Water Quantity and Quality
Route 2-102 Consensus Study

North Kingstown, Rhode Island

Sept 26, 2012

WATER QUANTITY (BASIC FACTS)

North Kingstown Distribution System Overview

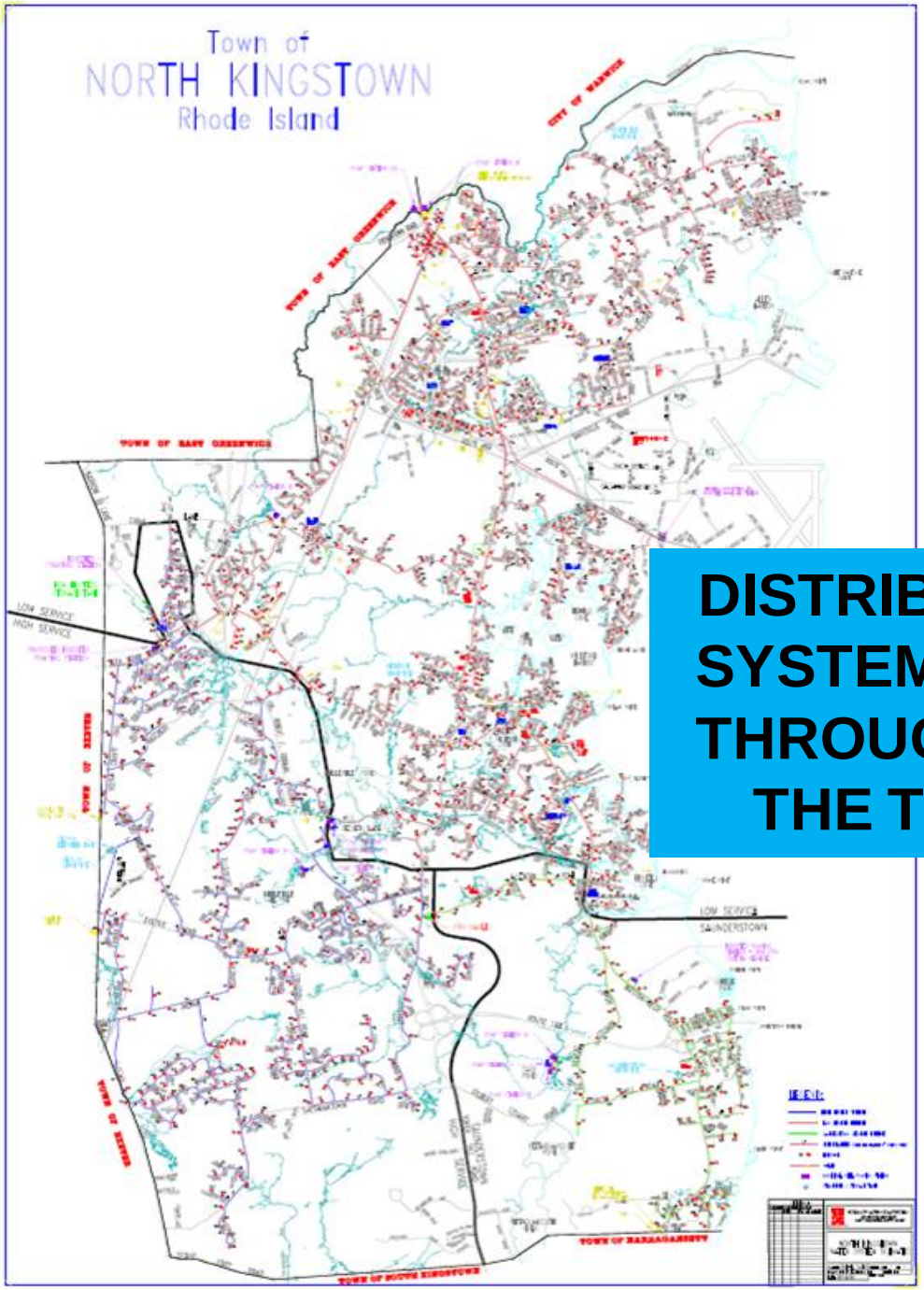
11 Municipal Wells

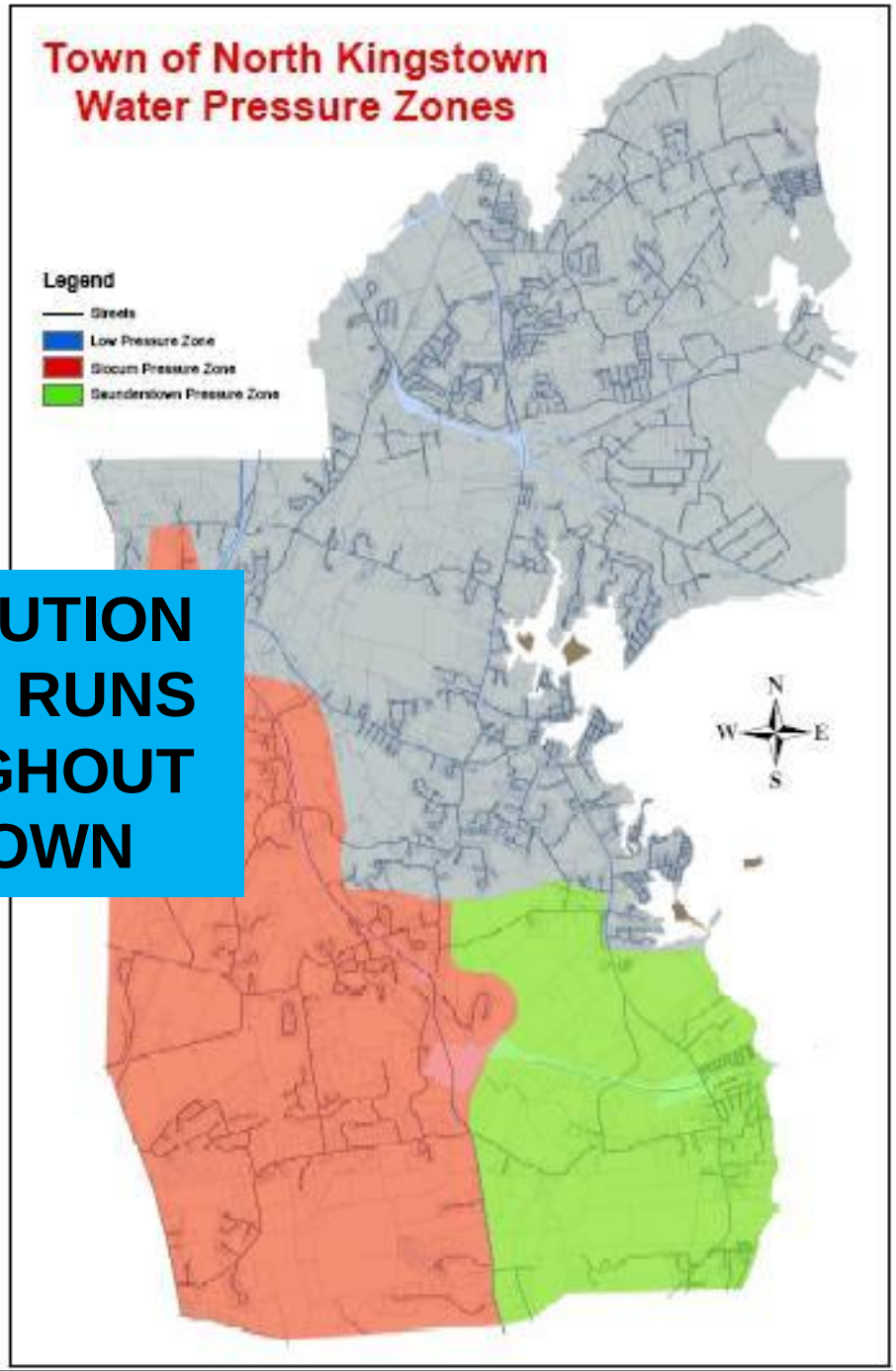
North Kingstown Distribution System Overview
Five (5) Water Storage Tanks

