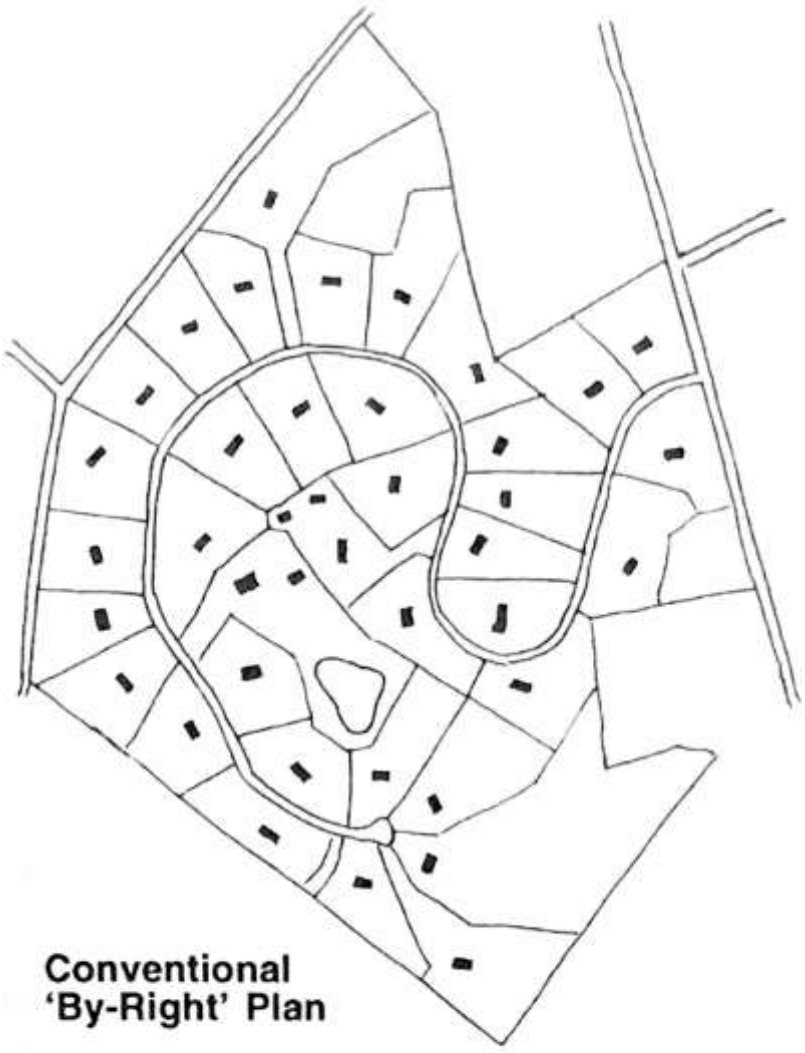
“LID is an approach to land development (or re-development) that **works with nature to manage stormwater** as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that **treat stormwater as a resource** rather than a waste product.”

- EPA

Source: Whole Buildings Design Guide, wbdg.com

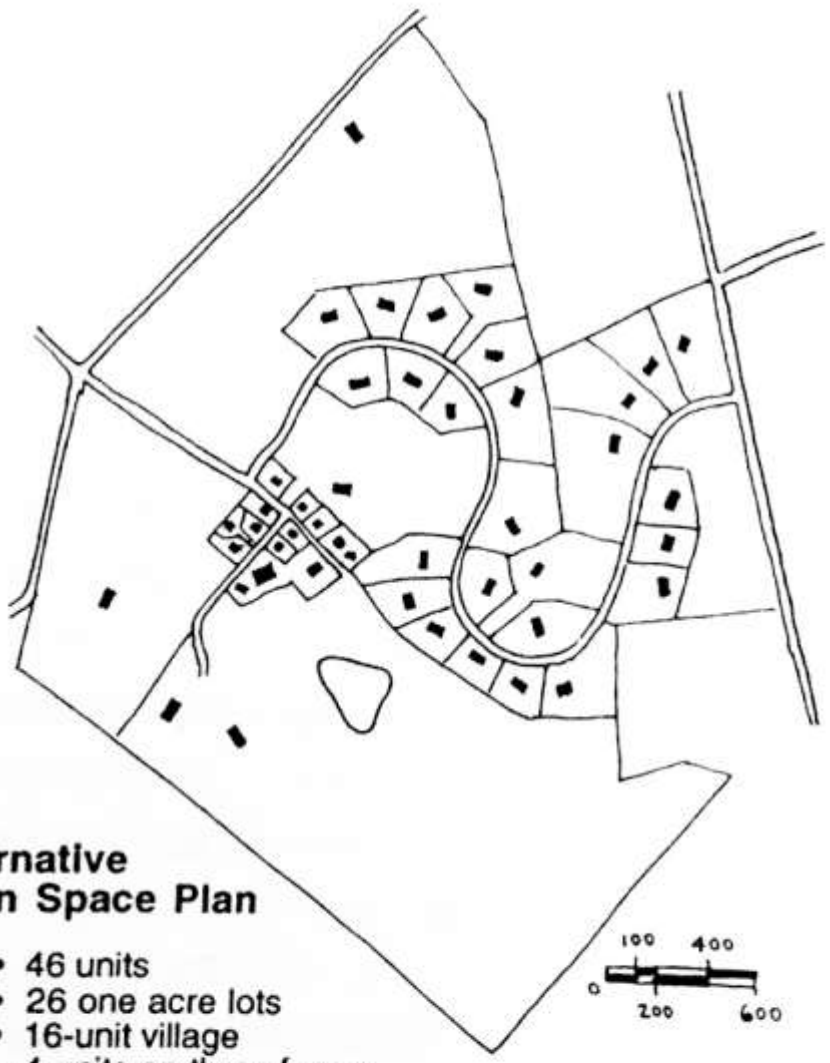
What is Conservation Design?

