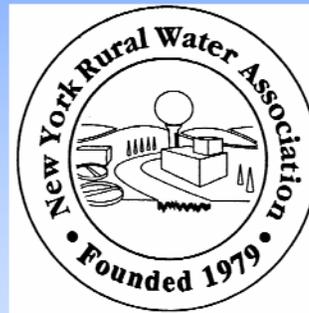


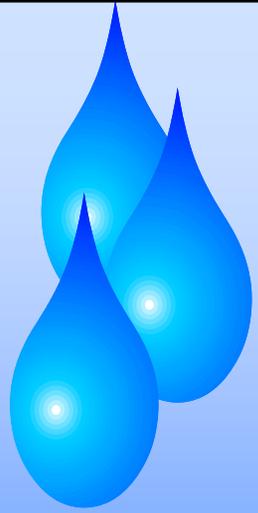
# **Wellhead Protection Plan for the Village of Cazenovia Water Supply**

**By**

**Steven Winkley**

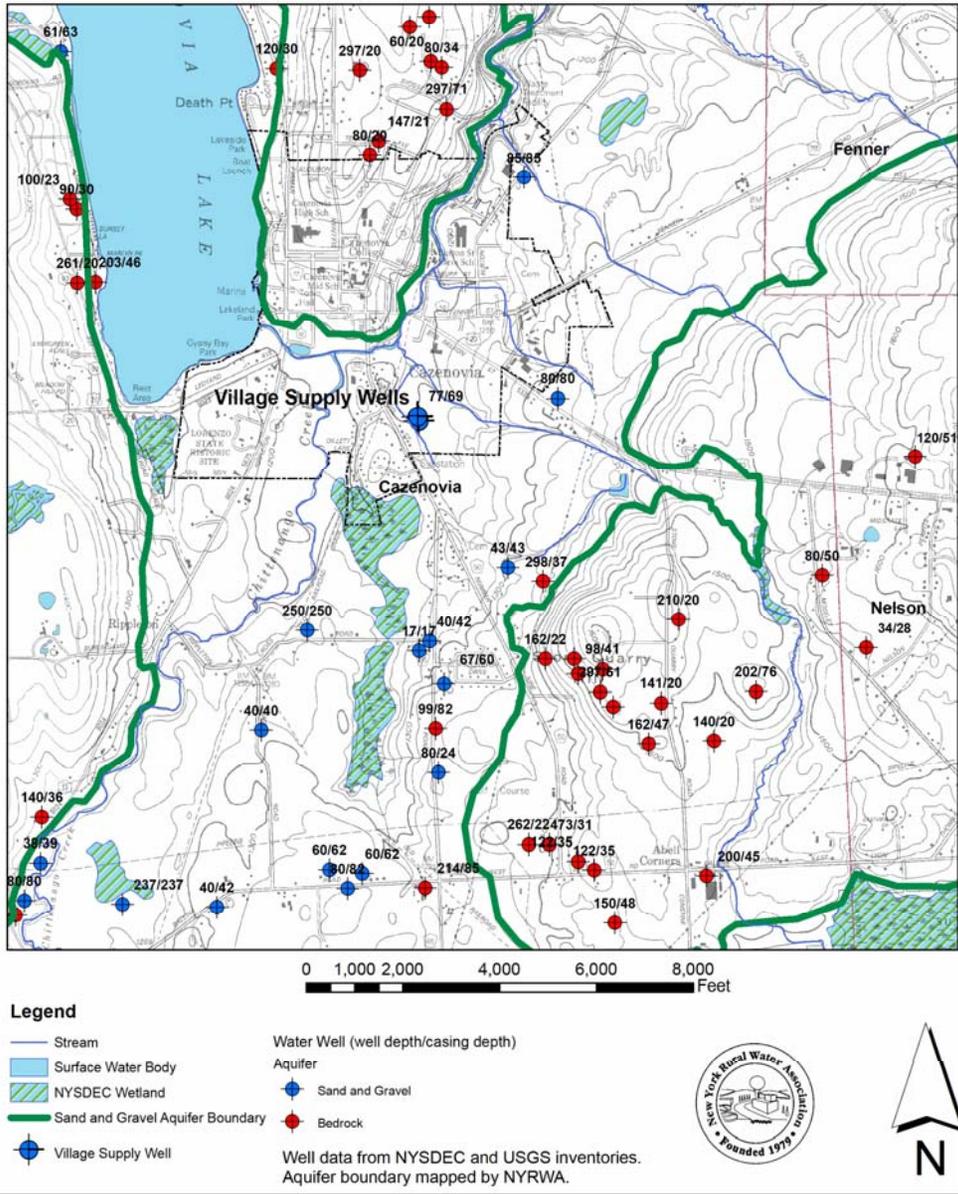
**New York Rural Water Association**





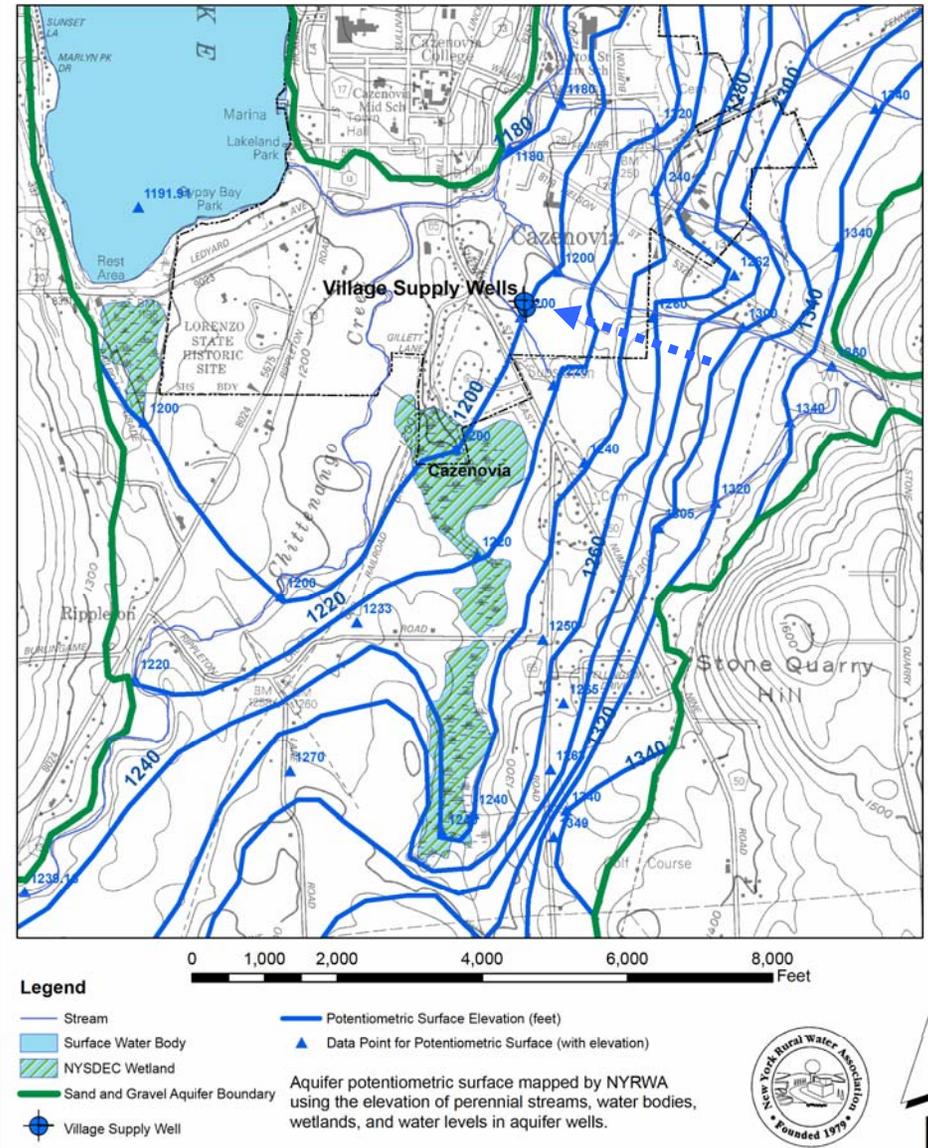
# Hydrogeological Findings

## Hydrogeologic Setting Cazenovia, New York

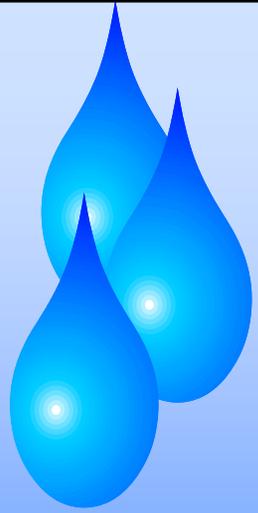


Subsurface data from the NYSDEC & USGS was used along with soils data, topographic expression, and site reconnaissance in order to define aquifer boundaries.