SOURCE WATER

In North Kingstown the source of our drinking water is

GROUNDWATER





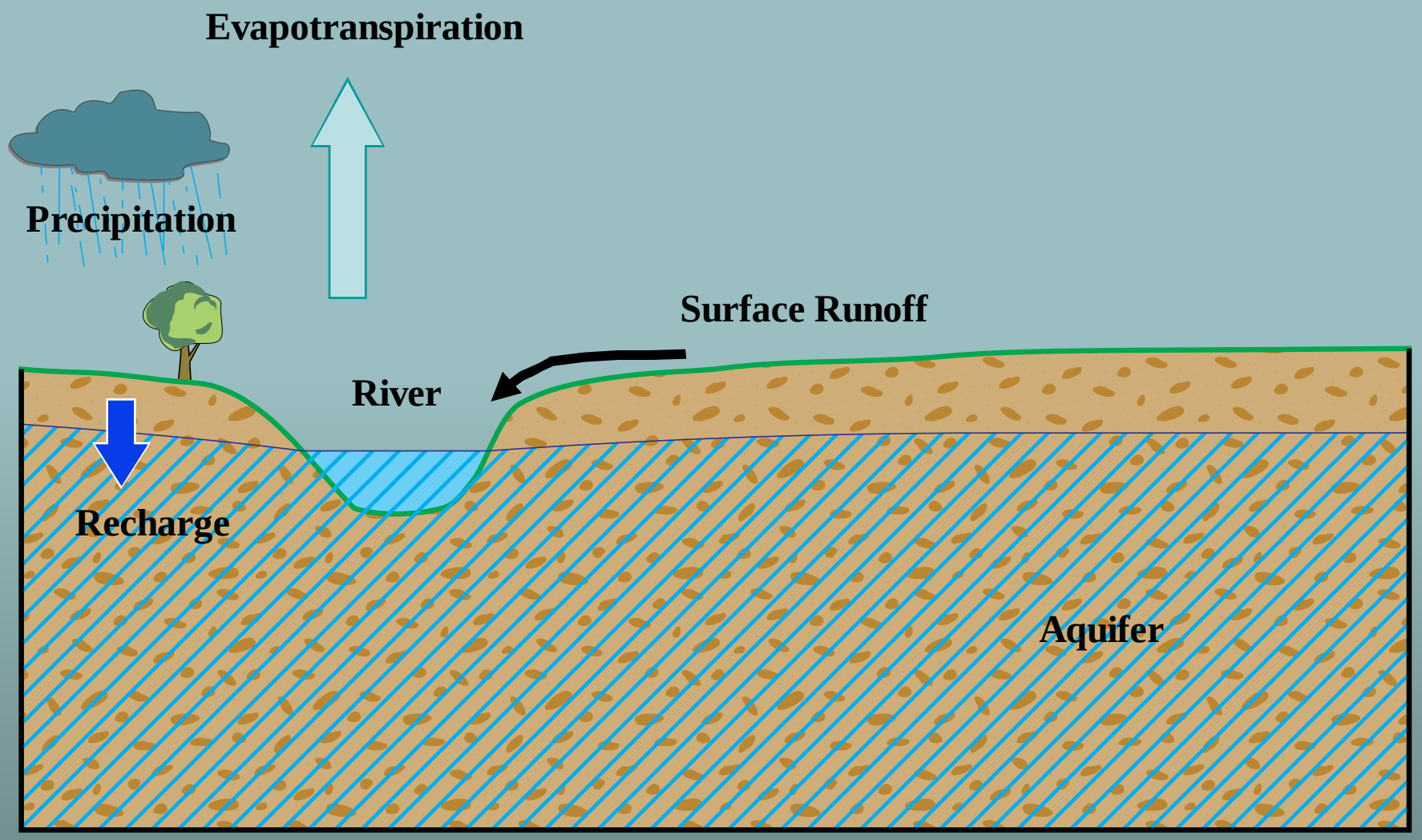
DISTRIBUTION SYSTEM RUNS THROUGHOUT THE TOWN

WATER QUANTITY
(THE ISSUES)

