DRAFT
GROUNDWATER PROTECTION PLAN

for the

OLD HURLEY AREA
ULSTER COUNTY, NEW YORK

November 2005

Prepared for:

Town of Hurley Conservation Advisory Council

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1.0 INTRODUCTION

1.1 Goals and Objectives

Ground water is a valuable resource for the area of the Town of Hurley known as Old Hurley (see Figure 1). Here, public water systems and many individual residences rely upon wells for their source of supply (see Section 3.0). In addition, ground water contributes a significant portion of water to local streams, wetlands, and ponds. Unfortunately, groundwater contamination can and does occur as a consequence of a variety of land use activities. In addition, ground water can become depleted if withdrawal rates exceed natural replenishment rates.

The Town of Hurley, like many communities in Ulster County, is currently experiencing residential development pressures. In order to preserve the groundwater resources of Hurley for today and the future, the following Groundwater Protection Plan for the Old Hurley area has been prepared by the New York Rural Water Association (NYRWA) in cooperation with the Town of Hurley Conservation Advisory Council (CAC). This plan maps the groundwater resources and aquifers in the Old Hurley area, identifies potential sources of contamination, and outlines potential protection strategies.

1.2 Scope and Methods

New York Rural Water Association has utilized a variety of published and unpublished data sources for this plan. All data were inputted into a Geographical Information System (GIS). This is a computer system that allows one to visualize, manipulate, analyze, and display geographic (spatial) data.

Well data was collected from the United States Geological Survey (Frimper, 1972), and Ulster County Information Services. Geologic maps from Frimpter (1970), Marshak (1990), and the New York Geological Survey were reviewed and digitally scanned. Similarly, paper soils maps from the Ulster County Soil Survey (Tornes, 1979) were utilized. Elevation data were taken from digital elevation models (DEMs). This information was then used to derive hillshading and slopes. Land use information was taken from parcel mapping from Ulster County Information Services. Other digital data including surface waters, roads, regulated facilities, aerial photography, etc. were downloaded from the New York State GIS Clearinghouse and the Cornell University Geospatial Information Repository.

New York Rural Water Association also conducted on-site activities in Hurley to document the location of public water supply wells, potential contaminant sources, etc. A global positioning system (GPS) device was used to capture the geospatial coordinates of such features. New York Rural Water Association also conducted geologic reconnaissance in selected areas to confirm surficial and bedrock mapping.

2.0 SETTING

2.1 Study Area

The area that was studied as part of this groundwater protection plan is depicted on Figure 1. This area, commonly referred to as Old Hurley, is the southeastern portion of the Town of Hurley. It is situated just west of the New York State Thruway and the City of Kingston in Ulster County, New York (Figure 1).

2.2 Physiography

The study area is comprised of four distinct physiographic regions identified by New York Rural Water Association and depicted on Figure 2. Within each of these regions, the geology and topography are similar. These regions include the Esopus Valley Trough, the Onondaga-Schoharie Carbonate Bench, the Esopus Shale Terrain, and the Binnewater Lakes Carbonate Fold-Thrust Belt (Figure 2).

The Esopus Valley Trough is a deep, fairly-broad, steep-sided valley that was substantially eroded by glacial ice. The Esopus Creek floodplain occupies the flat valley floor today. The depth to bedrock exceeds 100 feet here and a variety of glacial sediments fills the bedrock trough. To the southeast of the Esopus Valley Trough lies an area referred to as the Onondaga-Schoharie Bench (see Figures 2 and 3). This is an upland area lying above the Esopus Valley that is underlain by more resistant limestone bedrock. A number of low northeast trending hills are included in this area and most slopes are less than 3 percent. Southeast of the Onondaga-Schoharie Bench is an area termed the Esopus Shale Terrain. This area, underlain by the relatively weak Esopus Shale, is characterized by a number of narrow, steep ridges and valleys (see Figures 2 and 3). Slopes are highly variable here, ranging from less than 3 percent in the valleys to greater than 20 percent along the narrow ridges. The final physiographic region is referred to as the Binnewater Lakes Carbonate Fold-Thrust Belt. Here, limestone bedrock is at or near the surface and the topography consists of a number of distinct, higher northeast trending ridges (see Figures 2 and 3).

2.3 Bedrock Geology

The bedrock underlying the study area consists of Early to Middle Devonian limestones and shales (see Figure 4). These rocks have been folded and thrusted as a result of ancient tectonic history. The result is a series of northeast-trending ridges of varying relief (approximately 30 to 250 feet of relief). The relief of the bedrock ridges increases towards the southeast. In the region, Marshak (1990) has mapped a number of northeast-trending anticlines *(up folds)* and synclines (*down fold*s) as well as several thrust faults. Figure 3 is a simplified geologic cross section across the region. Figure 4 is a stratigraphic column that shows the sequence and type of rock that underlies the region. NYRWA has mapped a number of linear features that are likely indicative of the underlying bedrock structure. These features are presented on Figure 5 and are visible on aerial photographs, topographic maps, and digital elevation models.