- Clustered development that considers natural landscape
- Identifies and builds away from critical resources, historic significance, and scenic views
- Permanently conserves at least 50% of the parcel



Conventional 'By-Right' Plan

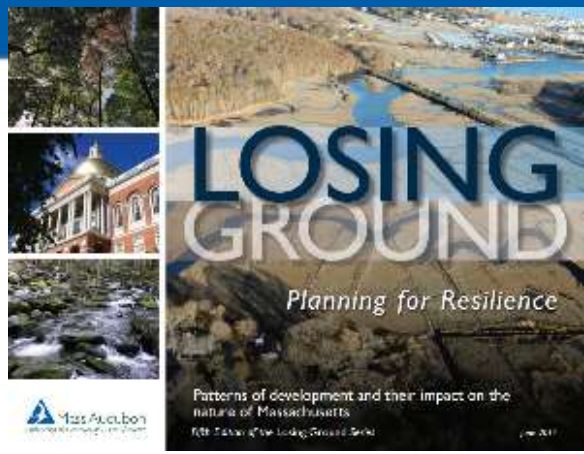
- 38 units
- 3+ acre lots
- No open space
- No rural character

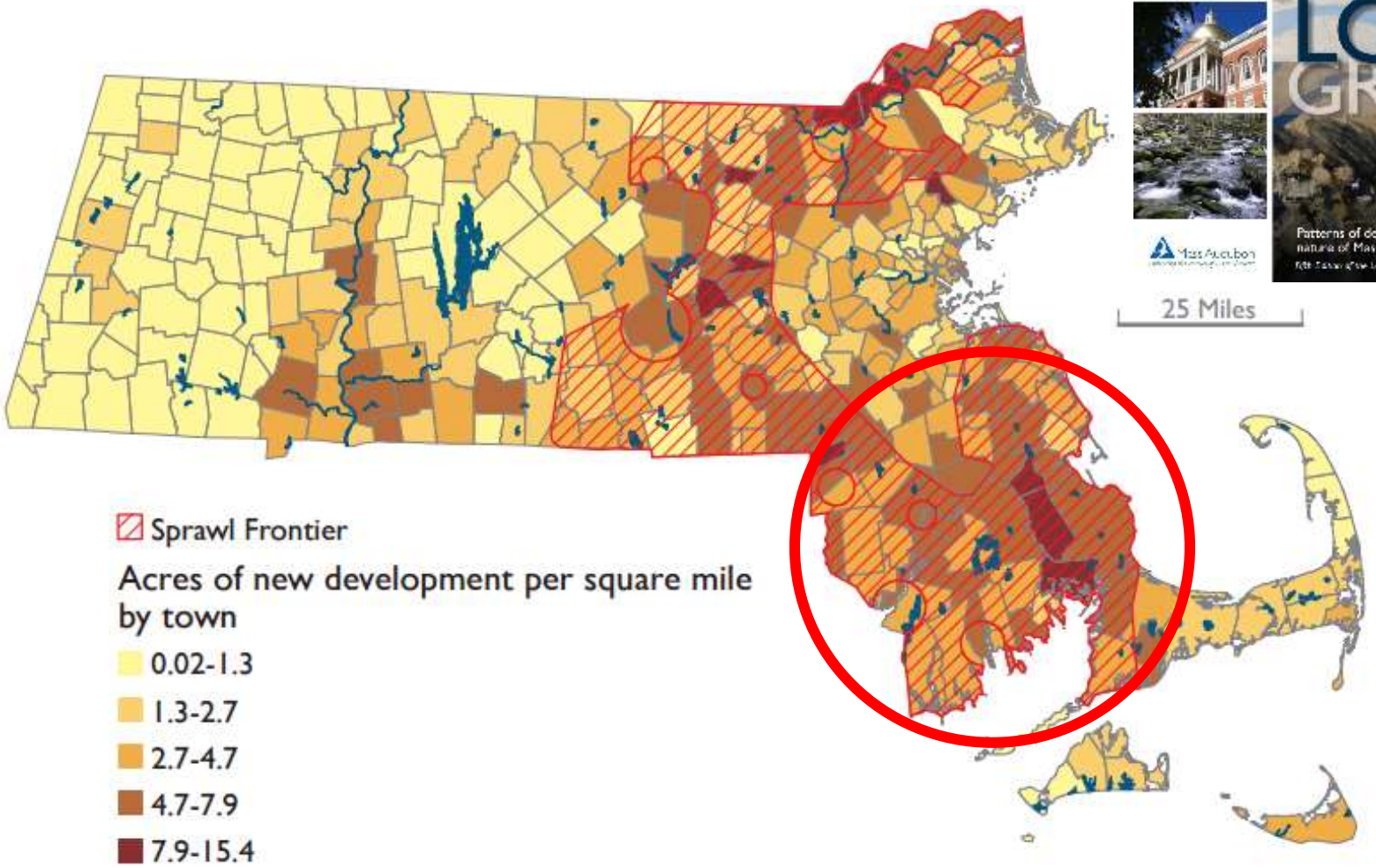


Alternative Open Space Plan

- 46 units
- 26 one acre lots
- 16-unit village
- 4 units on three farms
- 68% open space
- preserves rural character and working farmland

What's the problem?





