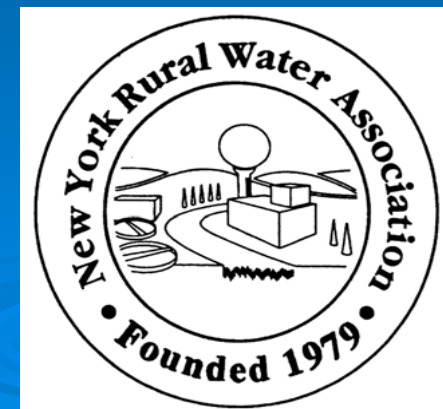
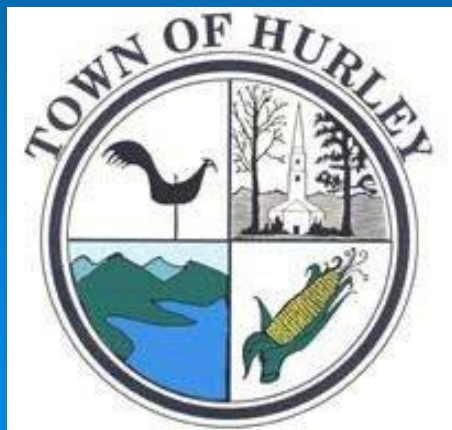


Groundwater Study and Protection Plan for the Glenford & West Hurley Areas

Steven Winkley
New York Rural Water Association

Project Funded By:
Water Quality Planning and Implementation Grant for the NYC Watershed




Why is Ground Water Important ?

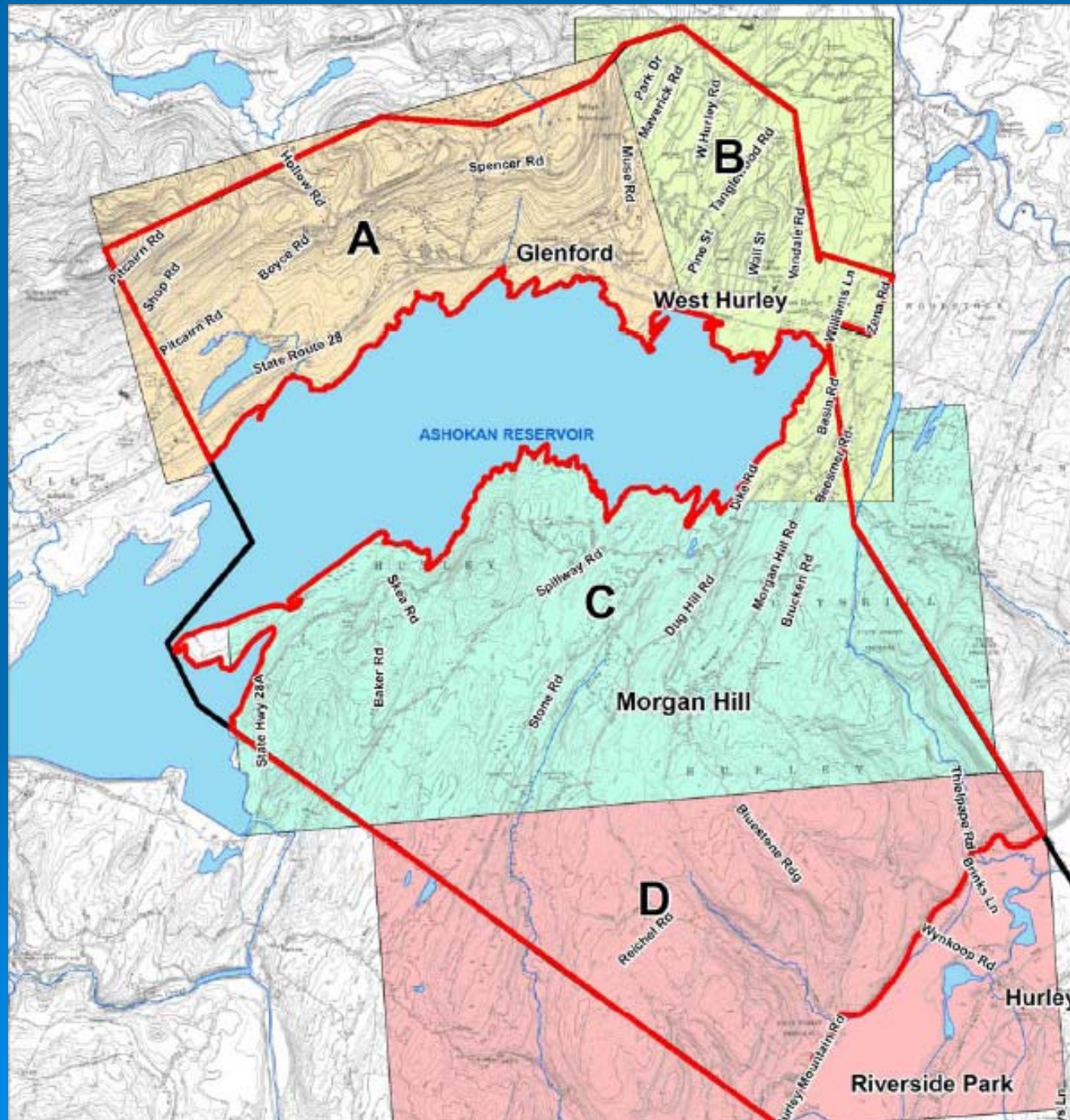
- Source of all drinking water in Glenford and West Hurley.
- Ground water sustains streams and creeks.
- Ground water interacts with ponds, lakes, and wetlands.



Objectives of Groundwater Study and Protection Plan

- Map groundwater resources in detail.
 - Identify existing and potential sources of contamination.
 - Outline potential protection strategies and future work.
- 
- The bottom of the slide features a decorative graphic of several concentric circles, resembling ripples on water, rendered in a lighter shade of blue against the main background.

Area Covered By Study



Methods of Study

- Geographical Information System (GIS)
 - Geological mapping (USGS, NYSGS, others)
 - Digital soil survey mapping (USDA)
 - Water well/boring data (USGS, NYSDEC, Ulster Co., NYSDOT)
 - Digital elevation models (USGS)
 - Parcel mapping (Ulster Co.)
 - Aerial photography (NYS GIS Clearinghouse)
 - Floodplains, hydrography, roads, wetlands, etc. (NYSGIS Clearinghouse, CUGIR)