Old Hurley Study Area

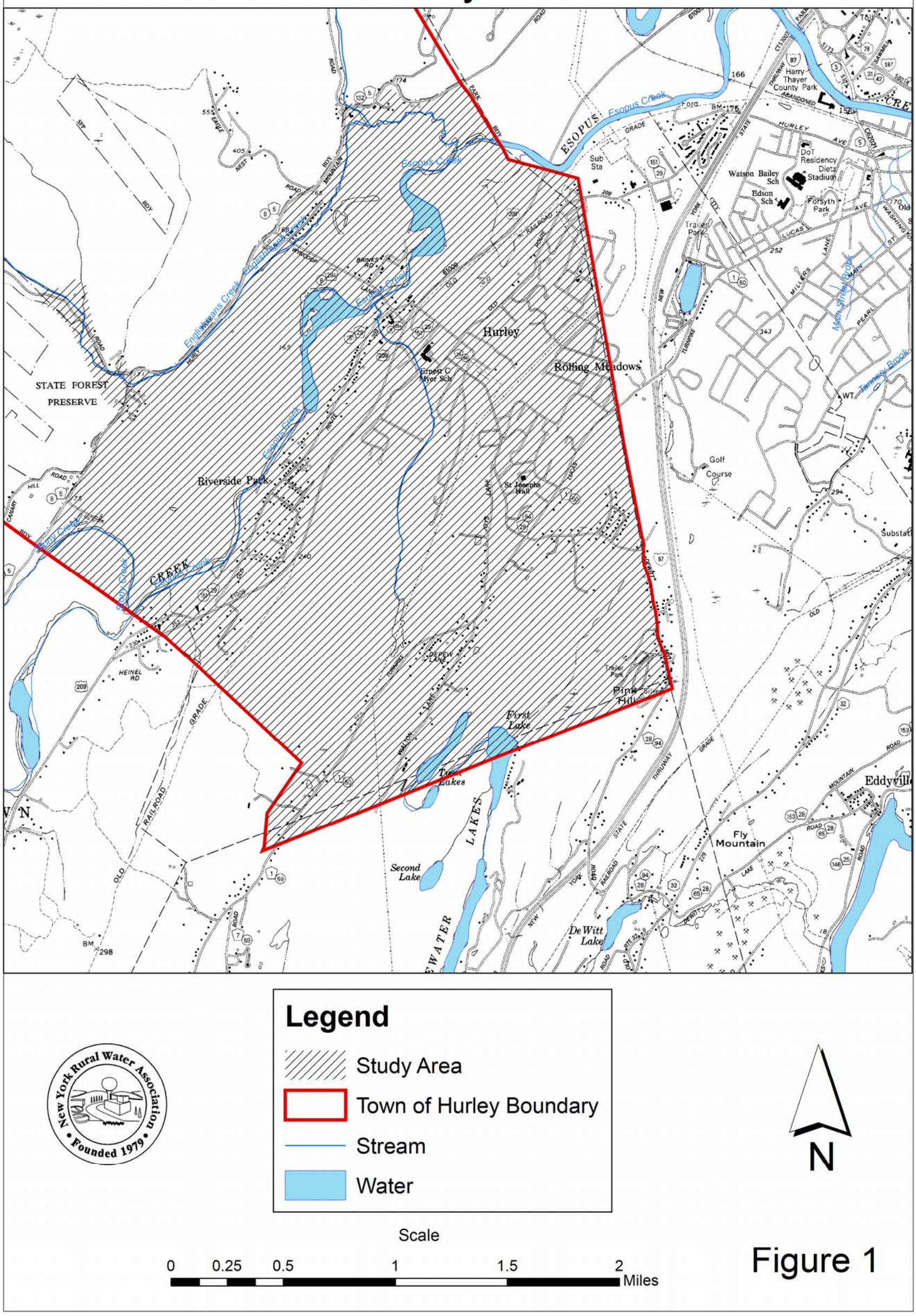


Figure 1

Old Hurley
Physiography

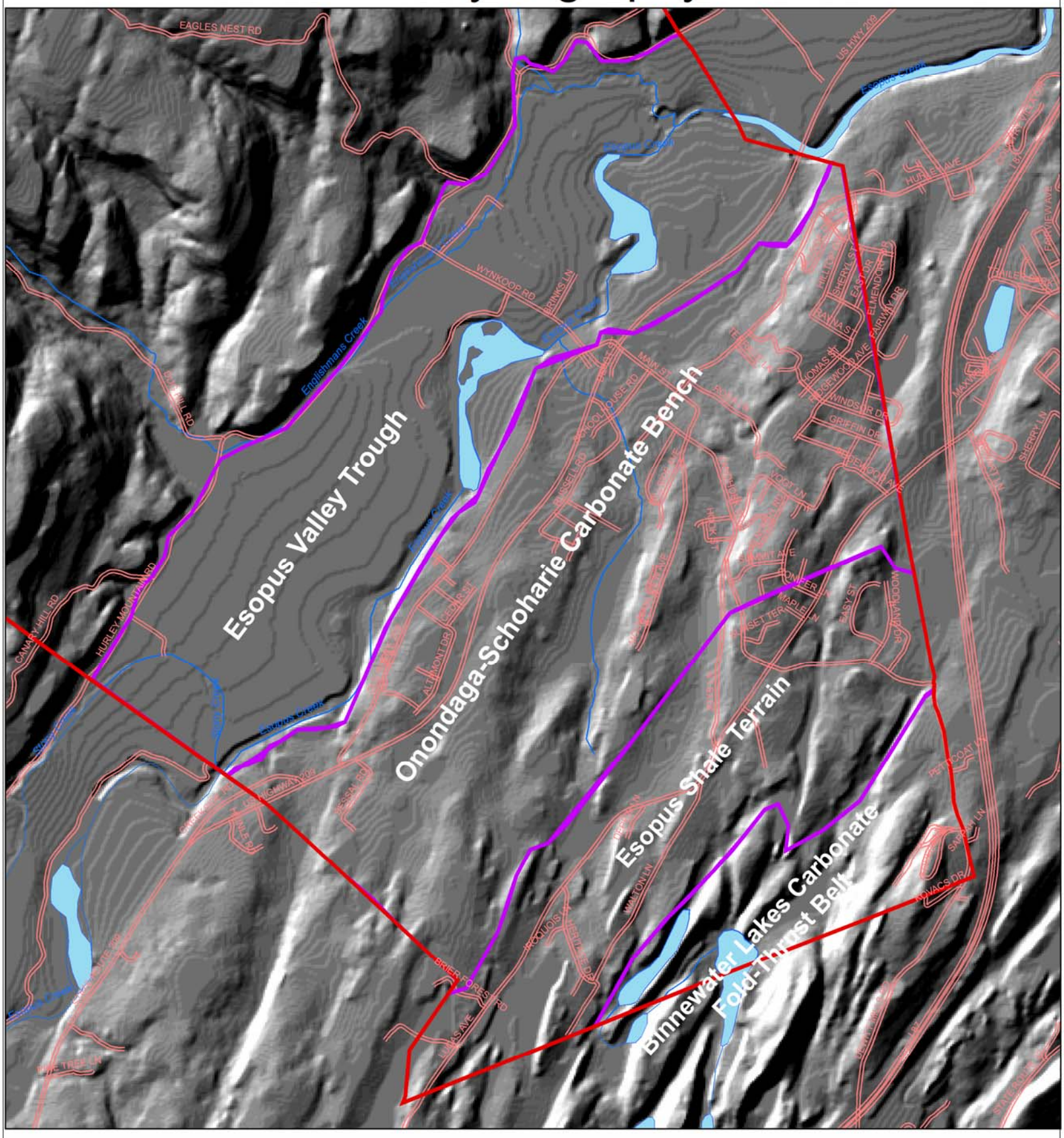


Figure 2

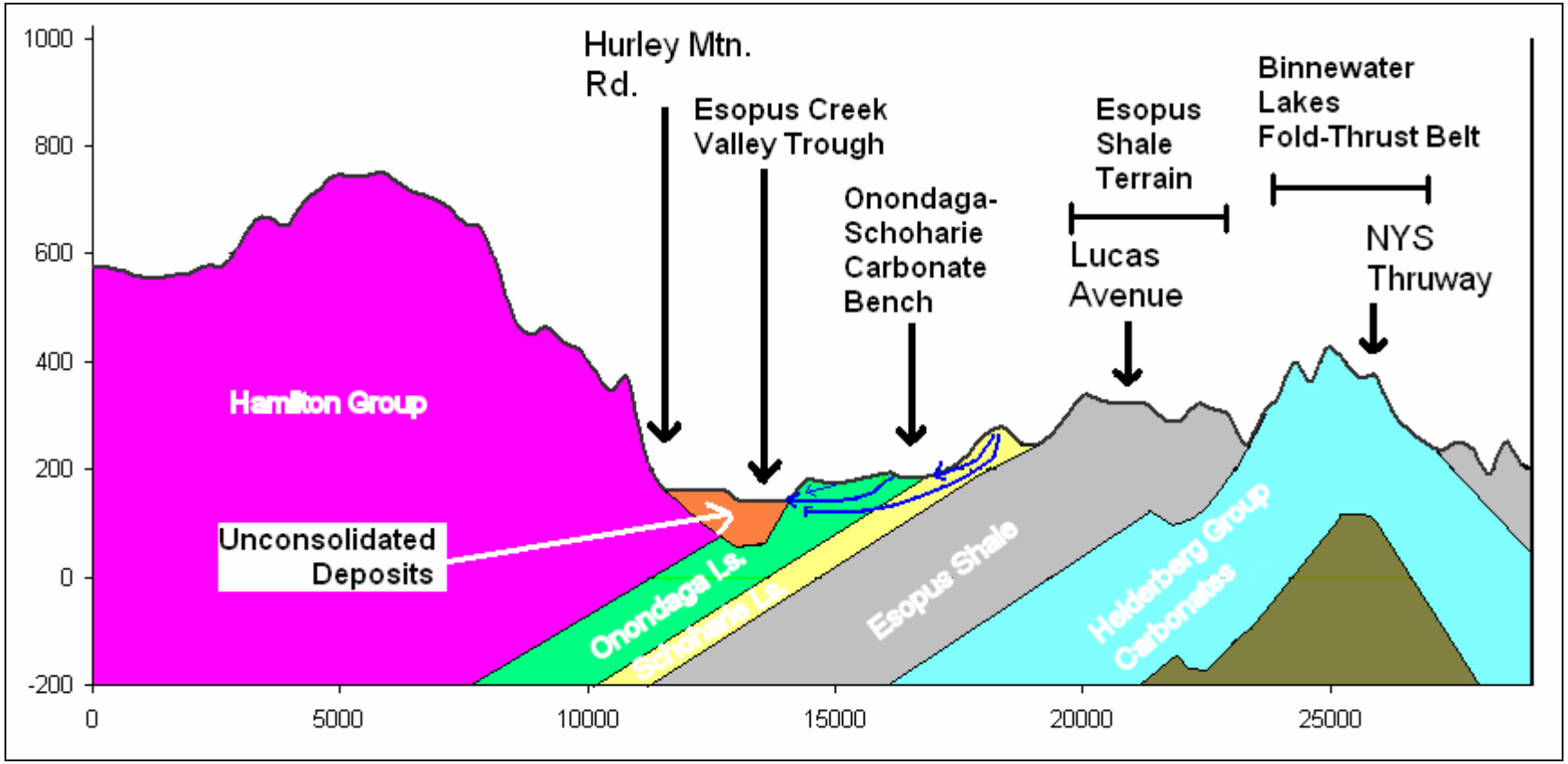


Figure 3. Cross Section

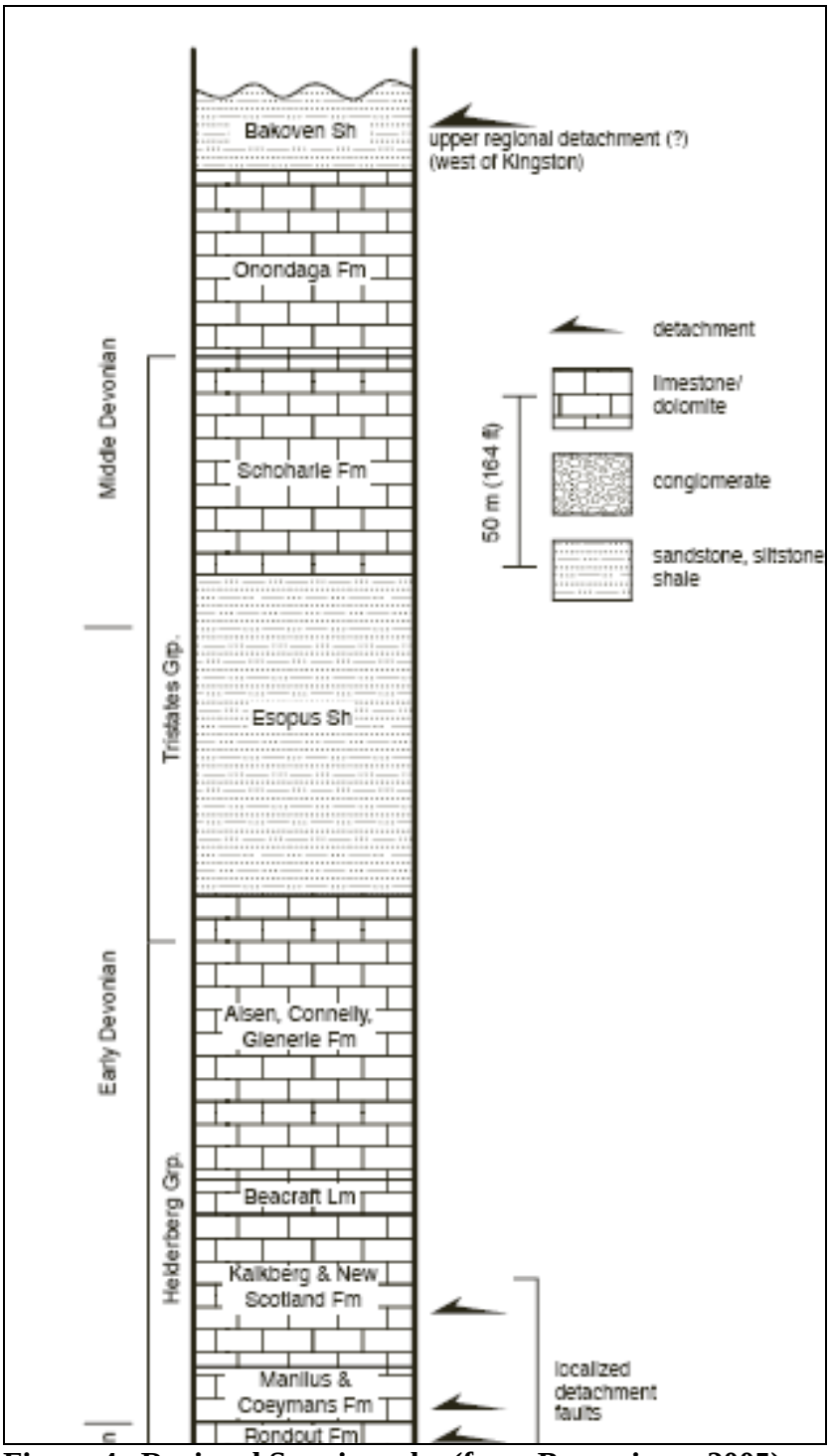


Figure 4. Regional Stratigraphy (from Burmeister, 2005)

Old Hurley
Bedrock Geology Map

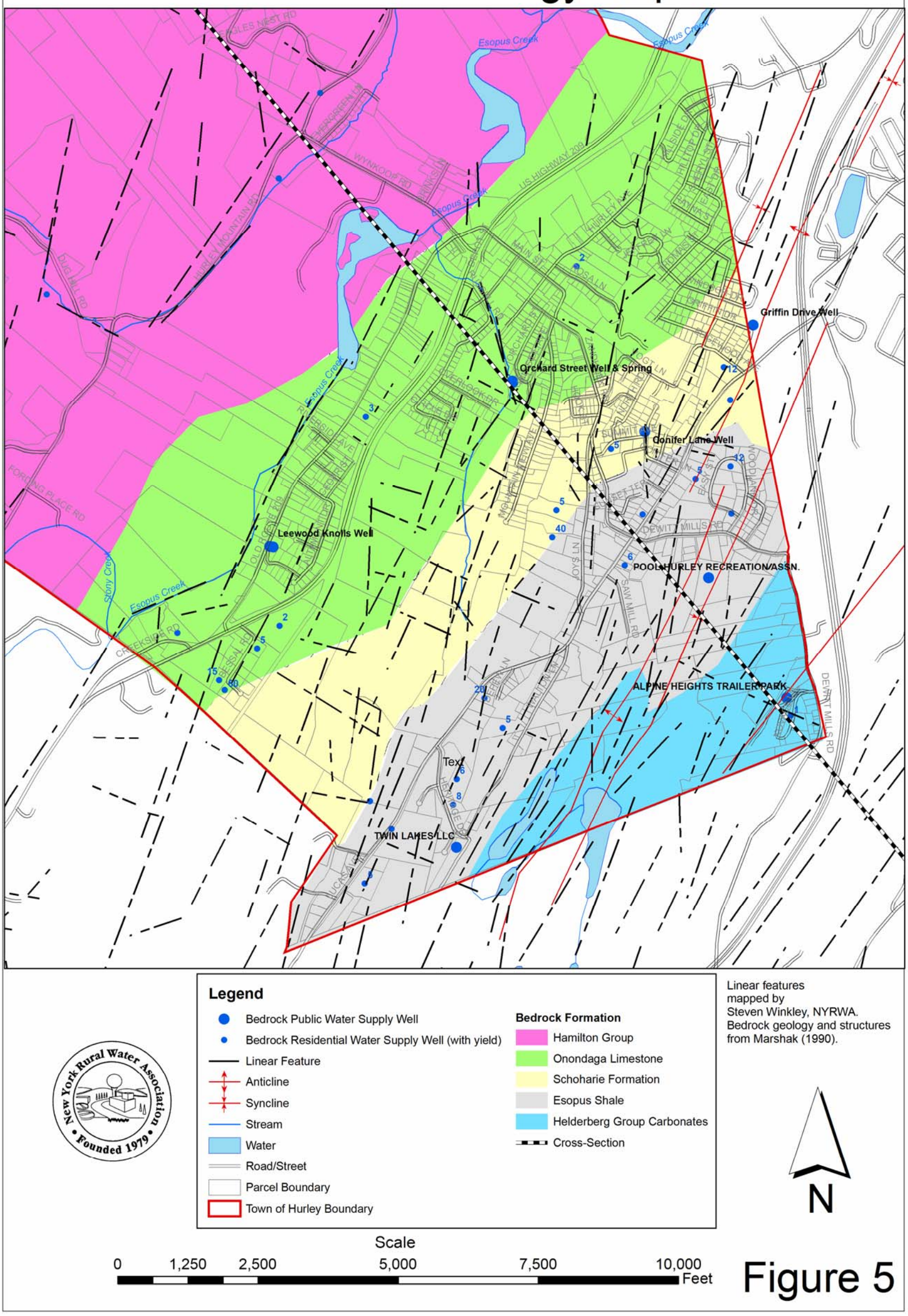


Figure 5

2.4 Surficial Geology

Surficial deposits are geologic materials that are found at the land surface. Most of these are unconsolidated deposits that formed as a result of continental glaciation, deglaciation, and post-glacial deposition. Figure 6 is a map of surficial deposits completed by NYRWA. This map was derived primarily from examination of Tornes, 1979 as well as the topographic expression of the various deposits.