Traditional, sprawling development =

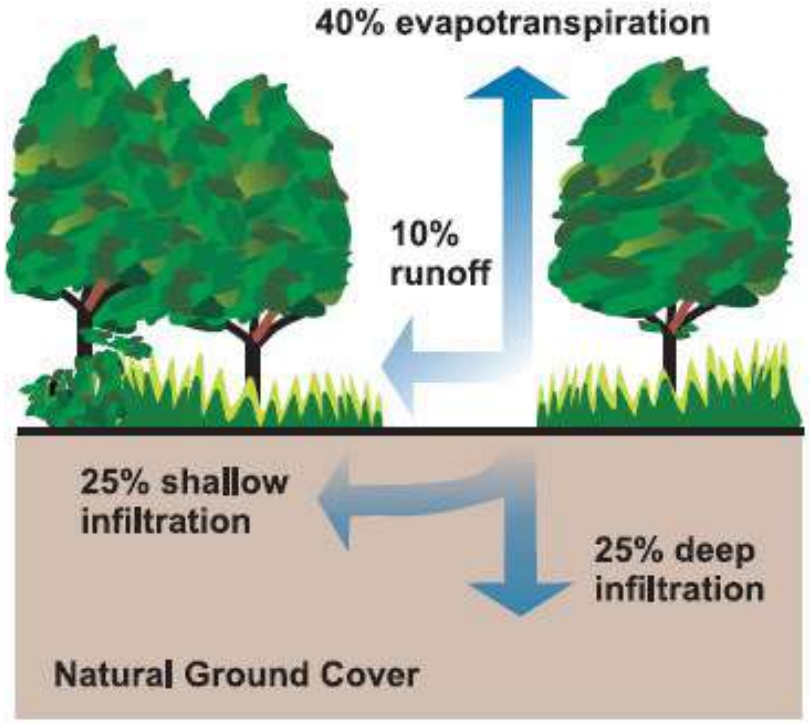
Less open space

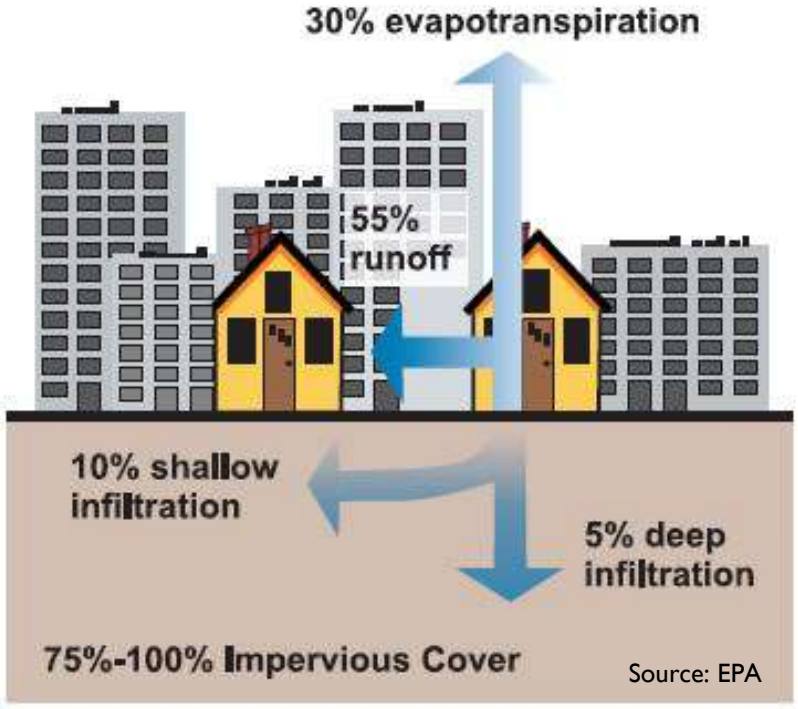
=

Traditional development: a fragmented landscape

What's The Problem?

Impervious surface → **Runoff**





Source: EPA

Impacts of Stormwater Runoff

We Need to Change Course

Traditional development

Impervious surfaces

Stormwater runoff

Water quality impairment

Infrastructure impacts

Financial and regulatory burden

Conservation and development can work together

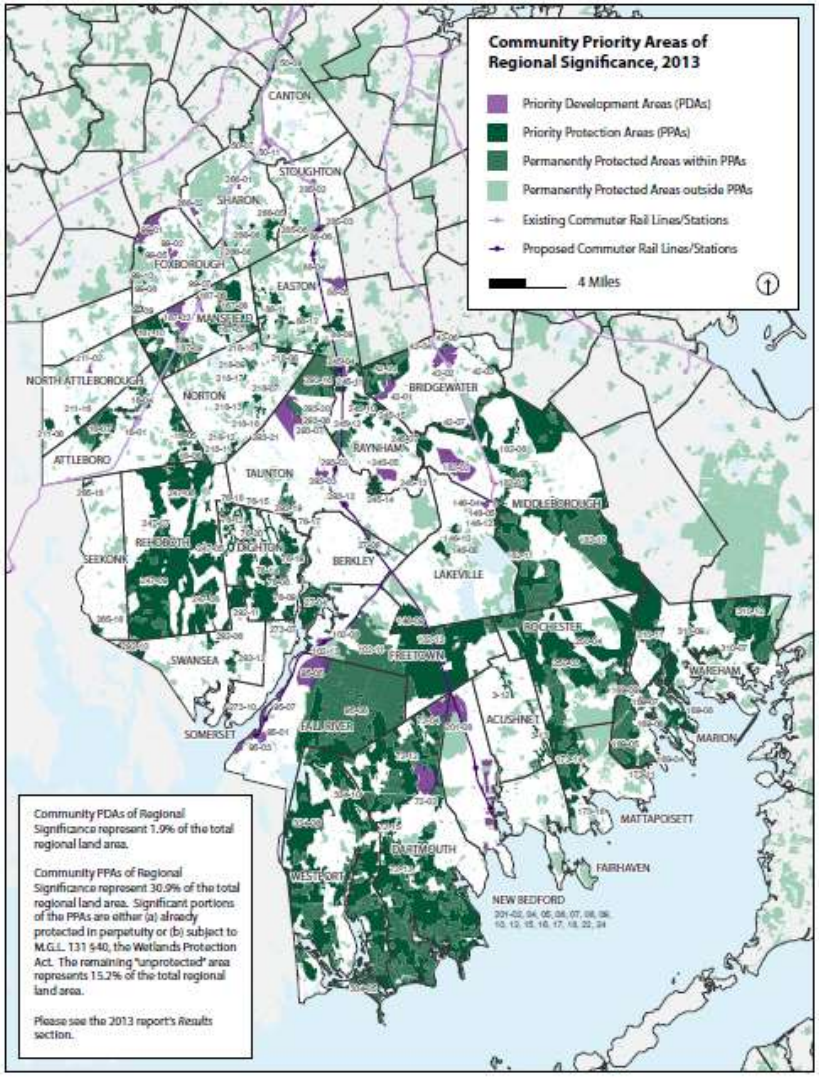
Prioritize areas for

Protection:

Contiguous parcels of critical habitat and green infrastructure

Development:

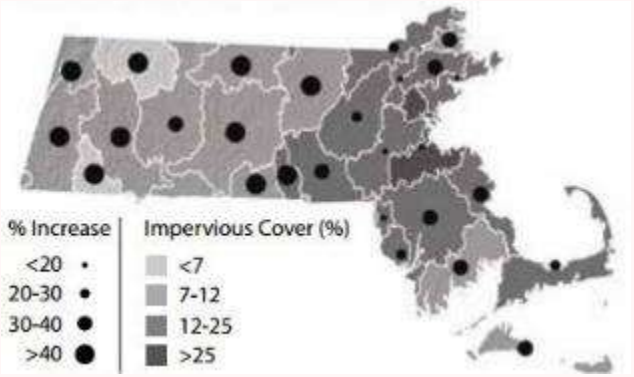
Concentrated, near infrastructure, and away from important natural resources

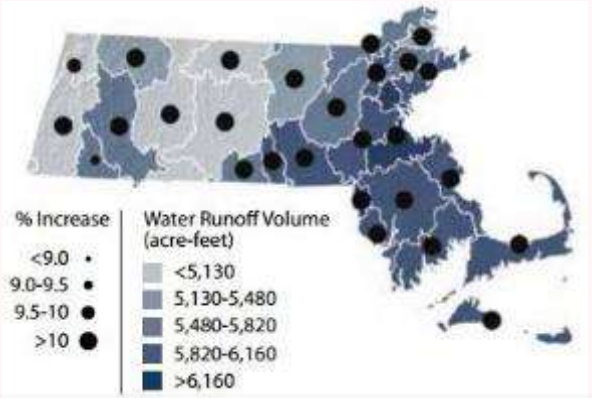


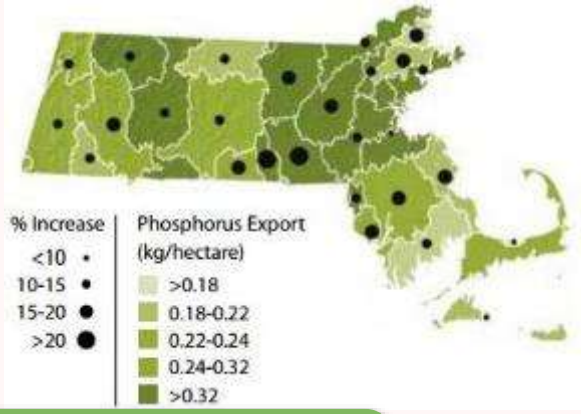
The Value of Green: Impervious, Runoff, Nutrients

