Aquifer Protection

Dutchess County Planning Federation
October 10, 2019

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The Chazen Companies

Meeting Outline

- How much water do we have?
- What groundwater looks like
- Aquifer recharge rates
  - Aquifer or project water budgets
  - Sustainable septic densities
- Pumping tests and Stream interactions
  - Consumption v. pumping rates
  - Interbasin transfers
- Groundwater protection

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How much Water do we Have?

- We get 38 to 44 inches of precip/year:
  - 15 inches in mid-west
  - Kansas aquifers recharged thousands of yea ago by glaciers
  - California out of Water
  - Florida/Georgia/Carolinas droughts
- Climate Change predicts MORE rain
- Hudson River
  - Freshwater mouth near Beacon
  - Average flow: 9.3 million gals/MINUTE

  (example: Po water plant takes just 0.07%)
- Water Level Monitoring confirms capacity

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Copious?!

Our region could
be thought of as a

Saudi Arabia of Water

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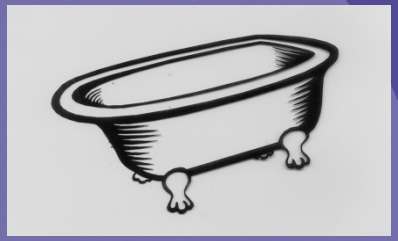
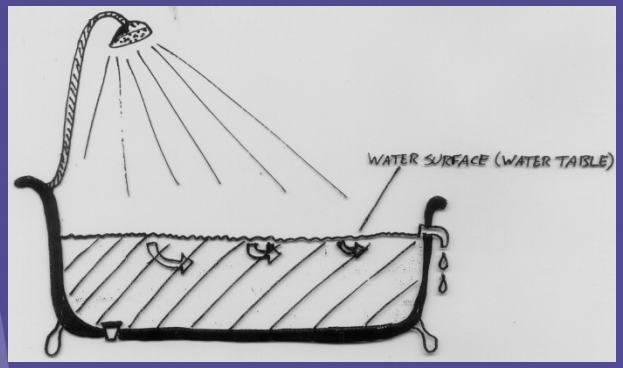
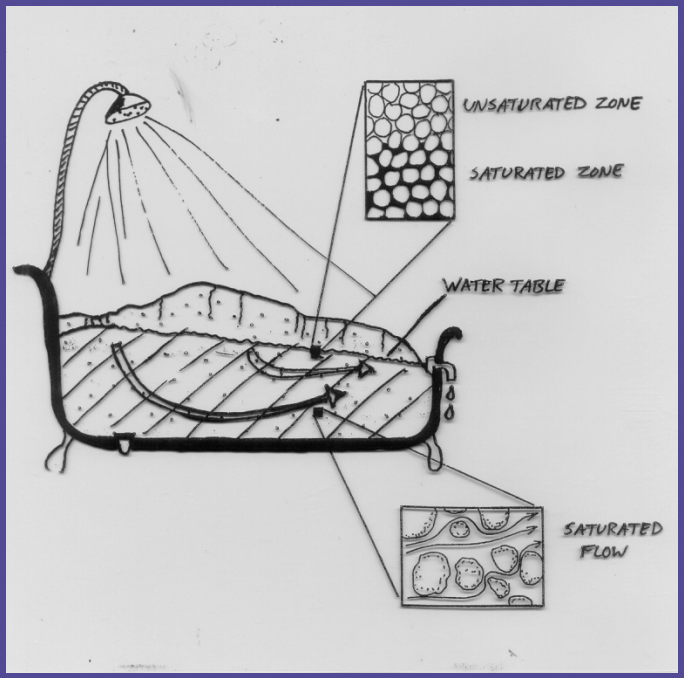
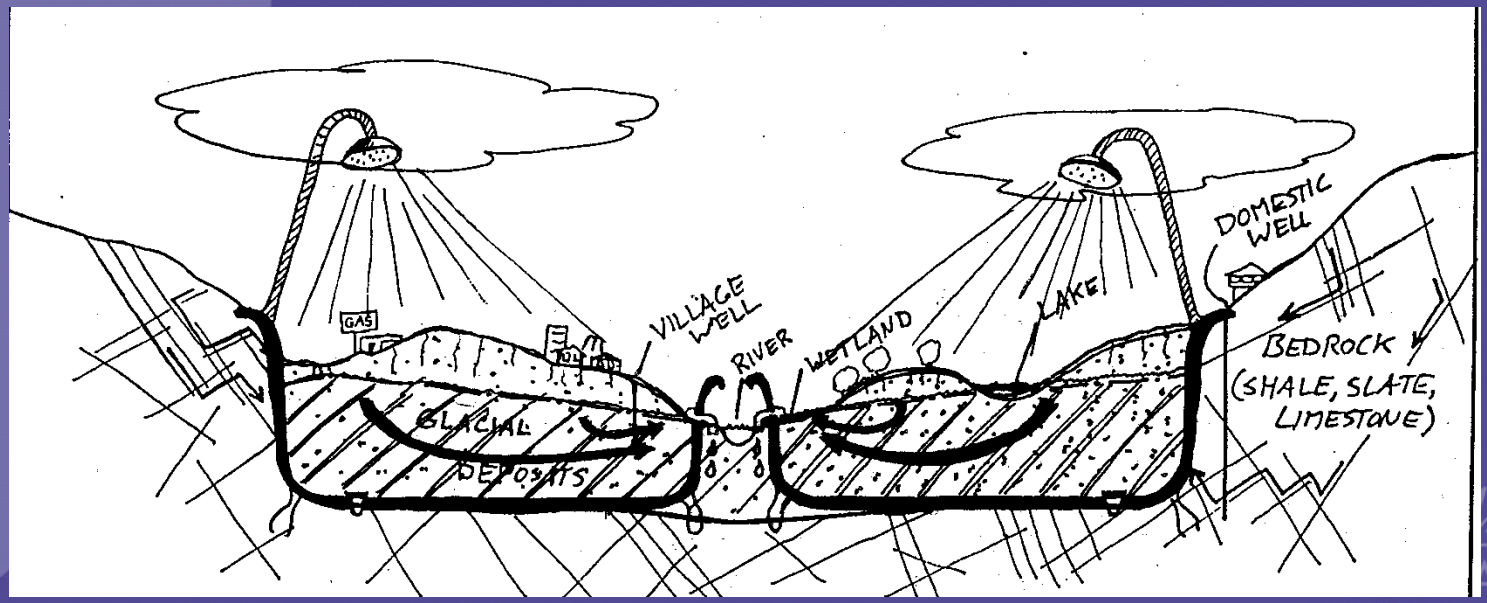
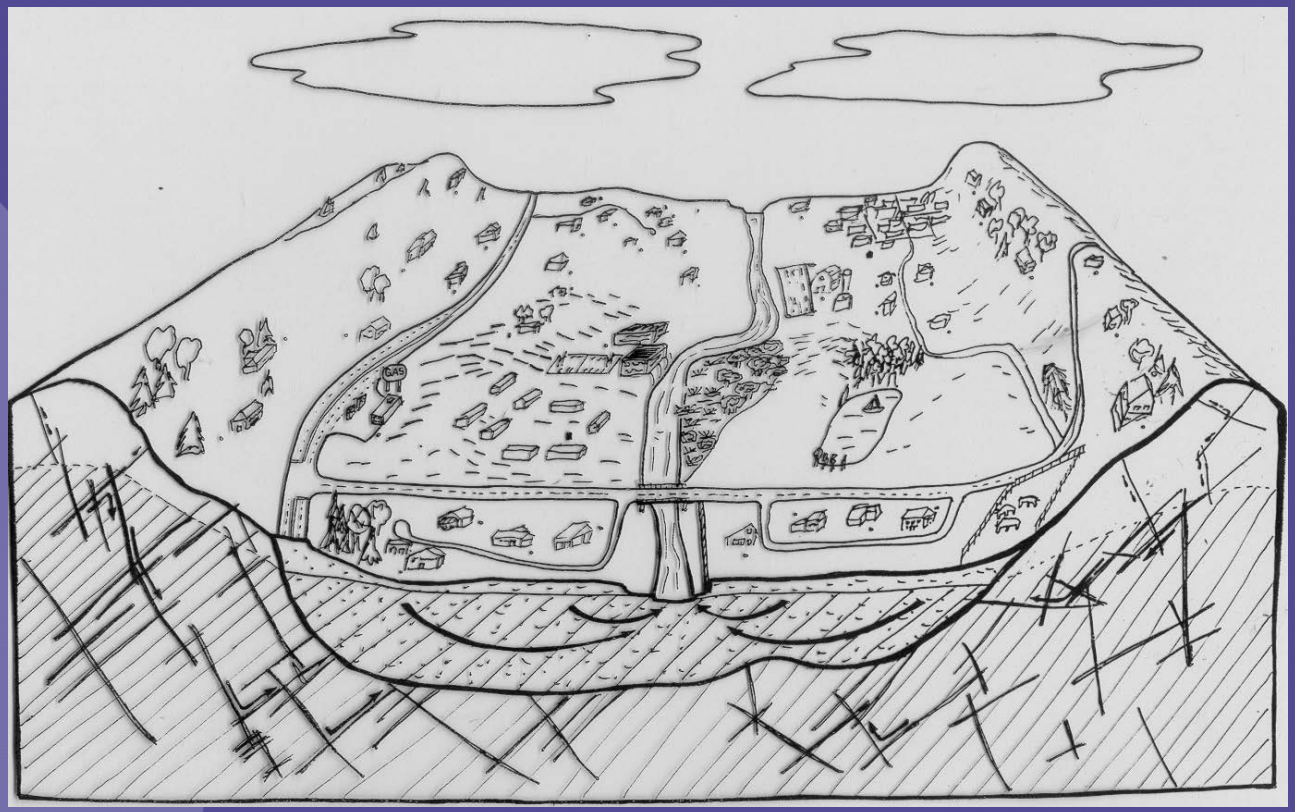
What Does it Look Like?

