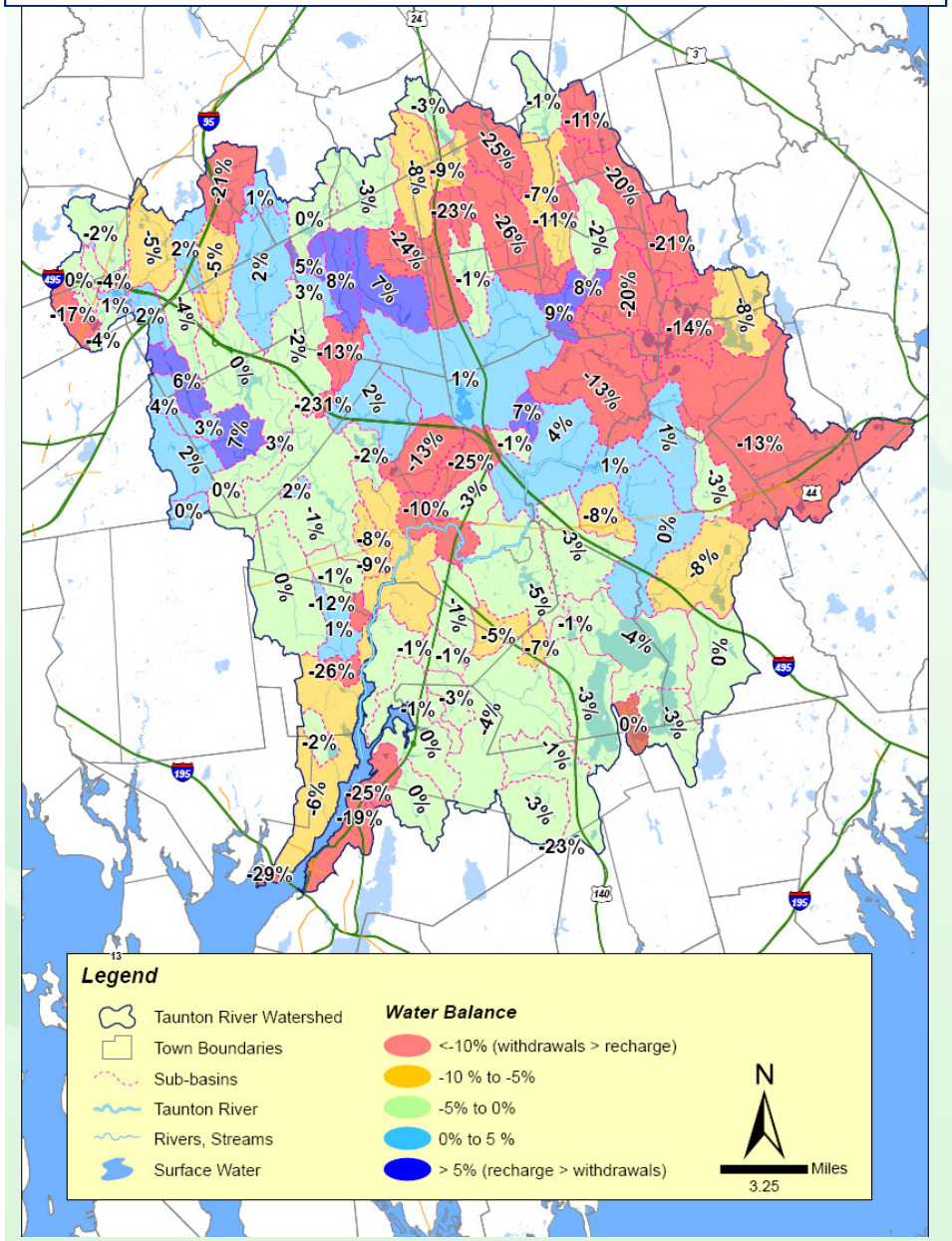
Taunton River Watershed Study

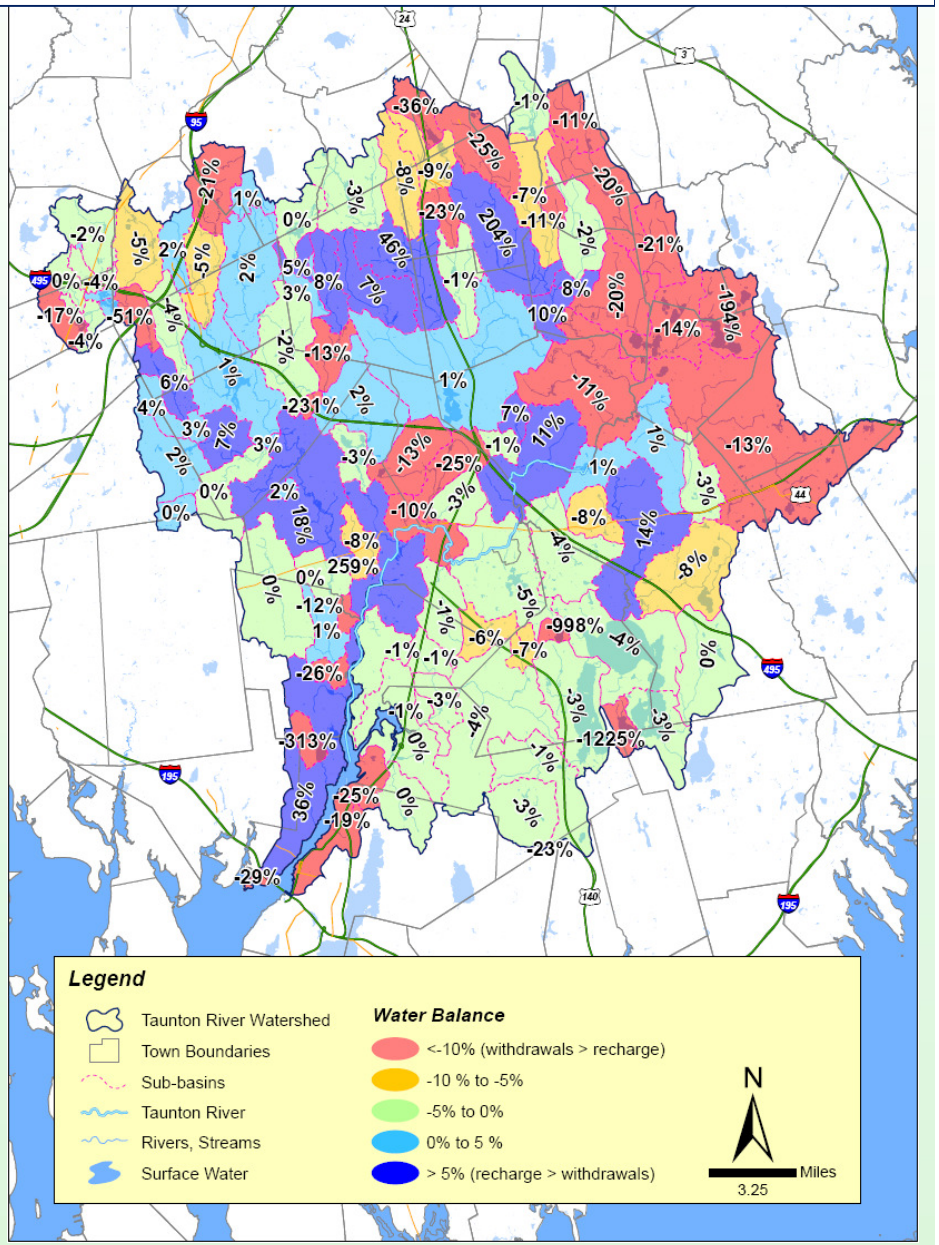
Horsley Witten Group, Inc.
Bridgewater State University

Sustainability

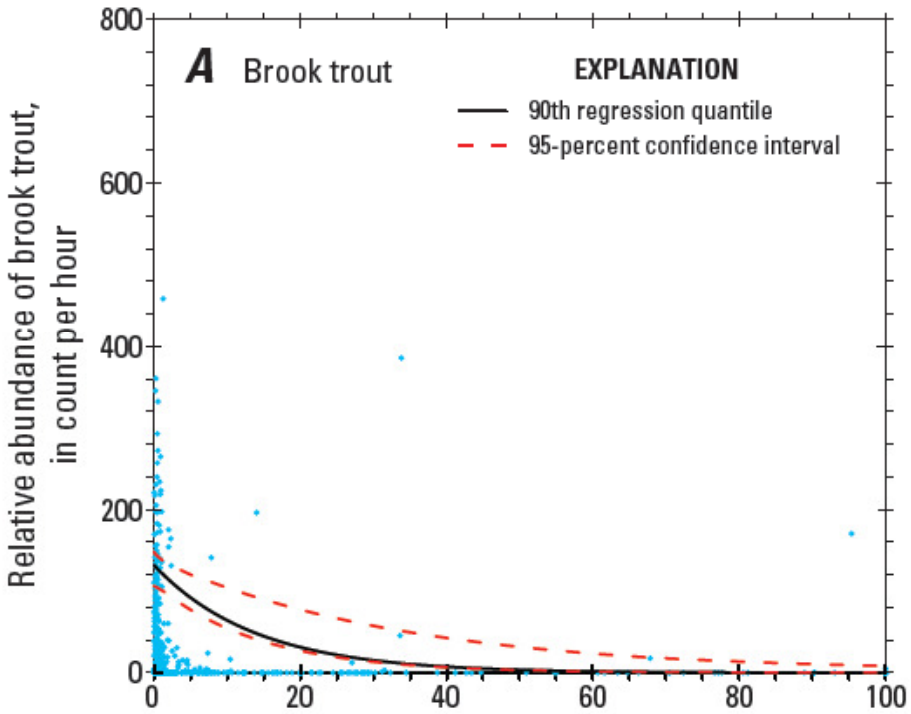
Taunton Water Budget Results:
Excluding Surface Water Withdrawals and NPDES Discharges

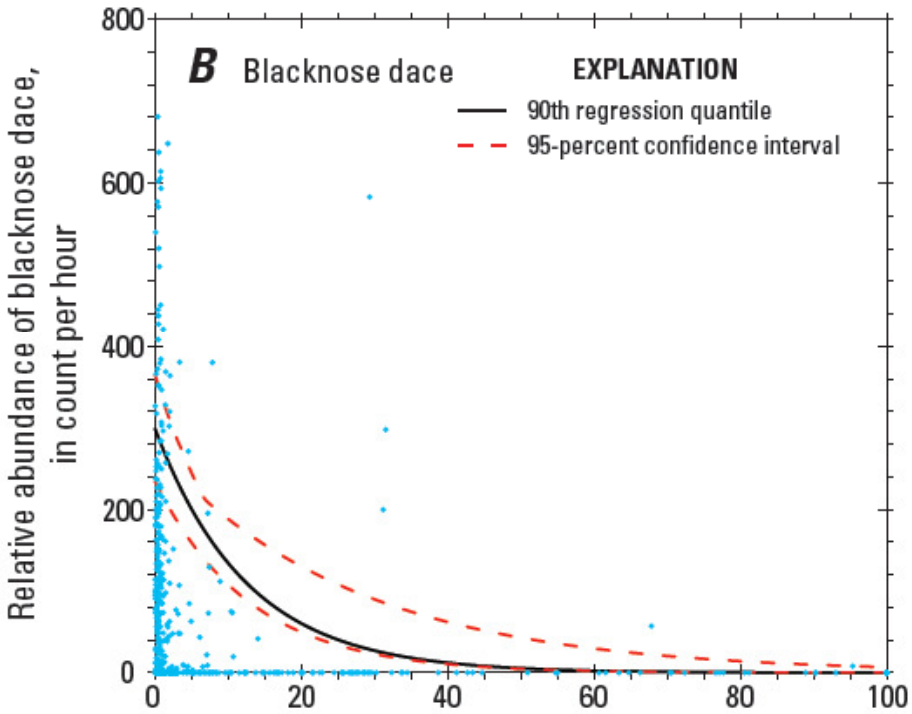


Taunton Water Budget Results:
Including Surface Water Withdrawals and NPDES Discharges