Source: Harvard Forest *Changes to the Land* 2014

If we continue to follow opportunistic growth, in 2060:







These allow for nearly the **same amount of development**, but 2/3 of it is **clustered** development

A Different Direction: Greening Your Community

Sustainable development

Increased infiltration

Reduced runoff & more groundwater

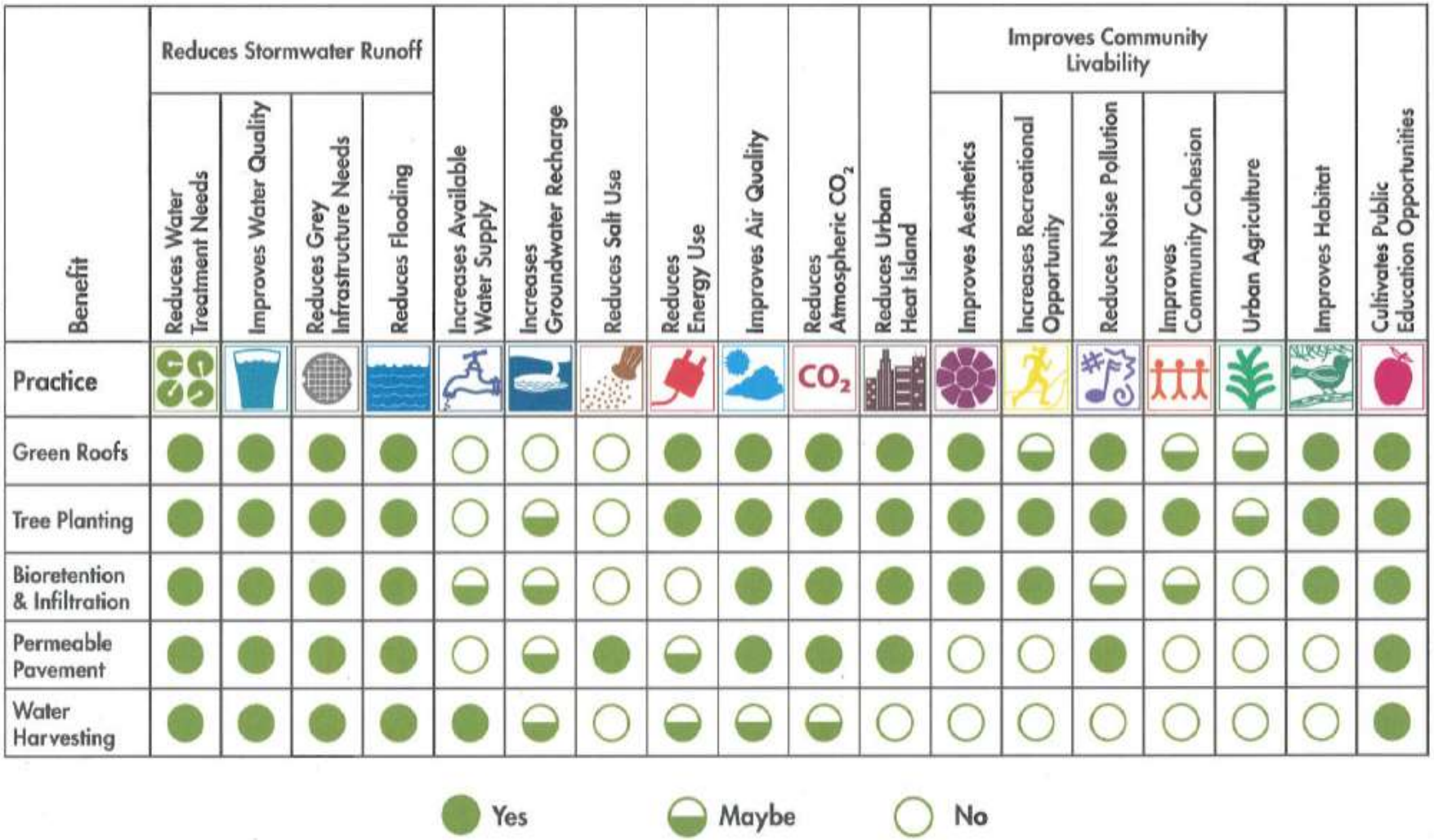
Improved water quality

Intact infrastructure

Regulations met

Money saved

Benefits of LID Practices



Source: Center for Neighborhood Technology's The Value of Green Infrastructure

Free Ecosystem Services:

Free services provided by the natural landscape

Every $1 invested in land conservation offers a ***$4 Return on Investment*** in terms of these ecosystem service values

- **Flooding**: Floodplains provide flood protection and reduce infrastructure damage
- **Public Health**: Managing stormwater and reducing retention ponds reduces creation of mosquito habitat
- **Air Quality & Public Health**: Trees reduce the urban heat island effect, reducing smog creation and resulting asthma occurrences as well as reducing nitrogen dioxide and particulate matter
- **Water Quality**: Streamside vegetation filters pollutants and reduces erosion
- **Water Quantity**: Forests and wetlands store water, improve water quality, and recharge groundwater
- **Recreation**: Clean, flowing waters support recreation, including boating, fishing, and swimming while open space provides areas for hiking and biking
- **Quality of Life**: Open space and street trees create a more enjoyable walking environment, benefiting community connection, health, and economic benefit in downtowns and commercial areas
- **Property Value**: Healthy, mature trees add an average of 10-30% to a property's value

Land Protection = Water Protection

- Quabbin & Wachusett Reservoirs serve 2.5 million
- Over 20 years, Massachusetts Water Resources Authority spent $130M to protect 22,000 acres of watershed lands
- Avoided ratepayer cost of $250M on a filtration plant and $4M/yr in operations