Glacial till is the oldest glacial sediment, and was deposited directly from glacial ice. Till is an unsorted dense mixture of clay, silt, sand, gravel, and boulders. Relatively thin till deposits (less than 5 feet thick) cover much of the Onondaga-Schoharie Bench and Esopus Shale Terrain (Figure 6). In these areas, bedrock frequently outcrops at the land surface. Glaciofluvial deposits typically consist of sorted and stratified sand and gravel that was deposited from glacial meltwater streams during the deglaciation period. In the Old Hurley area, these glaciofluvial deposits take two forms. One is as a terrace of relatively thin sand and gravel deposits laid down on glacial till or bedrock. The other is as an apparent delta in the vicinity of Main Street. A delta is an accumulation of sediment formed where a stream or river enters a quieter body of water. In this case, the water body was a glacial lake that occupied the Esopus Valley. In some areas, the coarser-grained delta deposits were later reworked to form overlapping fine sand deposits mapped as glaciolacustrine sand. In deeper water areas of the glacial lake, a thick accumulation of glaciolacustrine silt and sand was deposited. After the glacial ice receded from the area modern-day drainage became established. Thin layers of sand, gravel, and silt known as alluvium was deposited along floodplain areas.

2.5 Hydrogeology

Bedrock

The physiography and geology of the Old Hurley area is reflected in the region's hydrogeologic framework. In the area southeast of the Esopus Valley, there are three distinct hydrostratigraphic units. These are the Onondaga-Schoharie Limestone Aquifer, the Esopus Shale, and the Helderberg Group Carbonates. The Onondaga Limestone is a fossiliferous limestone that contains a hard black substance known as chert. The Schoharie Formation is what is termed an argillaceous limestone. It has a higher clay content than the Onondaga Limestone. Together, the Onondaga Limestone and Schoharie Formation form an aquifer that transmits water through solutionally enlarged fractures, bedding planes, and other secondary openings in the rock. Well yields in the Onondaga-Schoharie Limestone Aquifer are highly variable, depending upon the frequency of fractures encountered by the well. For example, reported domestic yields in the unit range from as little as 1 to 2 gallons per minute (gpm) to as much as 60 gpm. The Orchard Well and Spring is a major public water supply producer from this hydrostratigraphic unit (see Section 3.0).

Old Hurley
Surficial Geology

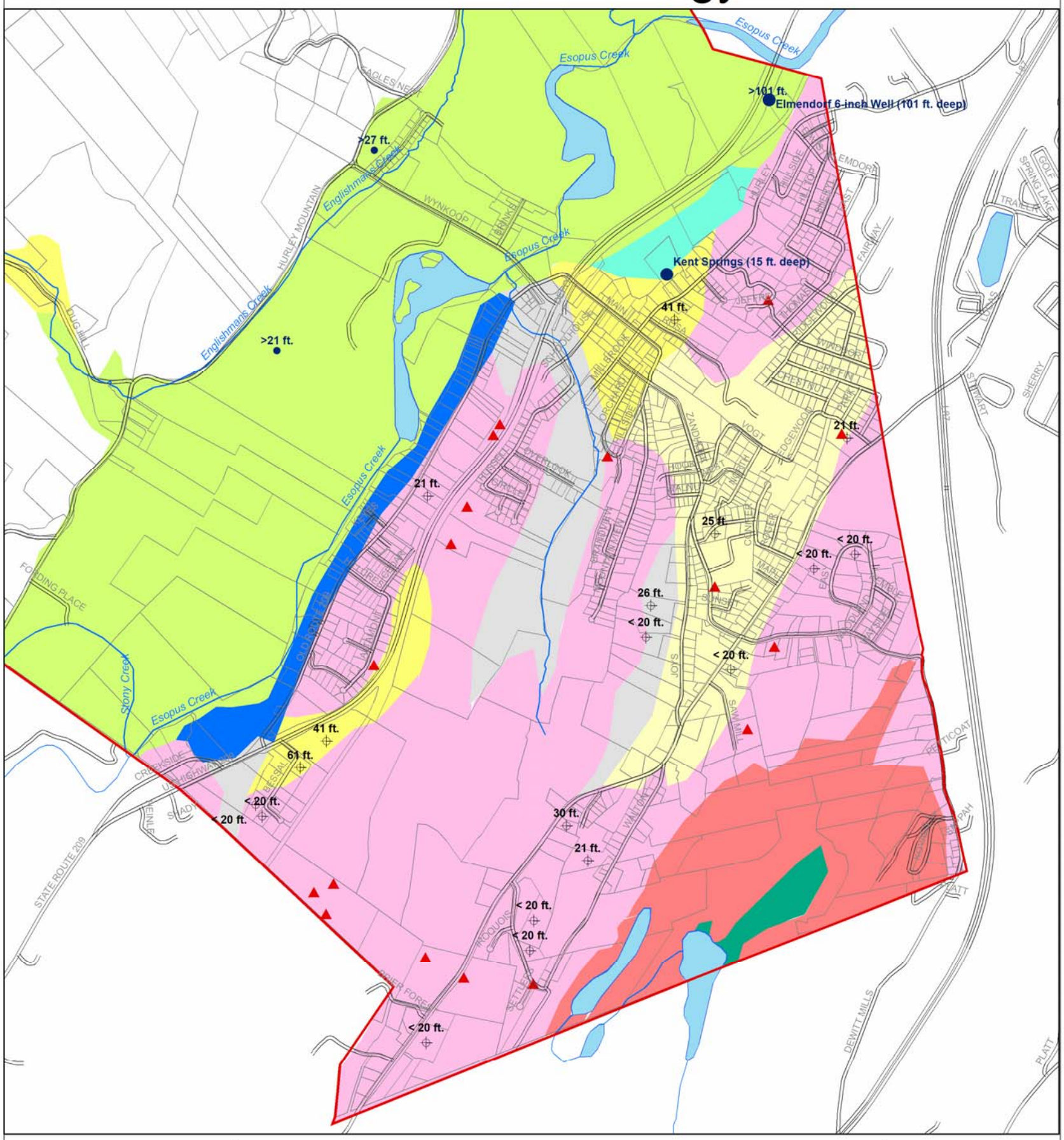


Figure 6

The water level in the Onondaga-Schoharie Limestone Aquifer varies considerably during the year. The Orchard Well and Orchard Street Spring (see Section 3.0) is known to be virtually dry at some times of the year (Jeff Vogt, verbal communication). This seasonal fluctuation is due to the fact that the bulk porosity of the limestone rock is quite low.

Groundwater flows from areas with higher hydraulic head to areas with lower hydraulic head. In the study area, land surface elevations generally decrease to the north and west. However, groundwater flow in carbonates rocks such as the Onondaga-Schoharie Limestone Aquifer is highly anisotropic. Groundwater flow is focused along concentrations of fractures that have been enlarged by chemical dissolution. Freeze and Cherry (1979) report that in folded carbonates, these concentrations of fractures are commonly associated with the crest of anticlines and troughs of synclines (see Figure 7). In the Old Hurley area, the orientation of anticlines and synclines as well as faults and other structural features is toward the northeast. Thus, the dominant groundwater flow direction in the Onondaga-Schoharie Limestone Aquifer is toward the northeast. The rate of groundwater flow in the aquifer is relatively rapid.

Rubin et al (2005) have indicated that the Onondaga Limestone is a major karst-forming unit in what they term the Kingston-Rosendale karst aquifer system (KRKAS) (karst is a distinctive landscape that forms by the dissolving of limestone bedrock by water). KRKAS is a group of caves, sinkholes, sinking streams, and springs (Rubin et al, 2005). The Draft New York State Open Space Conservation Plan 2005 refers to this area as the Karst Aquifer Region. Matson (1987) described a sinkhole in the Onondaga Limestone approximately 4 miles south of the Hurley-Marbletown town line along Route 209. It is theorized that this sinkhole is the result of a cave system within the Onondaga Limestone (Matson, 1987).

Below the Onondaga-Schoharie Limestone Aquifer is the Esopus Shale. This unit, composed of relatively poorly-permeable shale, forms a regional *aquitard*. It limits recharge water from reaching the underlying Helderberg Group Carbonates. Groundwater flow is limited in the Esopus Shale. Not surprisingly, two large wetlands exist within the outcrop area of the Esopus Shale. The Esopus Shale generally yields sufficient water to domestic wells in the area, but it has not produced significant amounts of water (enough for a municipal water supply source).

The final bedrock hydrostratigraphic unit within the study area is the Helderberg Group Carbonates. Three of the limestone formations of this group (the Rondout, Manlius, Coeymans) are known to form caves and other karst features. The Binnewater Lakes, including Twin Lake and First Lake in the Town of Hurley, are widely believed to have subsurface tributaries. A number of other unique hydrologic features such as sinkholes, sinking streams, and springs exist in this region. Well data is very limited for the Helderberg Group Carbonates in the Town of Hurley. As with the Onondaga-Schoharie Limestone Aquifer, yields in the Helderberg Group are likely to be highly variable. Groundwater flow is anisotropic and towards the northeast.

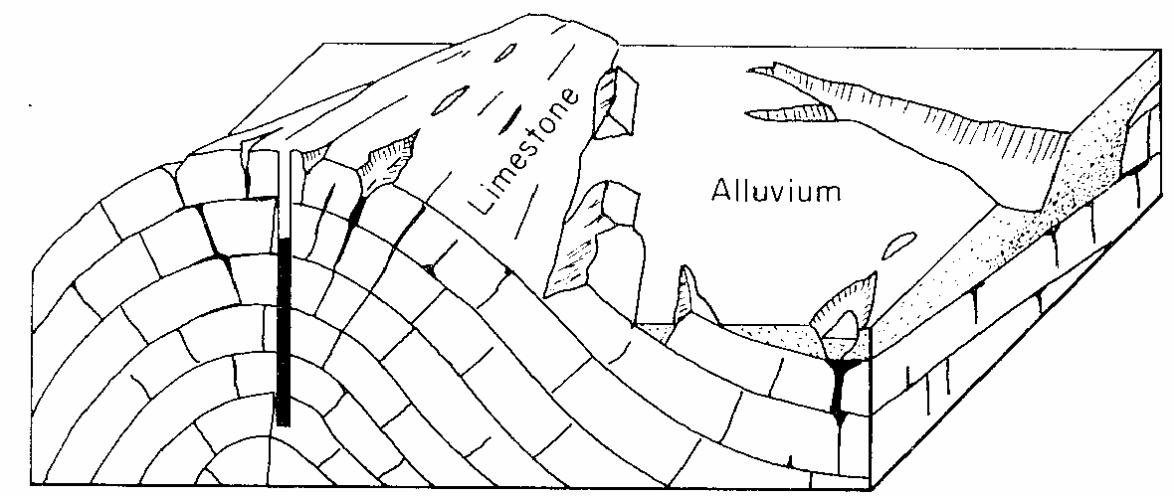


Figure 7a. Solution Enlarged Fractures: Fractures Along Anticlines (From Freeze and Cherry, 1979).