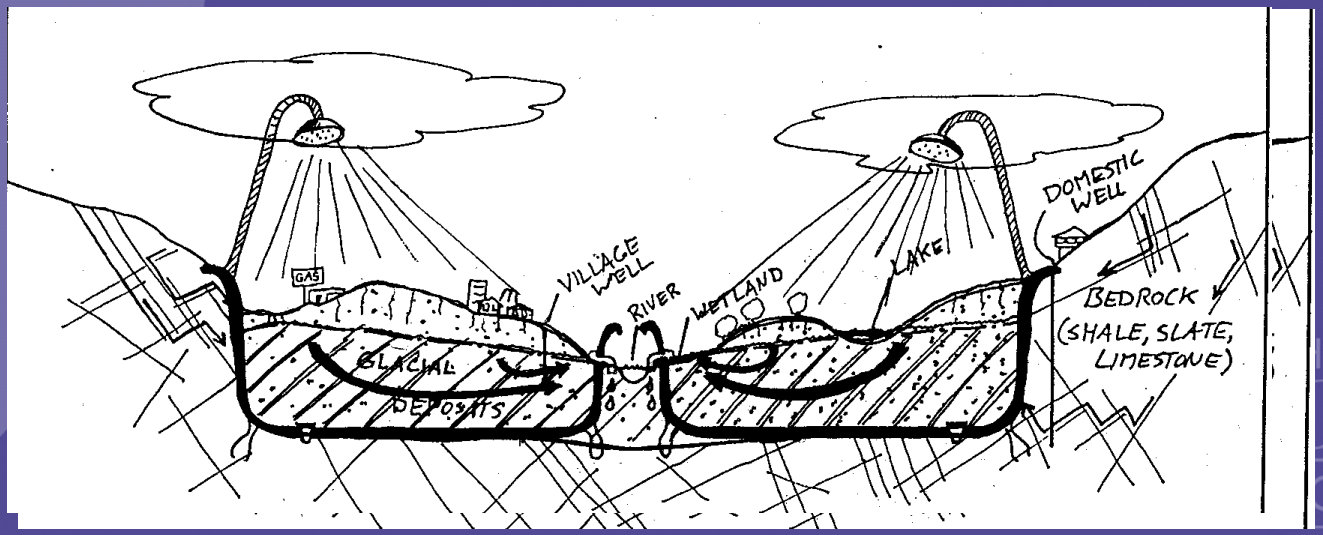












What Does it Look Like?

- Limestone
  - Hard
  - Some iron
- Shales
  - Sometimes hard
  - Some iron, sulfate
  - Some methane
- Granites/Gneiss
  - Soft
  - Sometimes lead

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Contaminant Sources

- Point Sources – manufacturing, gas stations, spills, dry cleaners.
- Non-Point – many associated with broadly distributed land uses
  - Road deicers
  - Septic systems
  - Sediment
  - Nutrients (lawns, ag, septics)

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Groundwater under Developed Areas

- Nitrate and hardness rises where septics are used
- Sodium & chloride rises where road density increases, and sometimes locally due to softeners
- Point contaminants by specific use