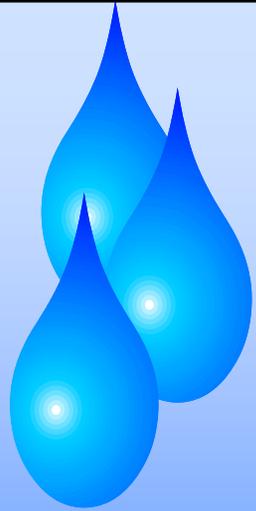
## Regional Aquifer Potentiometric Surface Cazenovia, New York



The elevation of water levels in wells, streams, and wetlands were contoured to produce a regional map of the aquifer's static groundwater head.



# **Wellhead Protection Area Delineation**



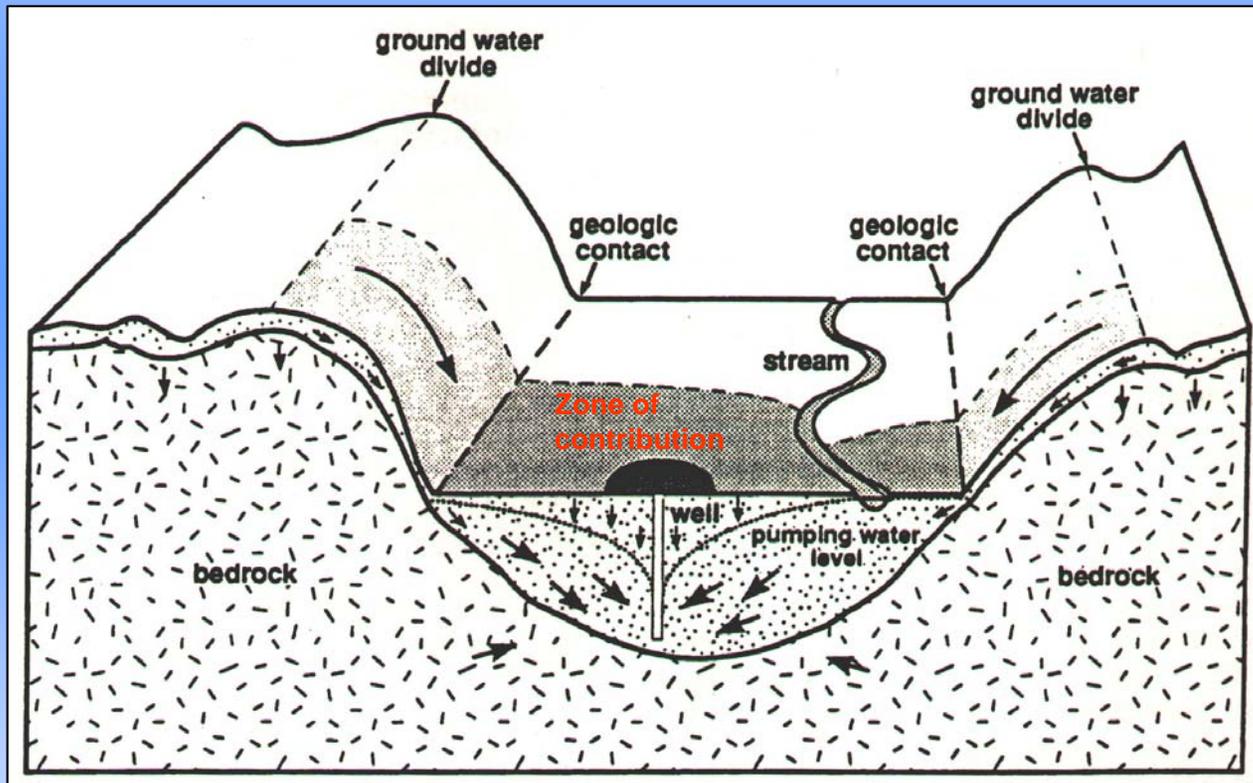