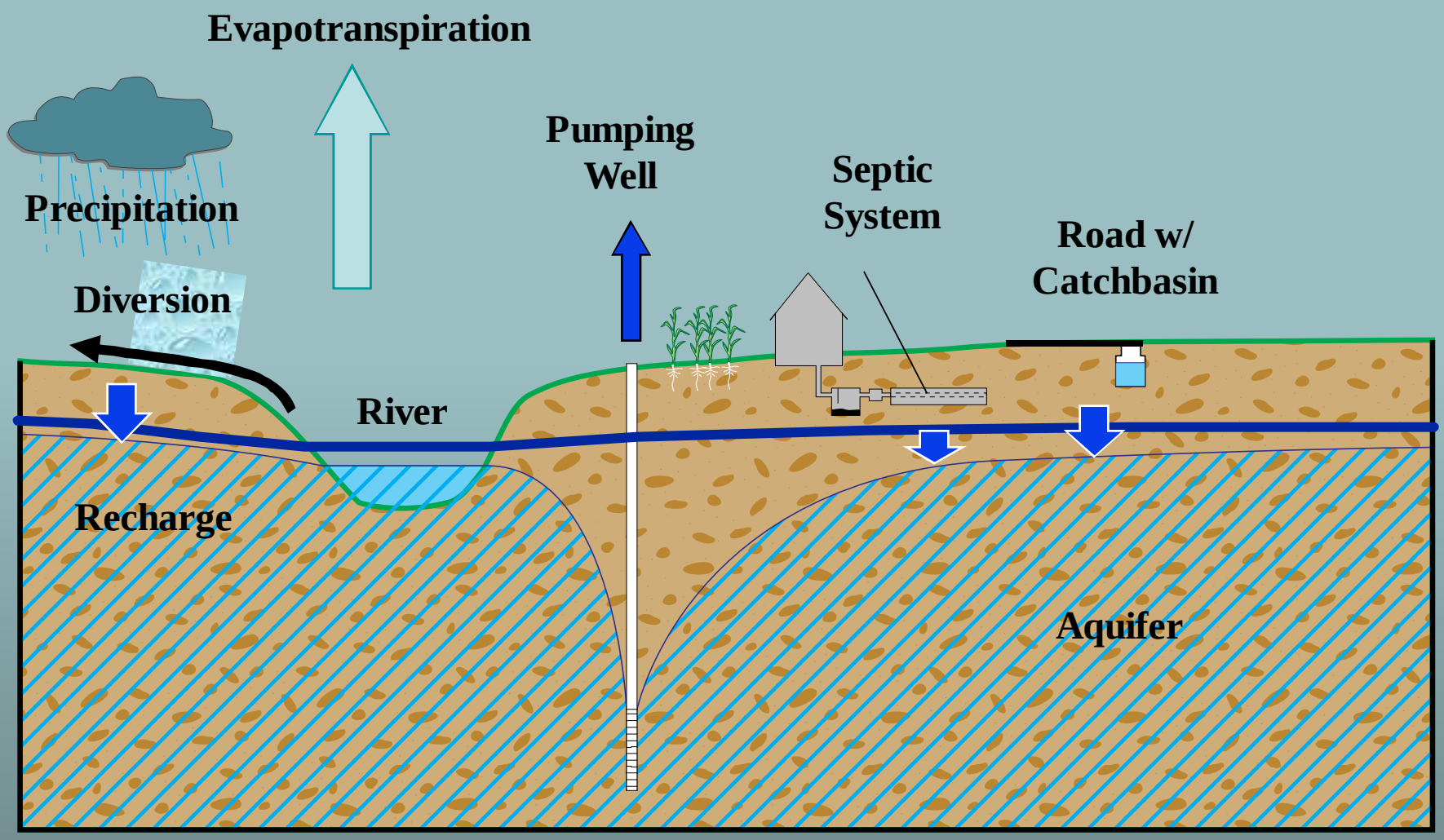
Hunt River in the Spring

Hunt River in the Summer

Hydrologic Budget (Undeveloped)



Hydrologic Budget (Developed)



Terms to know…

AVERAGE DAILY DEMAND (ADD)

- Average water use calculated on a daily basis over a fixed period of time (e.g., a month, quarter, year, etc.)

MAXIMUM DAILY DEMAND (MDD)

- Highest recorded demand for water usually calculated “per day”. Sometimes calculated as “summer demand” for broader analyses.

RI WATER RESOURCES BOARD WATER DEMAND PROJECTIONS

SOUTHERN REGION
CURRENT WATER DEMAND

Average Demand: 19 MGD
Summer Demand: 29 MGD
Total Available: 22 MGD
Average: + 3 MGD
Summer: - 7 MGD

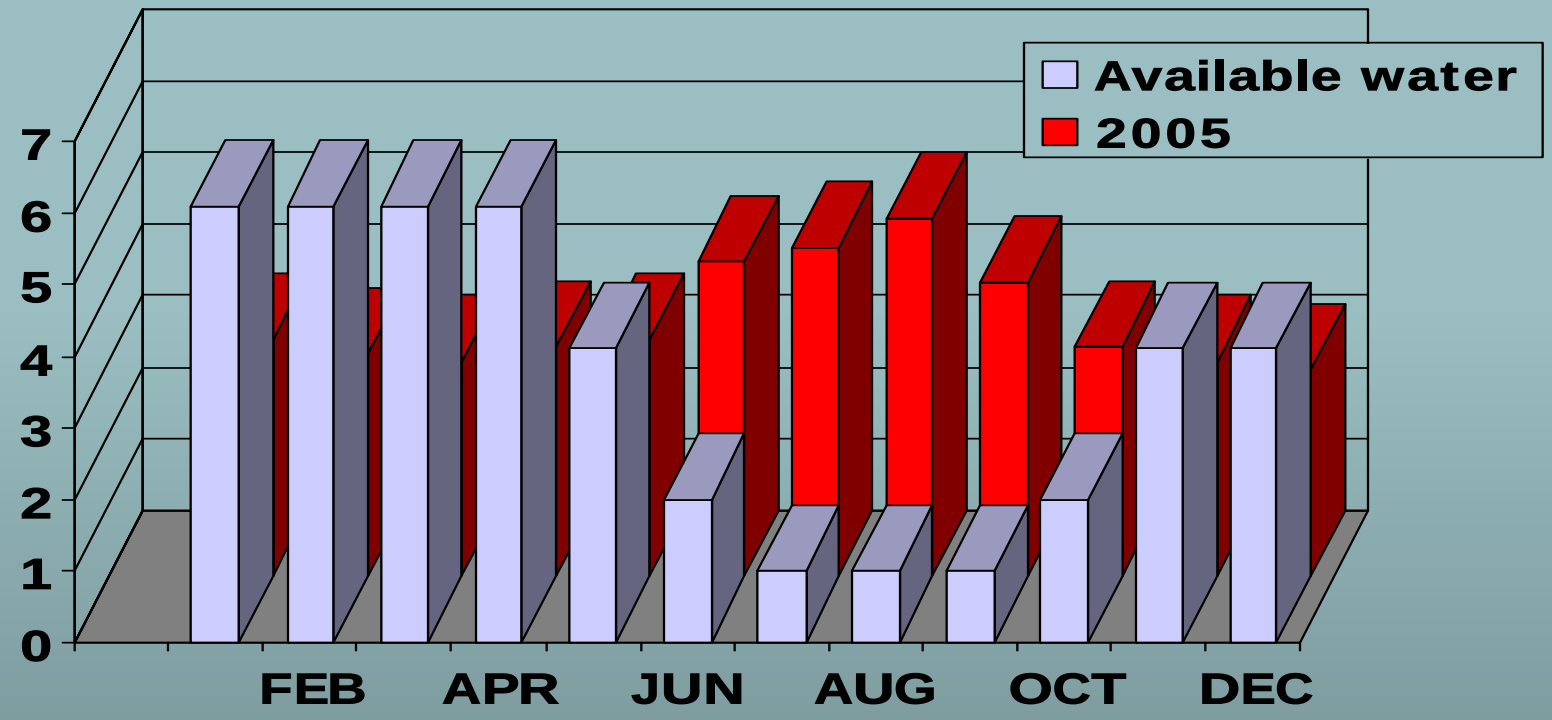
PROJECTED 2025 WATER DEMAND

Average Demand: 25 MGD (- 3 MGD)
Summer Demand: 38 MGD (- 16 MGD)