Methods of Study

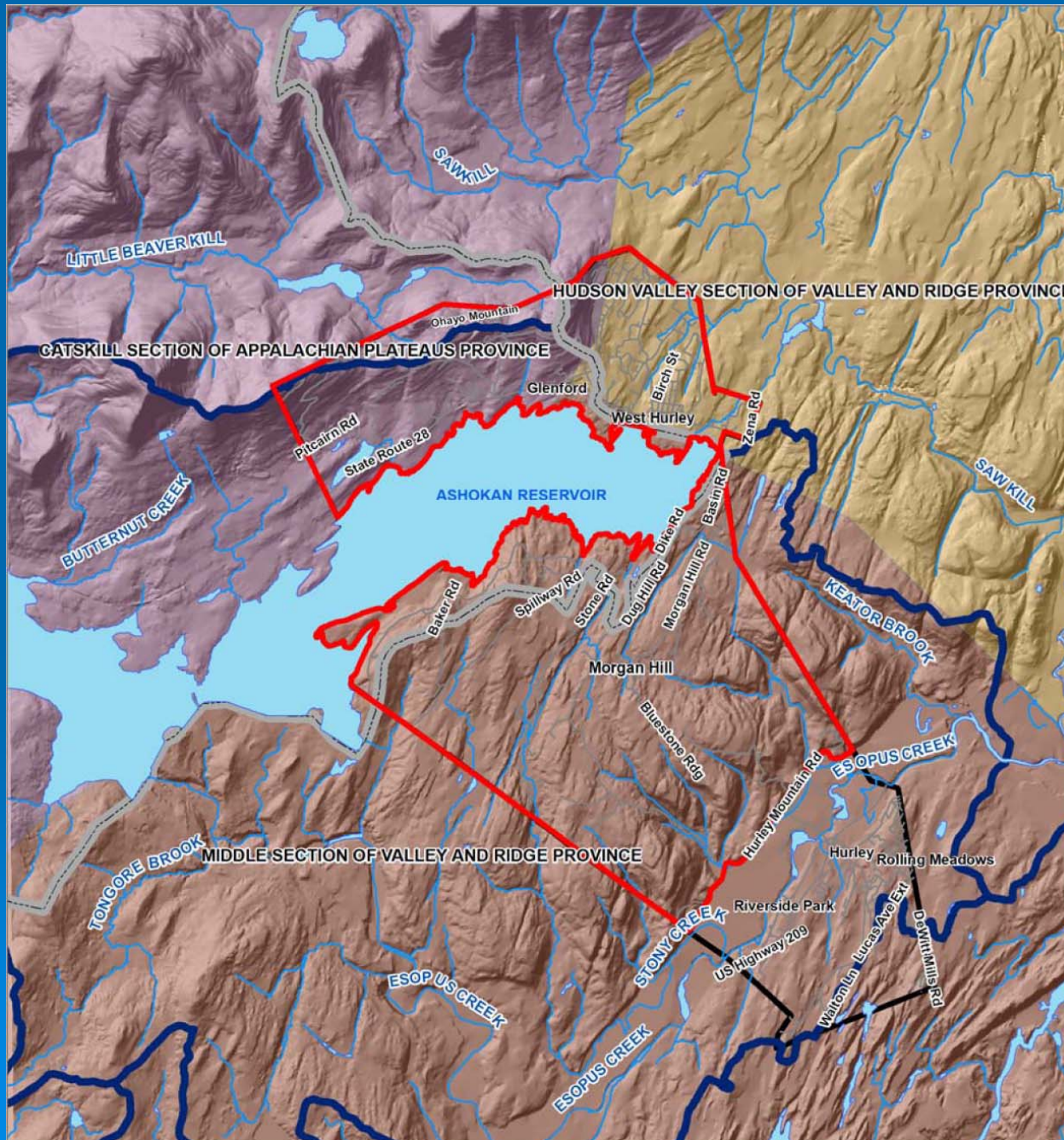
➤ On-Site Activities

- Document public water wells
- Identify potential sources of contamination
- Confirm geological mapping
- Collect data using GPS device