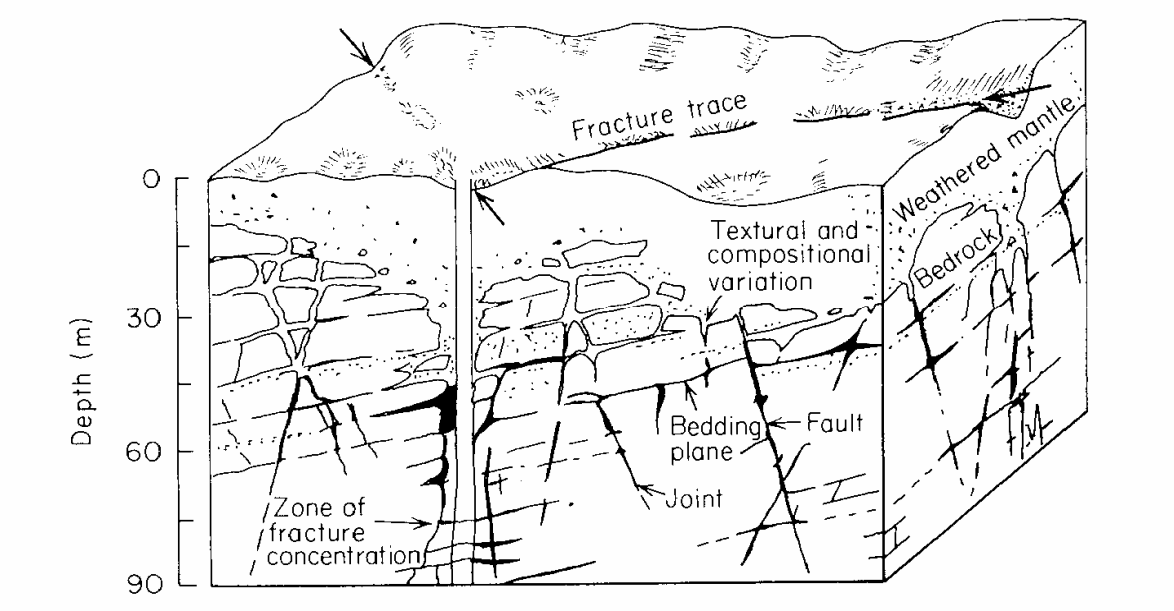


Figure 7b: Solution Enlarged Fractures: Zones of Fracture Concentrations (From Freeze and Cherry, 1979).

Unconsolidated Deposits

The Esopus Valley contains a considerable thickness of unconsolidated deposits. The geologic log from the so-called Elmendorf Wells in the valley indicates a thick accumulation of glaciolacustrine sediments, including a substantial confining layer of clay at a depth of 18 to 95 feet. A six-foot layer of water-producing sand and gravel underlies these sediments. Water quality from this aquifer is poor however, with abundant iron and hydrogen sulfide present in the water.

As Figure 6 indicates, surficial sand and gravel deposits exist along the southeastern wall of the Esopus Valley. These glaciolacustrine sand and glaciofluvial sand and gravel deposits form an unconfined aquifer that is 15 to 45 feet thick here. The Kent Springs produces water from these deposits. Unlike the deep Elmendorf Wells, the Kent Springs produces relatively high quality water.

3.0 WELLHEAD PROTECTION AREAS

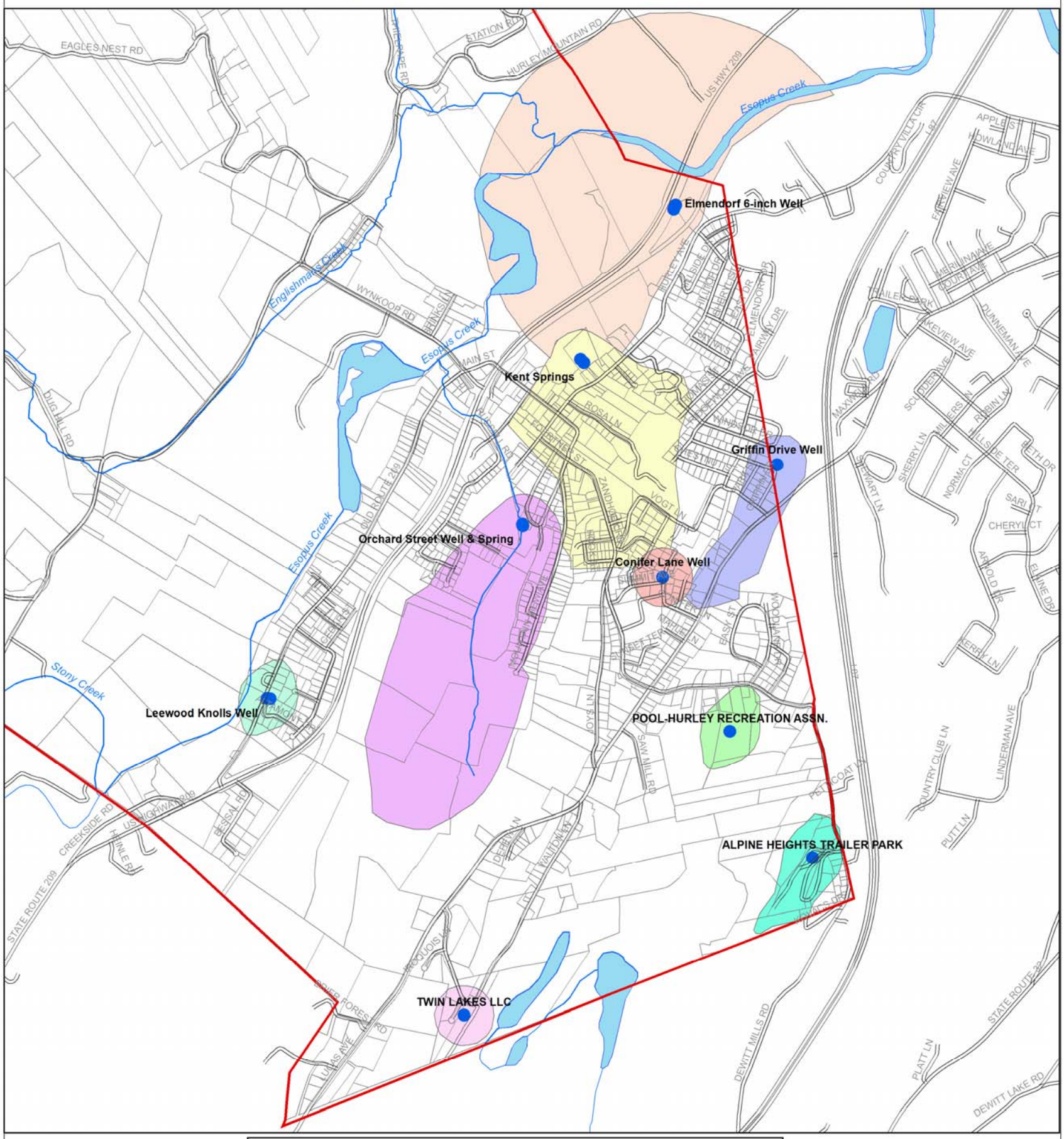
3.1 Water Supply Sources

The Rolling Meadows Water Corporation, a privately-owned water works corporation, provides public water service to approximately 907 households and businesses in the Old Hurley area. Rolling Meadows utilizes a number of water sources to service these customers. Currently, the primary water supply source is the Kent Springs (Figure 8). This shallow source (15-foot deep) produces an average of 140,000 gallons per day (gpd) from glaciofluvial and glaciolacustrine sand and gravel deposits. The nearby Elmendorf Wells are deep (101 foot) wells that produce water from confined sand and gravel deposits in the Esopus Valley (Figure 8). These wells are not used very much due to poorer water quality. However, they are capable of producing approximately 150,000 gpd.

The remainder of Rolling Meadows' water sources are from the local bedrock. The Orchard Street Well and Spring are 30 feet and 15 deep, respectively (Figure 8). They produce up to 40,000 gpd from the Onondaga-Schoharie Limestone Aquifer. Other bedrock wells supplying residents include the Griffin Drive Well (206 ft. deep, 25,000 gpd), the Conifer Lane Well (306 ft. deep, 1,500 gpd), and the Leewood Knolls Well (290 ft. deep, 7,000 gpd) (see Figure 8). The Leewood Knolls Well is the sole source for the Altamont Drive subdivision in the Riverside Park area.

In addition to the Rolling Meadows Water Corporation, there is one other community water system in the study area: the Alpine Heights Trailer Park (Figure 8). A drilled bedrock well at the location serves approximately 20 units. Finally, there are also two non-community public water systems in the Old Hurley area. These are Twin Lakes Resort and the Hurley Recreation Association (Figure 8). Both rely upon drilled bedrock wells.

Old Hurley
Wellhead Protection Areas



Legend

Wellhead Protection Areas

- Alpine Heights Well
- Conifer Lane Well
- Elmendorf Wells
- Griffin Road Well
- Hurley Recreation Association Well
- Kent Springs
- Leewood Knolls Wells
- Orchard Street Spring/Well
- Twin Lakes Well

- Public Water Supply Source
- Water
- Stream
- Parcel Boundary
- Town of Hurley Boundary

N

Wellhead protection areas mapped by Steven Winkley, NYRWA.

Scale

0 1,250 2,500 5,000 7,500 10,000 Feet

Figure 8

3.2 Delineation of Wellhead Protection Areas

The USEPA defines a wellhead protection area as the surface and subsurface area surrounding a well through which contaminants are reasonably likely to move toward and reach the water well. Wellhead protection areas generally approximate the recharge areas for supply wells.

New York Rural Water Association has mapped the wellhead protection areas for the public water supply wells in the Old Hurley area (see Figure 8). A minimum 500-foot radius protective inner zone was established as part of the wellhead protection area around each public well in order to be consistent with NYSDOH's Source Water Assessment Area. For the bedrock supply wells, the remainder of the wellhead protection area was oriented along the inferred groundwater flow direction. This direction mirrors the trend of structural features such as the axis of folds, faults, strike of bedding planes, and observed linear features. The outer limits of the bedrock wellhead protection areas were drawn to include the area tributary to the inner zone (500-foot radius) under pumping conditions. The size of the wellhead protection areas were adjusted in some cases to ensure that the estimated amount of recharge generated in the protection area at least equaled the amount of ground water produced from each source (see Appendix A).

The wellhead protection area for the Kent Springs was based upon topography and surficial geologic contacts. The protection area for the Elmendorf Wells includes the minimum area of the confined Esopus Valley aquifer that would support the production from these wells (based upon representative recharge rates for surficial materials – see Appendix A).

4.0 GROUNDWATER CONTAMINATION POTENTIAL

4.1 Sensitive Hydrogeologic Settings

Vulnerability to groundwater contamination depends in large part on the hydrogeologic setting. Sensitive hydrogeologic settings are those aquifer types that have large interconnected openings (voids) that allow ground water to move at relatively high velocities with little or no reduction of contamination. The USEPA (2000) has identified three types of sensitive aquifers types: (1) karst aquifers, (2) fractured bedrock (igneous and metamorphic rock) aquifers, and (3) gravel aquifers. These types of aquifers are highly vulnerable to contamination unless a hydrogeologic barrier exists. Hydrogeologic barriers are physical, chemical, and biological factors that prevent the movement of contaminants to a supply well.

As discussed previously, the Old Hurley area is situated in the so-called Karst Aquifer Region. The Onondaga-Schoharie Carbonate Bench and the Binnewater Lakes Carbonate Fold-Thrust Belt are karst aquifer settings. Here, groundwater has the potential to flow rapidly through large, interconnected void spaces. Groundwater flow velocities can be measured in feet per hour in such aquifers. Karst formations such as the Onondaga Limestone can transmit contaminants long distances over relatively short time

periods with little or no inactivation or removal of the contaminants. Sinkholes and other depressions at the land surface represent direct pathways for contaminants to enter the aquifer. Many areas of the Onondaga-Schoharie Carbonate Bench and Binnewater Lakes Carbonate Fold-Thrust Belt have very limited soil cover. Here, an effective hydrogeologic barrier does not exist and activities at the land surface have high potential to impact aquifer water quality.