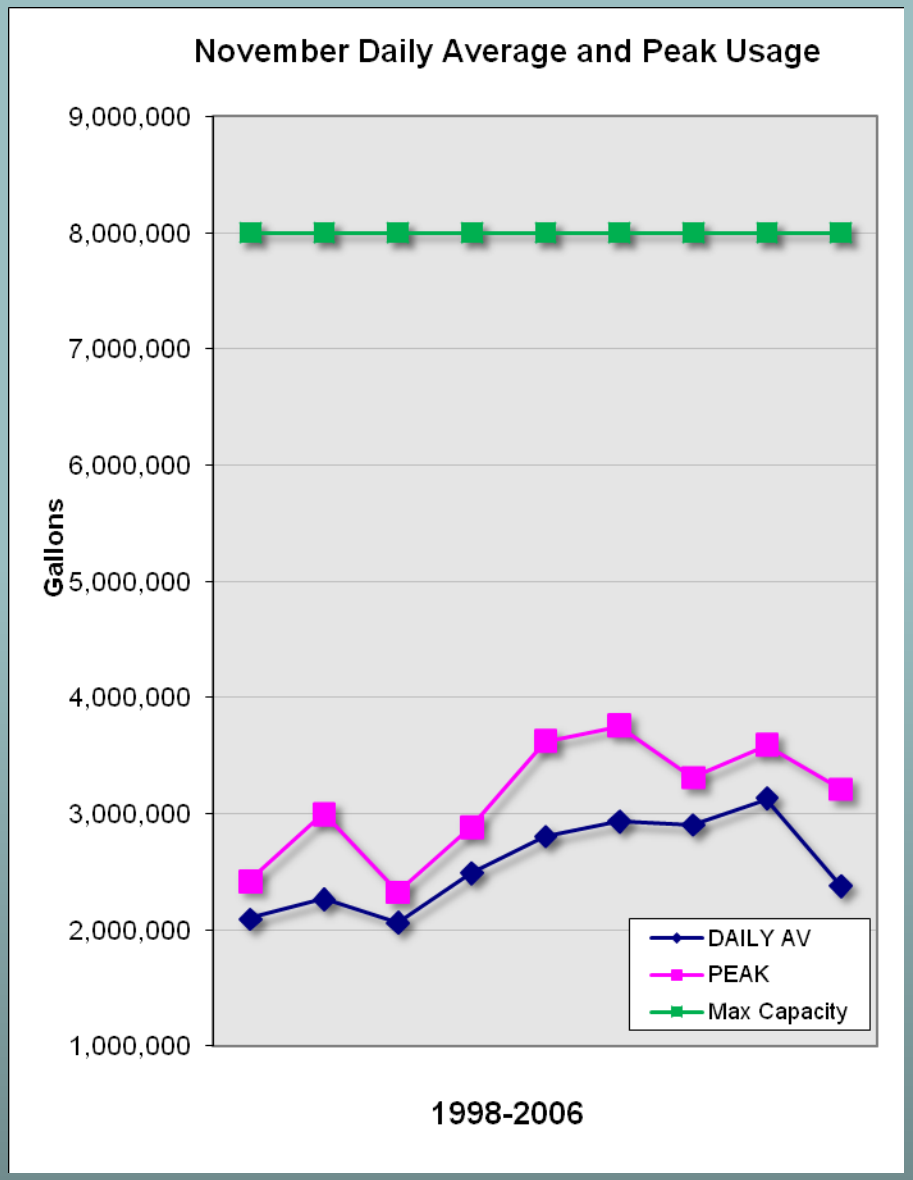
PROJECTED BUILD-OUT WATER DEMAND

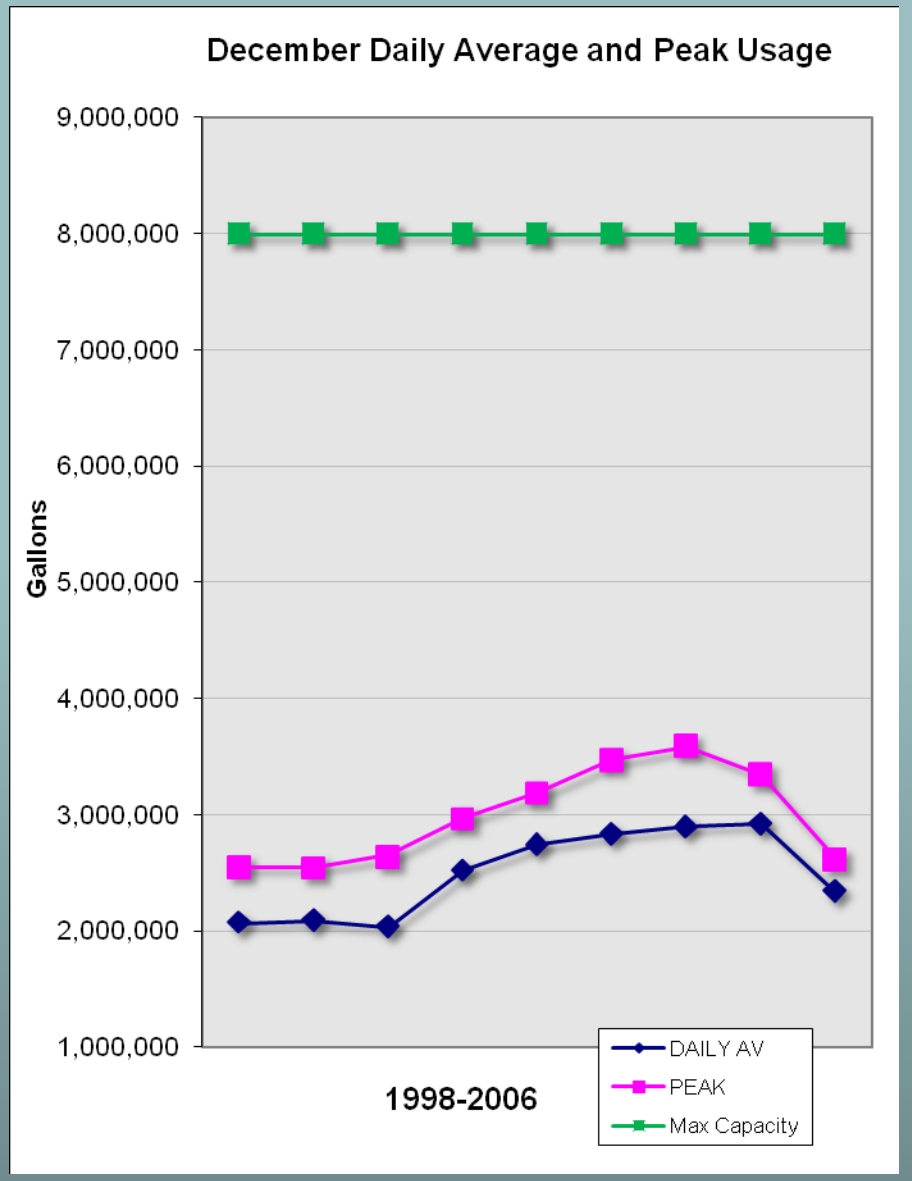
Average Demand: 34 MGD (- 12 MGD)
Summer Demand: 52 MGD (- 30 MGD)