# Wellhead Protection Area

Includes the Zone of Contribution and the Watershed Zone

## Zone of Contribution:

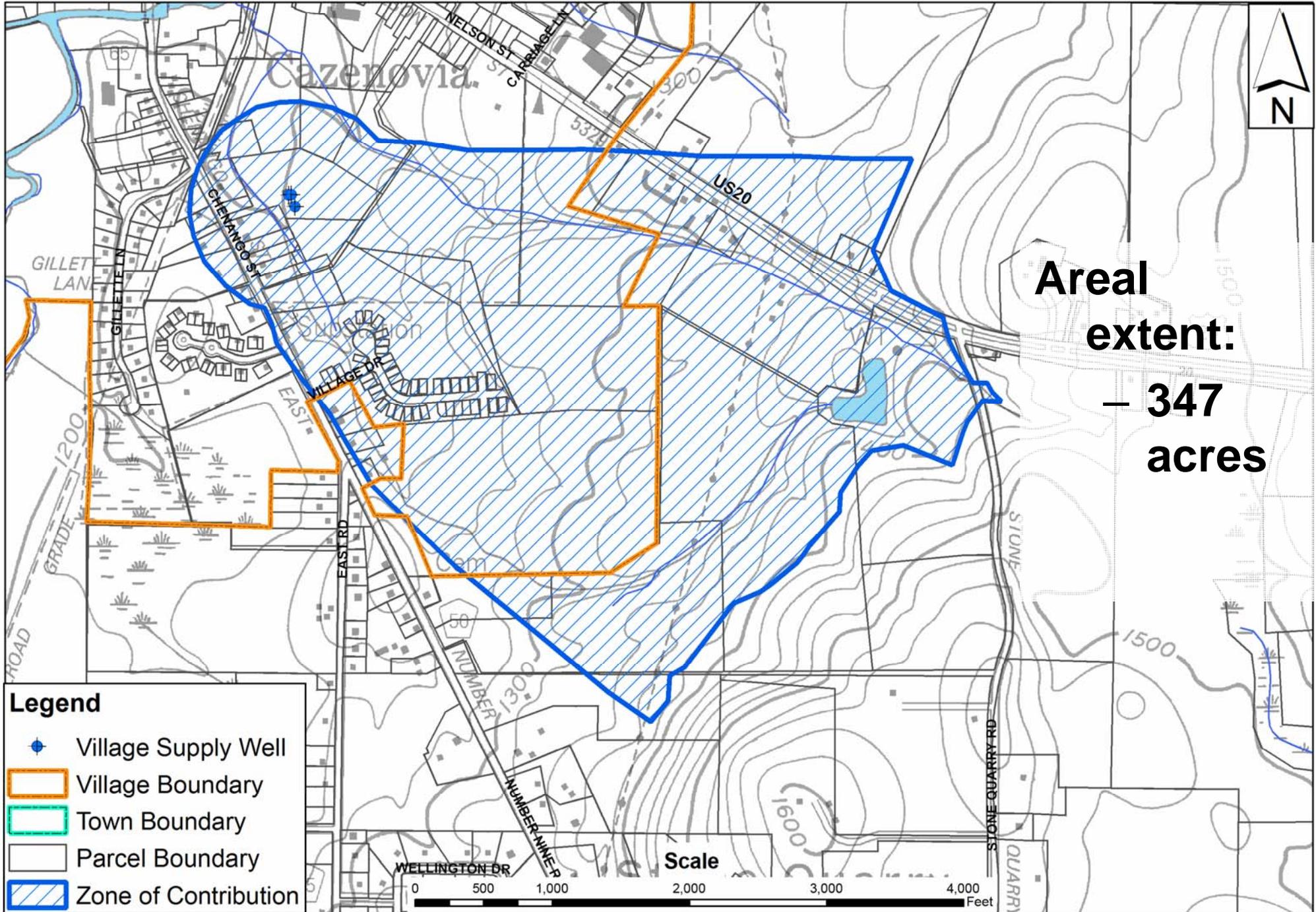
That portion of the local sand and gravel aquifer where all recharge and ground water directly flows toward the pumping well(s).