Gravel aquifers exist along the Esopus Valley. Groundwater flow in some of these aquifers is relatively fast, measured in feet per day. The glaciofluvial sand and gravel deposits supplying the Kent Springs lack an effective hydrogeologic barrier. This aquifer is thus vulnerable to potential sources of contamination. In contrast, deeper sand and gravel in the Esopus Valley is overlain by a considerable thickness of clay and other fine-grained deposits. Such a confining layer is a type of hydrogeologic barrier that protects the aquifer from sources of contamination at or near the land surface. This aquifer is not vulnerable to contamination as long as the confining layer(s) is not breached by wells, mines, boreholes, etc.

4.2 Existing and Potential Sources of Contamination

Groundwater resources are susceptible to contamination from a variety of manmade sources. These include various industrial, commercial, residential, and agricultural uses and activities. Several of these potential sources of contamination are regulated by state agencies such as the New York State Department of Environmental Conservation (NYSDEC). Some others are not. Once contaminated, ground water is very difficult and costly to cleanup. There have been a number of petroleum and other chemical spills that have been investigated by the NYSDEC Spill Response Unit. The majority of these spills were found to not be of serious concern and their cases were closed. Some of these spills were investigated further and some cleanup activities were undertaken. Four spills have not been closed in the Old Hurley area (see Figure 9). These spills are either still being investigated or have not met cleanup standards.

As indicated previously, there are a number of different uses and activities that have the potential to contaminate ground water. These practices typically involve the handling, use, storage, and/or disposal of petroleum and other hazardous substances that are capable of contaminating ground water. The threat of groundwater contamination can be reduced to some extent through the use of environmentally-sound best management practices and/or structural methods. Table 1 is a list of potential contaminant sources that typically pose a high risk of contamination. This checklist was taken from USEPA (1994).

Figure 9 is a map displaying potential groundwater contamination sources in Old Hurley. Some of these potential sources (petroleum storage tanks, spills) are regulated by the NYSDEC. RCRA waste facilities are regulated by USEPA. The RCRA (Resource Conservation and Recovery Act) program regulates the management of solid waste, hazardous waste, and underground storage tanks holding petroleum products or certain chemicals.

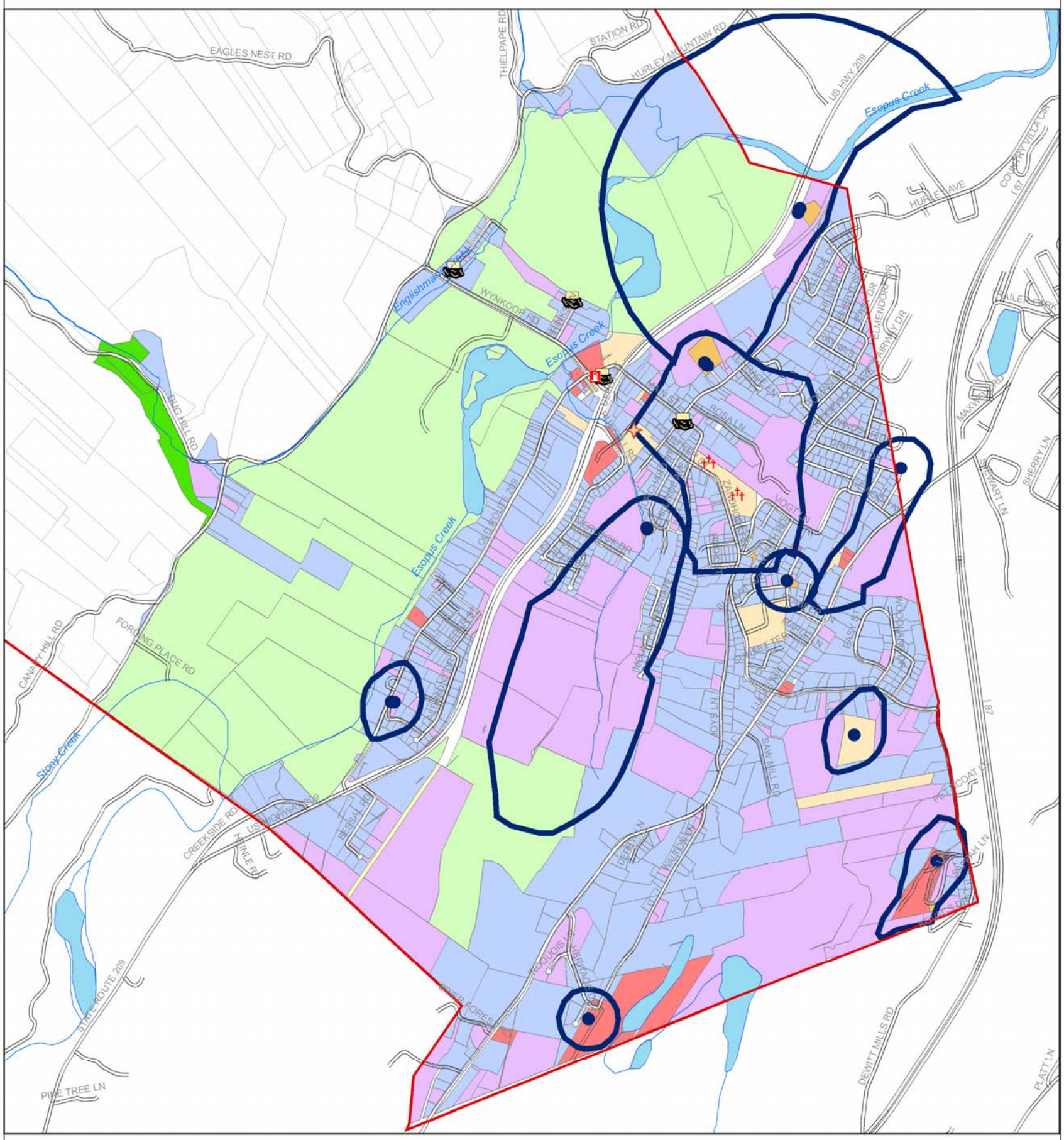
Risk Categories of Land Uses and Activities Affecting Ground Water Quality

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*

Table 1. High Risk Potential Sources of Contamination (from EPA, 1994).

Old Hurley
Land Use and Potential Contaminant Sources



Legend

- Town of Hurley Boundary

Potential Contaminant Source

- Cemetery
- Gas Station
- RCRA Small Generator
- Open Spill (From NYSDEC Data)

Land Use Classification

- Agricultural
- Commercial
- Community Services
- Public Services
- Recreation and Entertainment
- Residential
- Vacant
- Wild, Forested, Conservation Lands

- Public Water Supply Source
- Wellhead Protection Area
- Water
- Stream

N

Wellhead protection areas mapped by Steven Winkley, NYRWA.

Scale
0 1,250 2,500 5,000 7,500 10,000 Feet

Figure 9

NYRWA used property classification codes from Ulster County real property data to identify land use within the study area. Based on this review of land use, only the Hurley Cemetery and the Stewart's gas station were revealed as high-risk potential sources of contamination within the study area. Agricultural land use is prevalent in the Esopus Valley area, but no high-risk concentrated animal feeding operations were identified here.

4.3 Land Use

Figure 9 displays the present land use in the area based largely upon a classification from real property data. Residential development on lots typically ranging from 0.25 to 1 acre is the prevalent land use in the area. Most of these homes are supplied with public water from the Rolling Meadows Water Corporation. There is no central sewer system, and each lot has an on-site septic system. Commercial development is very limited. As indicated before, agricultural use is extensive in the Esopus Valley.

4.4 Potential Future Development

Commercial and residential development does have the potential to affect the quantity and quality of available groundwater resources. If improperly planned, development in wellhead protection areas and sensitive hydrogeologic settings could conceivably lead to a diminishment of groundwater supplies or an increased risk of contamination. In order to identify groundwater resources that are susceptible to growth, it is necessary to try to predict where development may occur. First, an assumption is made that development will occur on land that is not now developed. A second assumption is made that development is not likely in some areas due to physical constraints.

Land that is not intensively developed for residential, commercial, industrial or institutional use is referred to as open space. In order to identify open space areas that could conceivably be developed, a GIS and real property tax data are utilized. First, large (>10 acres) privately-owned parcels that are either vacant or are not intensively developed are defined. Next, some areas that are either not developable or are less likely to be developed due to certain site characteristics are identified (see Figure 10). These characteristics are referred to as physical site development constraints. These constraints include: (1) proximity to wetlands, streams, ponds, lakes, and other surface waters; (2) floodplain areas; and (3) steep slopes.

Residential or commercial development would not likely occur within close proximity to wetlands and surface water bodies due to state or local regulations. For example, a setback of 50 feet is required from surface water bodies for certain components of onsite wastewater treatment systems. A wetlands permit is required for most development activities within 100 feet of a mapped NYSDEC wetland. Other areas of wetlands, such as those identified on the National Wetlands Inventory (NWI) by the U.S. Fish & Wildlife Service, would not be suitable for development. Development on floodplain areas is not currently specifically regulated by the Town of Hurley in its zoning. However, the Federal Emergency Management Agency (FEMA) requires new development to be elevated above the 100-year flood level in order to qualify for

insurance. Steep slopes are problematic for new construction for a variety of reasons including surface erosion, creep and sudden slope failure, as well as septic system failure. Septic systems are generally not permitted on slopes greater than 15 percent. Figure 10 is a map of physical site development constraints in the Old Hurley area that was produced by NYRWA using a GIS.

The critical groundwater resources that are highly susceptible to growth are privately-owned open space areas that do not have any site development constraints and are located in either wellhead protection areas or sensitive hydrogeologic settings (i.e. karst aquifers and unconfined sand and gravel aquifers). These areas are depicted on Figure 11.