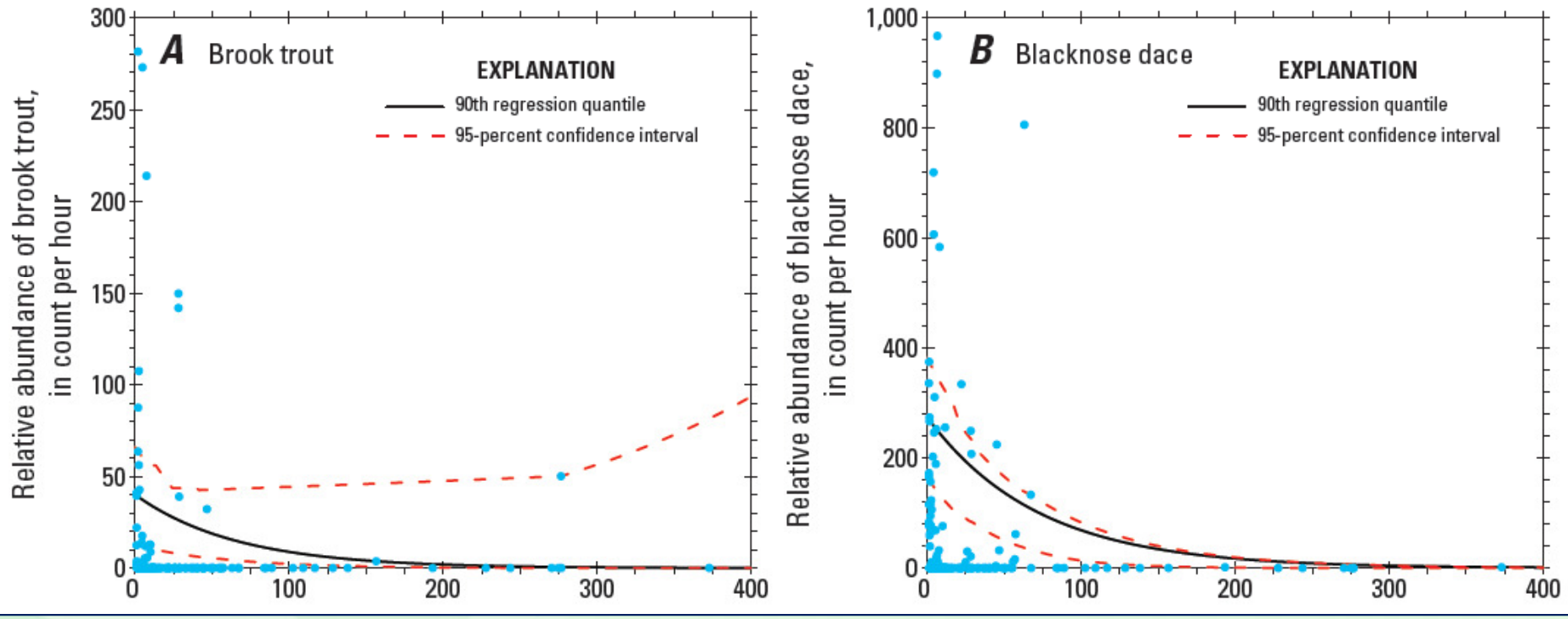
Relative Abundance of Indicator Fish Species in Relation to Percent Alteration of August Median Flow at Selected Net-Depleted Sites





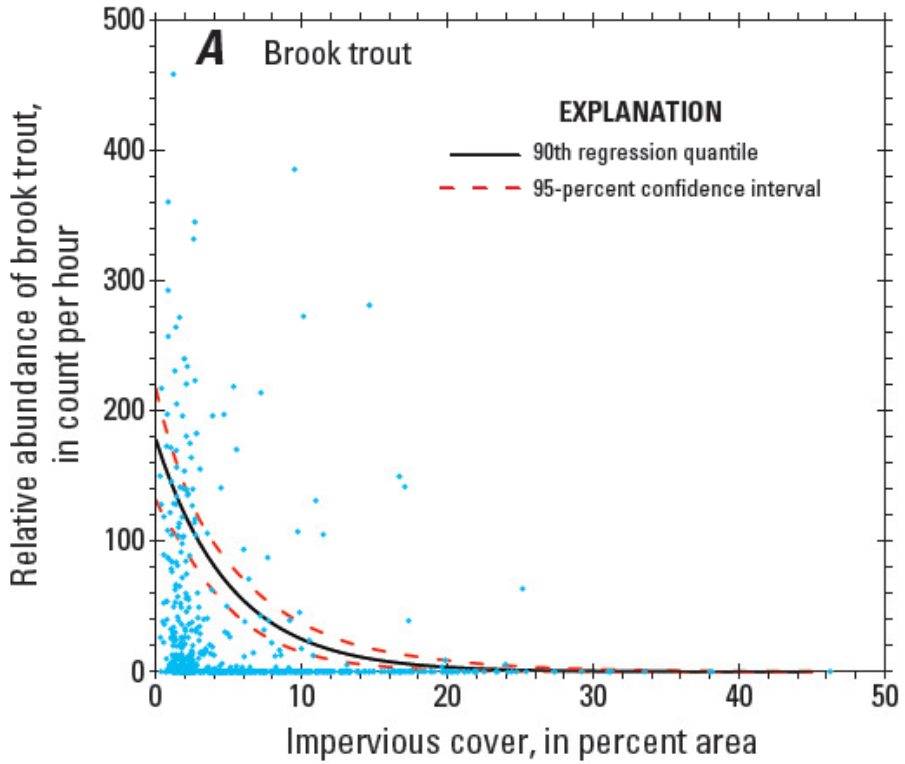
Source: Armstrong et al., Preliminary Assessment of Factors Influencing Riverine Fish Communities in Massachusetts, USGS 2010

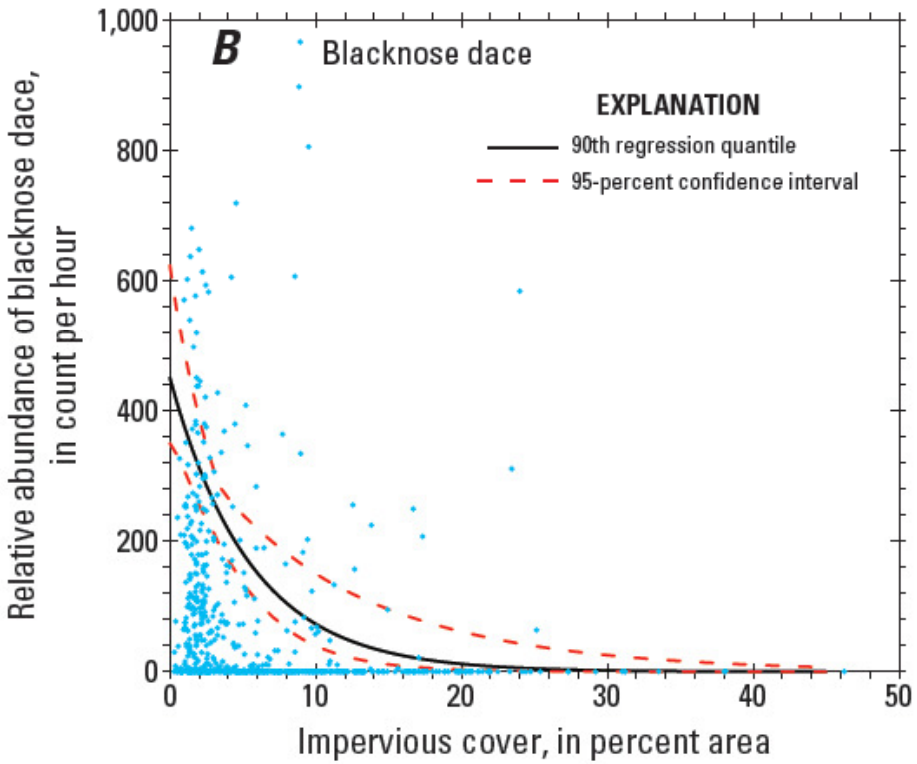
Relative Abundance of Indicator Fish Species in Relation to Percent Alteration of August Median Flow at Selected Net-Surcharged Sites



Source: Armstrong et al., Preliminary Assessment of Factors Influencing Riverine Fish Communities in Massachusetts, USGS 2010

Relative Abundance of Indicator Fish Species Metrics in Relation to Impervious Cover





Source: Armstrong et al., Preliminary Assessment of Factors Influencing Riverine Fish Communities in Massachusetts, USGS 2010

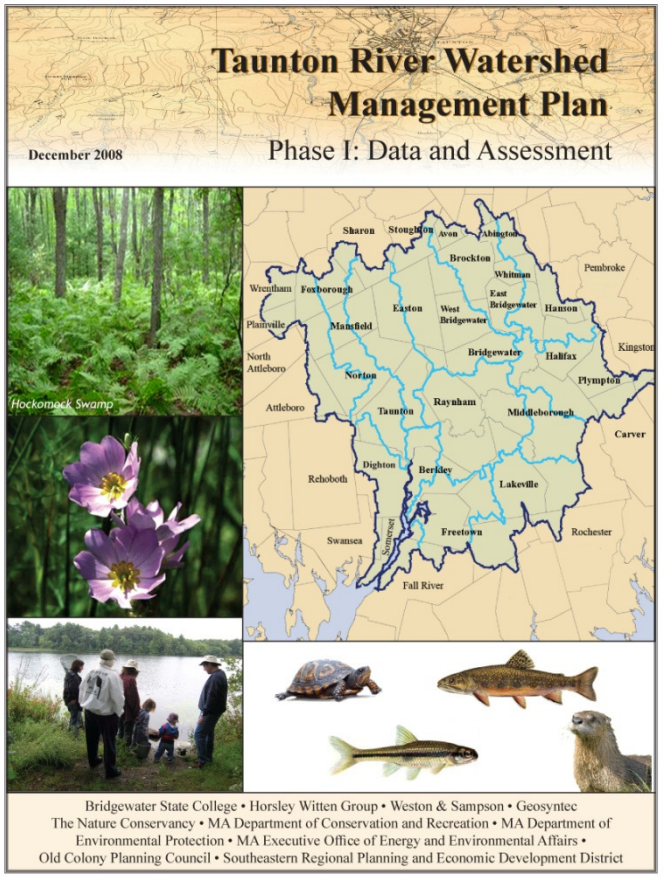
Taunton River Watershed Management Plan

PHASE I:

March 2007 to December 2008
Final Report:
www.horsleywitten.com

Phase I Project included:

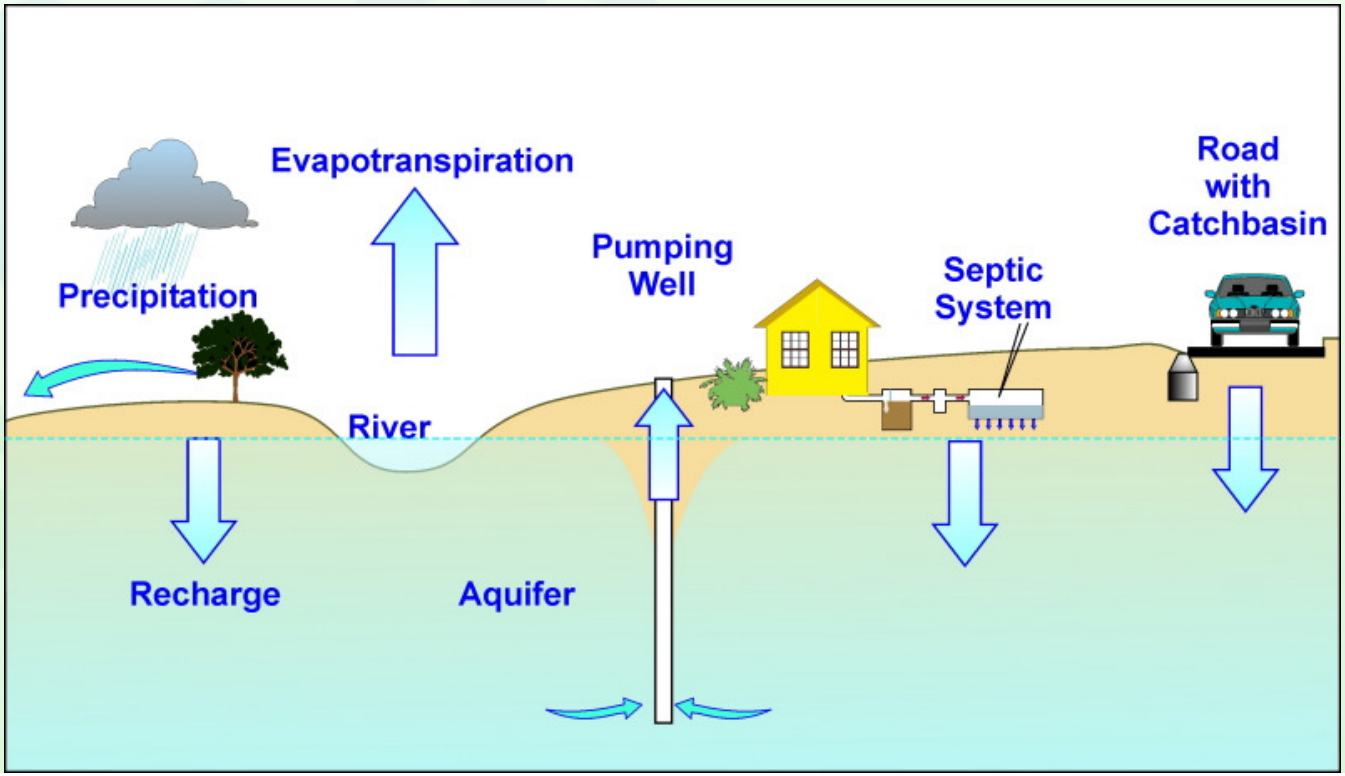
6 Public Meetings/Watershed Day
Data Collection
Water Balance Assessment
Ecological Assessment
Smart Growth Case Study -Easton



Horsley Witten Group, Inc.