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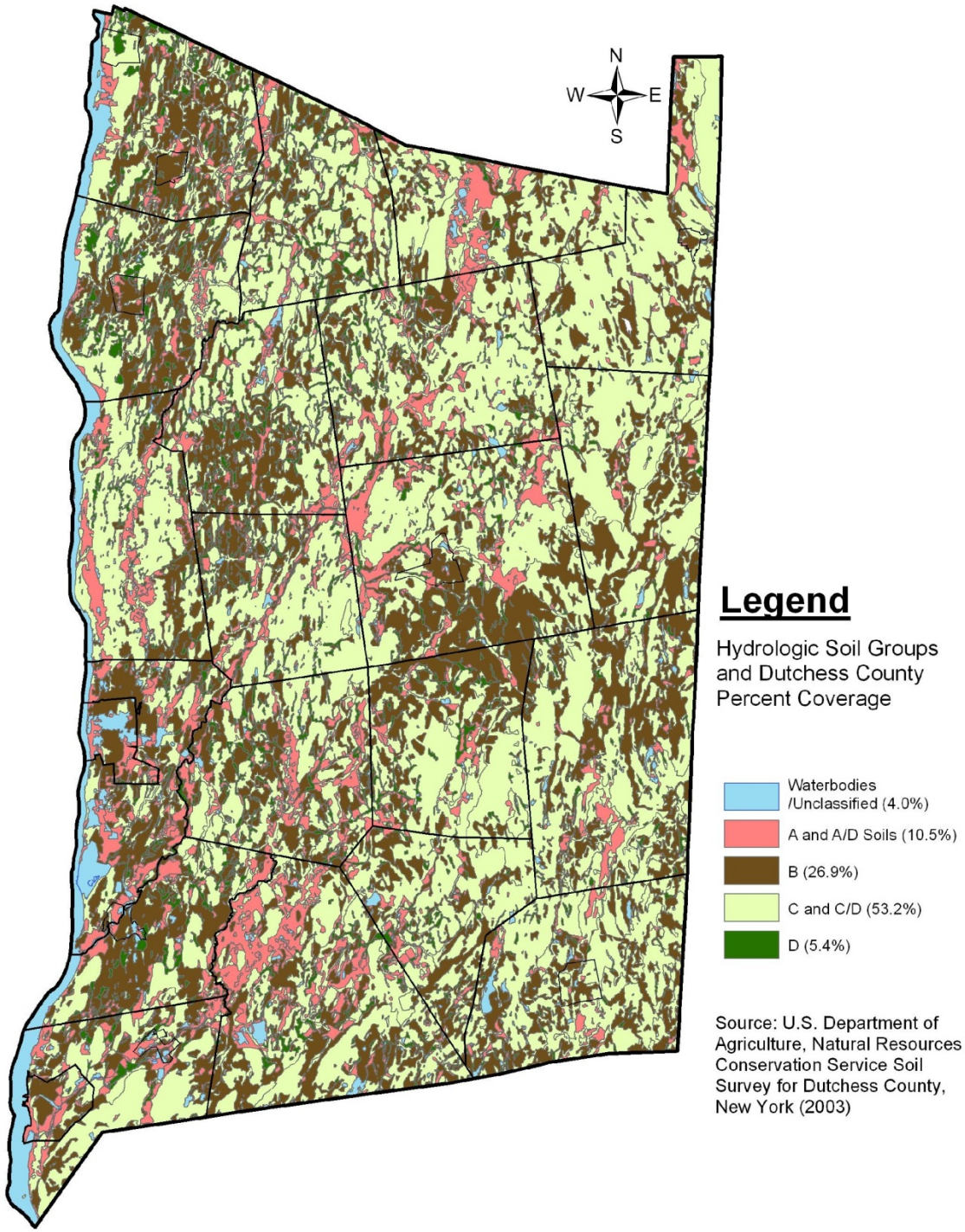