Hunt River Withdrawals

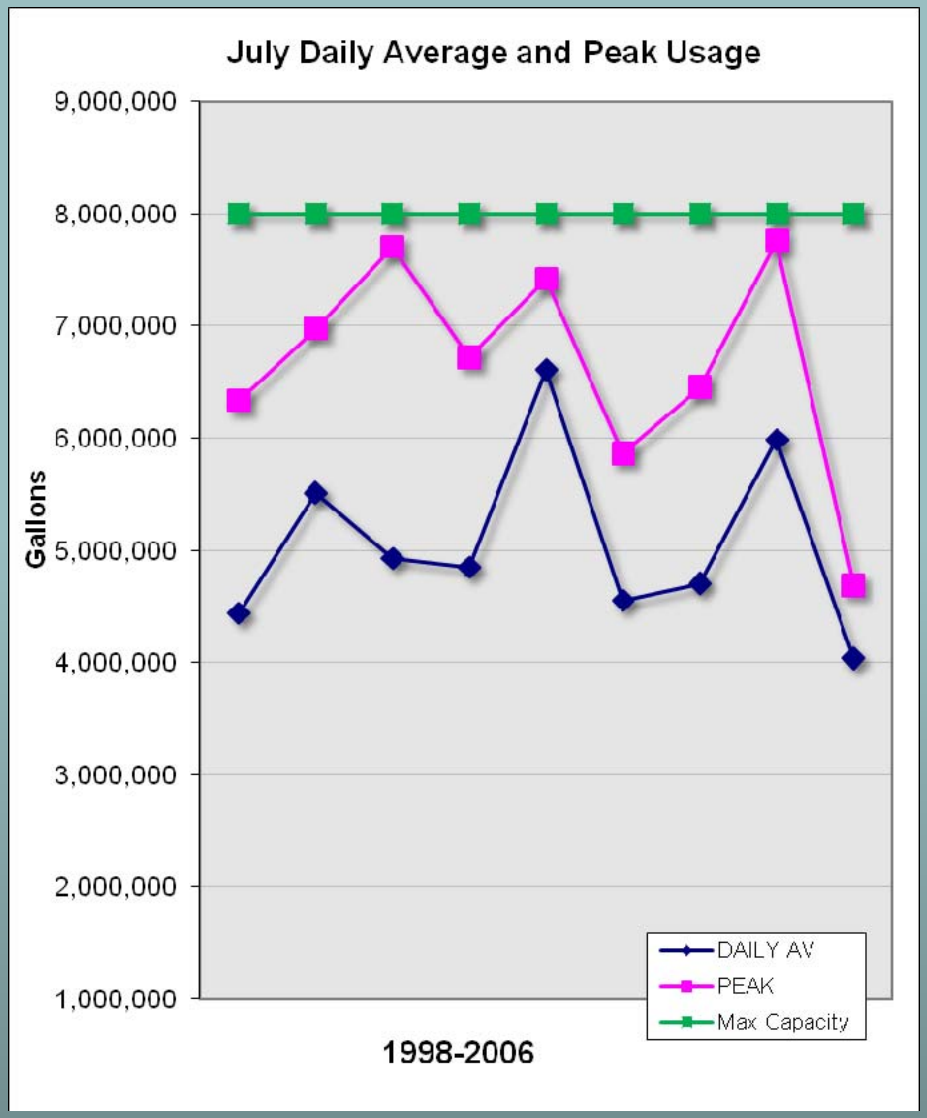


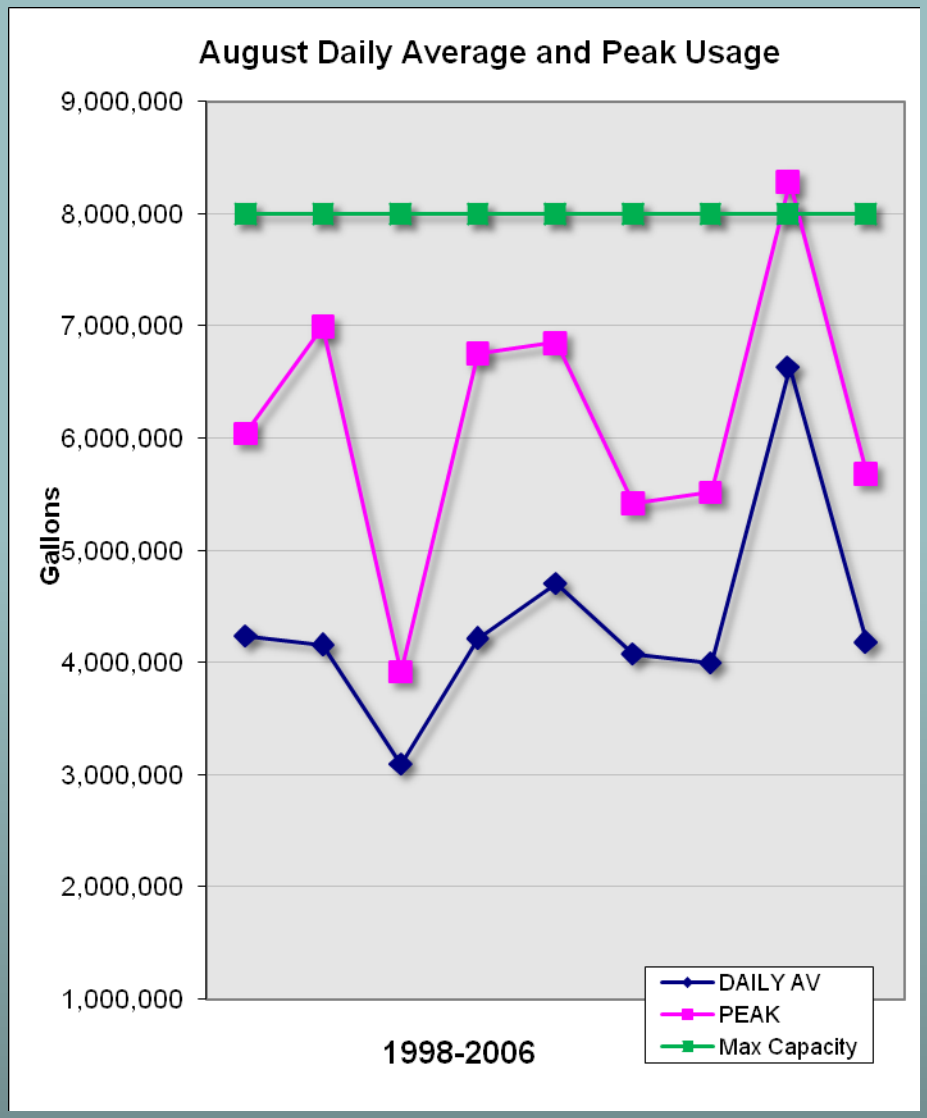
North Kingstown Water Monthly Pumping Data





North Kingstown Water Monthly Pumping Data





Water Use and Build-out

- Build-out scenarios for land use and water consumption
  - Status quo
  - Post Road buildout TDR and no TDR
- Hydraulic Model update
  - Latest data on pumping, water use, and new developments

NORTH KINGSTOWN
CURRENT WATER DEMAND
(Hydraulic Model Update 2009)

Average Demand (ADD): 3.45 MGD
Maximum Day Demand (MDD): 8.13 MGD

Total Available: 8.0 MGD

We have available:

ADD: +4.55 MGD
MDD: - .13 MGD

EXAMPLE BUILDOUT SCENARIO

POST ROAD SOUTH DISTRICT BUILD OUT DEMAND

	MGD
ADD	0.60
MDD	1.42

POST ROAD NORTH DISTRICT BUILD OUT DEMAND

	MGD
ADD	0.38
MDD	0.90

TOTALS:	**ADD**	4.43	**+3.57**
(current + Post Rd)	**MDD**	10.45	**-2.45**

How is this addressed?