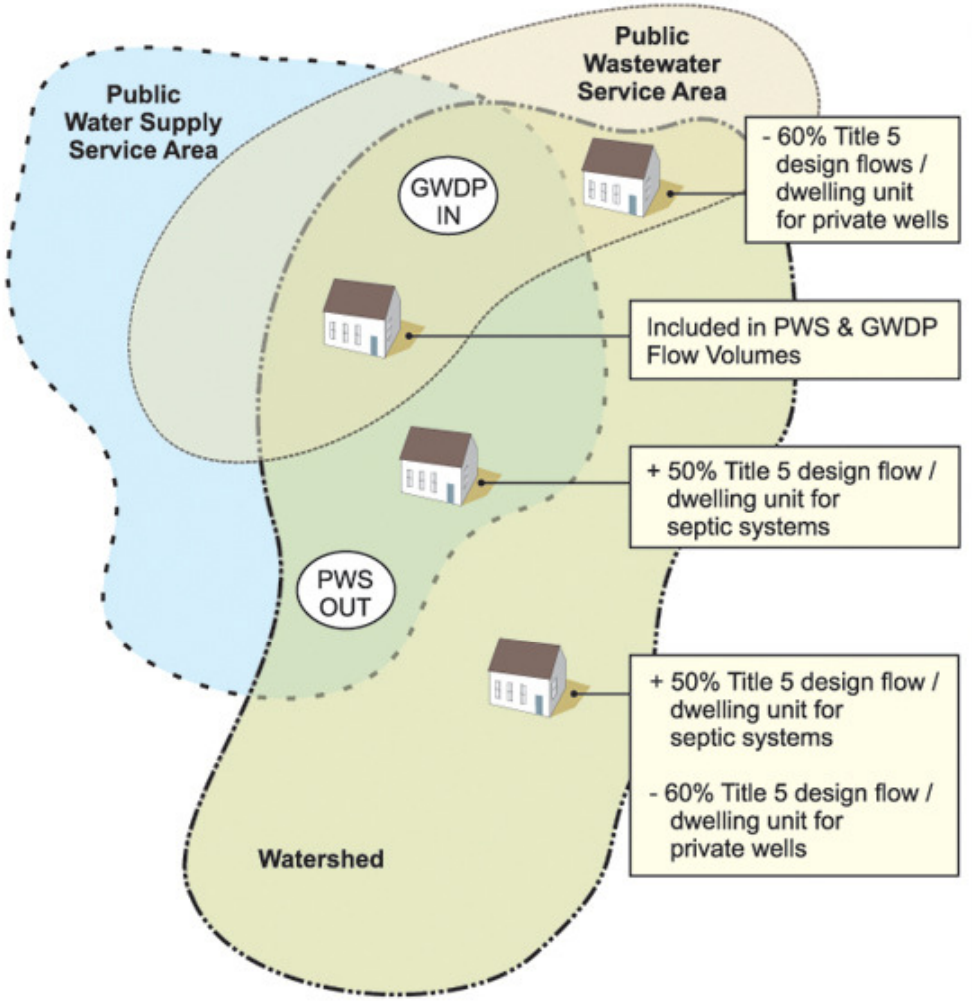
Major Human Impacts on Watershed Hydrology
(Groundwater and Stream Base Flow)

- Drinking water withdrawals and distribution
- Wastewater collection and discharges
- Impervious cover



Inc.

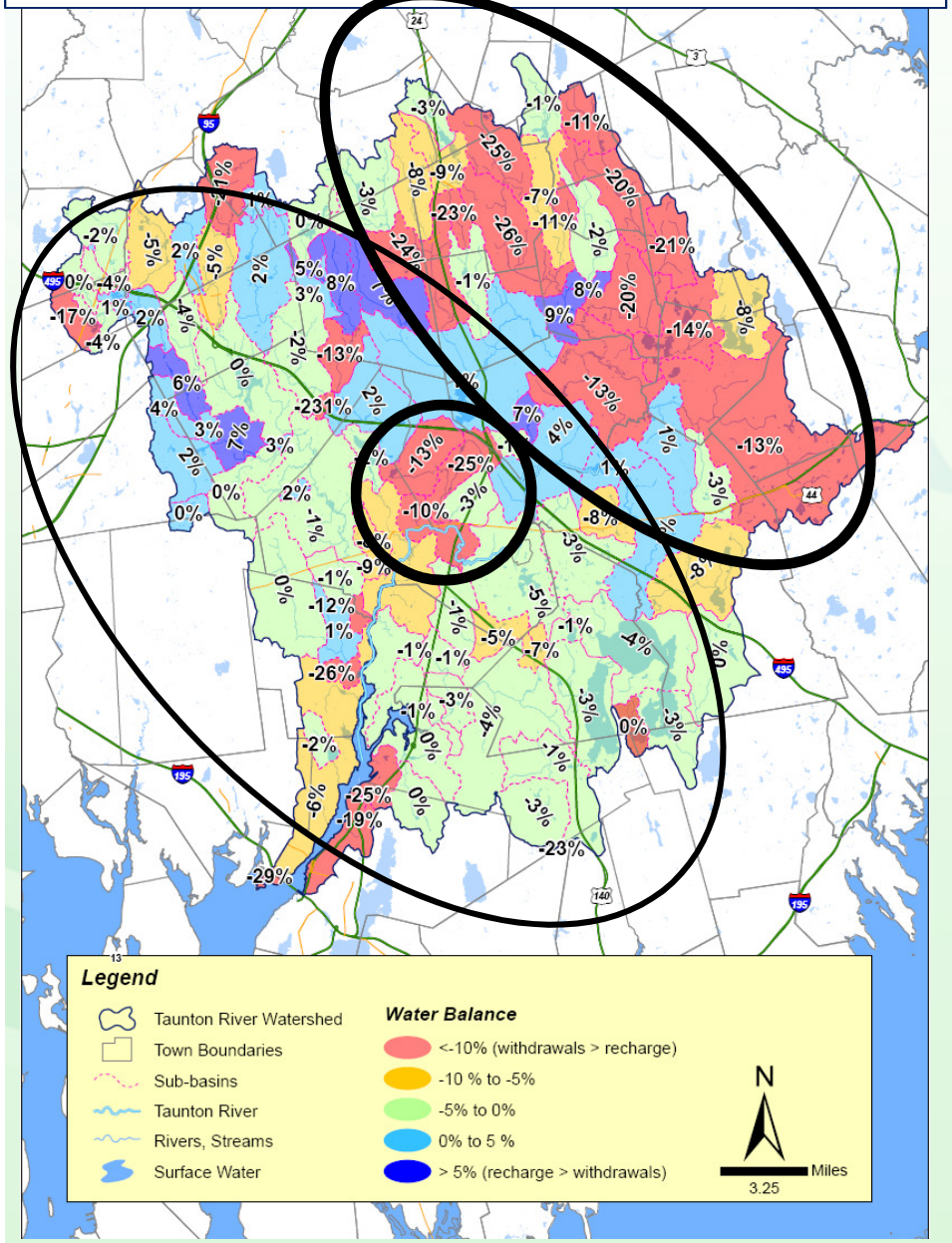
Taunton River Water Budget Approach Schematic



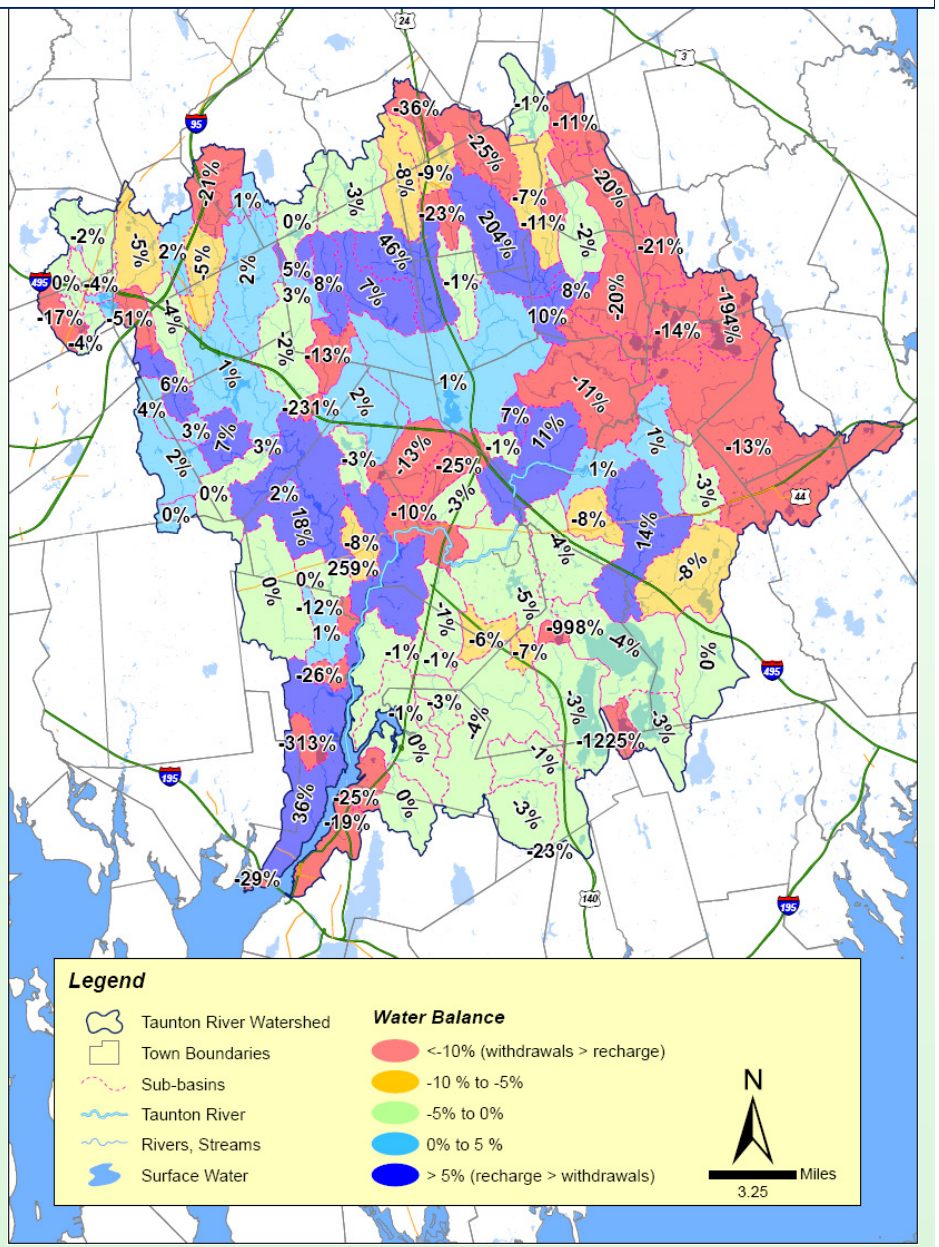
Four Main Water Use Development Scenarios:
1.) Public Water Supply & Public Wastewater
2.) Public Water Supply & Private Wastewater (septics)
3.) Private Water Supply & Private Wastewater (septics)
4.) Private Water Supply & Public Wastewater

Notes:
- GWDP - Ground Water Discharge Permit (Public Wastewater)
- PWS - Public Water Supply
- Water Budget Inputs are (+) and Outputs are (-)

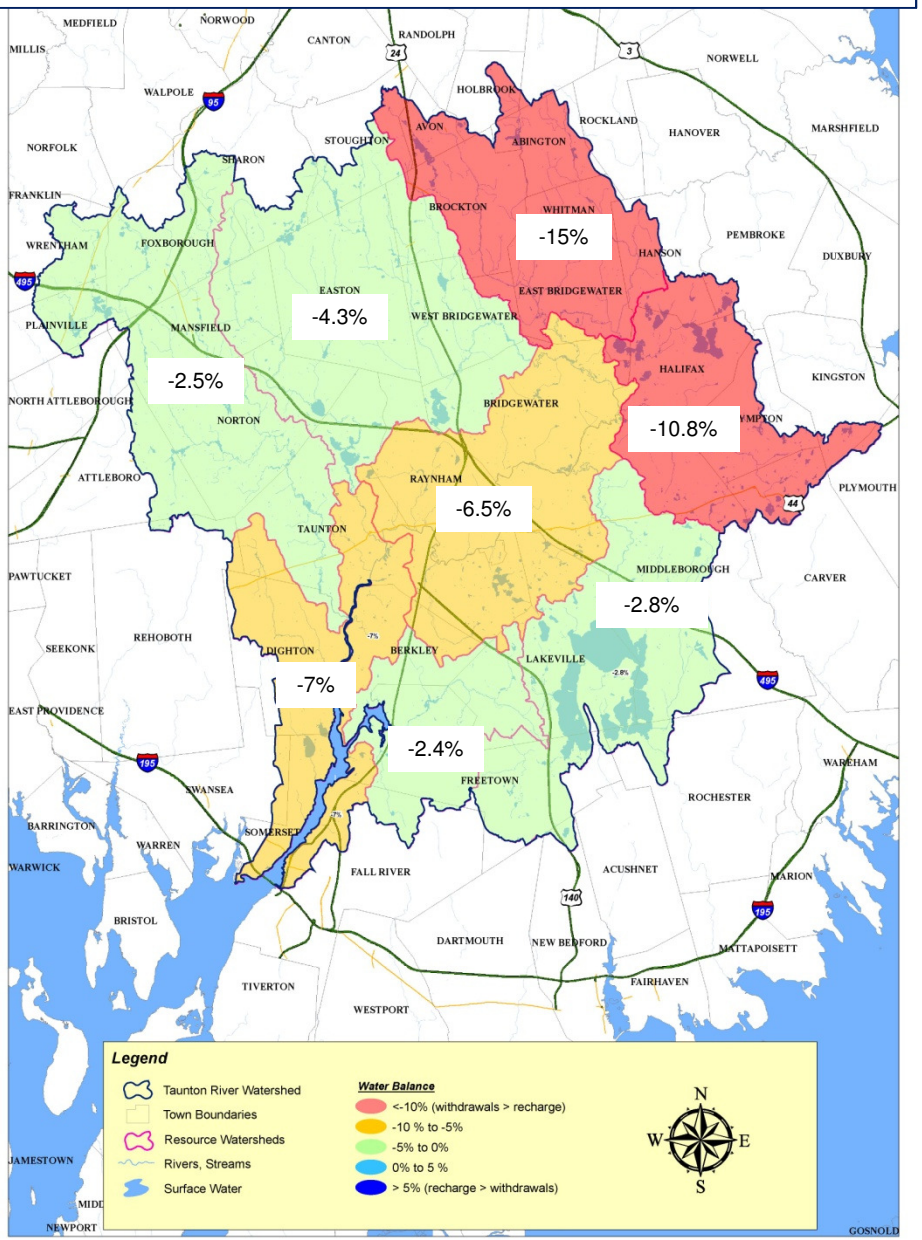
Taunton Water Budget Results:
Excluding Surface Water Withdrawals and NPDES Discharges