Defined by analytical techniques, modeling, and geologic mapping.



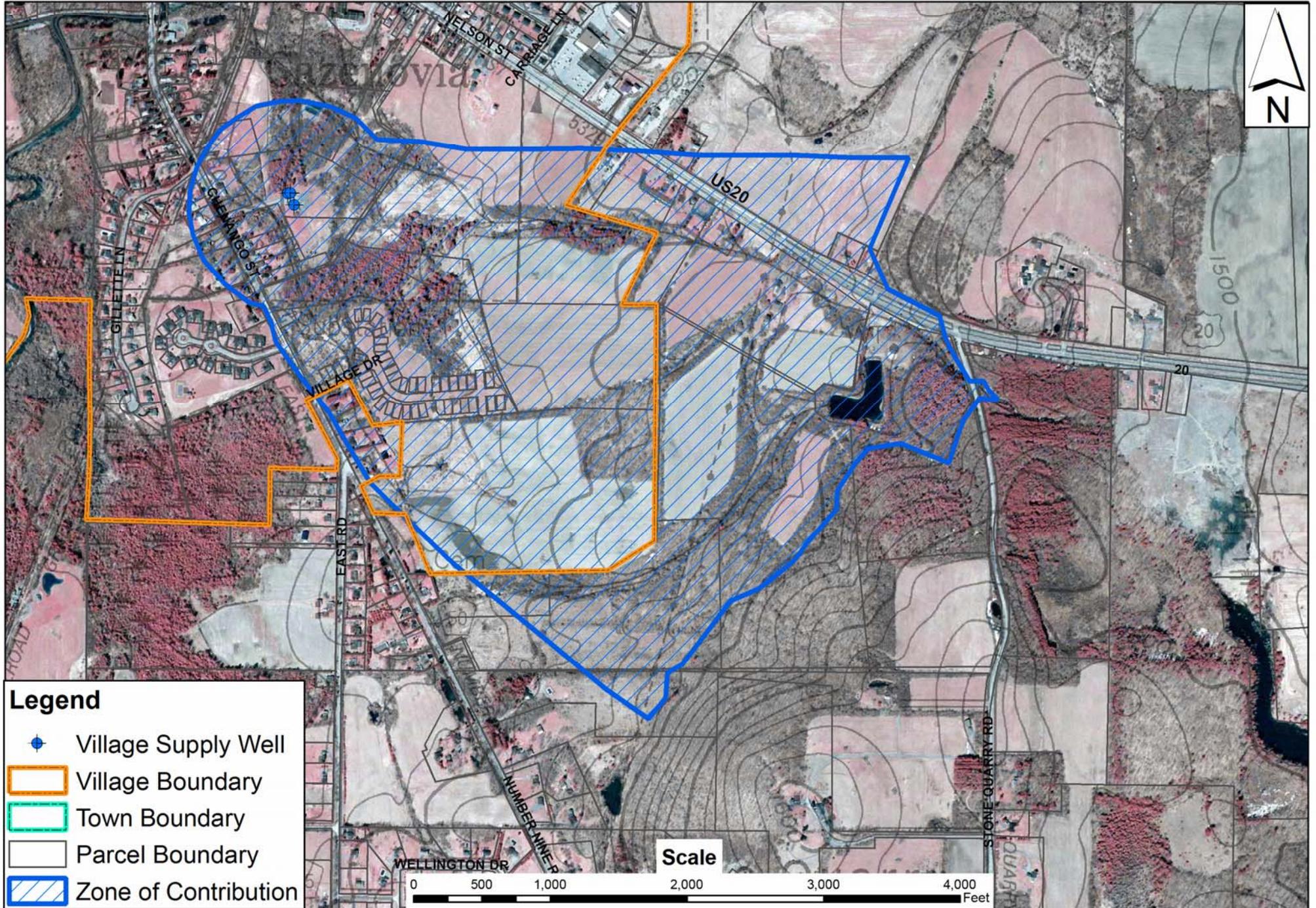


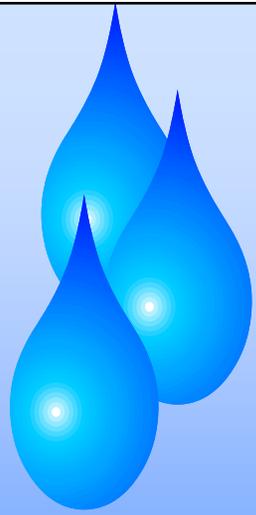
# Zone of Contribution Cazenovia, New York