Town primarily uses regulation

- Pre-development (Planning and Zoning)

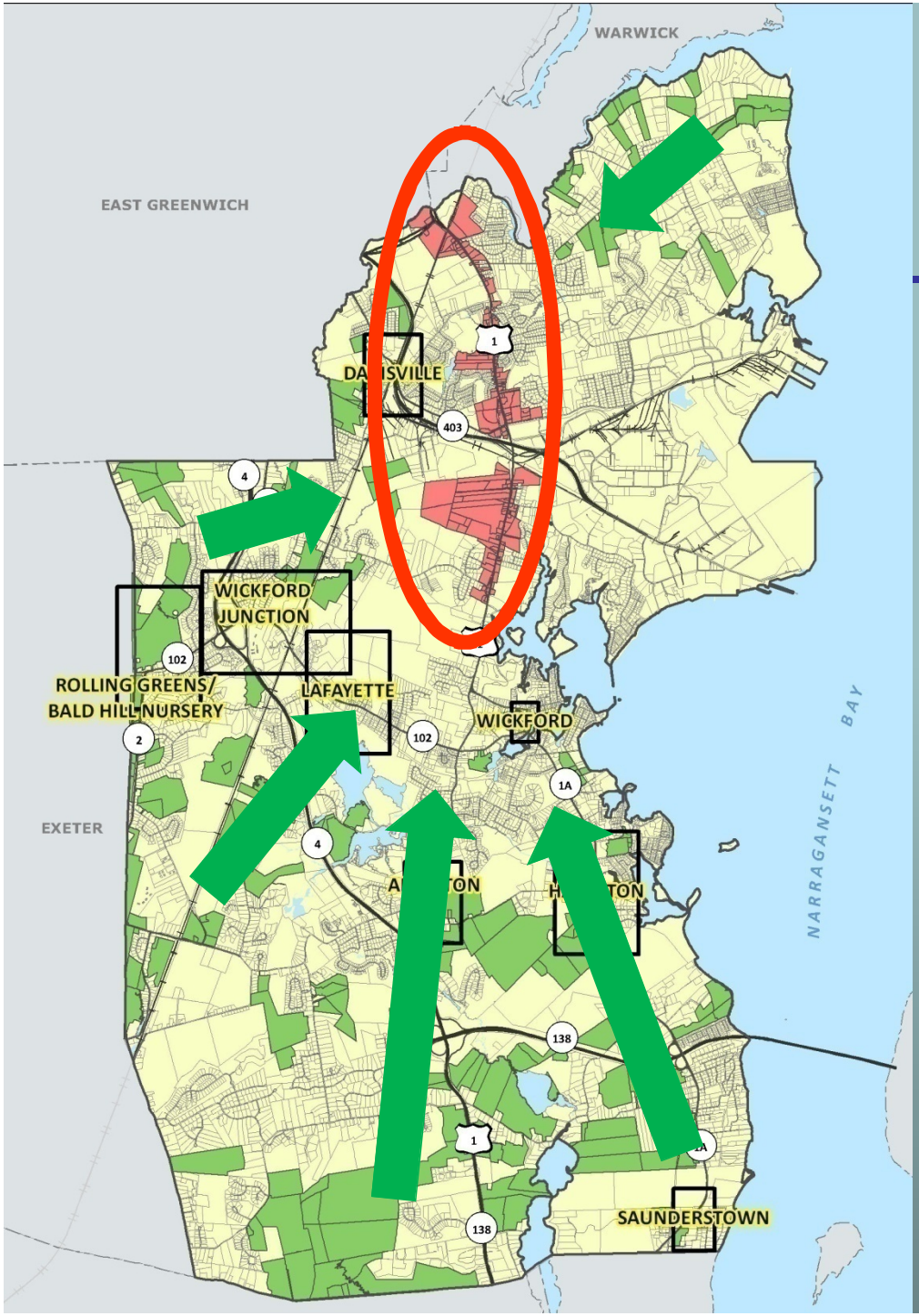
  Where do we develop? What is Allowed?

- Development activity (Zoning and Land Development)

  How do we develop? What are construction best practices?

- Post-development (User fees, restrictions, fines)

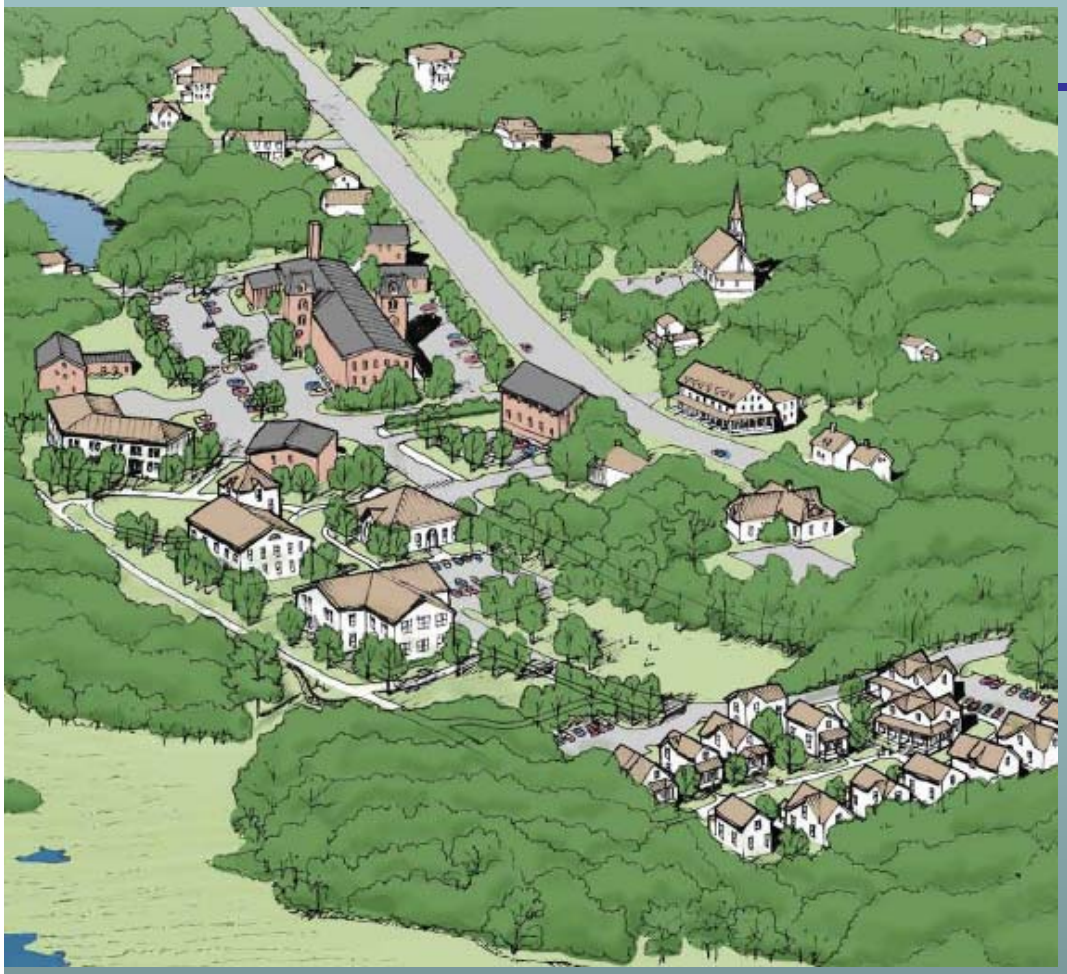
  How do we reduce impacts?