Groundwater Budgets

Hydrologic Soil Groups

B and C-C/D soils most common

Figure Source: County Planning

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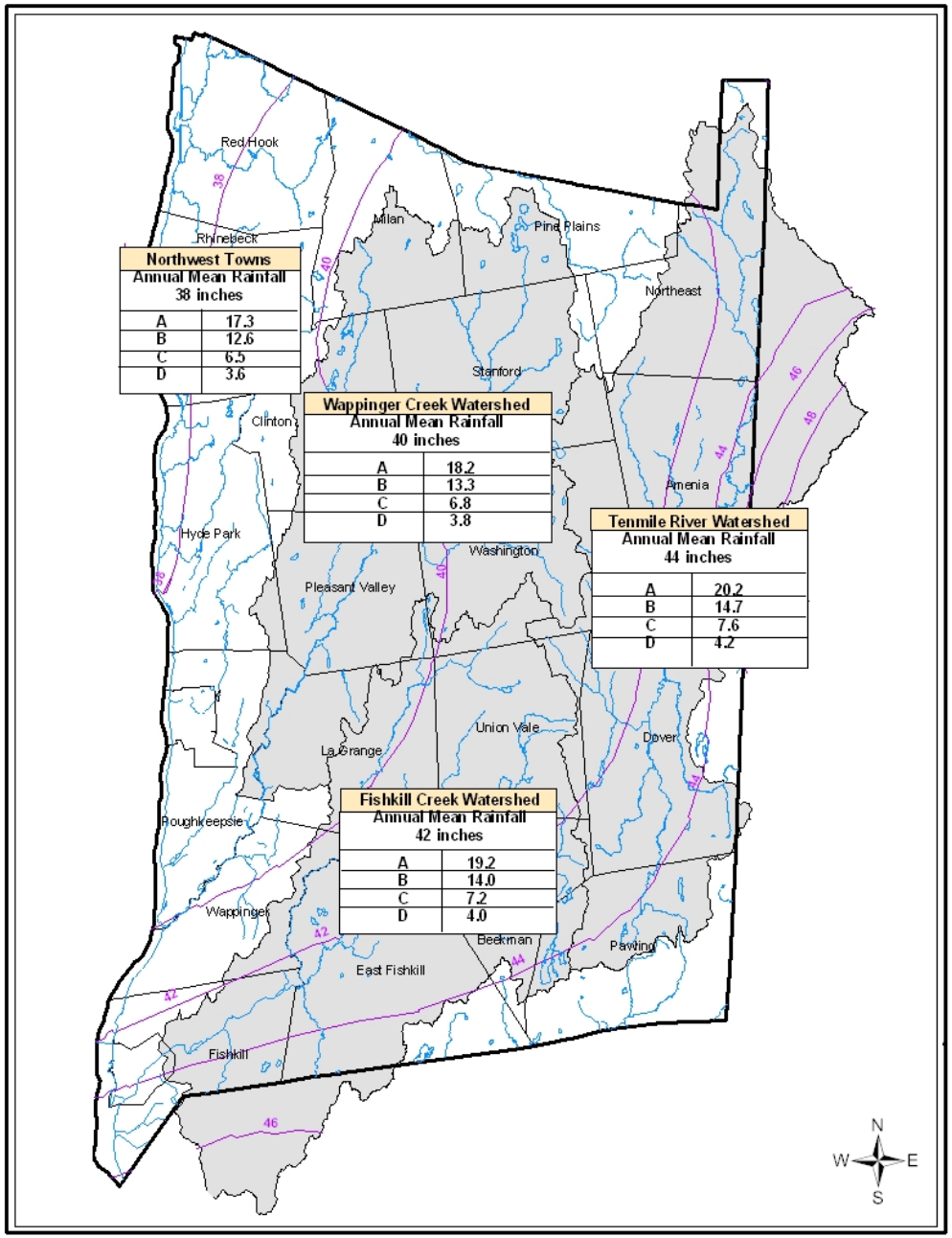

Water Budgets Based on Aquifer Recharge Rates

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Recharge Data are Useful for

* Site or regional water budget studies
* Impact development analyses
  (along with impervious cover consideration)
* Streamflow studies
  (along with interflow which adds 35-40%).

Example: a 40 acre site in an area with 40" rain, with 25% HSG B and 75% HSG C would receive

unit adjustment factor

10 acres at 13.3 inch/year ↘ = 9,895 gpd
30 acres at 6.8 inch/year = 15,178 gpd
25,073 gpd (17.4 gpm)

A project consuming more than 17.4 gpm might warrant more SEQRA review of potential wetland, stream or offsite well impacts, or more careful water supply tests

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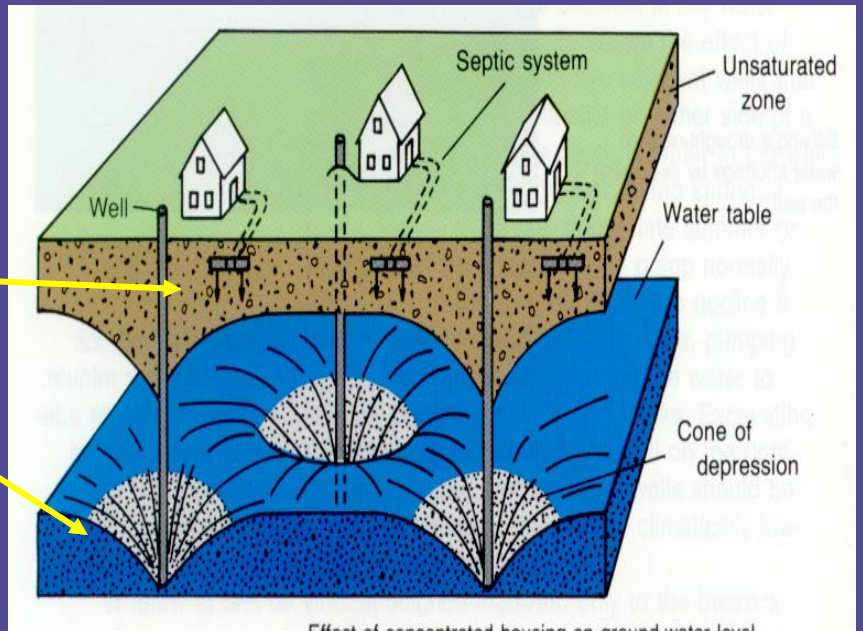
Well and Septic Density Analysis

* Density recommendations for domestic wells & traditional septic systems (in areas without central water and/or sewer).
* Recharge dilutes wastewater and supports wells.
  With high recharge, wells and septics can be close.
  With low recharge, more separation is needed.