5.0 GROUNDWATER PROTECTION STRATEGIES

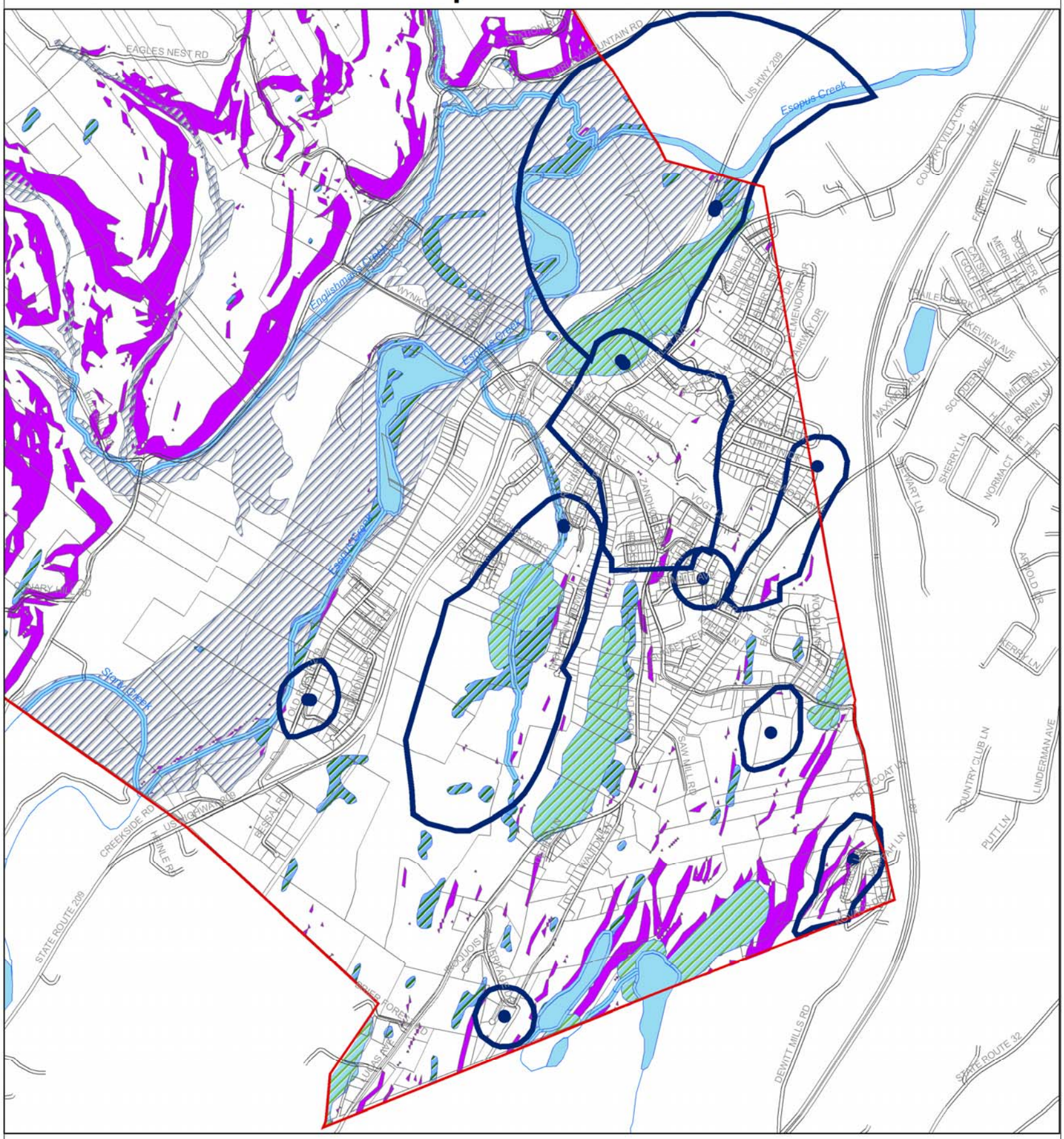
It is important to develop and implement effective groundwater protection measures in order to protect water resources and encourage future development where it is best suited. There are number of groundwater protection measures that can be chosen. Some of these are regulatory in nature. Others are non-regulatory. The Town of Hurley must determine which measures are acceptable given local socioeconomic and political conditions.

5.1 Open Space Planning

In 2004, the Hurley CAC finished preparing an Open Space Preservation Plan. This plan inventoried open space resources and recommended short-term and long-term actions to initiate open space preservation. The CAC did fund a special study by Dr. Katherine J. Beinkafner of Mid-Hudson Geosciences to study the Town's unconsolidated and bedrock aquifers, wetlands, and surface waters and to make recommendations for measures to protect them. The resulting study identified five general areas of concern: (1) the Esopus Creek Floodplain; (2) Contaminated Sites; (3) High Permeability Recharge Soil Locations; (4) Wells in the Carbonate Bedrock; and (5) Potential Areas for New Water Supplies. It was beyond the scope of the Mid-Hudson Geosciences report to identify recharge areas or wellhead protection areas for individual public water supply wells, to identify specific parcels warranting protection, or to develop specific protection strategies such as overlay protection zone(s).

NYRWA recommends that the Hurley Open Space Preservation Plan be amended to include those specific areas identified in Figure 11. Protection of these vulnerable open space areas is critical to groundwater resource protection in the Old Hurley area. In addition, much of this area coincides with a priority conservation project area in New York State's 2005 Draft Open Space Conservation Plan known as the Karst Aquifer Region. This narrow band of carbonate rocks in Ulster County is *"rich in biological, geological and historical resources, provides diverse outdoor recreational opportunities and critical water reserves."*

Old Hurley
Site Development Constraints



Legend

- NYSDEC Wetlands & 100-Ft. Buffer
- NWI Wetlands
- Surface Water & 50-ft. Buffer
- FEMA Flood Hazard Area
- Steep slopes (> 15 %)
- Parcel Boundary
- Road/Street
- Public Water Supply Well
- Wellhead Protection Area
- Town of Hurley Boundary

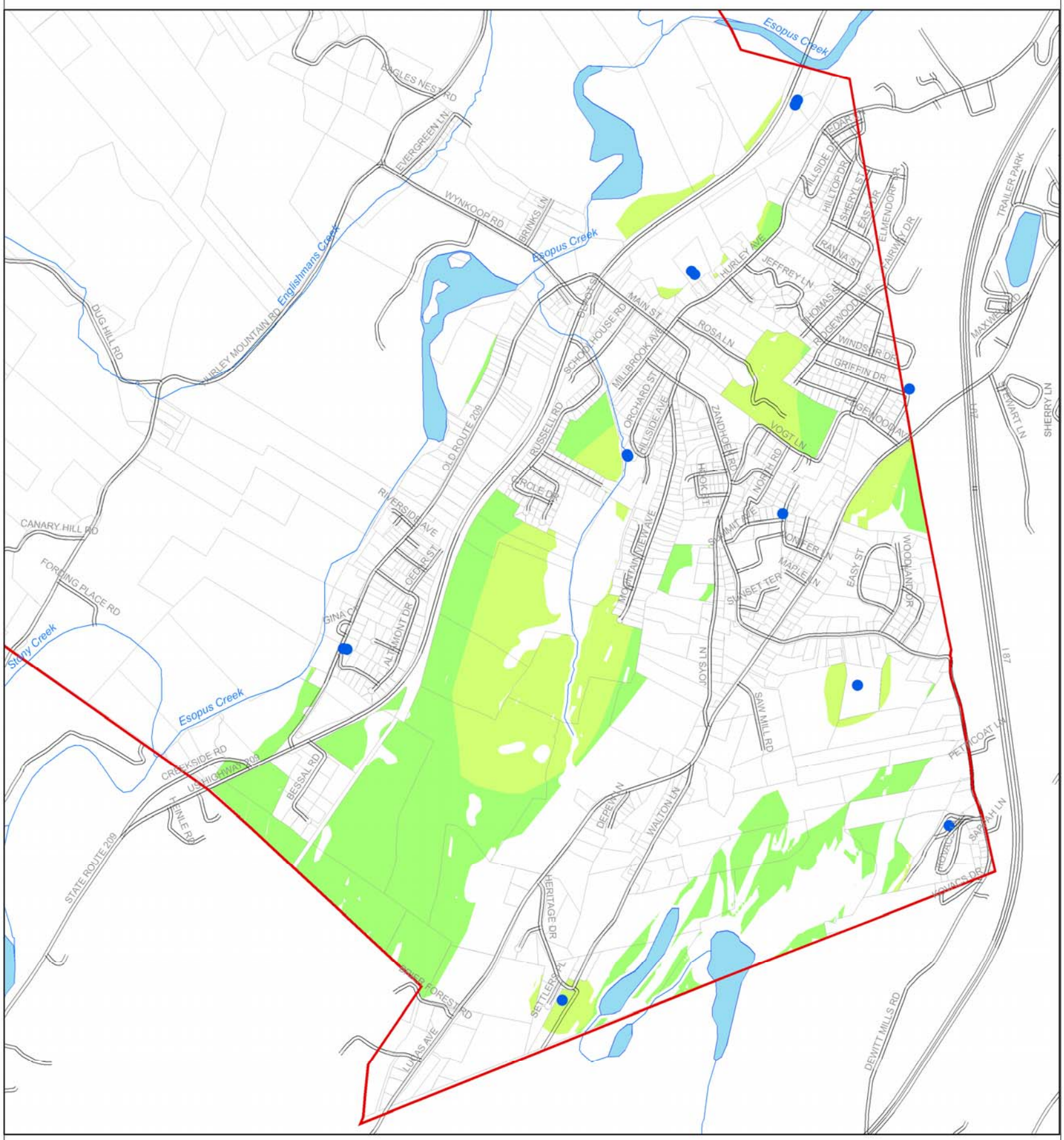
N

Wellhead protection areas mapped by Steven Winkley, NYRWA.

Scale
0 1,250 2,500 5,000 7,500 10,000 Feet

Figure 10

Old Hurley
Open Spaces Critical to Groundwater Resources



Legend

- Developable Open Space In Wellhead Protection Areas
- Developable Open Space In Other Sensitive Hydrogeologic Settings
- Parcel Boundary
- Road/Street
- Town of Hurley Boundary
- Public Water Supply Source

N

Scale

0 1,250 2,500 5,000 7,500 10,000 Feet

Figure 11

5.2 Land Use Regulations

There are three types of land use regulations that are commonly used to protect ground water and other water resources. These include subdivision regulations, site plan review, and zoning.

Subdivision Regulations

Subdivision regulations relate to how land is to be divided into lots and what improvements such as streets, lighting, fire protection, utilities, drainage, and parks are made to service the lots. In Hurley, the Town has Land Subdivision Regulations. Subdivisions are to be approved by the Planning Board. This approval involves review of the proposed layout of lots, topography, drainage, roads, water and sewer facilities and other details. Subdivision regulations are separate from zoning regulations and apply to the entire Town.

Subdivision regulations in Hurley can be amended to optimize protection of groundwater resources. For example, regulations could stipulate how wells, septic systems, storm water infiltration structures, and fuel storage facilities are located in order to minimize impacts. Subdivision regulations could also be written to specify that the quality, quantity and dependability of a proposed water supply must be sufficient. For example, subdivision regulations could require technical documentation that the local groundwater resources will support the planned subdivision and that the development does not impact other existing water supplies such as public water supply wells.

Subdivision regulations can also be written to encourage the use of so-called conservation subdivisions. These are essentially enhanced cluster subdivisions. Conservation areas are protected from development and houses are clustered on the remaining property. These conservation areas could include sensitive groundwater features. Conservation subdivisions reduce the amount of impervious surfaces and protect groundwater discharge areas along streams and surface water. However, conservation subdivisions do pose a concern with respect to onsite wastewater disposal. By clustering homes on smaller lots, there is the possibility that the density of individual disposal systems will lead to excess nitrate loading. If individual disposal systems are planned, lot sizes must be appropriately sized to prevent loading. Alternatively, a small on-site centralized wastewater disposal facility could be constructed for the subdivision. Such a facility must be carefully designed and sited to avoid off-site impacts.

Site Development Plan Review

Site development plan review is a local regulatory process that involves municipal review and approval of how development is to occur on a single parcel of land. In this way, site development plan review differs substantially from subdivision regulations. Site development plan review does not prohibit certain land uses. However, it does regulate

how development will take place by specifying the arrangement, layout and design of the proposed use.

Local site development plan review and approval requirements are currently part of the Town of Hurley Zoning Law. A site development plan review by the Planning Board is required for certain proposed uses in certain zoning districts.

In Appendix B, it is proposed that site development plan review be extended to any multi-unit residential projects, commercial, or industrial project within an aquifer protection overlay district (see below). Along with other required data for a site plan, the Planning Board could also require applicants to submit additional pertinent data such as:

- The proposed means of storage, distribution, use, treatment, and/or disposal of any wastes, chemicals, etc.
- The proposed means of water supply, including if applicable an estimate of the total daily groundwater withdrawal rate;
- Results of aquifer pumping tests and water quality tests;
- A list of all petroleum, chemicals, pesticides, fuels and other hazardous substances/wastes to be used, generated, stored, or disposed of on the premises;
- A description of the pollution control measures proposed to prevent groundwater or surface water contamination; and
- A statement as to the degree of threat to water quality and quantity that could result if the control measures failed.

After submittal of a site plan and related data, the local municipality grants approval only after the applicant can demonstrate that certain standards and criteria have been met. Here is sample language for an approval criteria that addresses groundwater concerns:

> *"The proposed site development and use must not adversely impact either the quality or quantity of ground water available to abutting properties or to any public water supply systems."*

Zoning

Zoning regulates land uses, the density of land uses, and the siting of development. For those communities with zoning, it can prove to be an effective means of water resource protection. There are a number of zoning techniques that are applicable to groundwater protection. Perhaps the most widely accepted zoning technique for water resource protection involves overlay zoning. Overlay zoning creates a set of regulations for a given area that are in addition to the regulations in the standard "underlying" zoning districts. The area that is covered by overlay zoning depends upon the particular resource to be protected. Examples of overlay zoning are for waterfront areas, flood plains, historic areas, steep slopes, and sensitive environmental areas such as wellhead protection areas, watersheds, and groundwater recharge areas. Overlay zoning regulations frequently define what additional uses are prohibited, what the bulk and area regulations exist in the overlay zone, and what design standards apply.