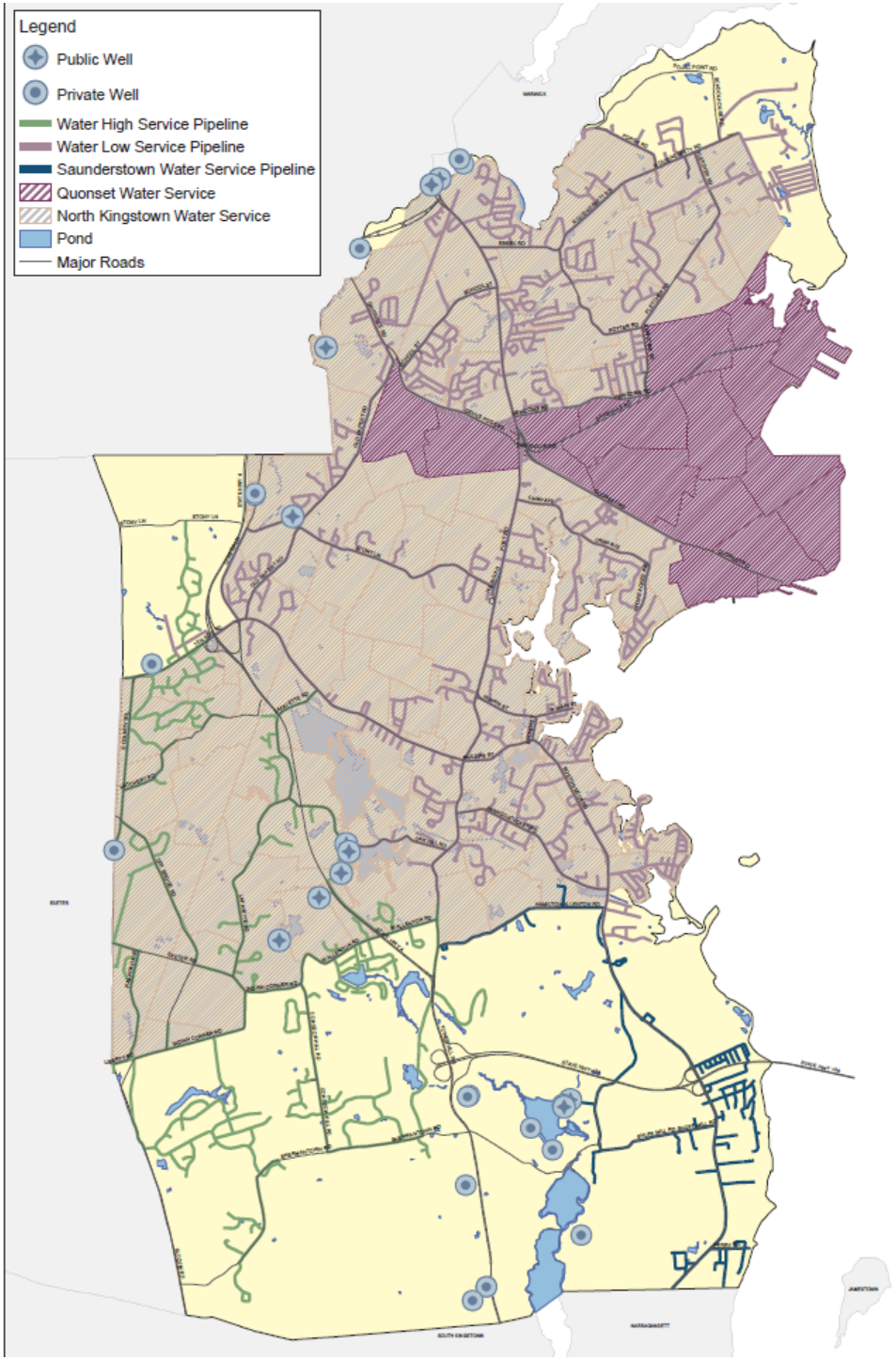
Planning and Zoning

- **Transfer of Development Rights (TDR).**
- **The rights from large parcels in the groundwater overlay can be transferred to the Post Road corridor.**

Planning and Zoning



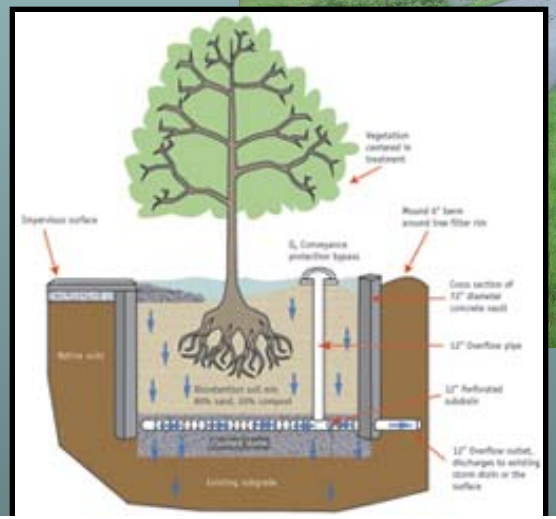
- **Village scale development.**
- **Compact development uses far less water per capita than more sprawling models.**



Planning and Regulation

WATER SERVICE AREA

- **Prescribes which properties may connect to the existing distribution system.**
- **Any extension of the system requires a hydraulic impact analysis.**
- **New water main installation requires Town Council approval.**
- **Significant revision (reductions) being considered**



Development Practices

LANDSCAPING ORDINANCE

- **Plant selection**
- **Installation**
- **Maintenance**

STORMWATER

- **Updated RIDEM manual**
- **Low Impact Development practices to maintain recharge rates.**