Recharge Dilutes Wastewater

Recharge Supports Wells



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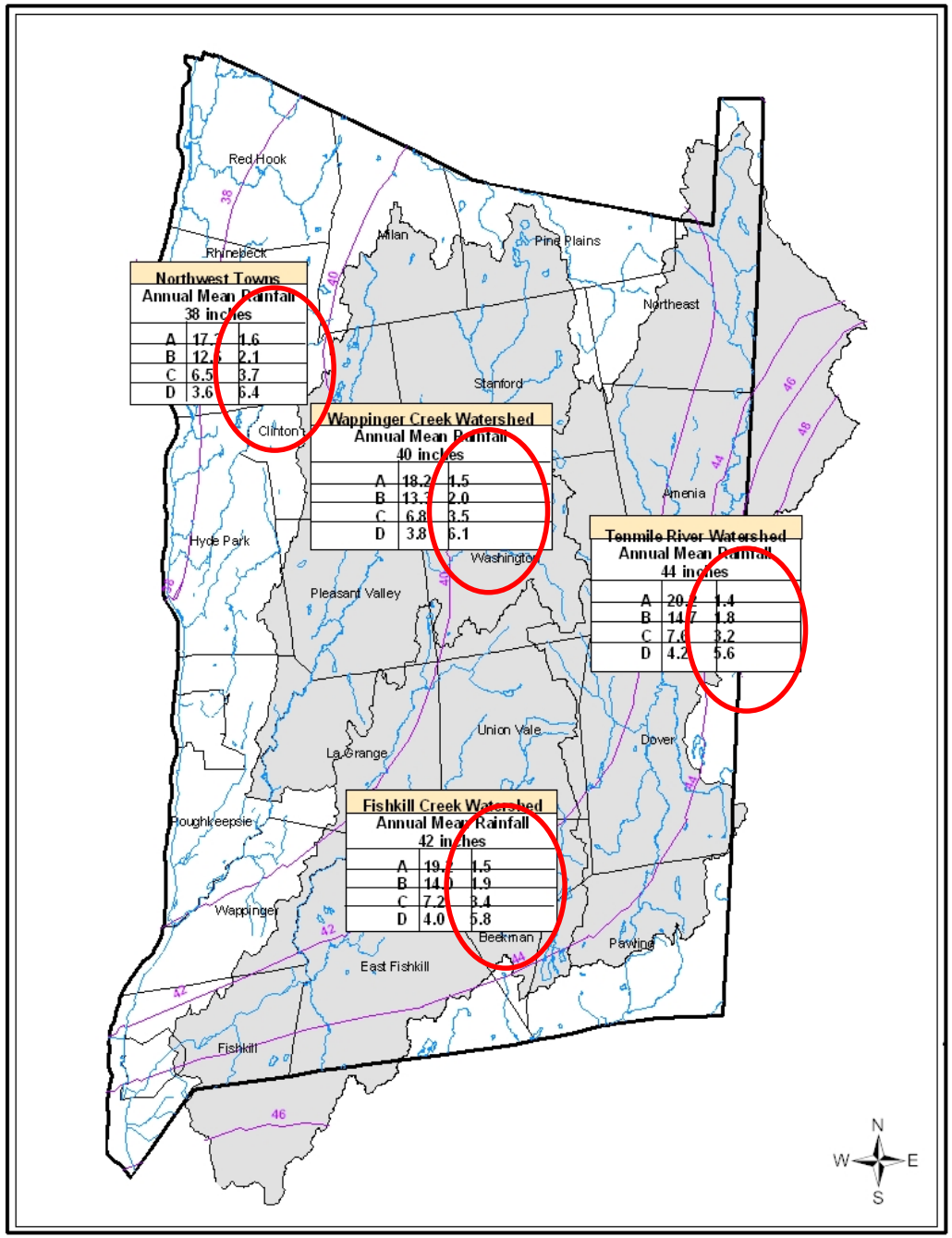
Water Budgets and Sustainable Rural Parcel Sizes



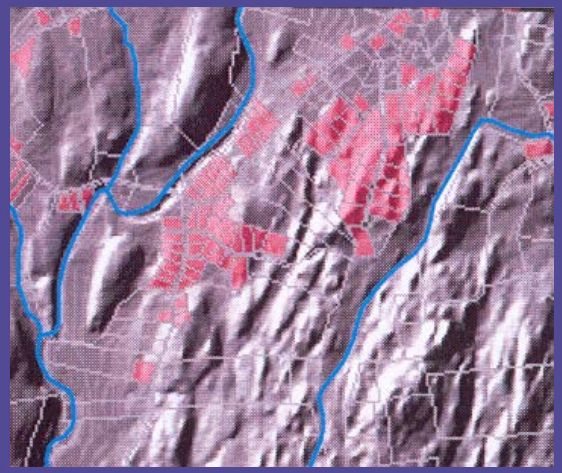
Septic Minimum Density Data are Useful for

* Regional planning & zoning
* Determining central service needs
* Project sustainability

Example 1: the 40 acre site with 25% HSG B and 75% HSG C will sustain (without roads)

10 acres with 1.8 acre/system = 5.6
30 acres with 3.3 acre/system = 9.9
15 homes

Example 2: Consider where water & sewer may be needed for existing homes



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Why Consider Density?