It is proposed by NYRWA that the Town of Hurley develop and implement an Aquifer Protection Overlay District. This overlay district would include all wellhead protection areas as mapped on Figure 8 and other sensitive hydrogeologic settings in the Old Hurley area (see Figure 12). Regulations for the Aquifer Protection Overlay District are contained in Appendix B. These include prohibitions on certain high risk land uses and site development plan review requirements.

5.3 Environmental Review

In New York, all state and local government agencies are required by the State Environmental Quality Review Act (SEQR) to consider environmental impacts prior to making decisions to approve, fund, or directly undertake an action. Types of decisions or actions that are subject to SEQR include approval or direct development of physical projects, planning activities that require a decision, and adoption of rules, regulations, procedures and policies. Note that so-called Type II actions do not require environmental review because they either do not significantly impact the environment or are specifically precluded from environmental review under SEQR. However, all other so-called Type I or Unlisted Actions do require a determination of significance. If an action is determined to have potentially significant adverse environmental impacts, an Environmental Impact Statement (EIS) is required.

One way to insure that agencies take an area of critical environmental importance into account when making discretionary decisions is for a local municipality to designate a specific geographic area within its boundaries as a critical environmental area (CEA) under SEQR. Aquifer, watersheds, wetlands, etc. would meet the SEQR criteria for a CEA. The consequence of designating a CEA is that all government agencies (local or state) must consider the potential impact of any Type I or Unlisted Action on the environmental characteristics of the CEA when determining the significance of a project.

It is recommended that the Town of Hurley name the Aquifer Protection Overlay District as a critical environmental area. In this way, potential impacts on water supplies and the environment can be adequately addressed.

5.4 Direct Purchase or Purchase of Conservation Easements

In some instances, a community may wish to purchase the full interest in a particular parcel(s) in order to conserve its natural or scenic resources. A more common method of land preservation is the purchase of an interest in the land, called a conservation easement. The easement places deed restrictions on property uses to assure that the property is not developed in an inappropriate manner. Typical easements permit agriculture, forestry, recreation, etc. but restrict or prohibit industrial, commercial, and residential development. The open space areas depicted in Figure 11 should be prioritized for direct purchase and/or conservation easements.

Old Hurley
Proposed Aquifer Protection Overlay District

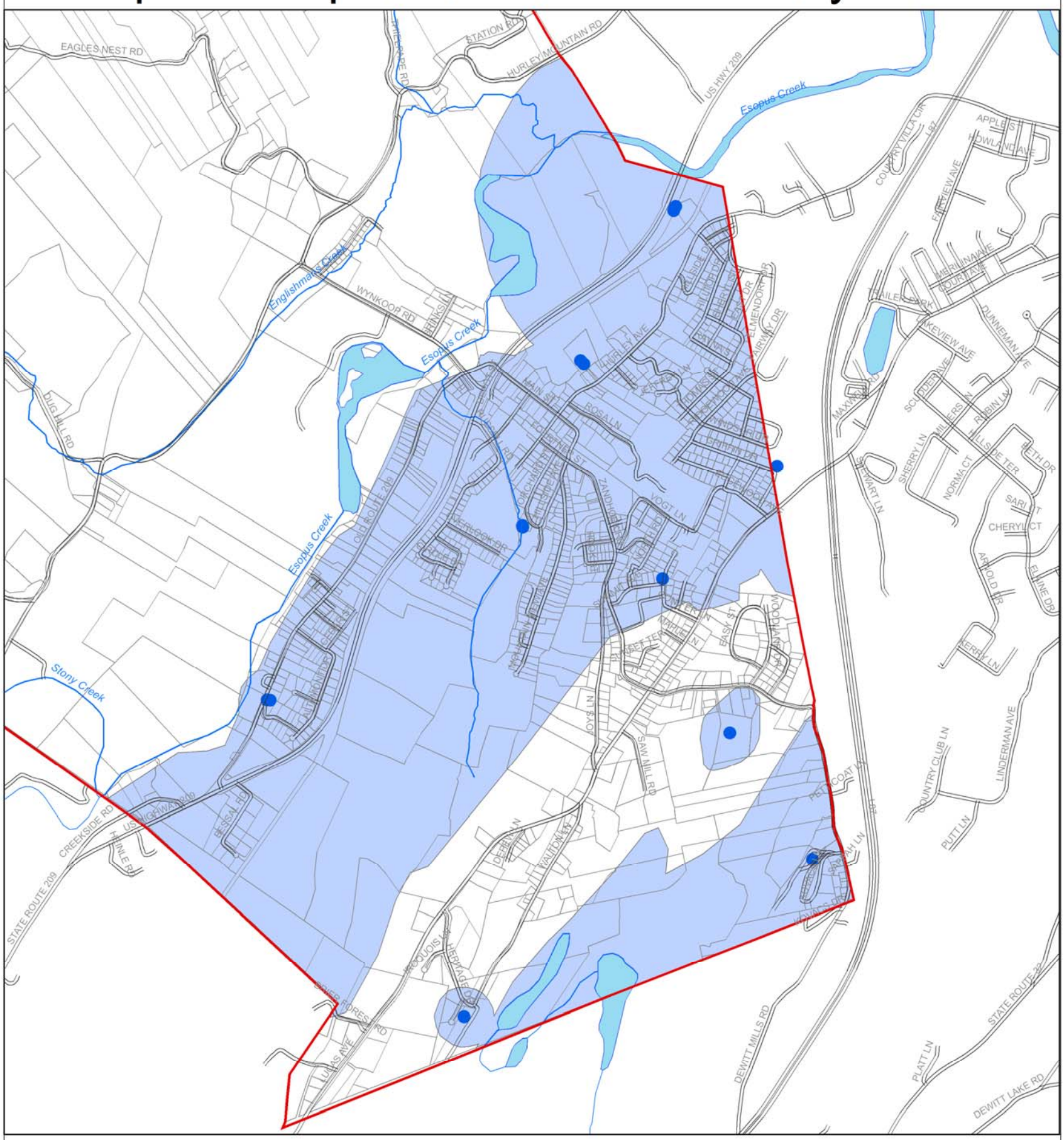


Figure 12

Communities may purchase conservation easements or individuals can donate the easements and thus qualify for possible tax advantages. Alternatively, non-profit land trusts may purchase conservation easements or work with local governments to facilitate conservation easements.

5.5 Education

Public education can be an excellent non-regulatory tool to minimize potential contamination. There are several instances where education may be effective. These include:

- Educating homeowners on proper operation and maintenance of onsite wastewater treatment systems and wells;
- Encouraging the use of water saving devices within homes;
- Promoting natural landscaping and other lower demand vegetation;
- Educating homeowners on proper fertilizer/pesticide application rates and practices; and
- Supporting proper waste disposal (i.e. recycling).

A particularly appropriate public education device for the Old Hurley area is a guide known as *Living on Karst.* This is reference guide for landowners in limestone regions that was produced by the Cave Conservancy of the Virginias (http://www.dcr.virginia.gov/dnh/livingonkarst.htm).

5.6 Emergency Planning

Unfortunately, emergency situations affecting ground water do sometimes occur. One conceivable scenario involves petroleum/hazardous material spills and/or the discovery of contamination. As indicated before in this plan, numerous chemical spills have occurred in Old Hurley and these may increase as the population does. With the busy Route 209 corridor in the Old Hurley area, the potential exists for accidents to occur.

Under state law, all petroleum and most hazardous material spills must be reported to the DEC Hotline (1-800-457-7362). NYSDEC then informs other response agencies such as the local fire department if the spill poses a potential explosion and/or fire hazard and the health department if a drinking water supply is threatened as result of a spill. However, in most instances, the local municipality is not required to be notified. Nevertheless, it is important that the Town be notified if a spill is discovered within a sensitive drinking water resource area such as the Aquifer Protection Overlay District.

Another emergency situation involving ground water is drought. Here in New York State we on average have ample precipitation. However, there are variations in weather patterns that result in periods of drier weather. Based upon data from the National Climatic Data Center, New York State regularly experiences moderate drought

conditions every 2 to 5 years. These moderate droughts typically last for a few months. Of much more concern is the fact that we also experience severe to extreme droughts every 10 to 20 years. These can last nearly a year to over two years.

During these periods of severe to extreme drought, many wells with marginal yields may fail. The Town of Hurley may wish to work with local water suppliers to have a plan in place in order to assist households or water systems in such difficulty.

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APPENDIX A

VALUES USED IN WHPA CALCULATIONS

Source Name	WHPA Size Acres	Surficial Deposit	Estimated Recharge Rate - ft/yr.	Estimated Daily Recharge - gpd	Estimated Use - gpd	% difference
Kent Springs	189.4	**Sand & Gravel** & shallow sand & gravel	0.94	158,507	140,000	12%
Griffin Road Well	59.2	**Thin till** & thin sand and gravel	0.56	29,736	25,000	16%
Conifer Lane Well	18.0	**Thin sand & gravel**	0.45	7,216	1,500	79%
Leewood Knolls Wells	22.2	**Shallow Till** & shallow sand and gravel	0.45	8,899	7,000	21%
Orchard Street Spring/Well	261.0	**Silt&clay/Shallow Till**	0.23	52,429	40,000	24%
Elmendorf Wells	454.2	**Sand/Clay & silt**	0.38	152,033	150,000	1%
Alpine Heights Well	35.9	**Rock**	0.19	6,008	6,000	0%
Hurley Recreation Assoc. Well	24.8	**Shallow Till**	0.11	2,491	2,500	0%
Twin Lakes Well	18.1	**Shallow Till**	0.19	3,026	1,250	59%

Note: recharge rate reduced due to topographic setting

APPENDIX B

PROPOSED AQUIFER PROTECTION OVERLAY DISTRICT

AQUIFER PROTECTION OVERLAY DISTRICT

I. PURPOSE

The Aquifer Protection Overlay District is established to preserve the quality and quantity of the Town's groundwater resources in order to ensure a safe and adequate water supply for present and future generations; and to preserve groundwater resources currently in use and those aquifers having potential for a future use as a public water supply.

II. APPLICABILITY

The provisions of this section shall apply to all properties that lie within the area that is designated as an Aquifer Protection Overlay District, as defined herein, and delineated on the Official Zoning Map and a map entitled "Aquifer Protection Overlay District Map", and filed with the Town Clerk.

III. DEFINITIONS

For the purpose of this section, certain words and terms shall have the meanings as listed below:

Agronomic rate - The rate of nitrogen addition designed to provide the amount of nitrogen needed by the crop or vegetation grown on the land, and to minimize the amount of nitrogen that passes below the root zone of the crop or vegetation grown on the land to ground water.

Animal feeding operation - A lot or facility (other than an aquatic animal production facility) where animals have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period, and the animal confinement areas do not sustain crops, vegetation, forage growth, or post-harvest residues in the normal growing season.

Aquifer - A geologic formation or deposit composed of bed rock or unconsolidated sediments that is capable of yielding significant amounts of ground water.

Aquifer protection overlay district - The areas identified as such on the Zoning Map and on the map entitled "Aquifer Protection Overlay District Map" based on the document by New York Rural Water Association entitled *"Groundwater protection Plan for the Old Hurley Area"*.

Bottled water - Any product, including natural spring or well water taken from municipal or private utility systems or other water, distilled water, de-ionized water or any of the foregoing to which chemicals may be added, which are put into sealed bottles, packages or other containers, to be sold for domestic

consumption or culinary use, involving a likelihood of such water being ingested by human beings.