Taunton Water Budget Results:
Including Surface Water Withdrawals and NPDES Discharges



Aggregated Results:
Excluding Surface Water Withdrawals and NPDES Discharges



Aggregated Results:
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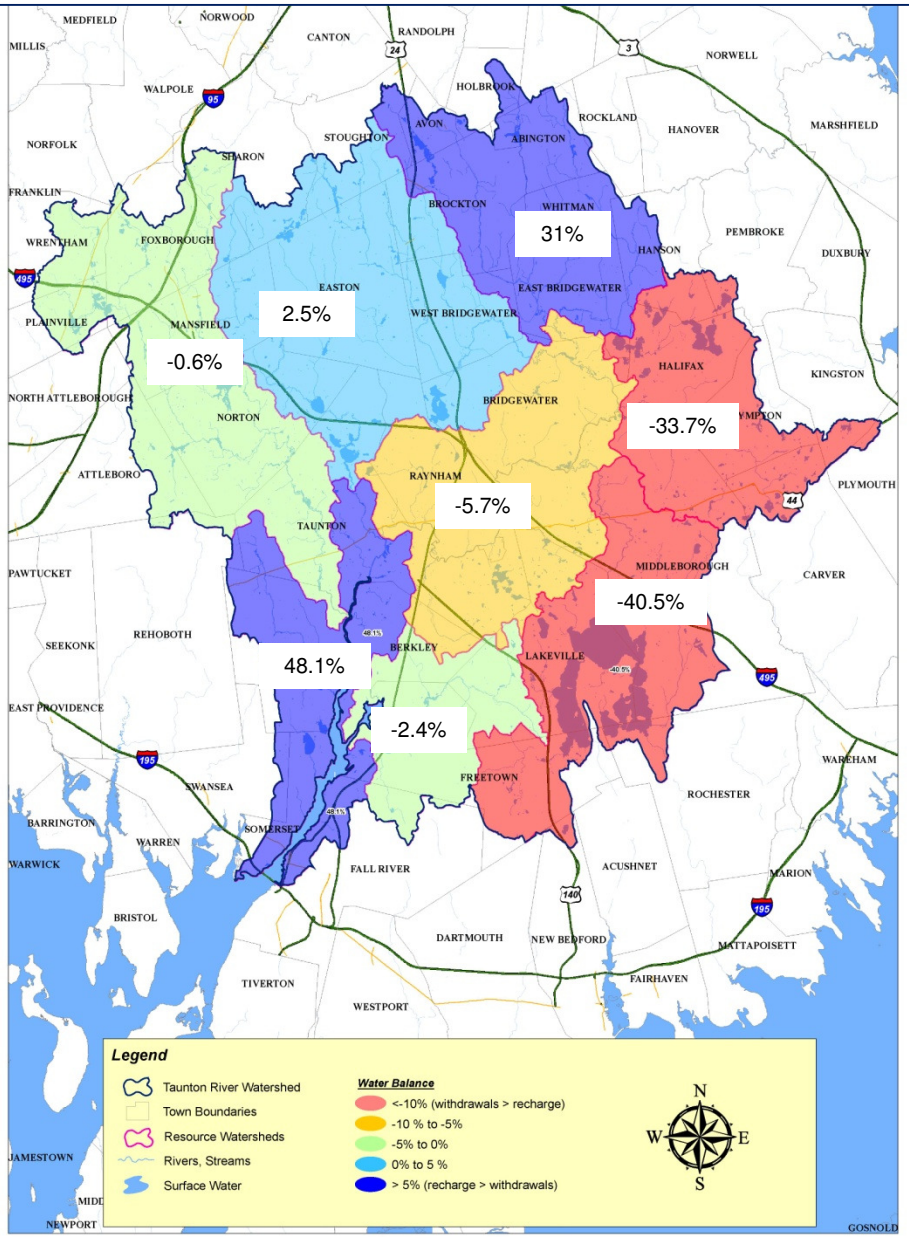
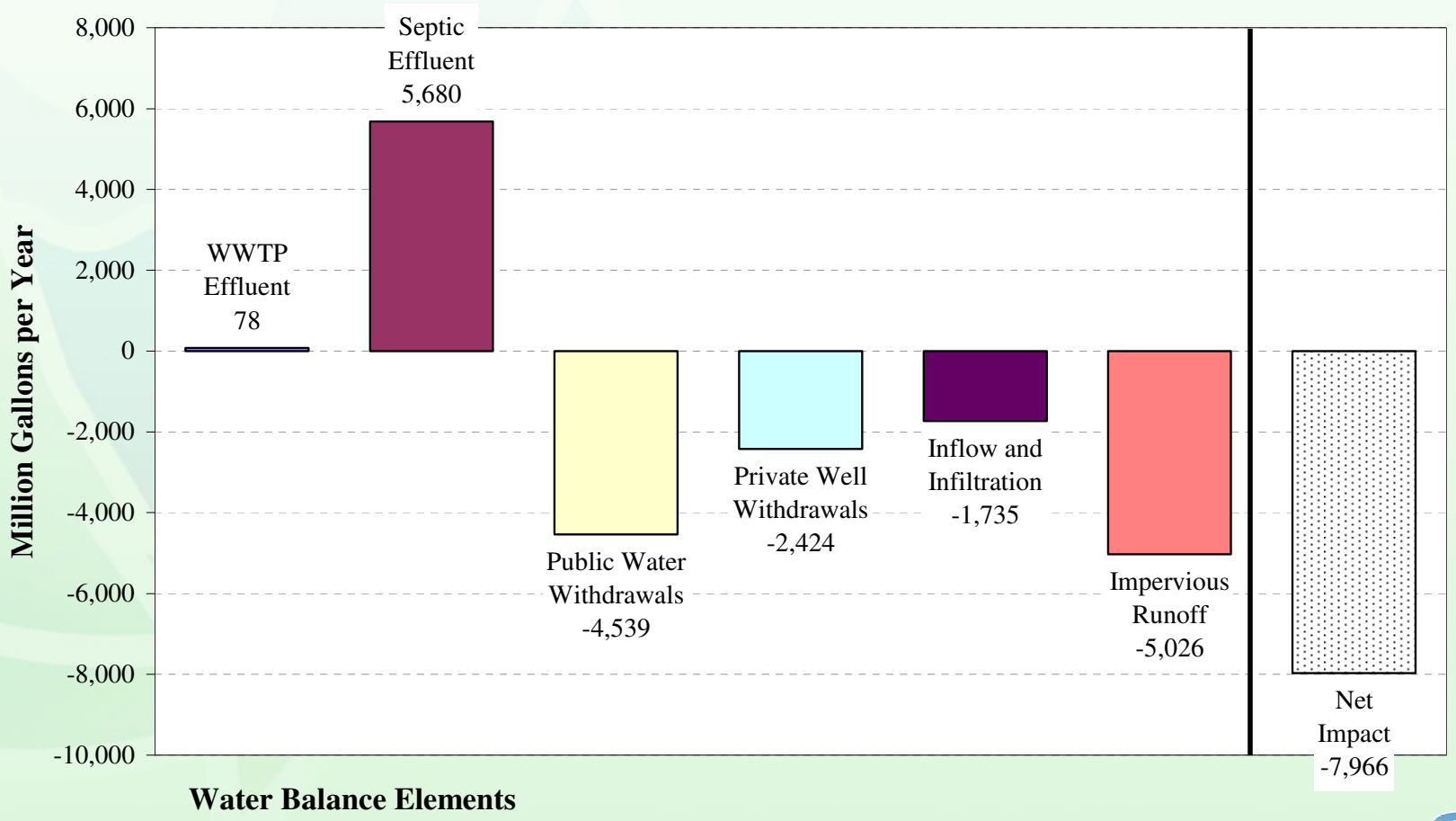


Taunton Water Budget Results:

Taunton Watershed, Excluding Surface Withdrawals & NPDES
(Natural Recharge = 131 BGY, Water Balance = -6.1 %)



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Water Balance Results

6.1 % The recharge deficit of the Taunton River Watershed compared to natural conditions.

27% of subwatersheds have a water surplus

73% of subwatersheds have a water deficit

0.3 % The deficit of the Taunton River Watershed when surface water discharges and withdrawals are included.

31% of subwatersheds have a water surplus

69% of subwatersheds have a water deficit

Conclusion: Human development is clearly altering the availability of water in the Taunton. Work should focus on policies, mechanisms and techniques to "keep water local" within the watershed. This Water Balance Tool can help drive this effort.

Top 5 Issues Identified by Public

- The amount of public education (training) for municipal staff, boards, commissions
- The amount of public education and outreach about environmental issues
- The amount of habitat, wetlands and open space being protected
- The extent of inappropriate development
- Quantity of flow and availability of critical habitat in rivers, stream and lakes

The Taunton River Watershed Management Plan, Phase II

Demonstration and Code Reform Projects

Horsley Witten Group, Inc.
October 21, 2010
Ocean Spray Headquarters
Lakeville-Middleboro

Horsley Witten Group, Inc.

Phase II: Demonstration and Code Reform Projects

Goals:

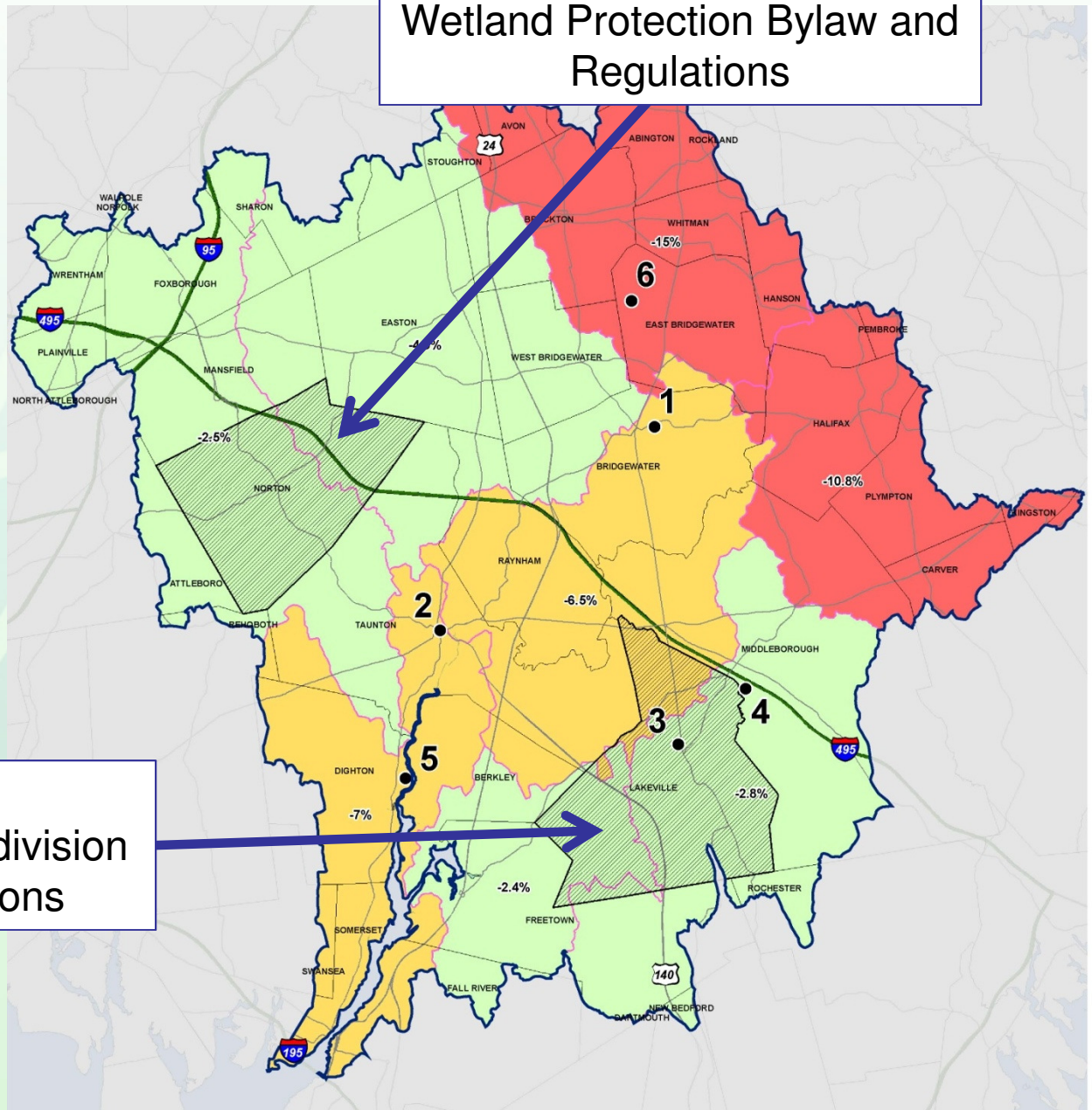
- "Keep Water Local"
- Restore natural water balance
- Demonstrate technology and techniques locally

Projects to address:

1. Low Impact Design – recharge water locally
2. Wetland/Habitat Restoration
3. Alternative Wastewater Management – recharge water locally