- Among 173 undersized parcels, 40% had nitrate over 1 mg/l (standard is 10 mg/l) while larger parcels were just 23%
- Among undersized parcels, 60% had sodium over 20 mg/l while larger parcels just 35%

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Better Pumping Tests for Reliabilty and Fewer Off-site Impacts

To satisfy SEQRA and Reliability

- For Community Water Wellfields
  - Monitor existing offsite wells
  - Monitor streams and wetlands
  - Include a water budget analysis with the pumping test report.
  - Conduct tests at higher rates if conducted during wet periods (e.g. 15% more if precip is 15% over average during prior 4 months)

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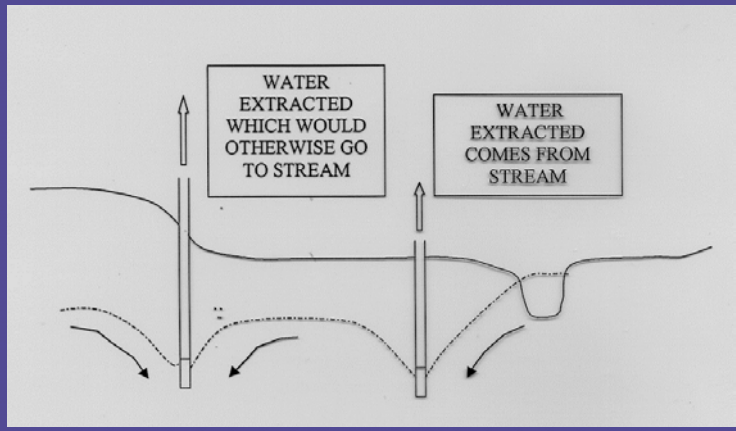
Be Aware of Potential Well Interactions

- Many Straws:
  - Wells can compete with each other
  - Wells or surface withdrawals can interact with streams or wetlands
    - Sprout Creek flow declines
    - Millerton high pumping can dry Webutuck Creek headwater
    - Wells lie along the Wallkill River, Woodbury Creek, others.



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Don’t confuse Pumping Rates with Consumption

- ~80 of pumped water becomes wastewater.
  - Passes to septic or WW plant
  - The rest is “lost” locally due to evaporation (sweat, steam, irrigation of plants, use of clothes driers/cooking, etc.)
- So – it’s always useful when considering local water budgets to consider where WW is going. If it’s returned locally, “site consumption” may be just ~20% of pumping rates.

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Model Ordinance Available

- Addresses gaps in existing state and federal laws.
- Includes performance specs.
- Bans on some higher risk activities.
- Adds requirements to pumping tests.
- Bans burial of new tanks under 1,100 gals.
- Incentivizes septic density concepts.

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Model Ordinance Available

- Other Issues are directly/indirectly addressed
  - In-Stream flows are preserved if density is controlled and consumption is considered
  - Wetlands and riparian corridors benefit from density guidance
  - Trace Pharmaceuticals in aquifers are diluted
  - Impacts of climate change are managed by use of pumping test standards and density considerations

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Model Ordinance Available

- Quality components:
  - A limited # of prohibited uses in high priority areas
  - Various special permit uses, with an application process and suggested Special Conditions
  - No new buried heating oil tanks under 1,100 gallons
  - Cluster subdivision guidance
- Aquifer Capacity components:
  - Any project that consumes more groundwater than is recharged on site is a SEQRA Type I action.
  - Pumping Test Evaluation Guidance

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Model Ordinance Available

- State Health Code, 10 NYCRR, Chapter III, Subchapter A.
- Zoning Ordinances:
  - Option 1: Two zones, Higher protection for intensively used aquifers (wellhead protection zones, well clusters in hamlets, and some high-capacity aquifer areas), Needs a map
  - Option 2: One zone, Mid-level protection everywhere, can apply to whole town without map.
  - The model ordinance has been adopted by Amenia and Philipstown (primary version w/ two zones) and Pleasant Valley (reduced version w/ one zone). Other versions passed in Dover & LaGrange