Bulk water - Water intended for potable uses, which is transported by tank trucks.

Concentrated animal feeding operation (CAFO) - An animal feeding operation that would be required to obtain a State Pollution Discharge Elimination System (SPDES) General Permit based upon the numbers and types of animals and/or method of animal waste discharge.

Contamination - The degradation of natural water quality as a result of human activities to the extent that its usefulness is impaired.

Deicing compounds - Any bulk quantities of chloride compounds and/or other deicing compounds (e.g., urea or calcium magnesium acetate) intended for application to roads, including mixtures of sand and chloride compounds in any proportion where the chloride compounds constitute over eight percent of the mixture. Bulk quantity of deicing compounds means any quantity, but does not include any chloride compounds in a solid form, which are packaged in waterproof bags or containers, which do not exceed one hundred pounds each.

Disposal - The abandonment, discharge, deposit, injection, dumping, spilling, leaking, or placing by any other means of any solid waste, petroleum, radioactive material, hazardous substance, hazardous waste, or wastewater into or onto land or a surface water body.

Fertilizers - Any commercially produced mixture generally containing phosphorous, nitrogen, and potassium, which is applied to the ground to increase nutrients from plants.

Ground water - Water in the subsurface zone beneath the water table in which all pore spaces are completely saturated.

Hazardous ~~material~~ substance- Any substance listed as a hazardous substance in 6 NYCRR Part 597, Hazardous Substance List, or a mixture thereof. In general, a hazardous substance means any substance which: (1) because of its quantity, concentration, or physical, chemical, or infectious characteristics poses a significant hazard to human health or safety if improperly treated, stored, transported, disposed of, or otherwise managed; (2) poses a present or potential hazard to the environment when improperly treated, stored, transported, disposed of, or otherwise managed; (3) because of it toxicity or concentration within biological chains, presents a demonstrated threat to biological life cycles when released into the environment.

Hazardous waste - A waste, or combination of wastes, which are identified or listed as hazardous pursuant to 6 NYCRR Part 371, Identification and Listing of Hazardous Wastes. Hazardous wastes include but are not limited to petroleum products, organic chemical solvents, heavy metal sludges, acids with a pH less than or equal to 2.0, alkalies with a pH greater than or equal to 12.5, radioactive substances, pathological or infectious wastes, or any material exhibiting the characteristics of ignitability, corrosivity, reactivity, or fails the Toxicity Characteristic Leaching Procedure (TCLP).

Petroleum - Any petroleum-based oil of any kind which is liquid at 20 degrees Celsius under atmospheric pressure and has been refined, re-refined, or otherwise processed for the purpose of: 1) being burned to produce heat or energy; 2) as a motor fuel or lubricant; or 3) in the operation of hydraulic equipment.

Process waste - Any waste generated by industrial, commercial, or mining operations that by virtue of some use, process, or procedure no longer meets the manufacturer's original product specifications.

Radioactive Material - Any material in any form that emits radiation spontaneously, excluding those radioactive materials or devices containing radioactive materials which are exempt from licensing and regulatory control pursuant to regulations of the New York State Department of Labor or the United States Nuclear Regulatory Commission.

Septage - The contents of a septic tank, cesspool, or other individual wastewater treatment work which receives domestic sewage wastes.

Sewage - The combination of human and household waste with water, which is discharged to the home plumbing system.

Sludge - The solid, semi-solid, or liquid waste generated from a waste processing facility, but does not include the liquid stream of effluent.

Solid Wastes - Any garbage, refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded materials including solid, liquid, semi-solid, or contained gaseous material, resulting from industrial, commercial, mining and agricultural operations, and from community activities.

Wastewater - Aqueous carried waste including, but not limited to, dredge spoil, solid waste, hazardous waste, incinerator ash and residue, septage, garbage, refuse, sludge, chemical waste, infectious waste, biological material, radioactive materials, heat, and commercial, industrial, municipal, and agricultural waste.

IV. GENERAL PROVISIONS

A. The provisions of this section are not intended to repeal, abrogate, or annul any portion of these regulations, existing state and federal regulations, or existing easements, covenants, or deed restriction. In any case where there is a conflict, whichever imposes the more stringent restrictions apply.

B. All uses that are permitted in the underlying zones shall be permitted in the Aquifer Protection Overlay District with the exceptions, restrictions, and requirements below.

V. PROHIBITED USES

A. The following uses and activities are specifically prohibited in the Aquifer Protection Overlay District in order to safeguard groundwater resources which serve as present or future drinking water supplies:

i. Airport and/or airport maintenance areas.

ii. Appliance or small engine repair shop.

iii. Automobile repair or service facility.

iv. Boat service, repair, and/or washing establishment.

v. Bottled water or bulk water facilities (including supply sources).

vi. Car wash.

vii. Cemetery or animal crematory.

viii. Chemical and/or biological testing laboratory.

ix. Concentrated animal feeding operations in areas outside of local agricultural district(s) created pursuant to New York State Agriculture and Markets Law.

x. Drilling of wells used for oil, gas, gas storage, solution mining, or brine disposal.

xi. Fertilizer stockpiling or storage except in containers or structures designed to prevent contact with precipitation.

xii. Fuel oil or bulk petroleum dealer/distributor.

xiii. Gasoline service station.

xiv. Golf course or country club.

xv. Hazardous waste treatment, handling, storage, or disposal facility.

xvi. Junkyard, salvage, or impoundment yard (including used motor vehicle parts and scrap/waste materials).

xvii. Laundry, dry cleaner, or self-service laundromat.

xviii. Manufacturing uses (including but not limited to food processing, animal or vegetable products textile products, lumber and wood products, furniture, paper, printing, chemicals, plastics, leather, asphalt/concrete/coal tar, metal industries, metal shops, machine shops, electrical/electronic equipment, and petroleum refining).

xix. Manure storage except for the primary purpose of agricultural use.

xx. Municipal or industrial sewage treatment facilities with disposal of primary or secondary effluent.

xxi. Outdoor storage of coal, deicing compounds, fertilizers, hazardous substances, or hazardous waste.

xxii. Pest control services or pesticide/herbicide store.

xxiii. Pipelines that carry petroleum (other than natural gas) or hazardous substance/waste.

xxiv. Radioactive materials treatment, handling, storage, or disposal facility.

xxv. Regulated medical waste storage, treatment, disposal, and/or destruction facility.

xxvi. Research laboratory.

xxvii. Extraction, preparation, and/or processing of sand and gravel, overburden, and/or naturally formed solid material located on or below the surface of the earth.

xxviii. Solid waste management facility.

xxix. Surface land application of septage, sewage, sludge, or human excreta except where permitted by NYSDEC for agricultural use.

xxx. Trucking or bus terminal.

xxxi. Veterinarian's office, kennel, and/or animal hospital.

xxxii. Any use or activity not otherwise specifically mentioned above that involves the on-site disposal of solid waste, petroleum, radioactive material, hazardous substances, hazardous waste, or aqueous-carried waste (except sewage, animal manure and associated bedding material, and agricultural use of food processing wastes where the waste is applied at or below agronomic rates).

VI. SITE DEVELOPMENT PLAN REVIEW AND APPROVAL IN AQUIFER PROTECTION OVERLAY DISTRICT

A. Requirements

Any proposed use or activity wholly or partially within the Aquifer Protection Overlay District shall be required to have site development plan review and approval by the Planning Board prior to issuance of a building permit or certificate of occupancy except for the construction or modification of a single one- or two-family dwelling, accessory building or use; and/or agricultural uses.

i. The Planning Board may require changes or additions to the site development plan as a condition of approval to safeguard groundwater resources. No building permit and no certificate of occupancy shall be issued unless and until such conditions have been fully met or performed. All improvements to the site shall be completed in strict conformance with the site plan as approved.

ii. In addition to other information that may be required for a site development plan submittal, the following information shall be provided for a proposed use or activity located partially or wholly within the Aquifer Protection Overlay District:

a. A location map of the proposed use or activity in relation to the Aquifer Protection Overlay District boundaries.

b. A map and report detailing the proposed conveyance, storage, distribution, generation, use, and/or treatment of any process wastes, aqueous-carried wastes (except sewage), petroleum, hazardous substances, hazardous wastes, solid waste, radiological substances, and/or incidental wastes.

c. A map and report detailing the proposed conveyance, storage, distribution, generation, use, treatment, and/or disposal of any stormwater and sewage. An application for any proposed use not served by public sewer that will generate more than a daily average of 1000 gallons of wastewater shall include a hydrogeologic assessment prepared by a qualified hydrogeologist. This assessment will include a projection of post development nitrate-nitrogen ground water concentration at the project boundaries.

d. A list of all process wastes, aqueous-carried wastes (except sewage), petroleum, hazardous substances, hazardous wastes, solid waste, and radiological substances to be used, generated, and/or stored on the premises.

e. A description of all pollution control measures and activities proposed to prevent on-site disposal and potential contamination of groundwater or surface water, including spill response activities.

f. A statement as to the degree of threat to groundwater and surface water quality that could result if the control measures failed.

g. A description of the provisions for the off-site disposal of solid waste, petroleum, radioactive material, hazardous substances, hazardous waste, process wastes, and/or aqueous-carried waste (except sewage).

h. A description of the proposed means of water supply, including if applicable an estimate of the total daily ground water withdrawal rate. An application for any proposed use or activity that will extract more than 1000 gallons per day of ground water shall include a groundwater extraction impact assessment prepared by a qualified hydrogeologist.

i. Copies of any permits and applications made to any other governmental agencies;

j. A completed short form SEQR Environmental Assessment Form (EAF);

k. Additional information or material that may be requested by the Planning Board in order to evaluate the site plan.

B. Approval Criteria

The following criteria shall be used by the Planning Board in reviewing applications for site development plan review and shall serve as minimum requirements for approval of the application pursuant to this section. The application shall not be approved unless the Planning Board determines that the applicant has met all of these standards. In all instances, the burden of proof shall be on the applicant who must produce evidence sufficient to warrant a finding that all applicable criteria have been met.

i. The proposed use or activity must comply with the regulations and requirements set forth in this section regarding the Aquifer Protection Overlay District.

ii. Adequate provisions must be made for the collection and disposal of all stormwater that runs off proposed roads, parking areas, roofs, and other surfaces such that it will not have an adverse impact on abutting or downstream properties.

iii. Filling, excavation and earth moving activity must be kept to a minimum. Natural vegetation must be preserved and protected wherever possible. Soil erosion and sedimentation of watercourses and water bodies must be minimized.

iv. The proposed use or activity must be located or designed in such a manner that it will not adversely impact the quantity of ground water available to existing off-site wells, including well water levels, aquifer water levels, and the levels of adjacent lakes, ponds, wetlands, or watercourses.

v. The proposed use or activity must be located or designed in such a manner that it will not adversely impact the quality of ground water available to wells, including the quality of water that may be induced from adjacent lakes, ponds, wetlands, or watercourses.

vi. The proposed use or activity must be designed with adequate control measures to prevent the on-site disposal of solid waste, pathological or medical waste, petroleum, radioactive material, hazardous substances, hazardous waste, or process waste, including aqueous-carried waste (except sewage). The adequacy of the proposed control measures must be evaluated in terms of their simplicity, reliability, and feasibility, as well as the degree of threat to public water supply wells and other wells in the event that the control measures failed.

vii. All handling and storage of solid waste, pathological or medical waste, petroleum, radioactive material, hazardous substances, hazardous waste, or process wastes must meet the standards of the New York Department of Environmental Conservation, and/or all applicable state or federal agencies.

viii. The proposed use or activity must provide adequate provisions for the safe off-site disposal of solid waste, hazardous waste, process waste, and other wastes generated. All waste must be disposed of at a licensed disposal facility having adequate capacity to accept the use's wastes.

ix. In the event of an on-site disposal (i.e. spill) of potential contaminants, the proposed use or activity must have adequate spill response and containment plans in place to minimize groundwater or surface water contamination.