Code Reform Projects

Norton:
Wetland Protection Bylaw and Regulations



Lakeville:
Zoning Code and Subdivision Rules and Regulations

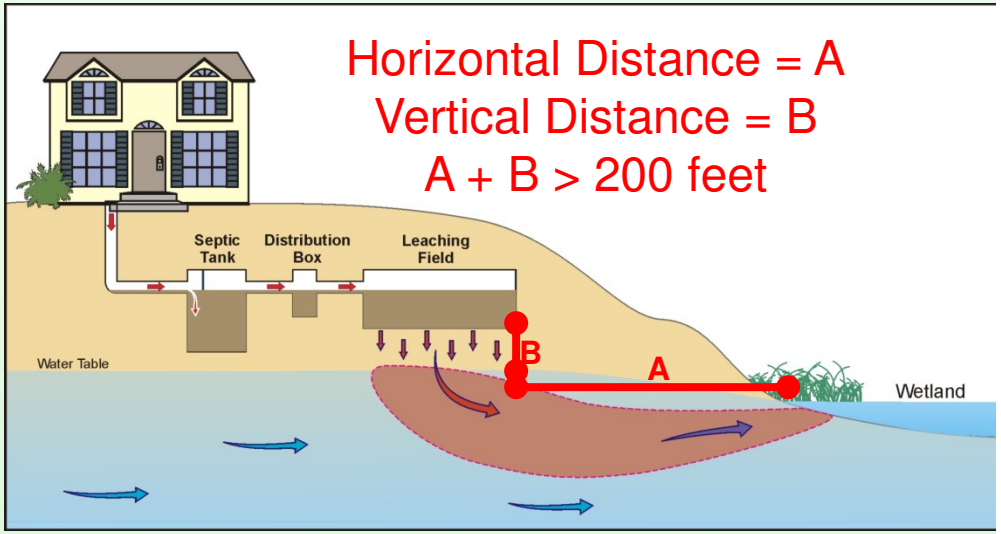
Lakeville Zoning Code Reform

- Goals
  - Balance the hydrologic budget within the watershed—QUANTITY
  - Mitigate the impacts to water resources from pollution—QUALITY
- Four local concerns addressed
  - Site plan peer reviews
  - Enhanced stormwater management techniques
  - Stormwater management enforcement
  - Permitting of lakeside redevelopment

4. Redevelopment Permitting in Lakeside Housing Development

Activities within a Zone C contributing area:

- Horizontal distance to the pond from the leaching area plus the vertical distance from leaching field to seasonal high groundwater shall exceed 200 feet where feasible
- Leach fields must be oriented perpendicular to groundwater flow direction



Demonstration Projects

Parking lot retrofit at Leland Farms Soccer Fields in E. Bridgewater

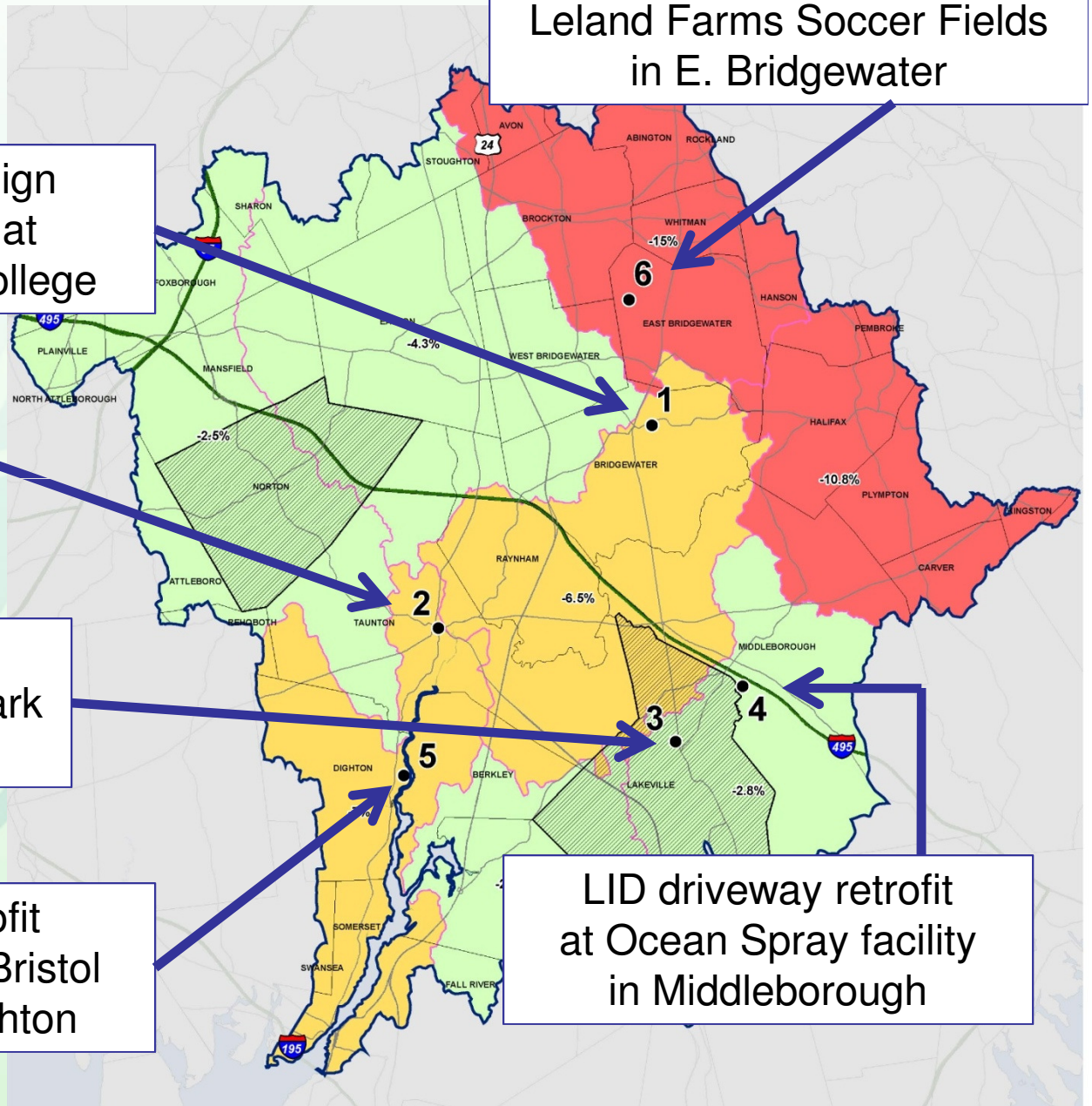
LID parking lot design and teaching tool at Bridgewater State College

Mill River park and riverwalk at Taunton City Hall

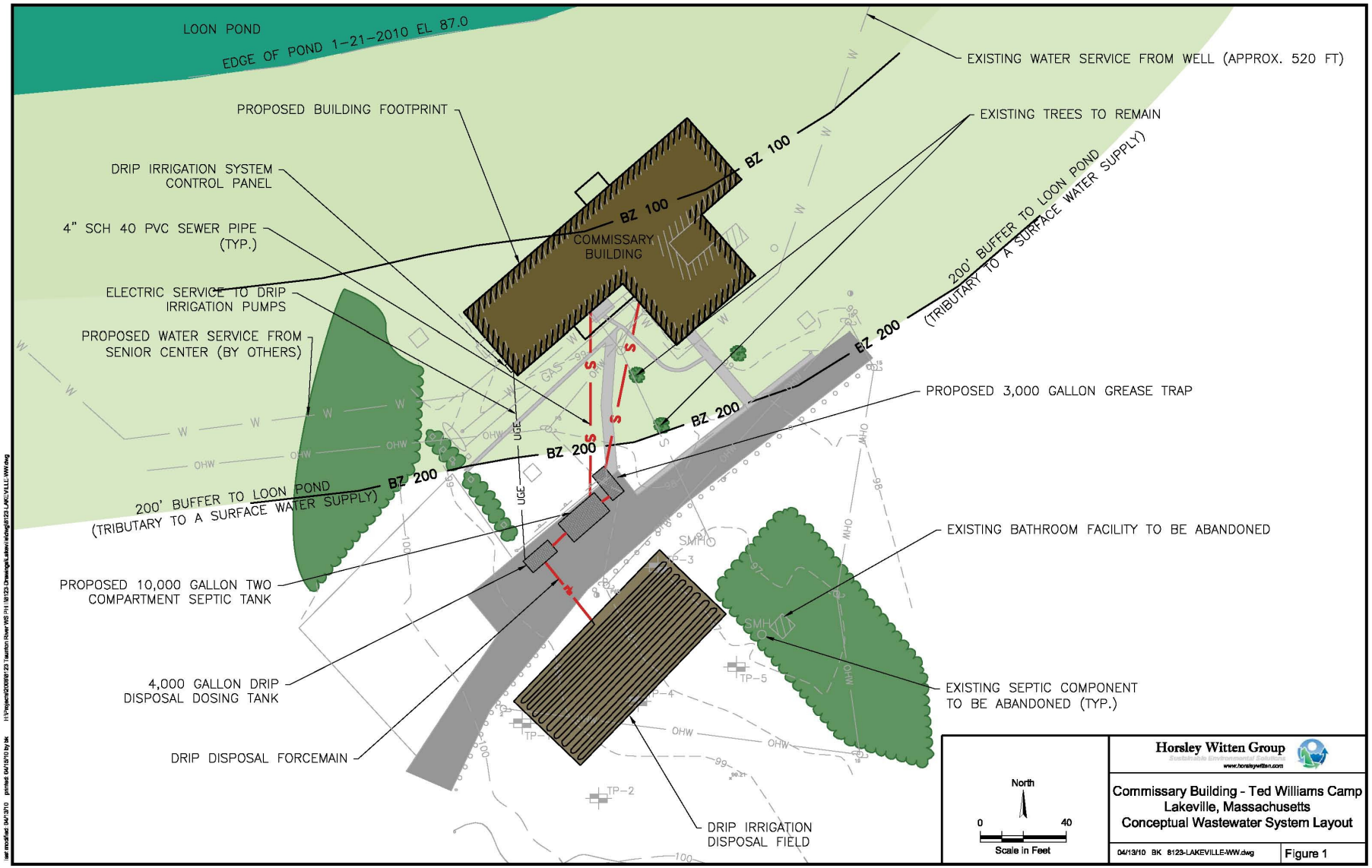
Innovative wastewater disposal at Ted Williams Park in Lakeville

LID driveway retrofit and teaching tool at Bristol Aggie School in Dighton

LID driveway retrofit at Ocean Spray facility in Middleborough



Innovative Wastewater Disposal
Ted Williams Park, Lakeville


LOON POND
EDGE OF POND 1-21-2010 EL 87.0
PROPOSED BUILDING FOOTPRINT
DRIP IRRIGATION SYSTEM CONTROL PANEL
4" SCH 40 PVC SEWER PIPE (TYP.)
ELECTRIC SERVICE TO DRIP IRRIGATION PUMPS
PROPOSED WATER SERVICE FROM SENIOR CENTER (BY OTHERS)
200' BUFFER TO LOON POND (TRIBUTARY TO A SURFACE WATER SUPPLY)
PROPOSED 10,000 GALLON TWO COMPARTMENT SEPTIC TANK
4,000 GALLON DRIP DISPOSAL DOSING TANK
DRIP DISPOSAL FORCEMAIN
DRIP IRRIGATION DISPOSAL FIELD
EXISTING WATER SERVICE FROM WELL (APPROX. 520 FT)
EXISTING TREES TO REMAIN
COMMISSARY BUILDING
BZ 100
BZ 200
PROPOSED 3,000 GALLON GREASE TRAP
EXISTING BATHROOM FACILITY TO BE ABANDONED
EXISTING SEPTIC COMPONENT TO BE ABANDONED (TYP.)
North
0
40
Scale in Feet
Horsley Witten Group
www.horsleywitten.com
Commissary Building - Ted Williams Camp
Lakeville, Massachusetts
Conceptual Wastewater System Layout
04/13/10 BK 8123-LAKEVILLE-WW.dwg
Figure 1


SEP 9 2009

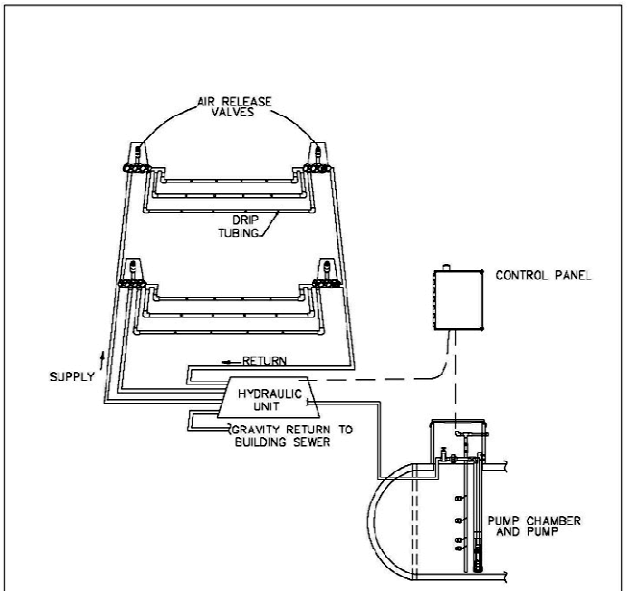

SEP 9 2009

Drip Irrigation System

- Shallow installation 8-12” below surface
- Can be installed under lawns and lightly used playing fields (perfect for baseball outfields)