The Power of a Bylaw: Westford

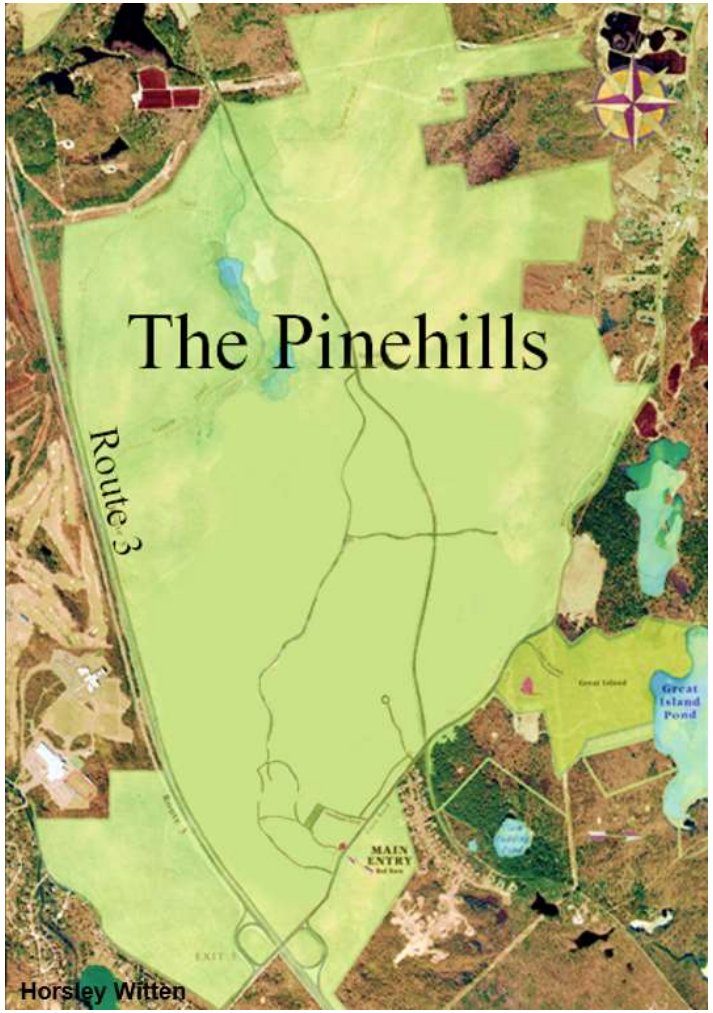
- Adopted a Conservation Subdivision bylaw in 1978
- Requires developers to submit both conservation and conventional & Planning Board chooses preferred
- 48 developments protected over1,700 of land

The Power of a Bylaw: Westford

- Preserved local habitat
- Protected water resources
- Created 13 miles of hiking trails & public recreation
- Town didn't have to purchase the land themselves, saving millions of dollars

Rail Trail in Westford

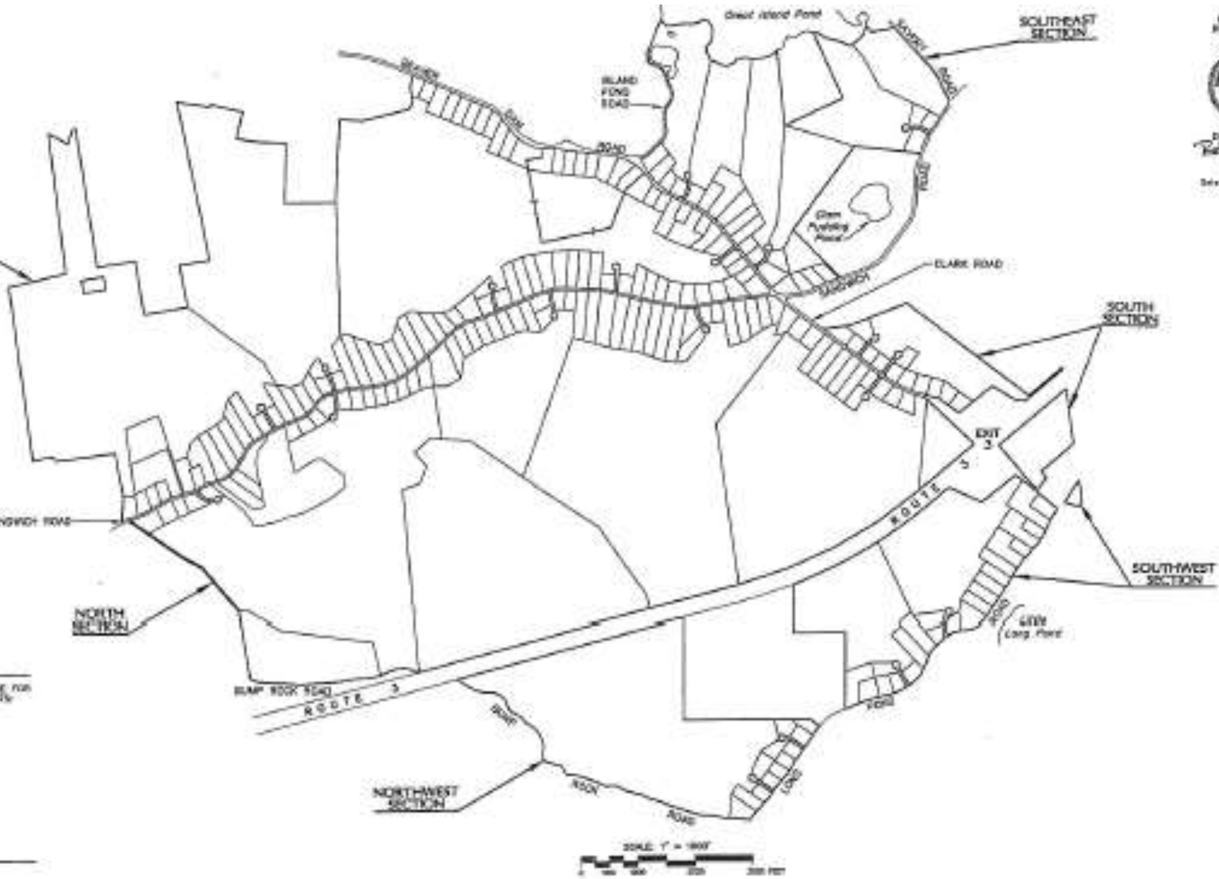
The Pinehills



- Home to 2,200 families
- Consists of 3,243 acres
- 2,200+ acres (70%) of land is natural and recreational open space
- Prompted change in local Plymouth regulations

Density & Views

Preserved Historic Sandwich Road



I CERTIFY THAT THIS PLAN CONFORMS TO THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

Date: 10-17-96

'97-296

"CERTIFY THAT 20 DAYS HAVE ELAPSED SINCE PLANNING BOARD APPROVAL AND THAT NO APPEAL HAS BEEN FILED IN THIS OFFICE."

"IN ACCORDANCE WITH A CERTIFICATE OF ACTION DATED 8/23/96 AND RECORDED HEREWITH."

"IN ACCORDANCE WITH A COVENANT DATED 11/12/96 AND RECORDED HEREWITH."