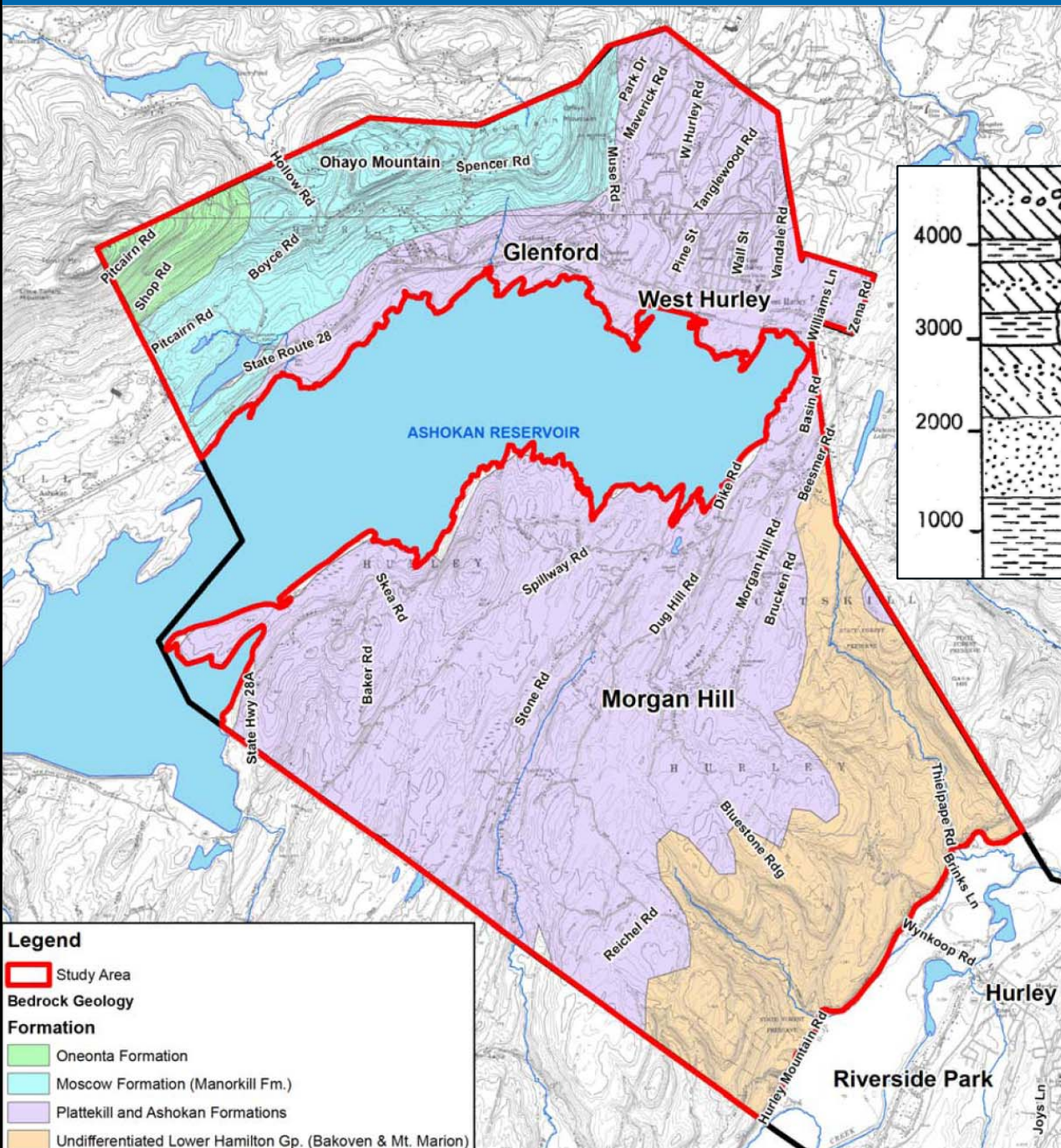
Setting



Physiography of Study Area



Bedrock Geology



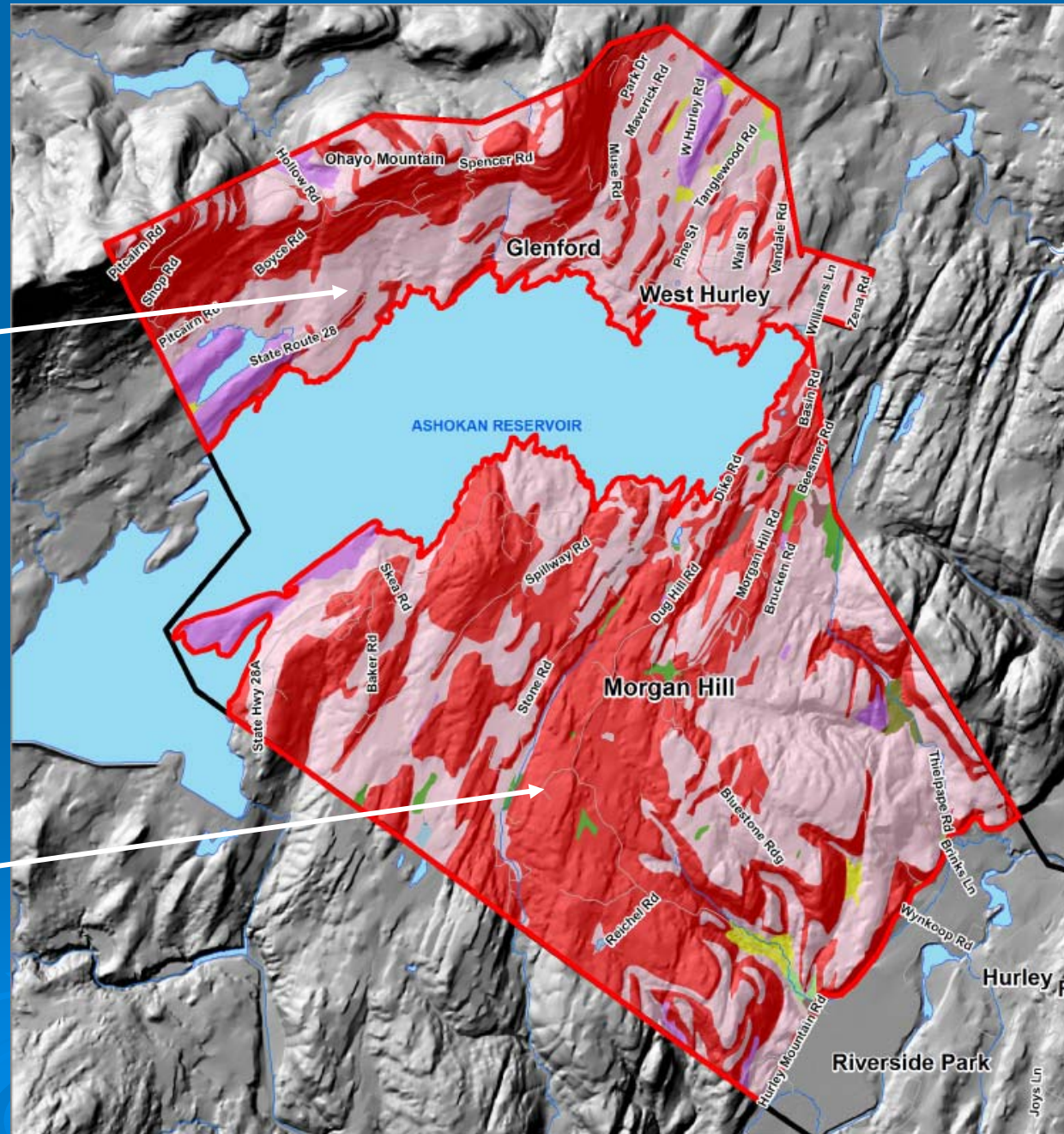
4000	ONEONTA	Red beds; medium-gray, medium-grained sandstone
	GRAND GORGE	Dark-gray shale and sandstone; protoquartzite
	Moscow Formation	
	MANORKILL	Red beds; gray, fine-grained sandstone
3000	POTTER HOLLOW	Dark gray shale and sandstone; protoquartzite
	PLATTEKILL	Red beds; medium-dark-gray sandstone
2000	ASHOKAN	Dark-gray sandstone
1000	MOUNT MARION	Dark-gray shale and sandstone; fossils

Surficial Geology

No significant sand and gravel bodies except along wall of Esopus Creek valley.

Thin till

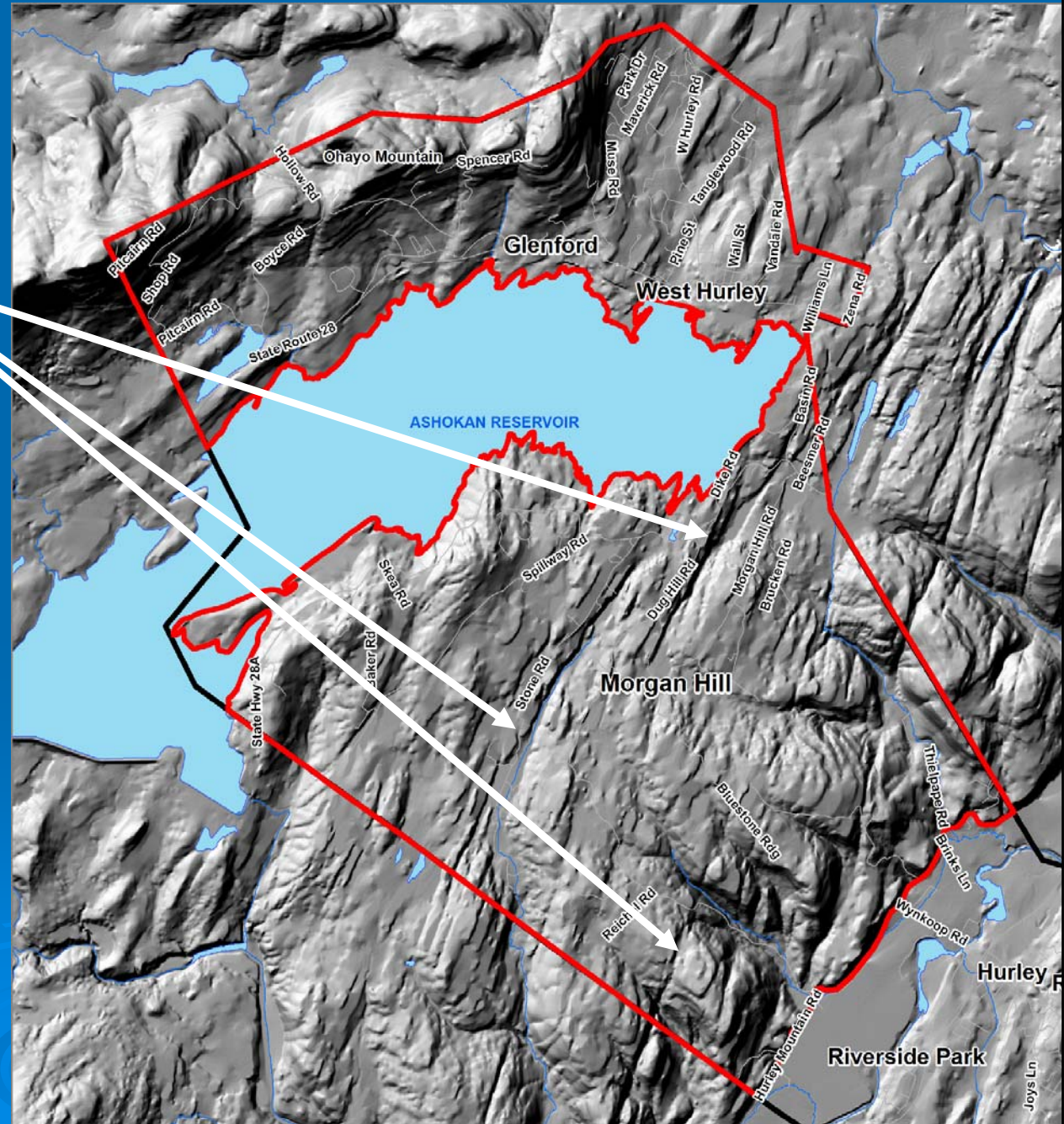
Rock



Distinctive Feature of Region

Northeastward trending, narrow, steep-sided linear valleys.

These follow the prominent fracture set and are most outstanding in the “bluestone” area.