Installation: MassAudubon Allen’s Pond Wildlife Sanctuary, Westport

Typical Drip Dispersal System Flow Diagram

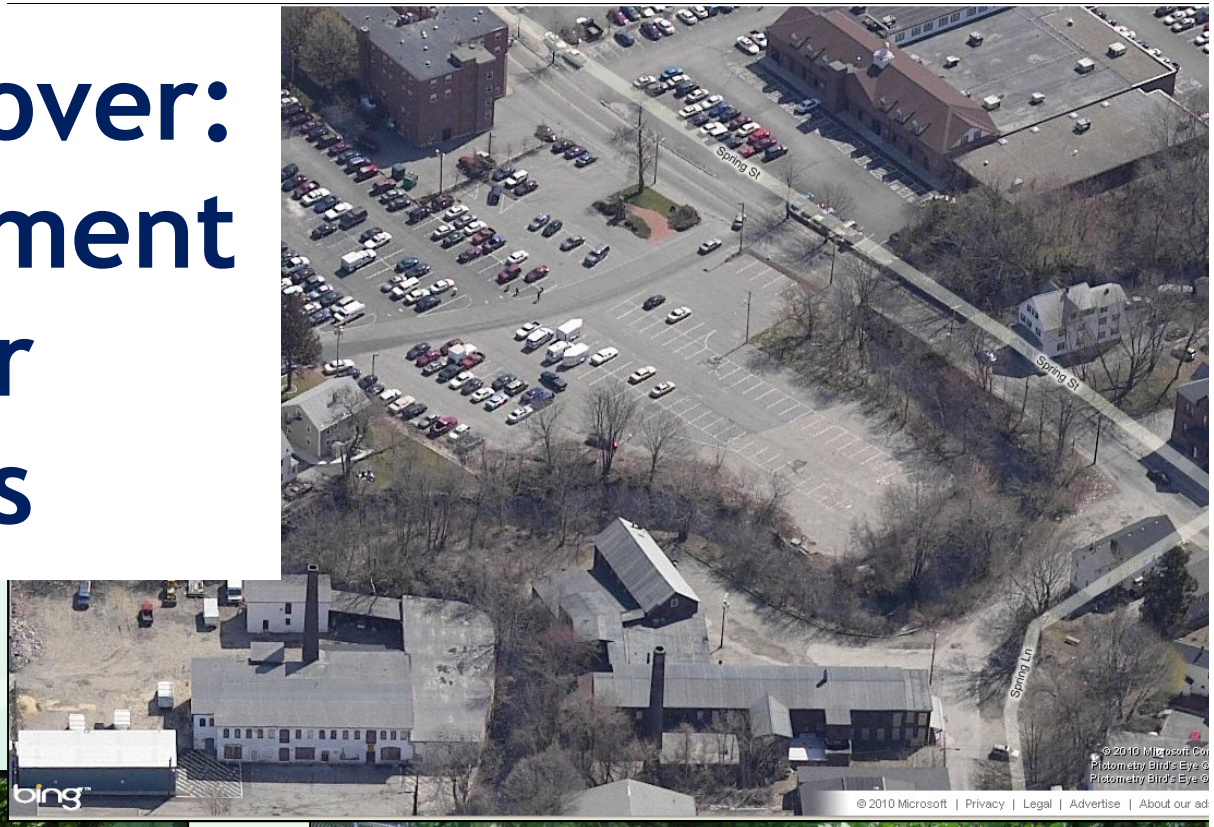


Oakson Inc. Perc-Rite Designer’s Guide For Pre-Treated Effluent, Page 2

Figure 1: Typical Drip Dispersal System Flow Diagram

Mill River Park and Riverwalk at Taunton City Hall

Impervious Cover: Erosion, Sediment and Other Pollutants



Invasive Species Infestation in Buffer Zone

Brown, Richardson & Rowe, Inc.
Landscape Architects and Planners
3 Post Office Square
Boston, MA 02110

Horsley Witten Group
Sustainable Environmental Solutions
www.horsleywitten.com

MILL RIVER PARK

Taunton, Massachusetts

FUTURE PROGRAM AND DESIGN PLAN

Gateway Cities Parks Program
Executive Office of Energy & Environmental Affairs

COMMUNITY MEETING #2
June 23, 2010


Bioretention

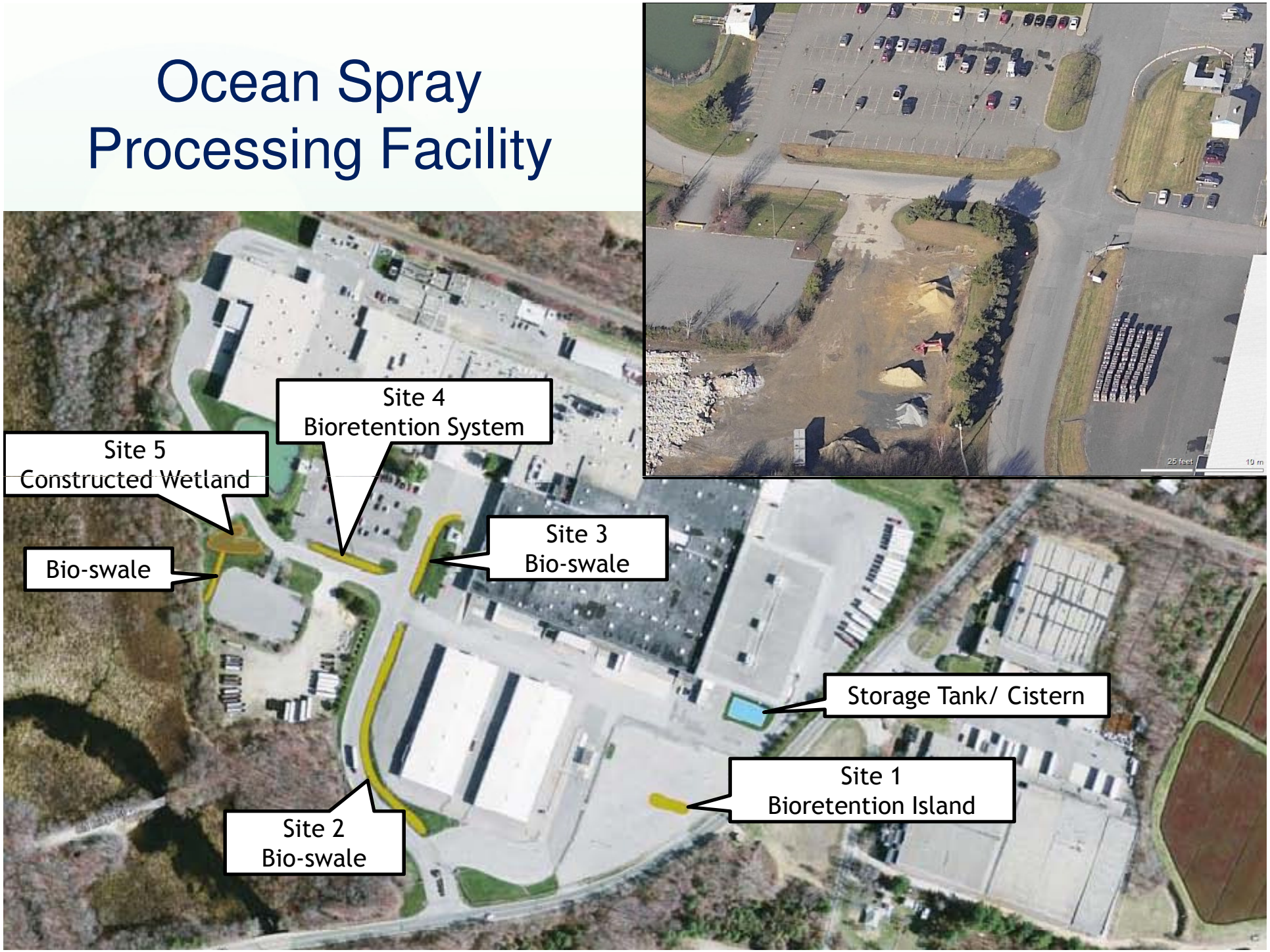

07/02/2009

Ocean Spray Processing Plant

Middleborough

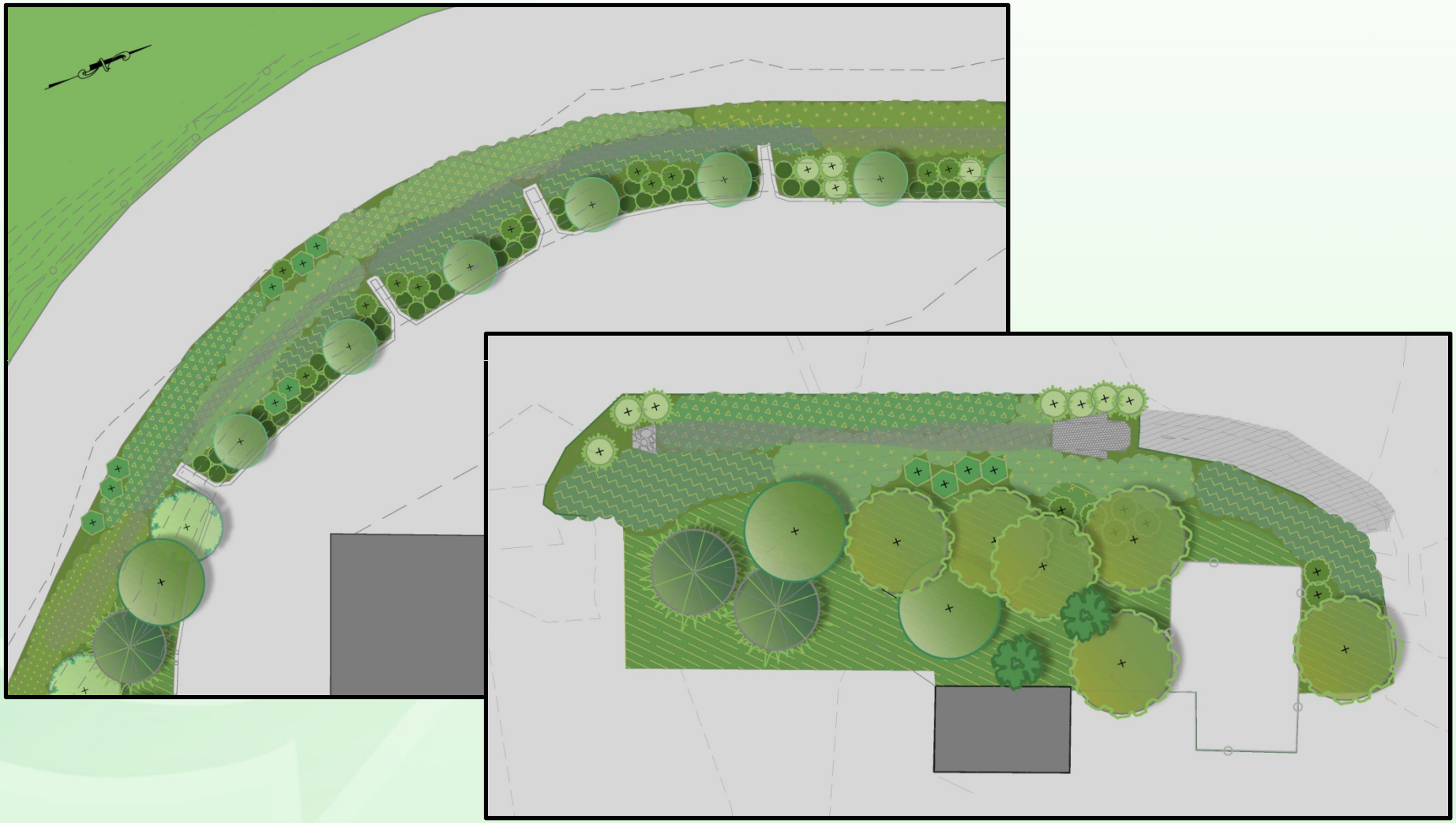
Horsley Witten Group, Inc.

Ocean Spray Processing Facility

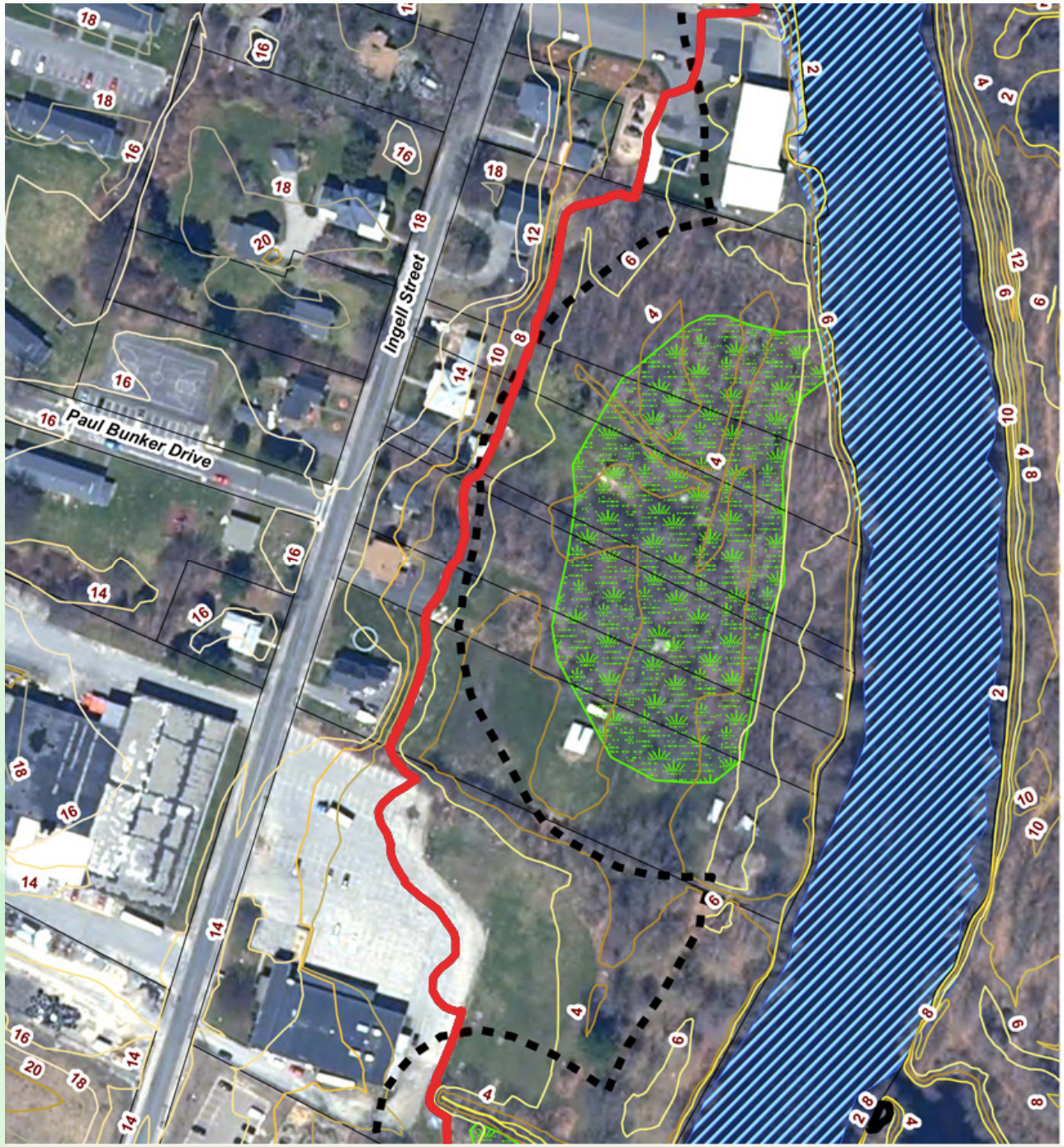



TOP

Ocean Spray Facility



Horsley Witten Group, Inc.