SUBDIVISION LOTTING SUMMARY

	LOTS
SOUTH SECTION	14
SOUTHWEST SECTION	26
NORTHWEST SECTION	13
SOUTHEAST SECTION	28
NORTHEAST SECTION	91
NORTH SECTION	72
TOTAL DEFINITIVE SUBDIVISION LOTS = 244	

PLANNING BOARD APPROVAL UNDER SUBDIVISION CONTROL LAW

Date of Approval: 8/7/96

Date of Endorsement: 11/13/96

Plymouth Planning Board

FORESTRY USE CLASSIFICATION

"FORESTRY USE CLASSIFICATION WILL REMAIN IN FORCE FOR AN INDEFINITE FUTURE PERIOD ON THE FOLLOWING LOTS:"

PLAT 78 LOT [illegible]	PLAT 77 LOT 94
PLAT 78 LOT [illegible]	PLAT 77 LOT 98
PLAT 78 LOT [illegible]	PLAT 77 LOT [illegible]
PLAT 78 LOT [illegible]	PLAT 77 LOT 10A
PLAT 78 LOT [illegible]	PLAT 77 LOT 10B
PLAT 78 LOT [illegible]	PLAT 77 LOT 10C
PLAT 78 LOT [illegible]	PLAT 77 LOT 10D
PLAT 78 LOT [illegible]	PLAT 77 LOT 10E

NOTE:
SEE PHASING COVENANT RECORDED HEREWITH.
period: 11/12/96

Prepared For:

OWNER: DIGITAL EQUIPMENT CORPORATION
111 Powdermill Road
Maynard, Massachusetts
01754

APPLICANT: WALLACE ASSOCIATES
P.O. Box 1495
Plymouth, Massachusetts
02362

ZONING REQUIREMENTS

DISTRICT: RURAL

MINIMUM LOT AREA	80,000 S.F.
MINIMUM LOT FRONTAGE	150' (120' ON TURNING CIRCLE)
MINIMUM LOT DEPTH	200'
MINIMUM LOT WIDTH	200' (150' IF REVERSE FRONTAGE)
MINIMUM FRONT YARD	100' FOR COLLECTOR STREET/ 120' FOR MINOR OR SCENIC STREET
MINIMUM SIDE YARD	30'
MINIMUM REAR YARD	50'
MAXIMUM LOT COVERAGE	15%

Plymouth County Registry of Deeds
PLAN BOOK 39 PAGE 1091

DEFINITIVE SUBDIVISION PLAN
OF
CHILTONVILLE HILLS
LOCATED IN
Plymouth, Massachusetts

Prepared By:
Daylor Consulting Group Inc.
Ten Forbes Road Braintree, MA 02184
617-849-7070 FAX 617-849-0066

NOTE: SEE SHEET INDEX ON INDIVIDUAL SHEETS.

DRAWING LIST

1	COVER SHEET
2	KEY SHEET LOCATIONS
3–37	LAYOUT PLANS (SEE KEY SHEET 2)
38–73	TOPOGRAPHIC PLANS (SEE KEY SHEET 2)
74–92	ROAD PLAN & PROFILES (SEE KEY SHEET 2)
93	LANDSCAPING PLAN
94	GENERAL NOTES & PLAN REFERENCES
95,96	DETAILS

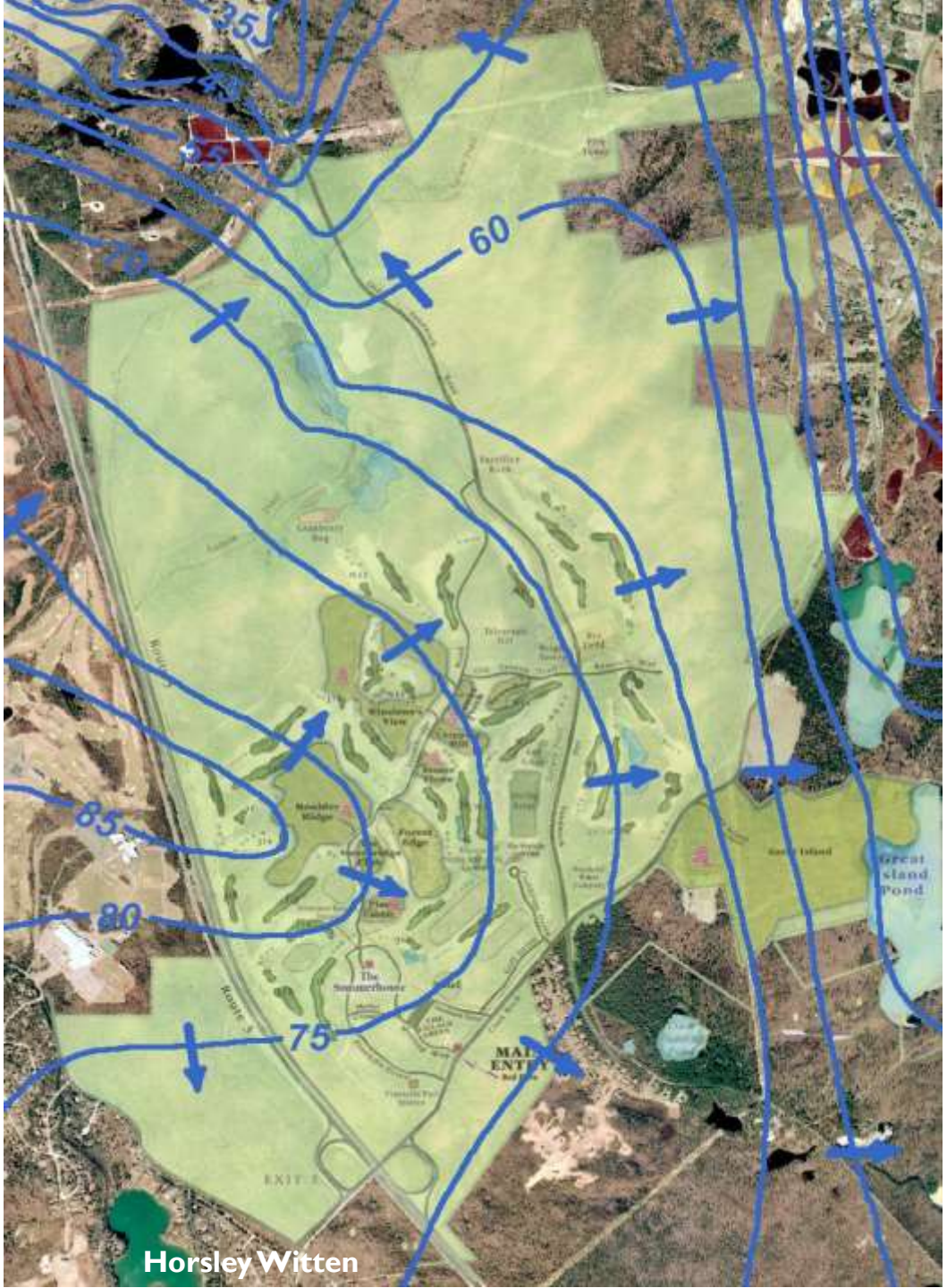
ENGINEER/SURVEYOR/DESIGNER:
ROBERT F. DAYLOR, P.E., P.L.S.
MASSACHUSETTS REGISTERED PROFESSIONAL ENGINEER NO. 23741
MASSACHUSETTS REGISTERED LAND SURVEYOR NO. 20108