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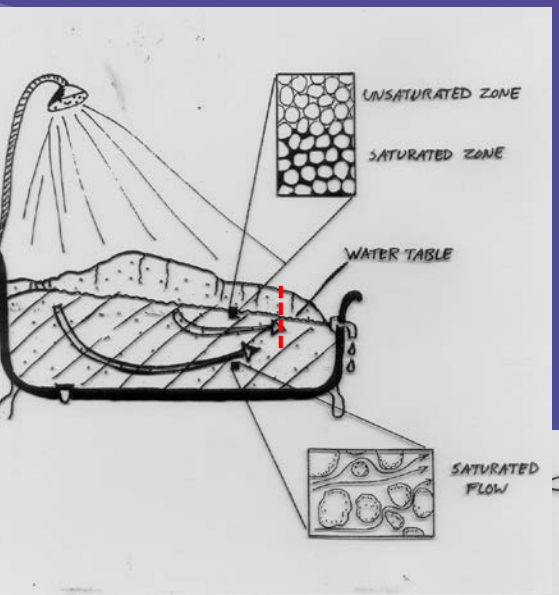
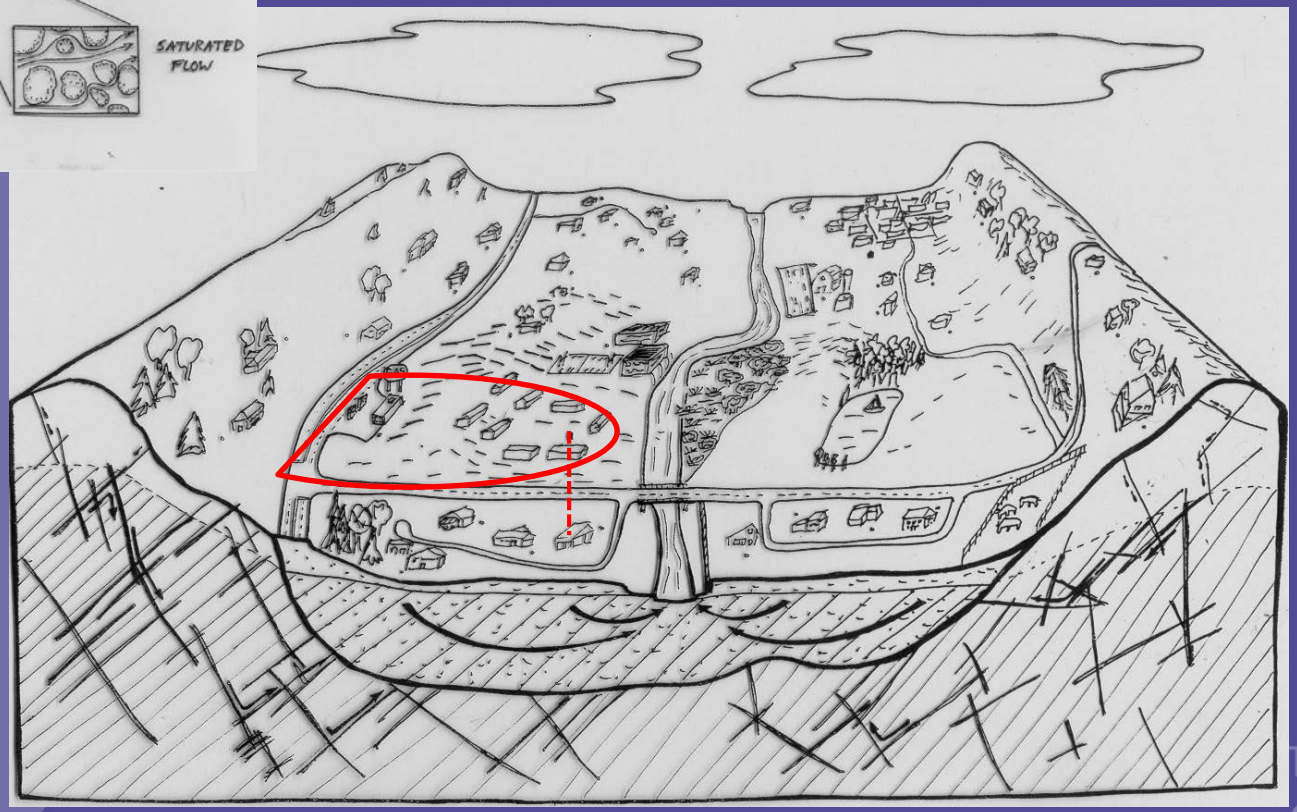
High and Lower Priority Aquifer Areas





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Review

- Copious water – with care
- Groundwater quality remains good
- Review ofAquifer recharge
  - Aquifer or project water budgets
  - Sustainable septic densities
- Pumping test concepts
  - Consumption v. pumping rates
  - Interbasin transfers
- Groundwater protection

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Groundwater Management

Model Ordinance Available Free

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