Legend

- Wetlands
- Open Water
- 100-ft. Wetland/Open Water Buffer
- Future Wetland Boundary
- Assessors Parcels
- Elevation Contours

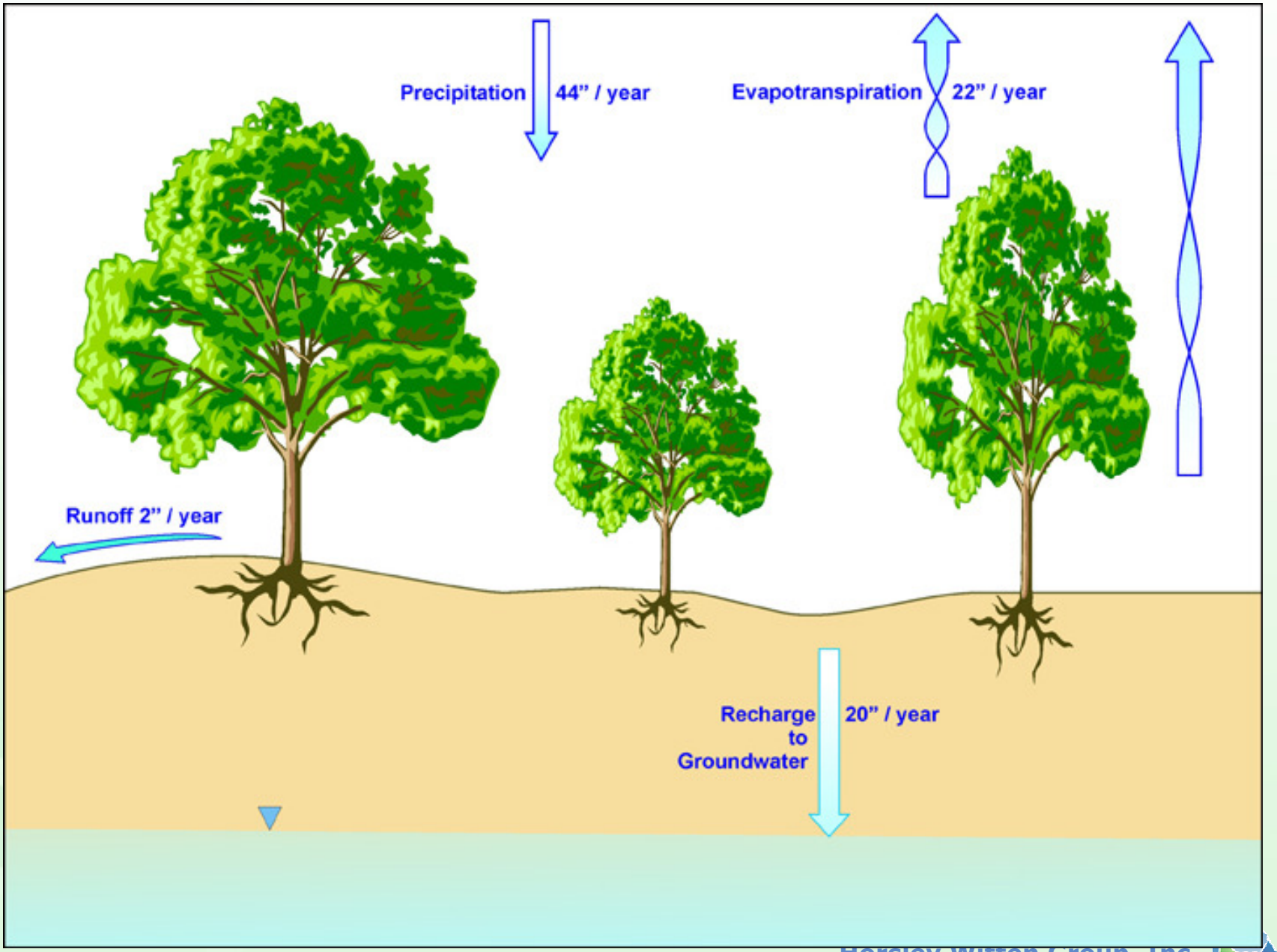
*Data Source: MassGIS, 2005

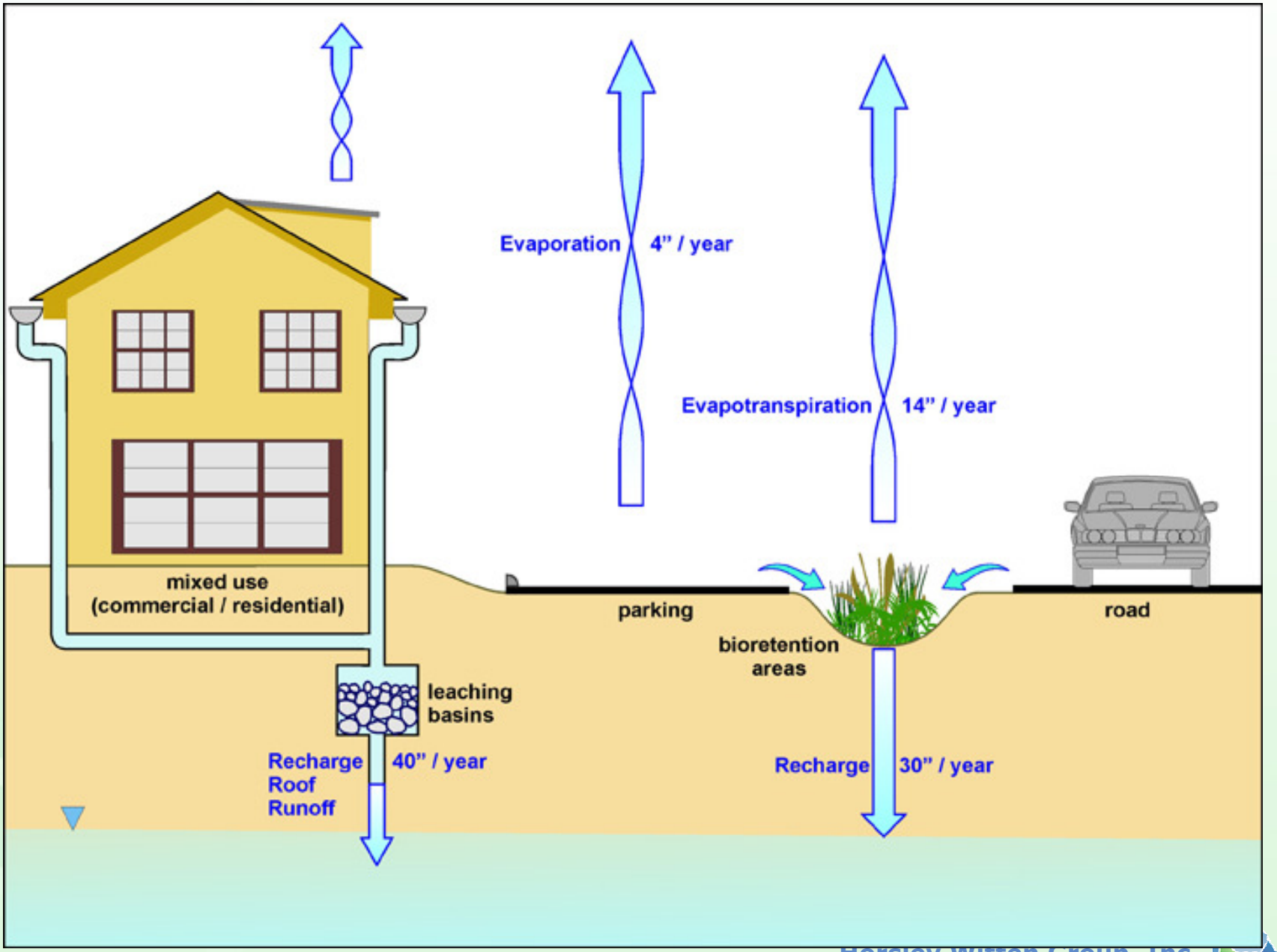
N

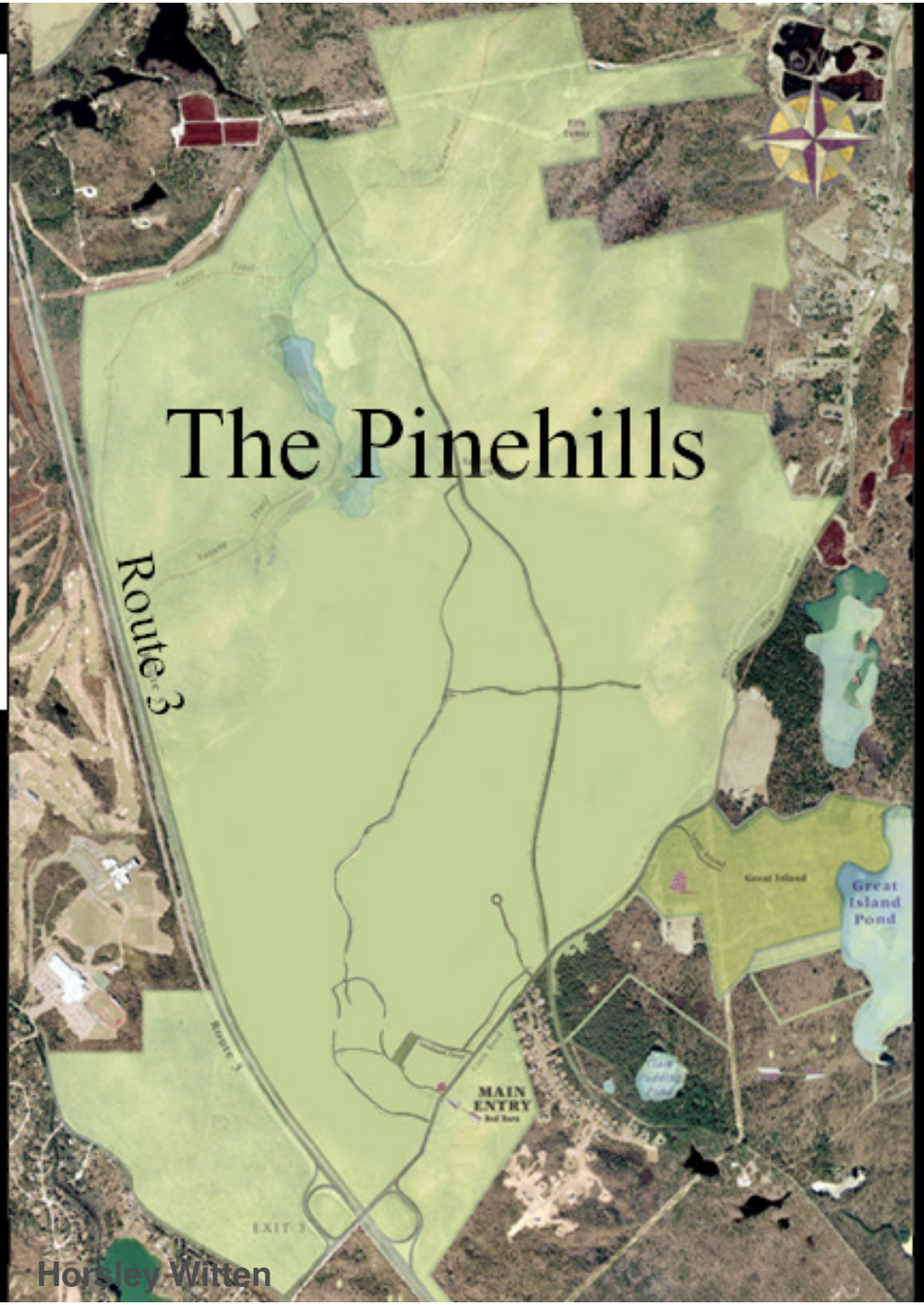
150 Feet

Horsley Witten Group
phone: 508-833-6600
www.horsleywitten.com

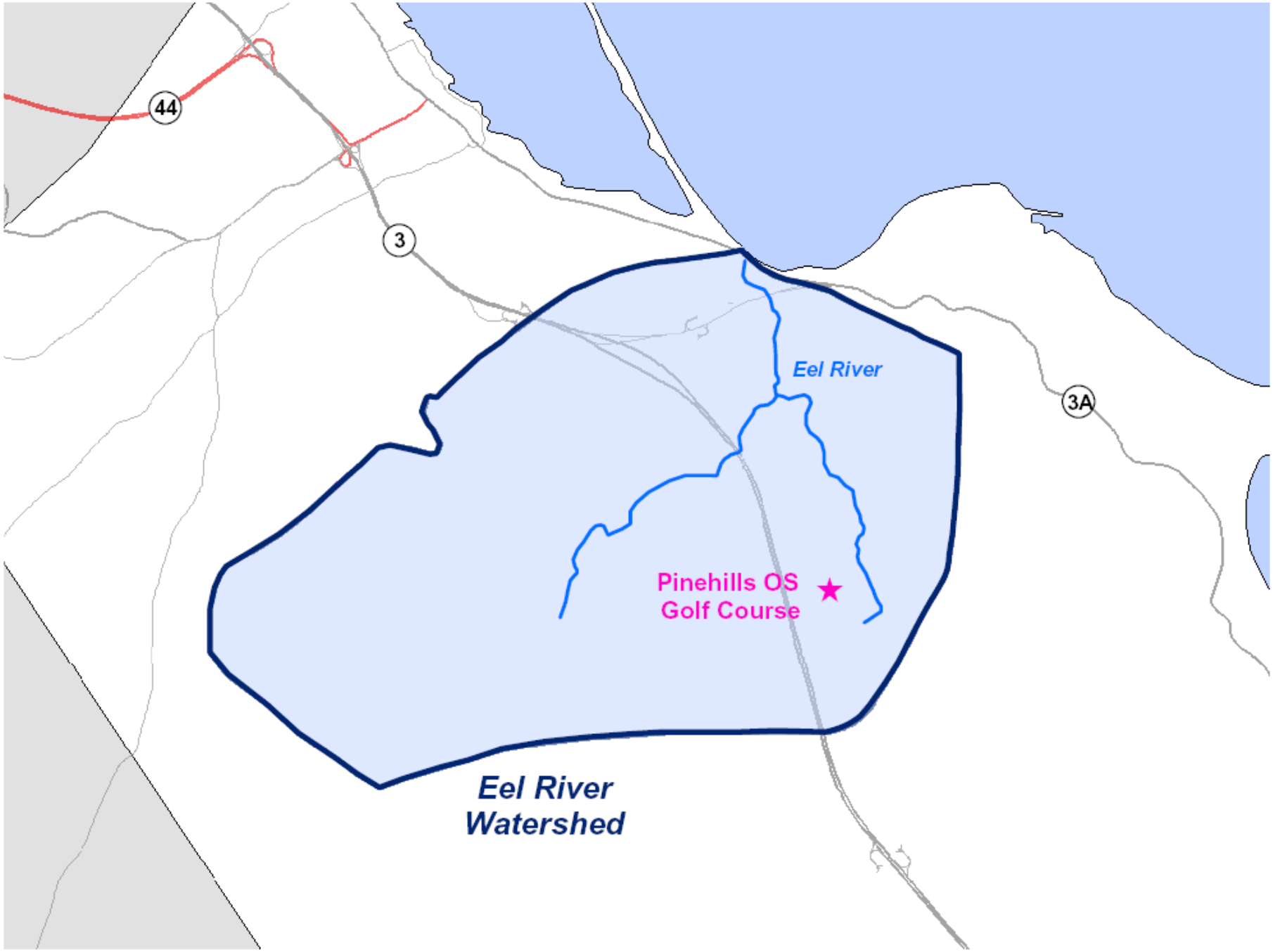
Climate Change
Sea Level Rise Analysis
Taunton, MA


Precipitation
44" / year
Evapotranspiration
22" / year
Runoff 2" / year
Recharge
to
Groundwater
20" / year

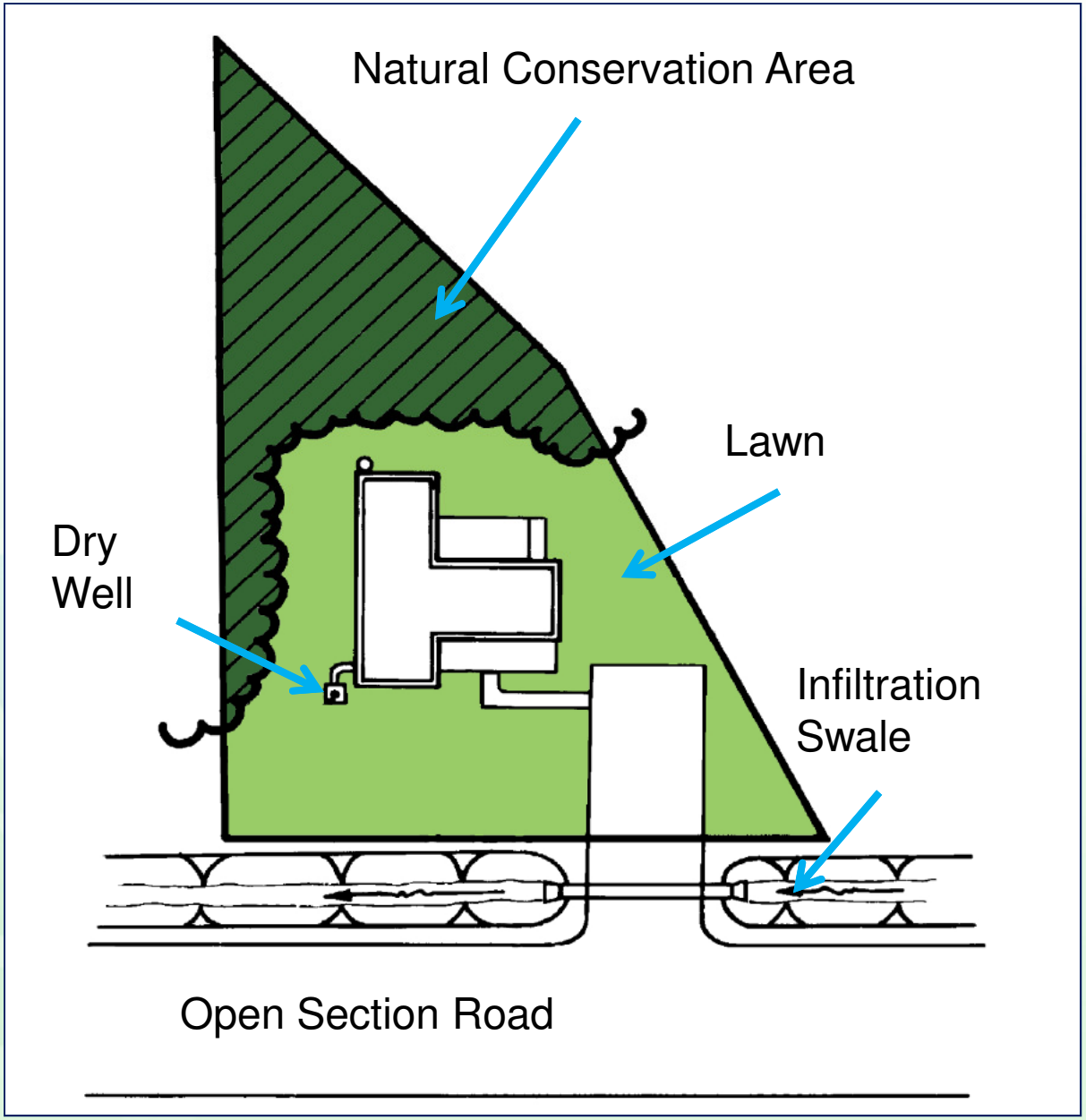

Evaporation 4" / year
Evapotranspiration 14" / year
mixed use
(commercial / residential)
parking
road
bioretention
areas
leaching
basins
Recharge
Roof
Runoff
40" / year
Recharge 30" / year



Horsley Witten


44
3
3A
Eel River
Pinehills OS
Golf Course
Eel River
Watershed

Water Balance Pinehills OS Golf Course		
Irrigation Well Water Demand	47	MG/year
Offsets:		
20% Return flow from Nickalaus Course	3.18	MG/year
20% Return flow from OS Course	9.4	MG/year
Wastewater return flows 35 homes	1.34	MG/year
Stormwater recharge Roof/Driveway runoff 557 homes	12.92	MG/year
Stormwater recharge OS Course parking lot	0.29	MG/year
Stormwater recharge road	10.13	MG/year
Total Offsets	37.26	MG/year
Net Consumption	9.74	MG/year