Post-Development Regulations

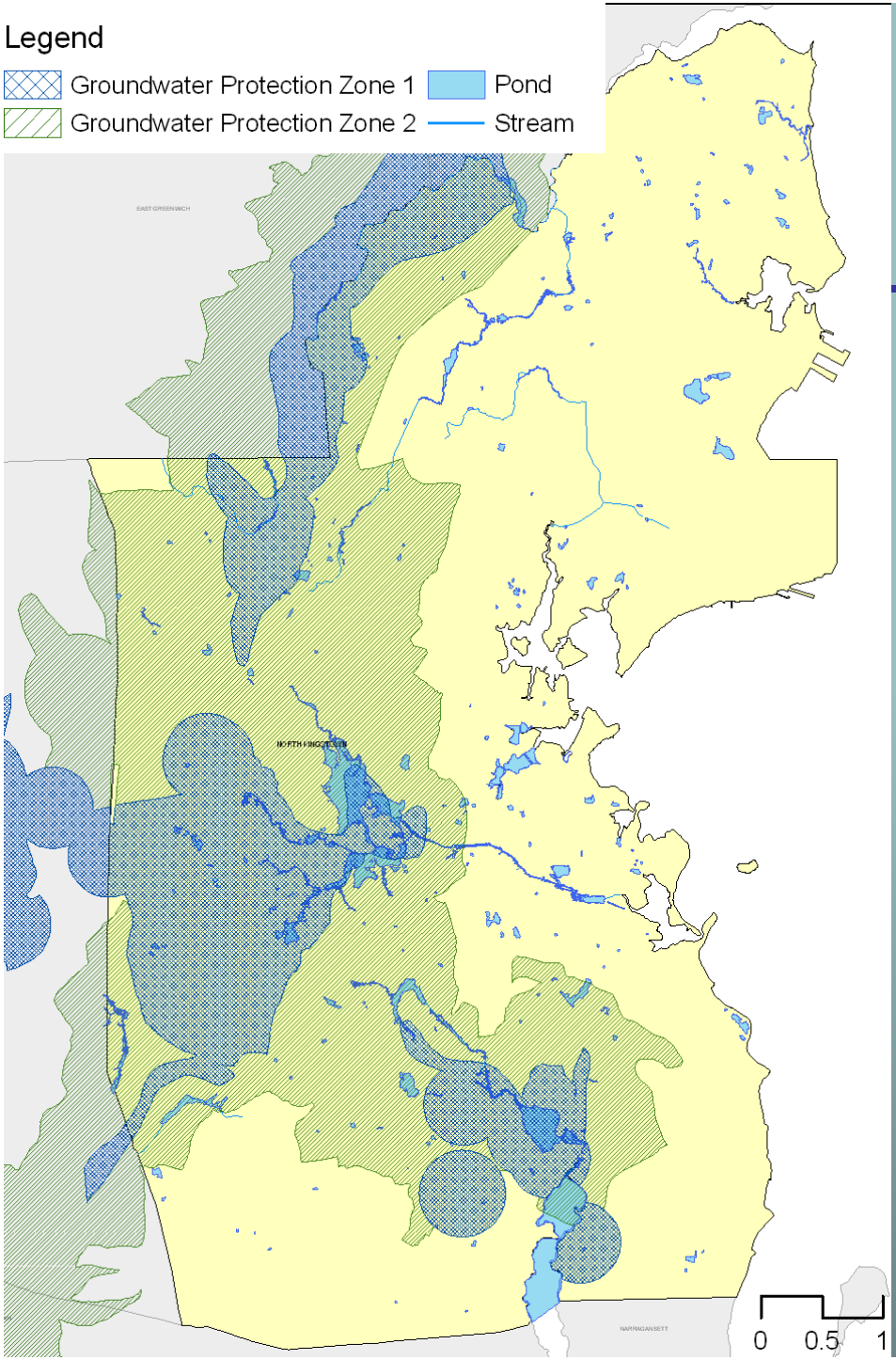
OUTDOOR WATERING

- **Allowable frequency**
- **Allowable time**

WATER RATE STRUCTURE

- **Scaled by user “blocks”**
- **Values range from $3.28 to $10.00 / 1,000 gallons**

WATER QUALITY

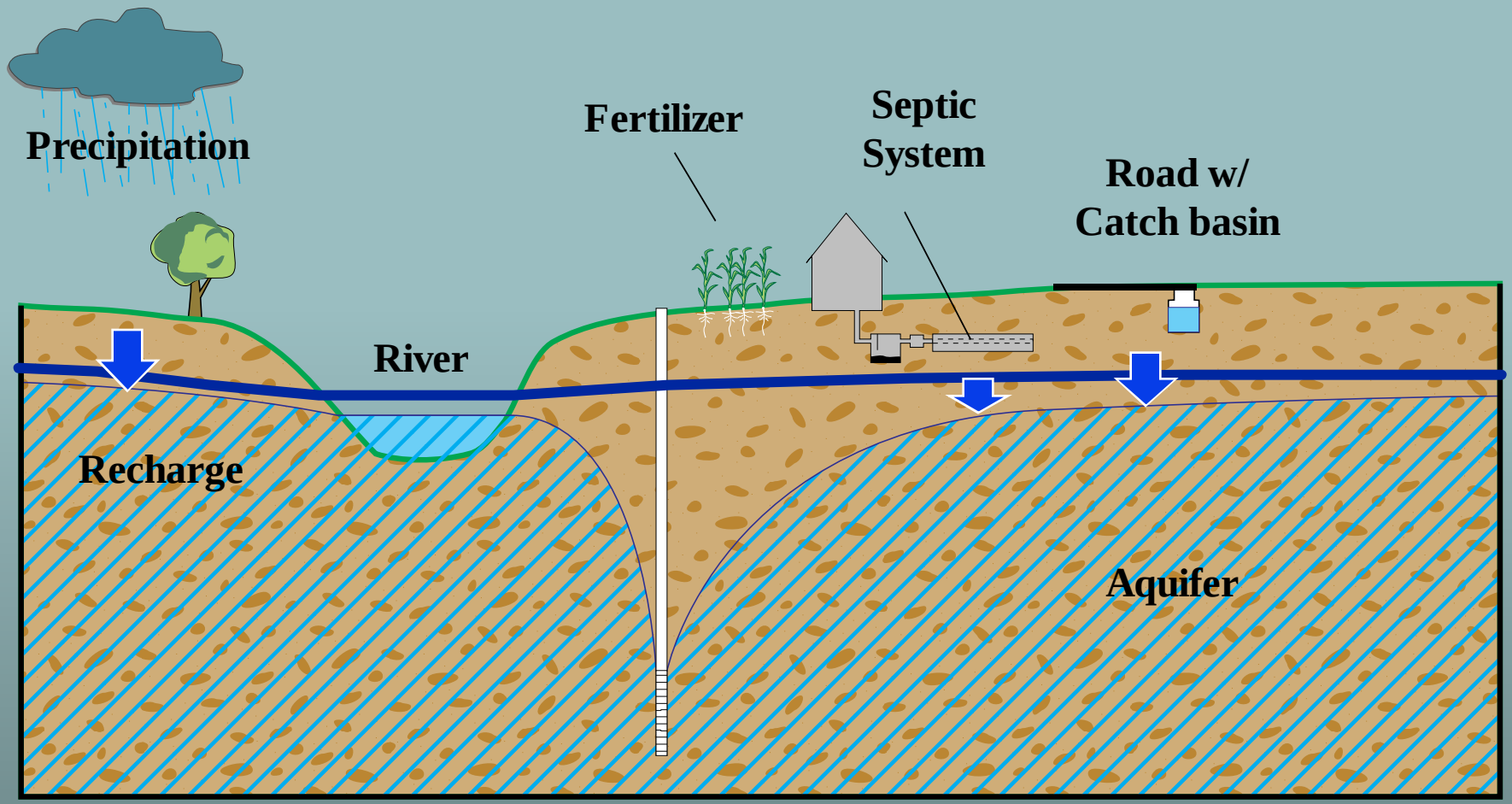


Planning and Regulation

GROUNDWATER PROTECTION DISTRICTS

- **Encompass approximately 44% of North Kingstown**
- **Limits on residential density – 1 du/2 acres**
- **Nitrate loading for commercial/mixed use**
- **Uses - limits or prohibition; SUP or dev stds.**

What is Nitrogen Loading?



Sources of Nitrogen

- Septic systems (usually at least 60% of the load)
- Fertilizer (lawns, golf courses, farms, etc.)
- Impervious surfaces (rooftops, pavement, etc.)
- Rainfall (atmospheric deposition)
- Animals (wildlife and pets…not usually modeled)

Why use Nitrogen Loading?

- Nitrogen is a “conservative” pollutant.
  - Moves readily through soil and groundwater
  - Generally does not degrade or breakdown
  - Clear drinking water standard (10 mg/L)
- Nitrogen is an indicator of other pollutants.
  - If you have a “nitrogen problem”, you may have other pollutants that need to be addressed

How is this used?

- In Groundwater Protection Overlay
  - Development applications with commercial/industrial or mixed use components provide an analysis
  - Each source has a pollutant load calculated
  - Nitrogen load is “diluted” into the amount of recharge
  - A final concentration is calculated

What is the Performance Standard?

- EPA standard is 10 mg/L
  - This level of nitrogen is considered unsafe particularly for infant populations
- North Kingstown limits analyses to 5 mg/L
  - This conservative approach is used throughout the region and beyond
  - Allows for development to occur with a “reasonable cushion” for impacts

Development Practices

EROSION AND SEDIMENT CONTROL

- **Site protection and stabilization**

STORMWATER

- **Updated RIDEM manual**
- **Low Impact Development practices to increase pollutant removal.**

DISCUSSION