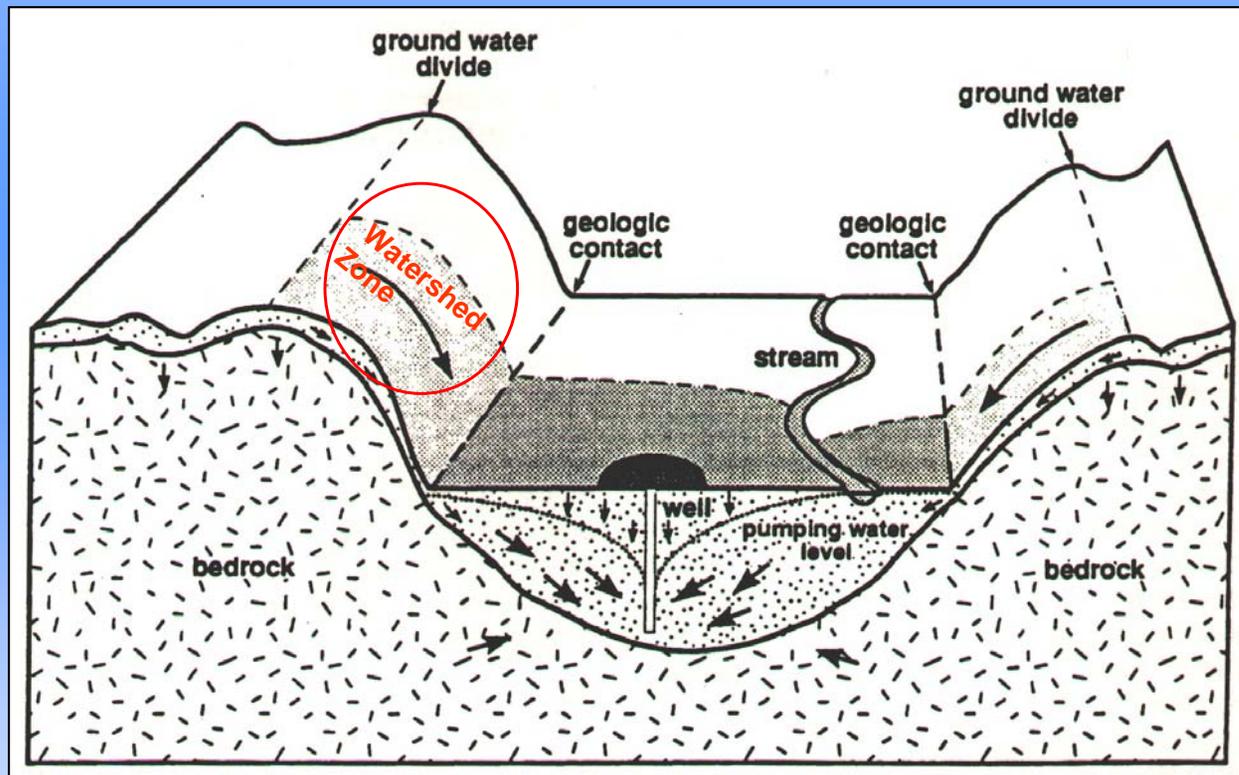
# Zone of Contribution Cazenovia, New York





# Wellhead Protection Area

Includes the Zone of Contribution and the Watershed Zone



## Watershed Zone:

Areas that supply indirect sources of recharge to the zone of contribution.