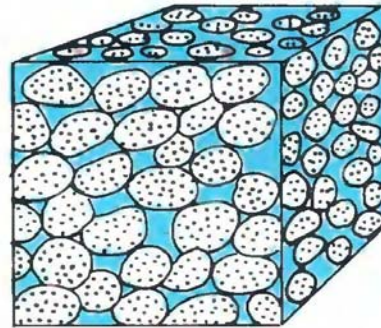


Groundwater Occurrence

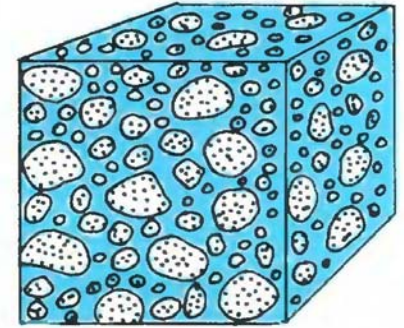


Groundwater Resources: Unconsolidated or Consolidated

**Unconsolidated
(Loose) Sand
and Gravel**

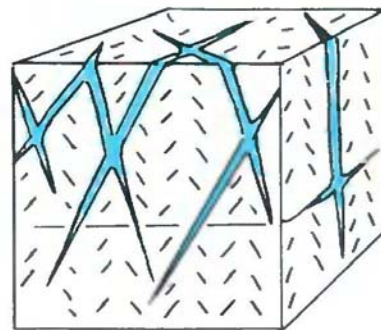


WELL-SORTED SAND

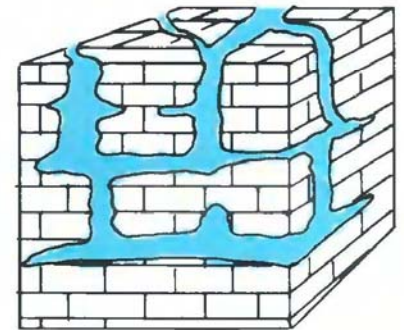


POORLY-SORTED SAND

**Consolidated
(bedrock)**



FRACTURES IN
GRANITE



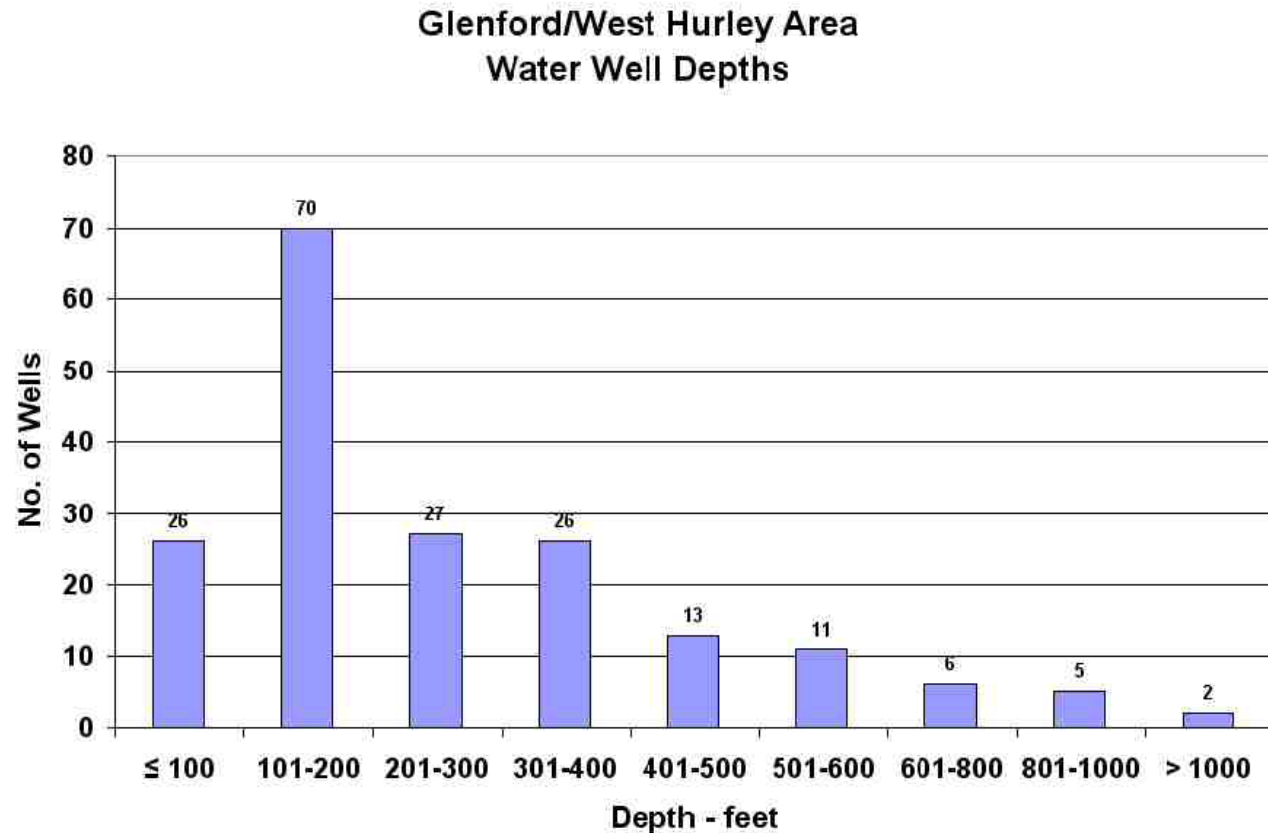
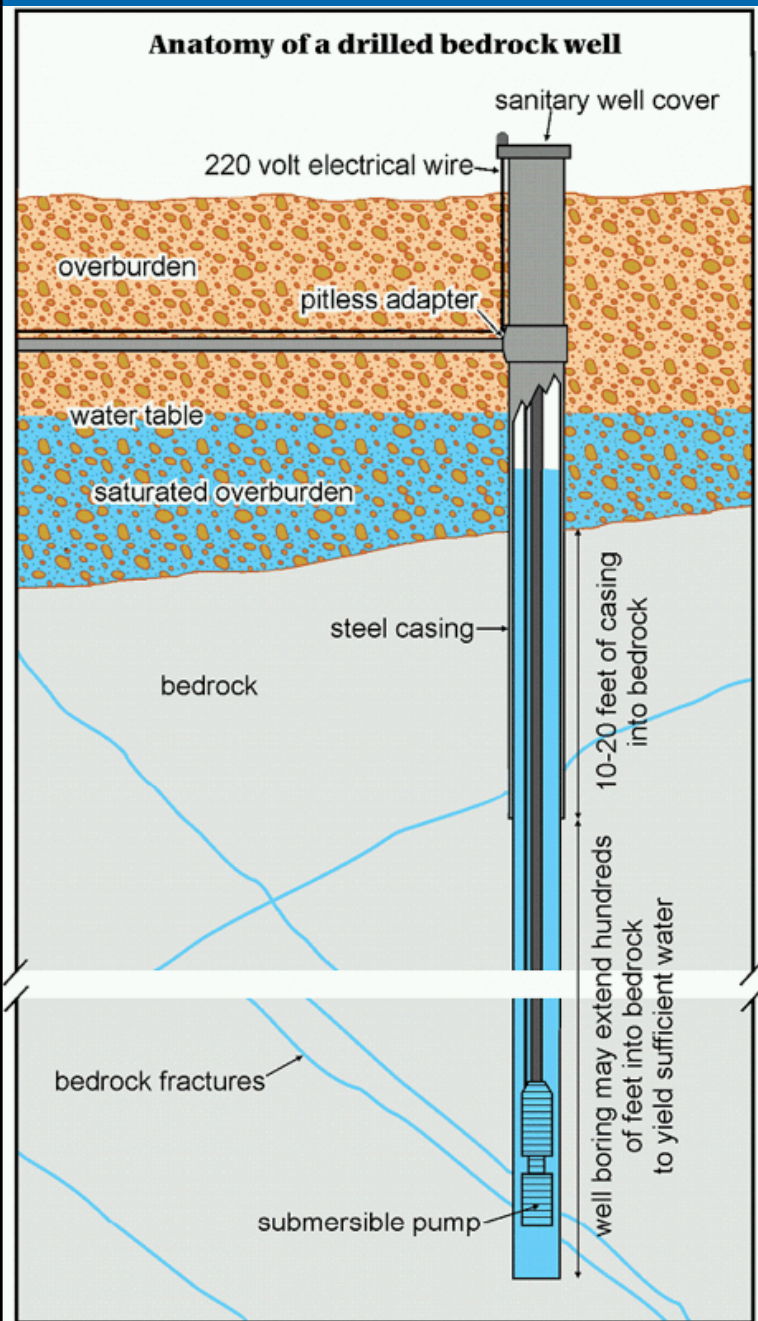
CAVERNS IN
LIMESTONE