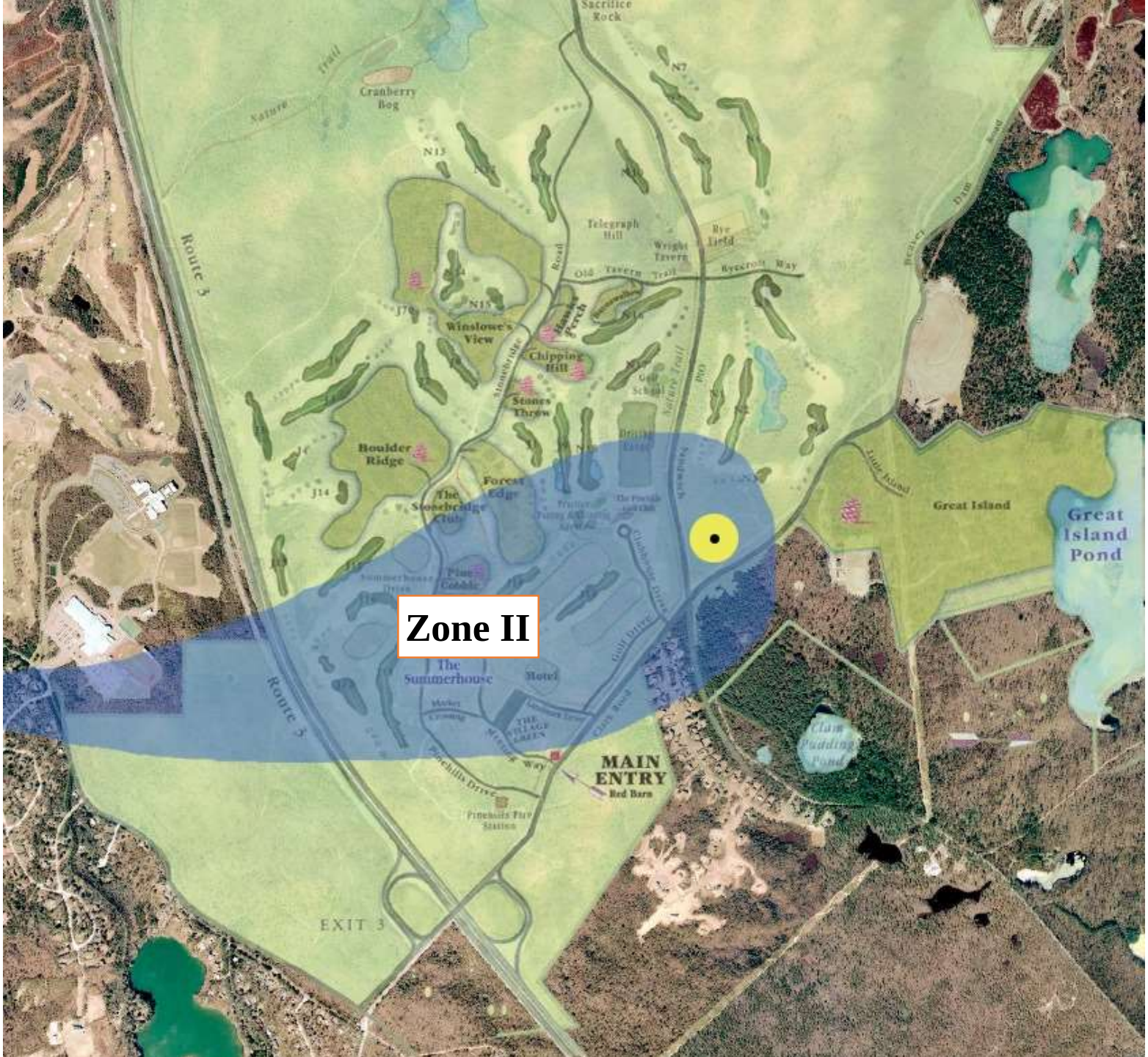
DATE: JUNE 1, 1996
AUGUST 1, 1996—ADDITIONAL INFORMATION

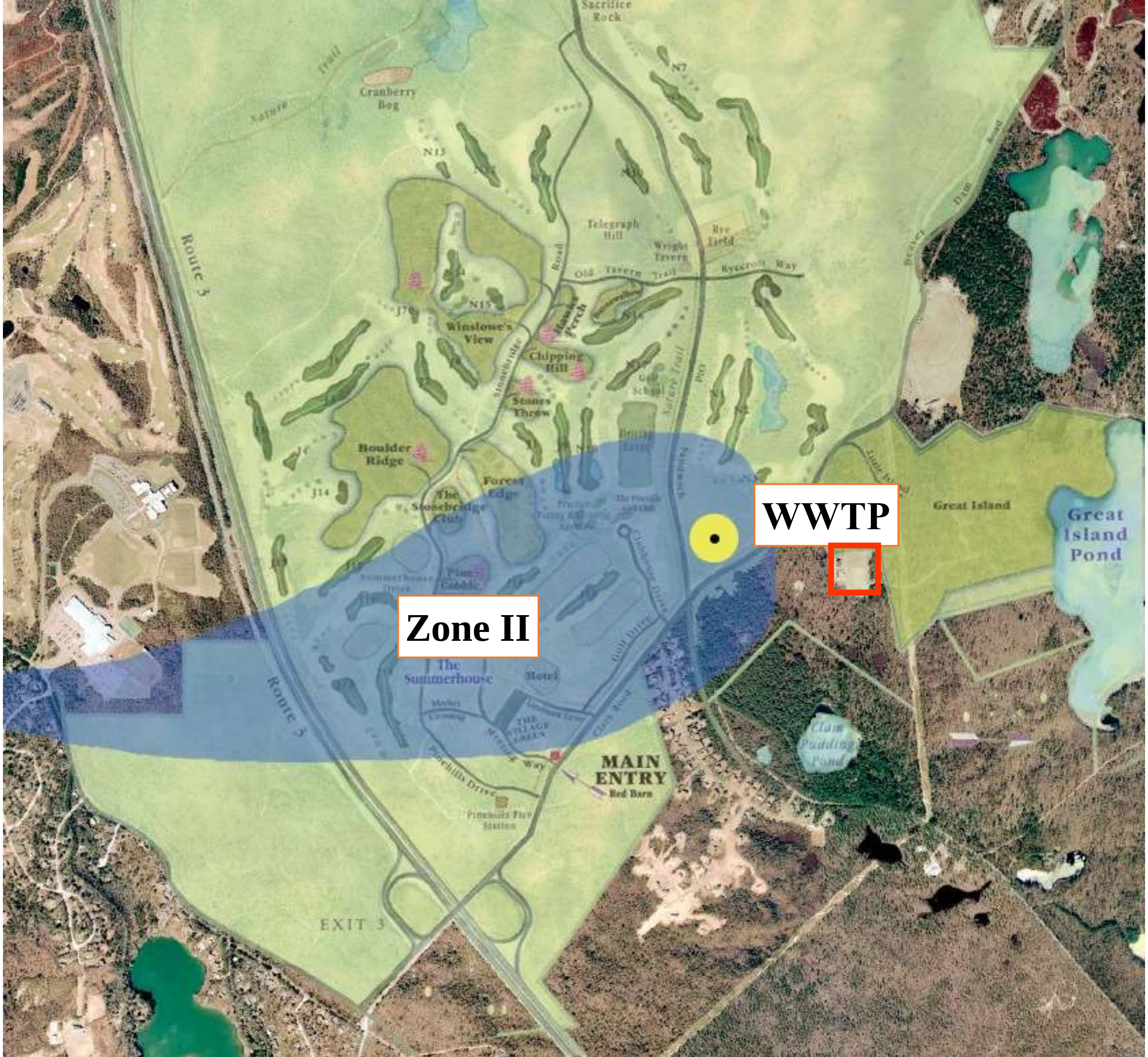
Sheet: 1 of 96

BMPs at The Pinehills

- Narrow roads
- No curbs
- Bioretention
- High density
- Preserved land
- Preservation of mature vegetation
- Nutrient recycling through fertigation


35
60
70
85
80
75
Great Island Pond
Horsley Witten


Zone II
Sacrifice Rock
Cranberry Bog
Nature Trail
N7
N13
N15
Telegraph Hill
Rye Field
Wright Tavern
Old Tavern Trail
Ryecroft Way
Winslowe's View
Chipping Hill
Stones Throw
Boulder Ridge
Forest Edge
The Stonebridge Club
Great Island
Great Island Pond
Claim Pudding Pond
The Summerhouse
Hotel
MAIN ENTRY
Red Barn
Route 3
EXIT 3


WWTP
Zone II
Great Island
Great Island Pond
MAIN ENTRY