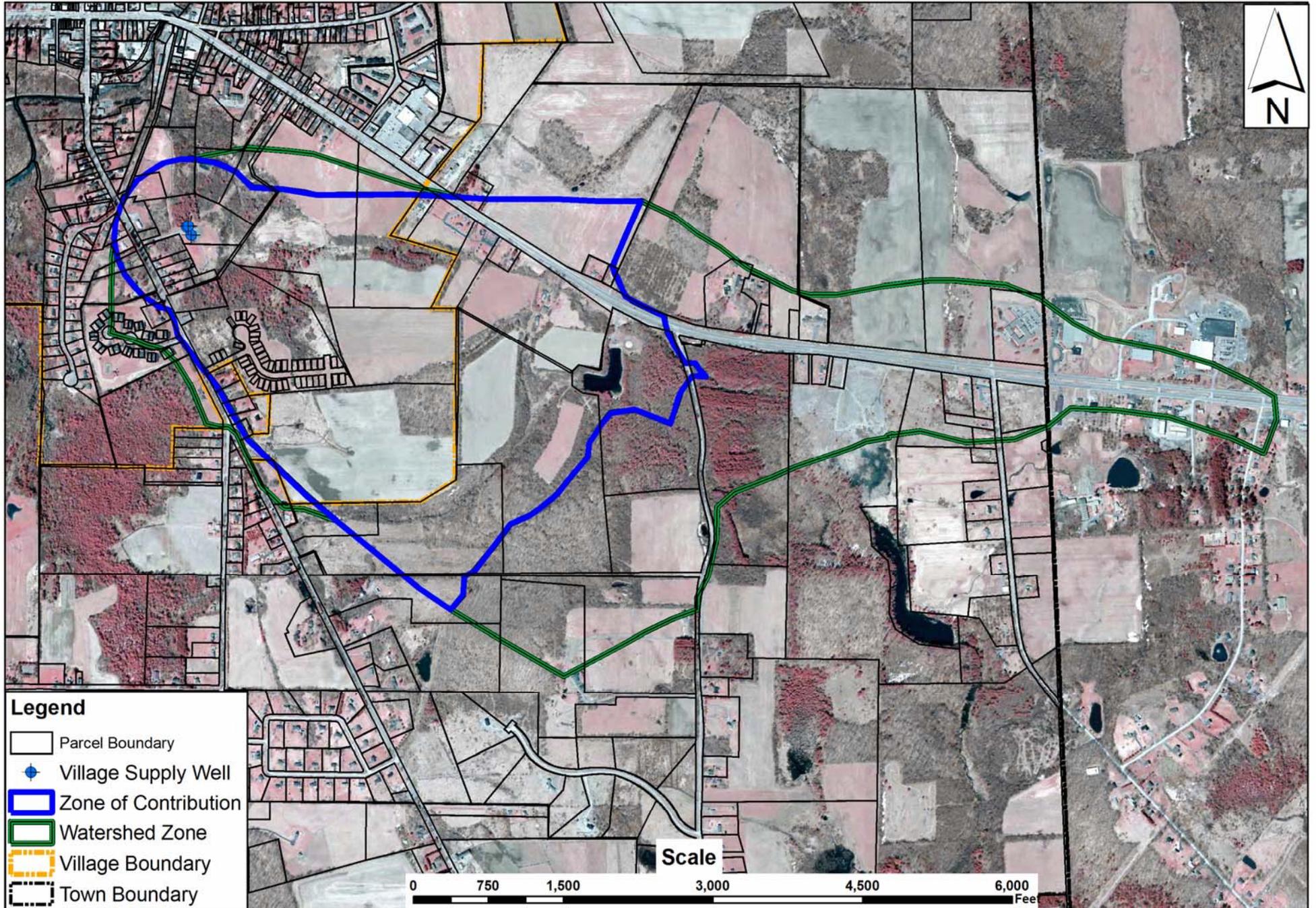
Defined by topography.

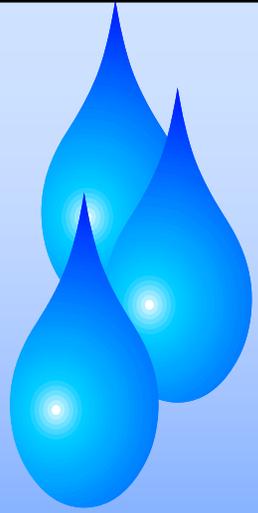
Mostly in Town of Cazenovia and Nelson.