There are No Unconsolidated Aquifers in Study Area

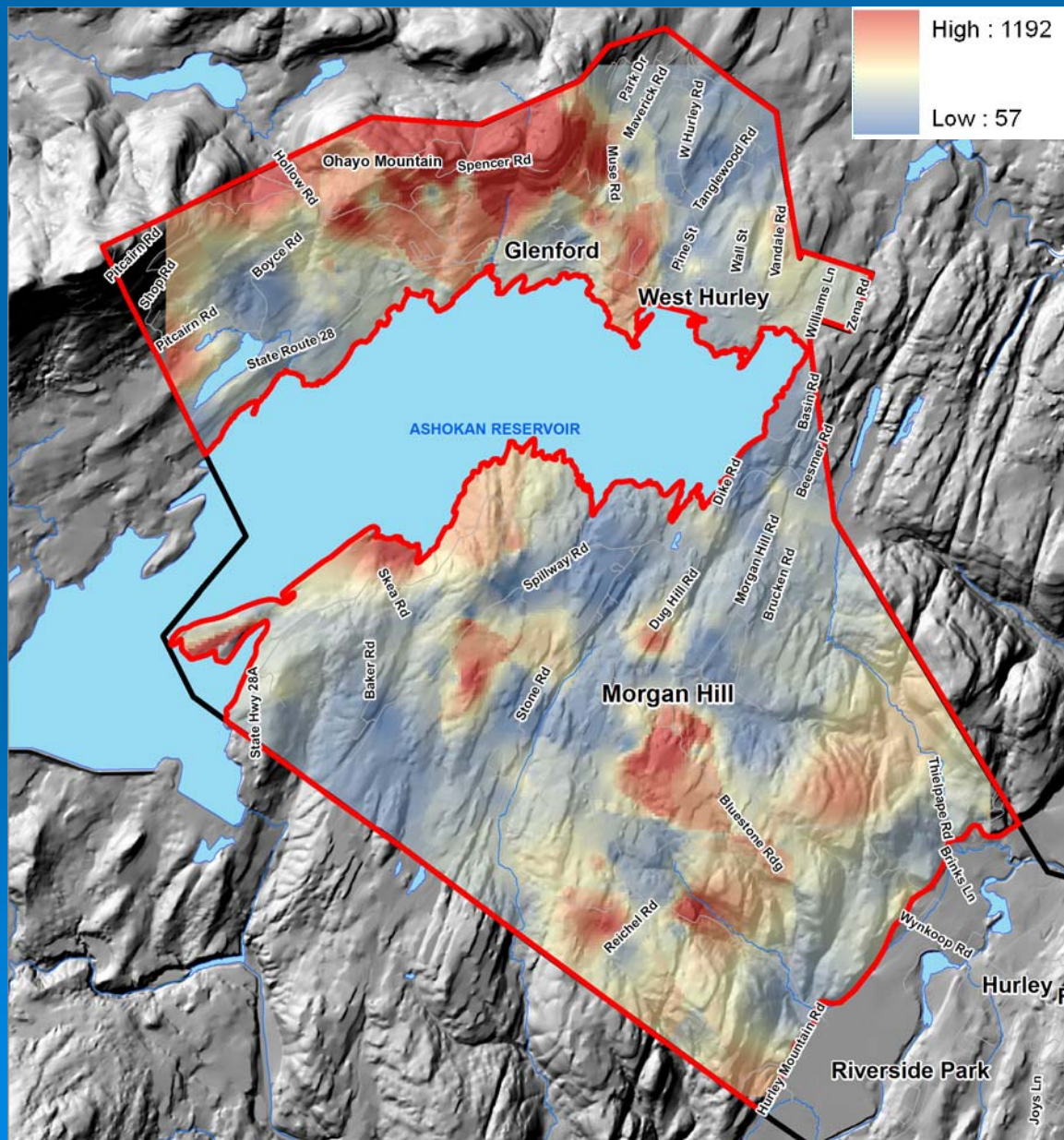
- The only wells reportedly completed in unconsolidated deposits date from before 1960.
- They were shallow wells completed in deeper glacial till deposits or alluvium (stream deposits) and were strongly impacted from contamination and drought.

Bedrock Wells

Wells are completed once an adequate number of water-bearing fractures have been encountered and there is adequate storage volume in the well. Well depths range from 57 to 1,198 feet (200 feet is the median).



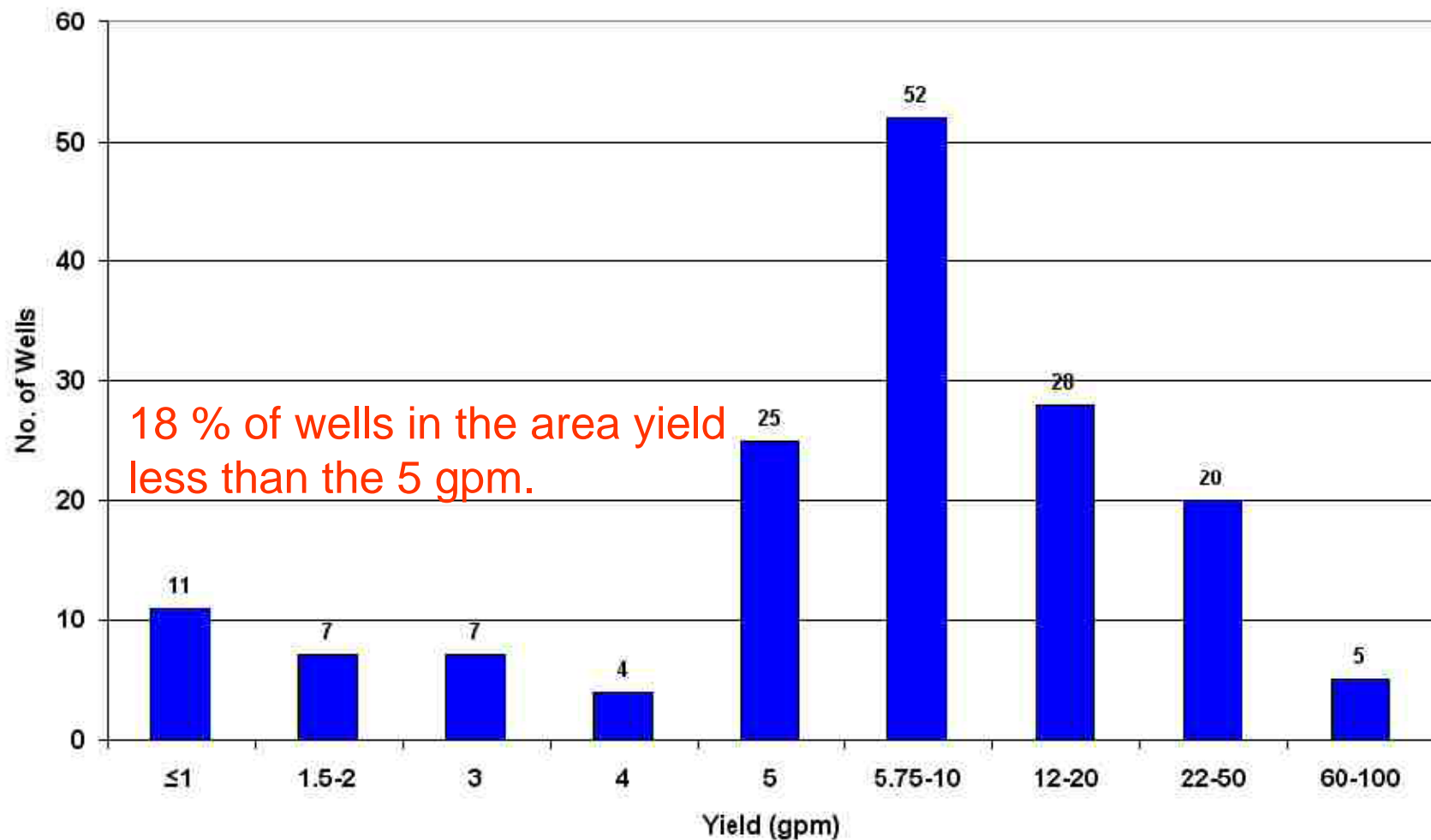
Well Depths



Deepest wells in the area are found
In the vicinity of Ohayo Mountain
(>900 feet deep).