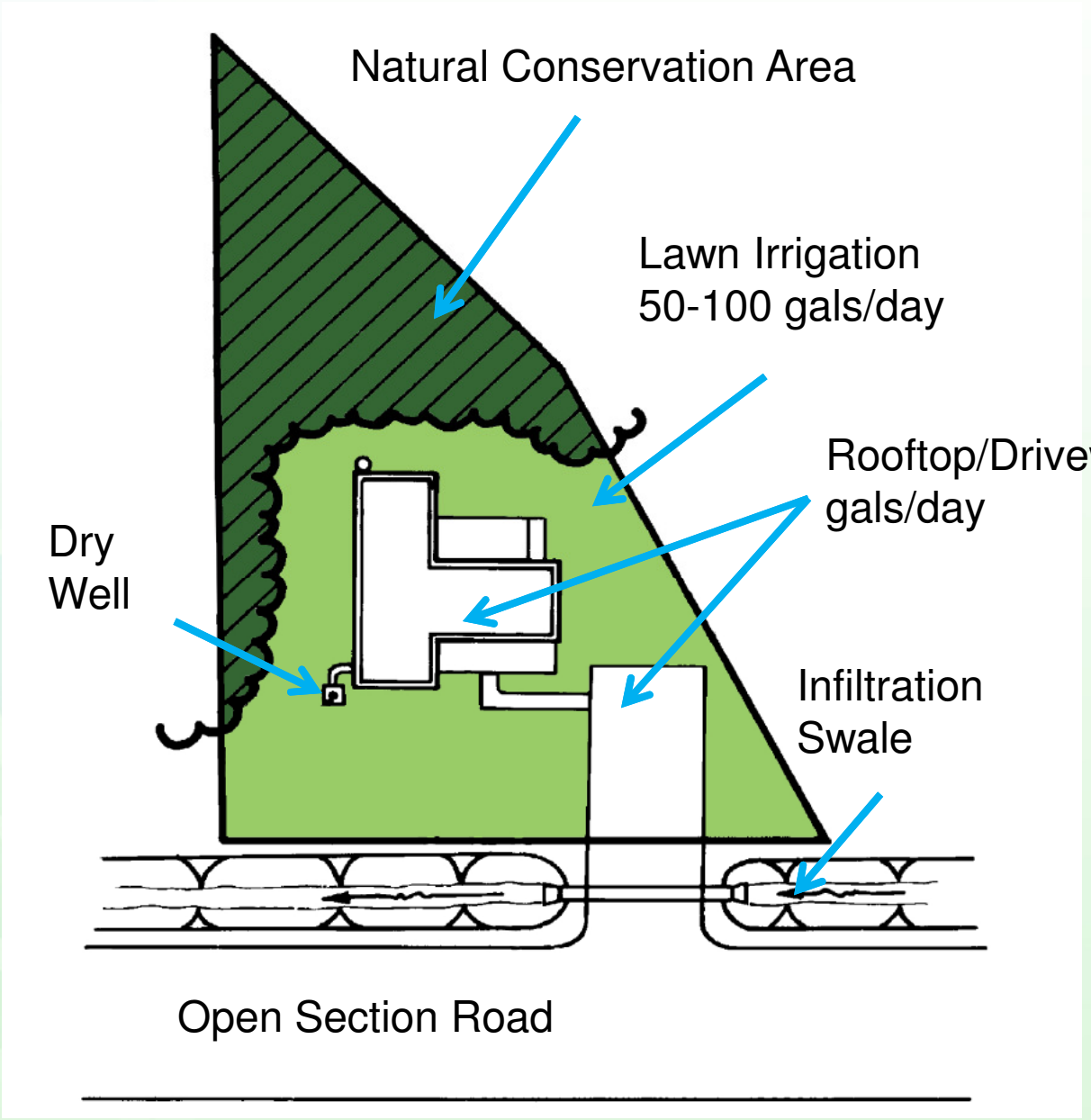

Natural Conservation Area
Lawn
Dry
Well
Infiltration
Swale
Open Section Road

Rooftop/Driveway Runoff Calculations

Hydro Soil Group	Recharge Rate (in/yr)	Rooftop/Driveway Area (SF)	Natural Recharge (gal/day)	34 in/yr Roof/Drive Runoff (gal/day)	Net Increase (gal/day)
A	23.5	2000	80.5	116.4	36.0
B	17.5	2000	59.9	116.4	56.5
C	13.5	2000	46.2	116.4	70.2
D	6.5	2000	22.3	116.4	94.2

Lawn Irrigation Calculations

1	inch/week	5000	square feet	103	gal/day
0.5	inch/week	5000	square feet	51	gal/day


Natural Conservation Area
Lawn Irrigation
50-100 gals/day
Rooftop/Driveway Runoff 36-94
gals/day
Dry
Well
Infiltration
Swale
Open Section Road

Recommendations

1. Provide education/training of local decision-makers through a formal certification process or training program.
2. Local regulatory revisions: individual municipal audits or toolkit.
3. Strategies to preserve/restore the water balance in subwatersheds.
4. Coordination with Narragansett Bay Management Plan Update.
5. Develop an integrated watershed restoration plan that utilizes economic incentives.
6. Develop a monitoring strategy for Phase II pilot projects.
7. Develop a pilot project to test sustainable water management strategies being developed by MA EOEEA Water Sustainability Advisory Committee.
8. Develop climate change adaptation strategies.