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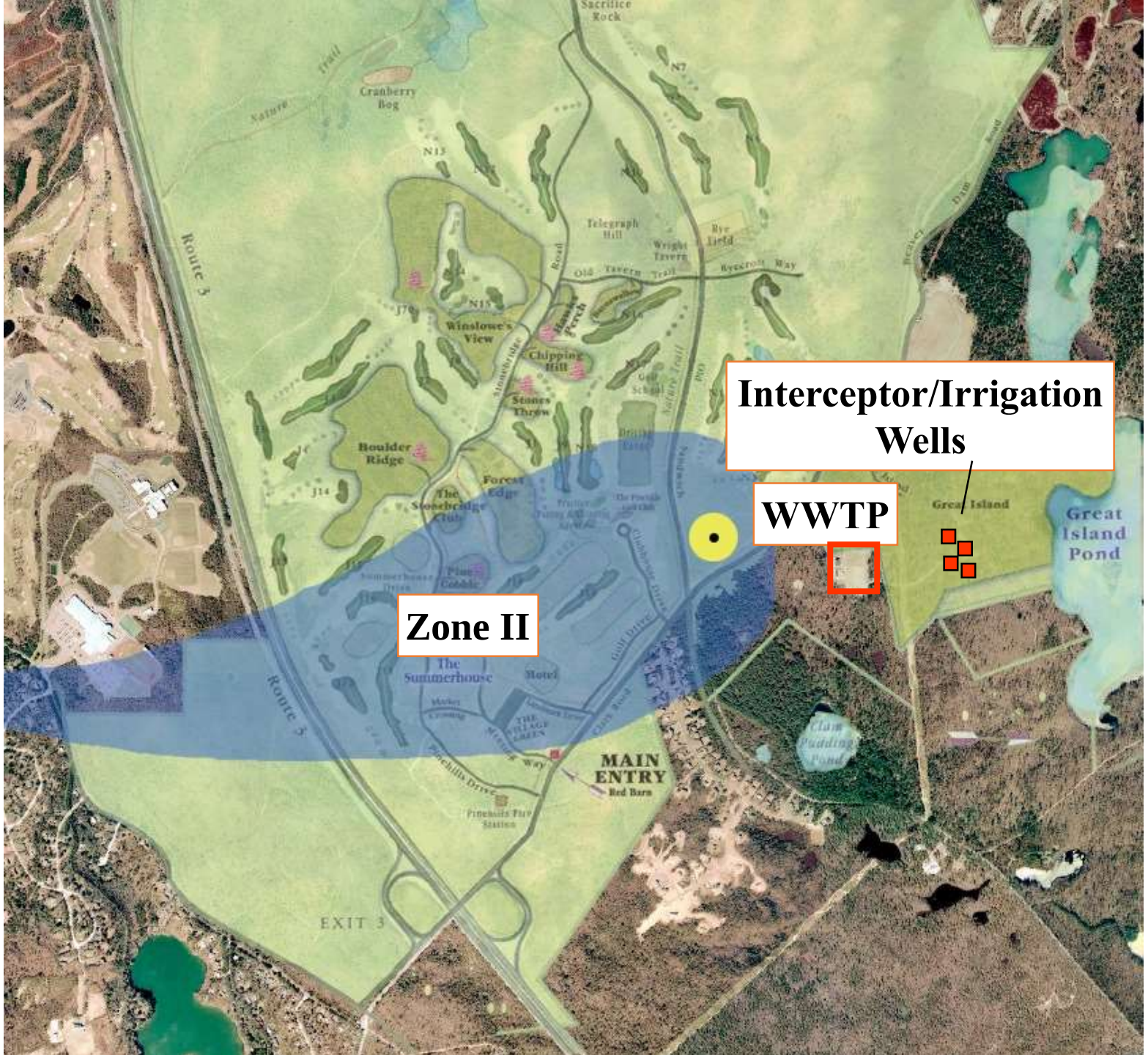
Route 3
EXIT 3
Boulder Ridge
Winslowe's View
Chipping Hill
Stones Throw
Forest Edge
The Stonebridge Club
The Summerhouse
Hotel
Telegraph Hill
Wright Tavern
Rye Field
Old Tavern Trail
Cranberry Bog
Nature Trail
Sacrifice Rock
Clam Pudding Pond
Pinehills Fire Station
Pinehills Drive


Interceptor/Irrigation Wells
WWTP
Zone II
Great Island
Great Island Pond
MAIN ENTRY
Red Barn
Route 3
EXIT 3
Cranberry Bog
Winslowe's View
Chipping Hill
Stones Throw
Boulder Ridge
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Let's go see!

Mass Audubon
Protecting the Nature of Massachusetts

Horsley Witten Group

The Pinehills

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