Well Yields

Well Yields in Glenford/West Hurley Area



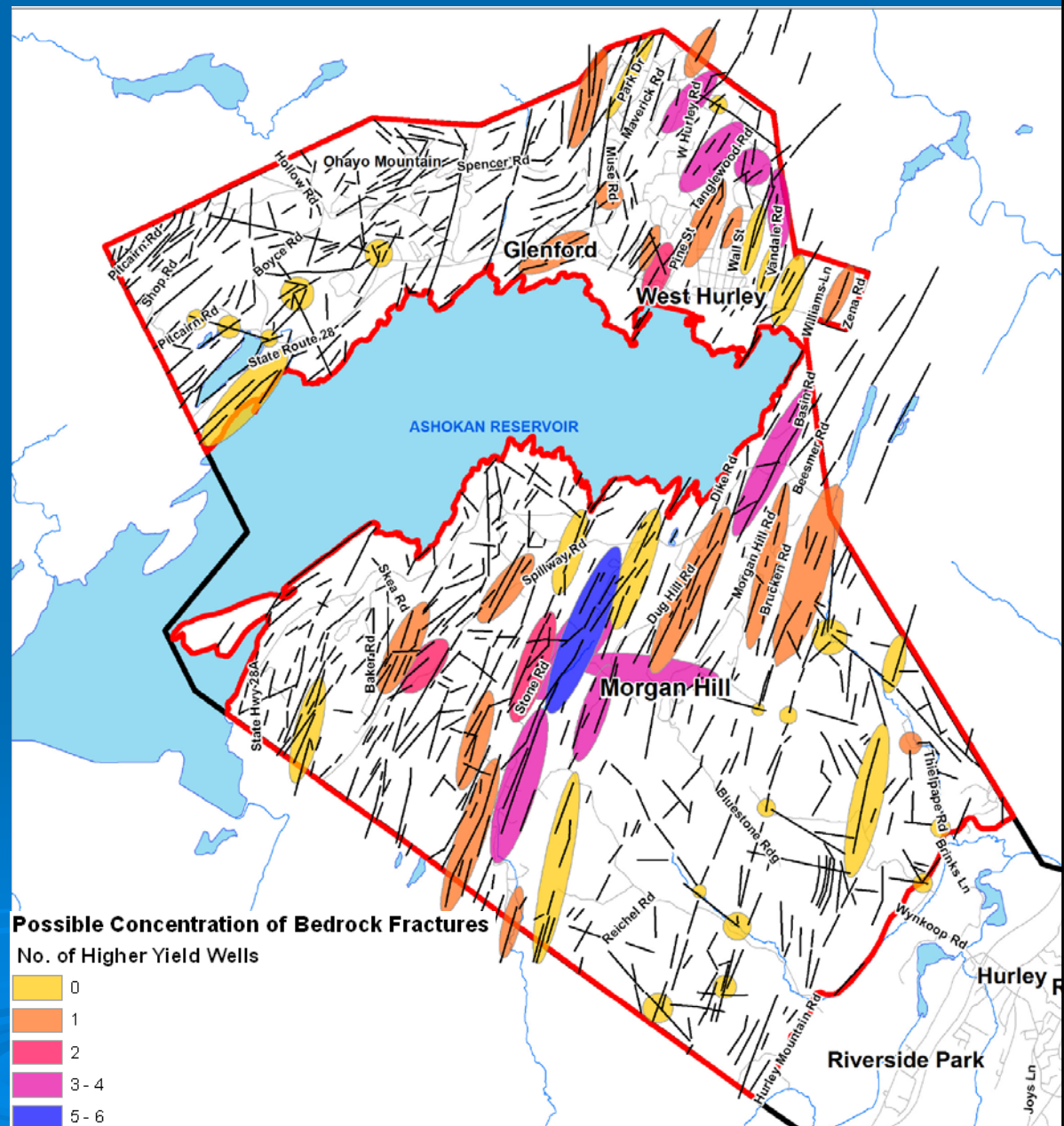
Well Yields and Fractures

The largest control on yield is the number of fractures intersected by the well.

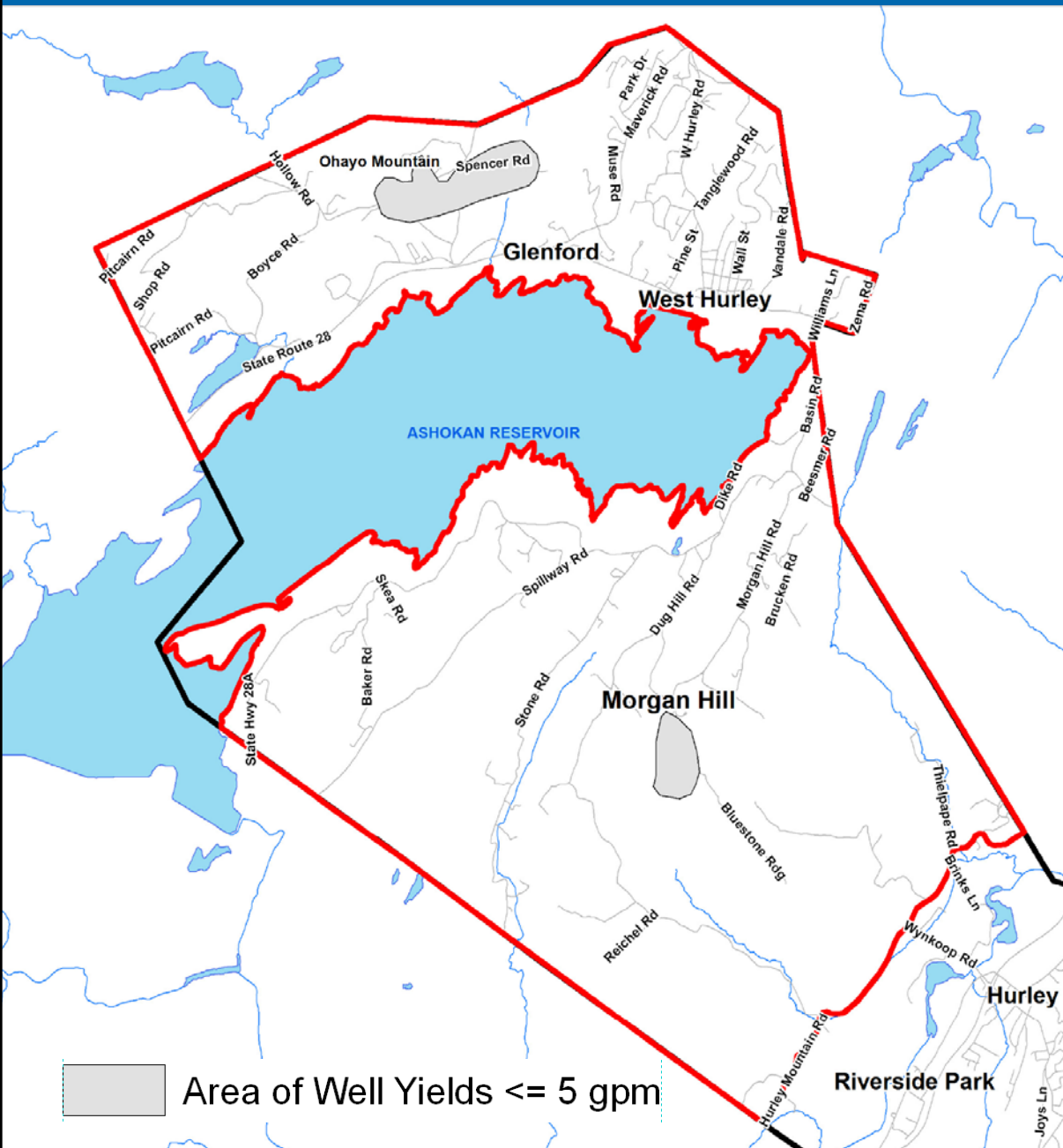
Fractures are concentrated in zones marked by linear features visible on aerial photography and topographic maps.

NYRWA mapped these individual linear features and clusters of such features (*possible concentrations of bedrock fractures*).

Median well yield is 20 gpm in these areas vs. 5 gpm elsewhere.



Areas of Lower Than Average Yields



Lower yields are found in topographically high areas with a low concentration of linear features.

More areas may become apparent as well data is compiled over time.

West Hurley/Glenford Residential Water Well Survey
West Hurley/Glenford Well Survey

[Exit this survey >>](#)

1. Please enter your street address (e.g. 100 Somewhere Road). This information is necessary and will be kept strictly confidential.

2. What type of well do you have?

- ☐ Drilled (6 to 8 inch diameter casing with sanitary well cover)
- ☐ Driven (1 to 3 inch diameter pipe with attached point)
- ☐ Dug (2 to 8 foot diameter constructed of concrete or stones)
- ☐ Not Sure

3. Do you have any documentation on your well?

- ☐ Yes
- ☐ No

4. Indicate below the approximate depth of your well. (Take a guess if you can)

5. If you know, how many feet of casing (steel pipe) was installed in your well?

6. If you know, indicate below your well's yield (in gallons per minute).

7. Have you ever had any of the following problems with your well?

- ☐ Not enough water
- ☐ Hardness (scale, soap scum, poor lathering)
- ☐ Reddish or black staining
- ☐ Rotten-egg odor
- ☐ Salty taste
- ☐ Sediment
- ☐ No problems

8. Any comments or concerns that you would like to share regarding ground water in the area?

Water Quality

Well water quality data is not widely available.

NYRWA conducted an online survey to determine if there were water quality concerns in the area.

3 of 6 respondents indicated problems with water quality (staining, odor, bacteria).

Hydrogeologic Analyses

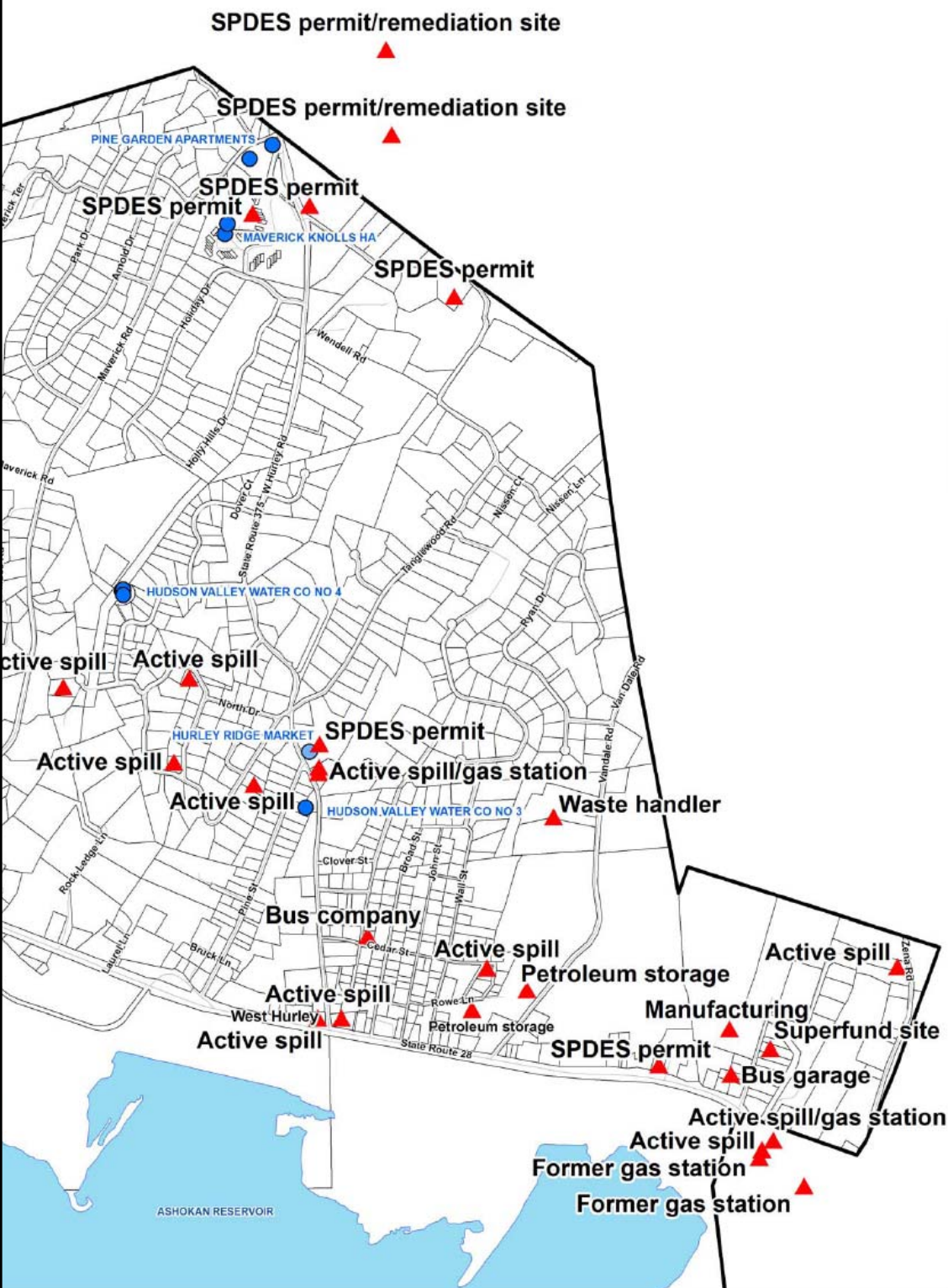


1. Inventory Potential Sources of Contamination

Risk Categories of Land Uses and Activities Affecting Ground Water Quality

High Risk (Frequently Prohibited in High Priority Water Supply Protection Areas)

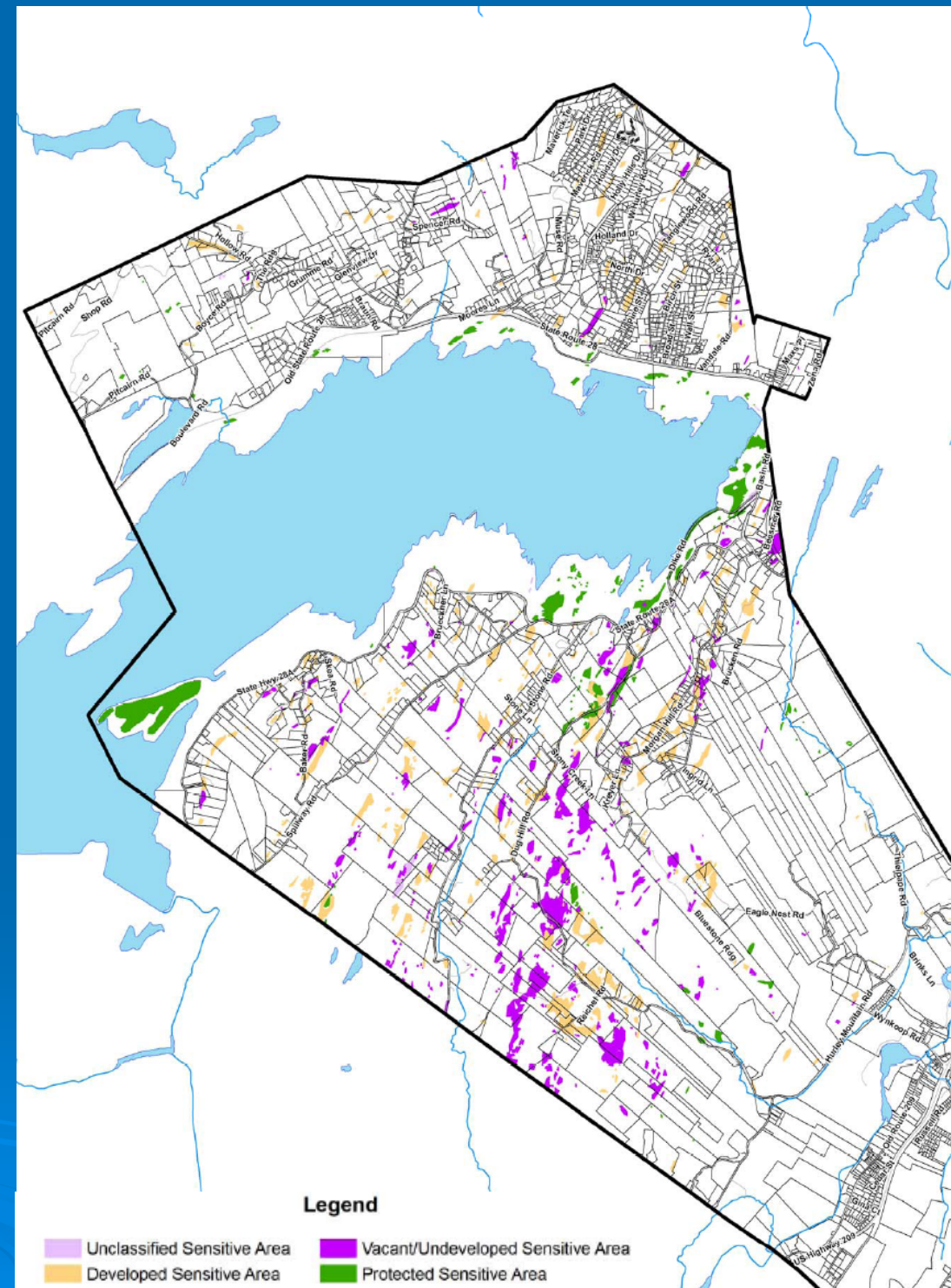
- ___ Airport maintenance areas
- ___ Animal feedlots
- ___ Appliance/small engine repair shops
- ___ Asphalt/concrete/coal tar plants
- ___ Auto repair and body shops*
- ___ Boat service, repair and washing establishments
- ___ Beauty parlors/hairdressers
- ___ Business and industrial uses (excluding agriculture) which involve the onsite disposal of process wastes from operations
- ___ Car washes
- ___ Chemical/biological laboratory
- ___ Chemical manufacturing/industrial areas
- ___ Cleaning service (dry cleaning, laundromat, commercial laundry)*
- ___ Disposal of liquid or leachable waste except for properly designed commercial and residential onsite wastewater disposal systems and normal agricultural operations
- ___ Electroplaters (metal plating and finishing) and metal fabricators*
- ___ Fuel oil distributors
- ___ Furniture and wood stripping and refinishing*
- ___ Gasoline stations
- ___ Golf courses/parks/nurseries
- ___ Graveyards
- ___ Improperly constructed or abandoned wells (perched, confined aquifers)
- ___ Junkyards and salvage yards*
- ___ Landfills and dumps
- ___ Making the surface of more than 10% of any lot impervious
- ___ Mining operations
- ___ Medical services (including dental/vet)
- ___ Military installations
- ___ Motels/hotels
- ___ Municipal sewage treatment facilities with onsite disposal of primary or secondary effluent
- ___ Oil and gas drilling and production
- ___ Outdoor storage of road salt, or other de-icing materials, the application of road salt and the dumping of salt-laden snow*
- ___ Outdoor storage of pesticides or herbicides
- ___ Parking areas of over 50 spaces
- ___ Pesticide/herbicide stores
- ___ Petroleum product refining and manufacturing
- ___ Photo processors/printing establishments
- ___ RCRA hazardous materials TSDs
- ___ Sand and gravel extraction
- ___ Trucking or bus terminals
- ___ Underground storage and/or transmission of oil, gasoline or other petroleum products
- ___ Use of septic system cleaners which contain toxic chemicals (such as methylene chloride, and 1,1,1 trichloroethane)
- ___ Wood preserving and treating*



- Groundwater resources are susceptible to contamination from a variety of manmade sources.
- The West Hurley area contains a large concentration of existing and potential sources of contamination (PCS).
- NYRWA mapped PCS from regulatory data, real property classification codes, and field reconnaissance.

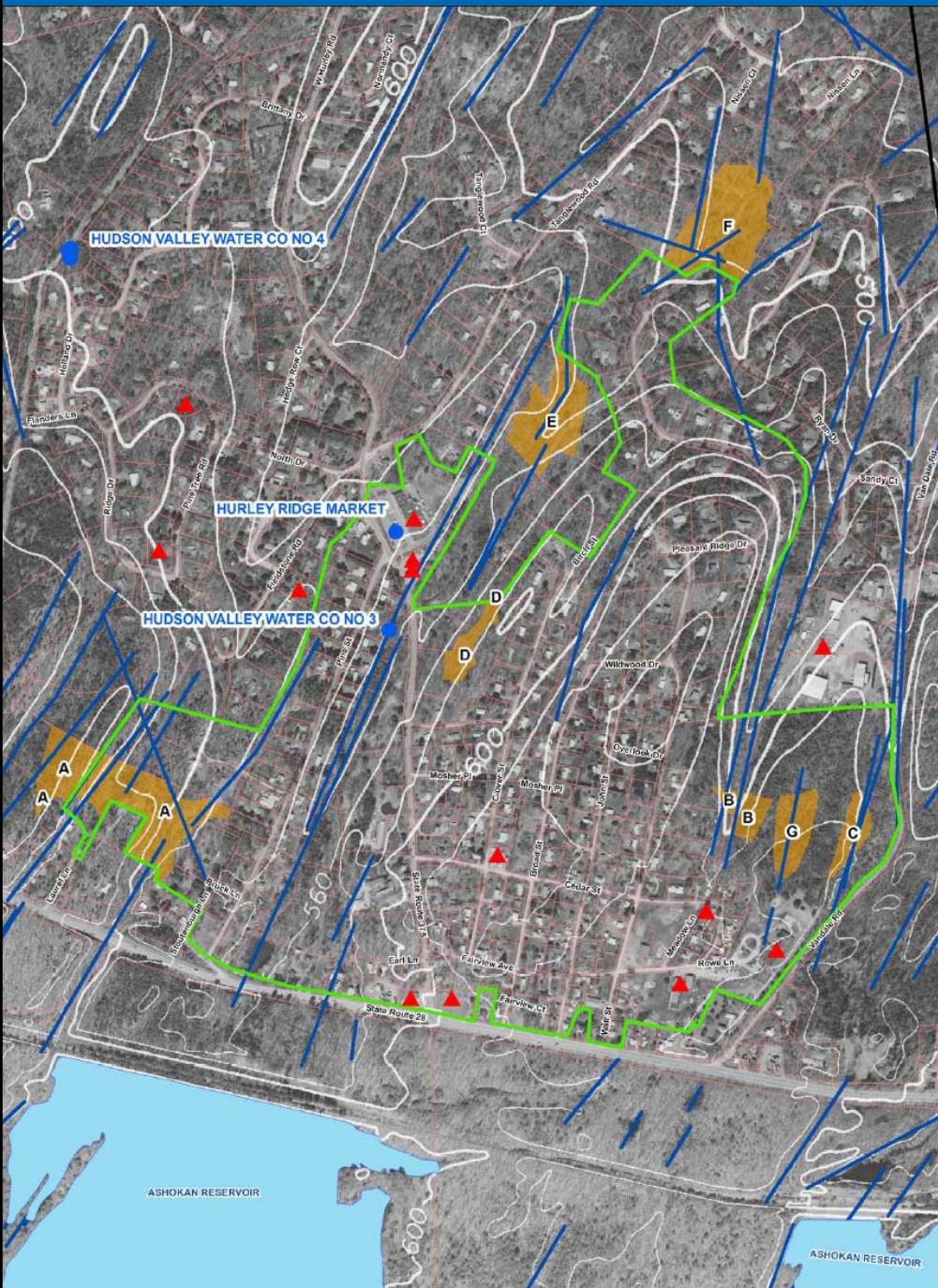
2. Map High Hydrogeologic Sensitivity

- A relative measure of the ease and speed with which a contaminant could migrate into and within the upper-most water-bearing unit.
- Controlled by the hydraulic characteristics of the uppermost water-bearing unit and the overlying soils, as well as topographic factors.
- NYRWA mapped areas with higher hydrogeologic sensitivity (coarser-grained or thin soils in likely recharge settings and relatively low slopes).



3. Plan for Possible Municipal Water Supply Source

- Public well requirements:
 - within or contiguous to the proposed water district
 - located away from potential contaminant sources
 - less vulnerable to the direct influence of surface water (>200 feet from water)
 - capable of meeting requirements for land ownership/control (at least 200 feet)
 - located in a potentially productive well yield area
 - accessible for drilling and construction.
- NYRWA identified seven possible sites (3 owned by the Ontario Central School District).



Protection Strategies



Recommendations

- Open Space Planning
 - Protect hydrogeologically sensitive areas.
- Land Use Regulations
 - Require more hydrogeologic documentation in sensitive hydrogeologic settings or in areas with poorer well yields.
 - Develop wellhead protection overlay zones around public water supply well sources.
- Future Public Well Study
 - Investigate the engineering feasibility and landowner willingness for the identified potential sites.
 - Conduct environmental assessment(s).
 - Perform geophysical surveys and test drilling on 1-2 selected sites.

Questions ???