# Wellhead Protection Area Cazenovia, New York

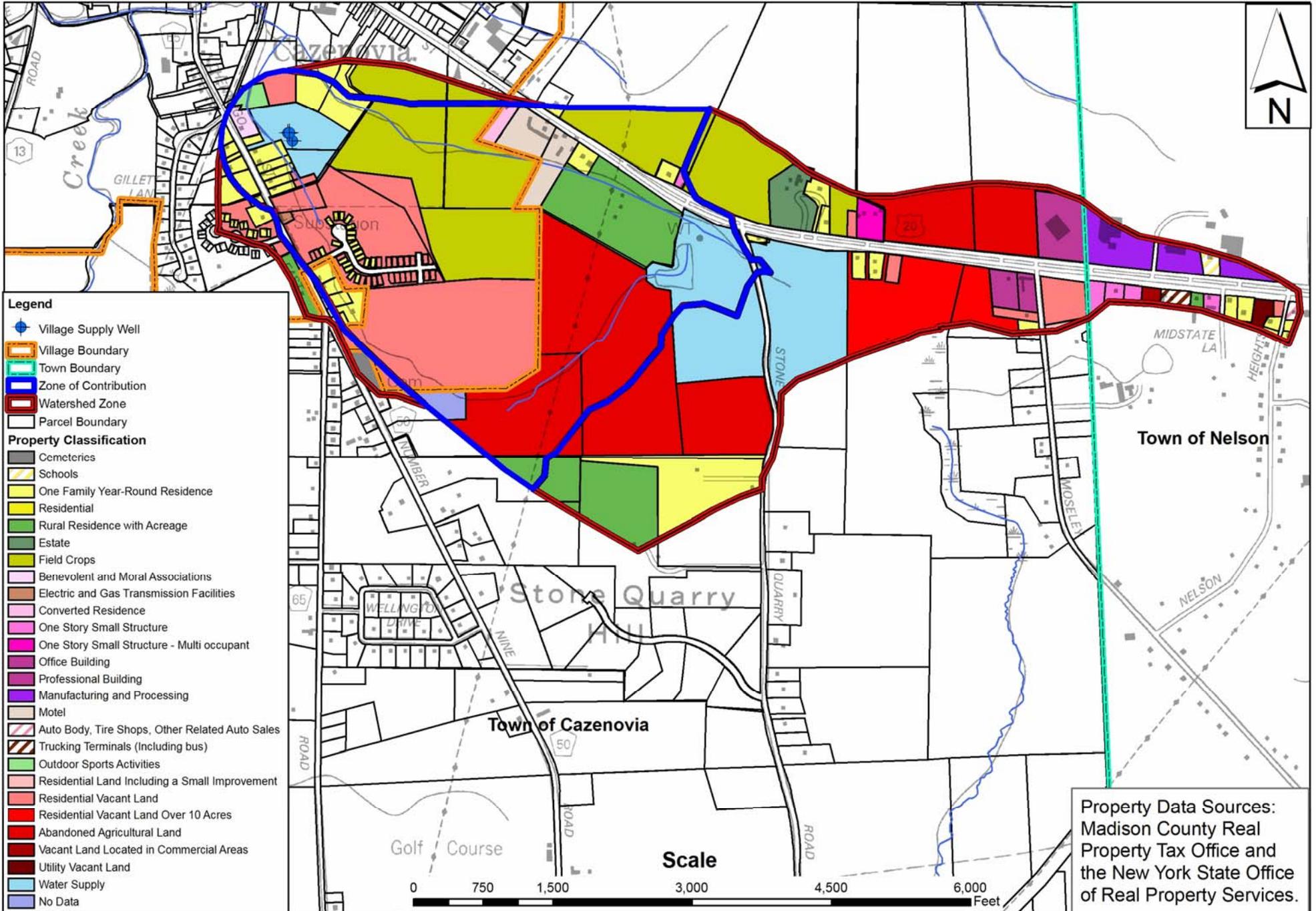


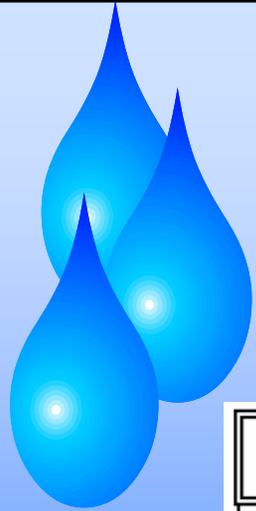


# Land Use Analysis



# Wellhead Protection Area Land Use Based Upon Property Classification Data Village of Cazenovia, New York





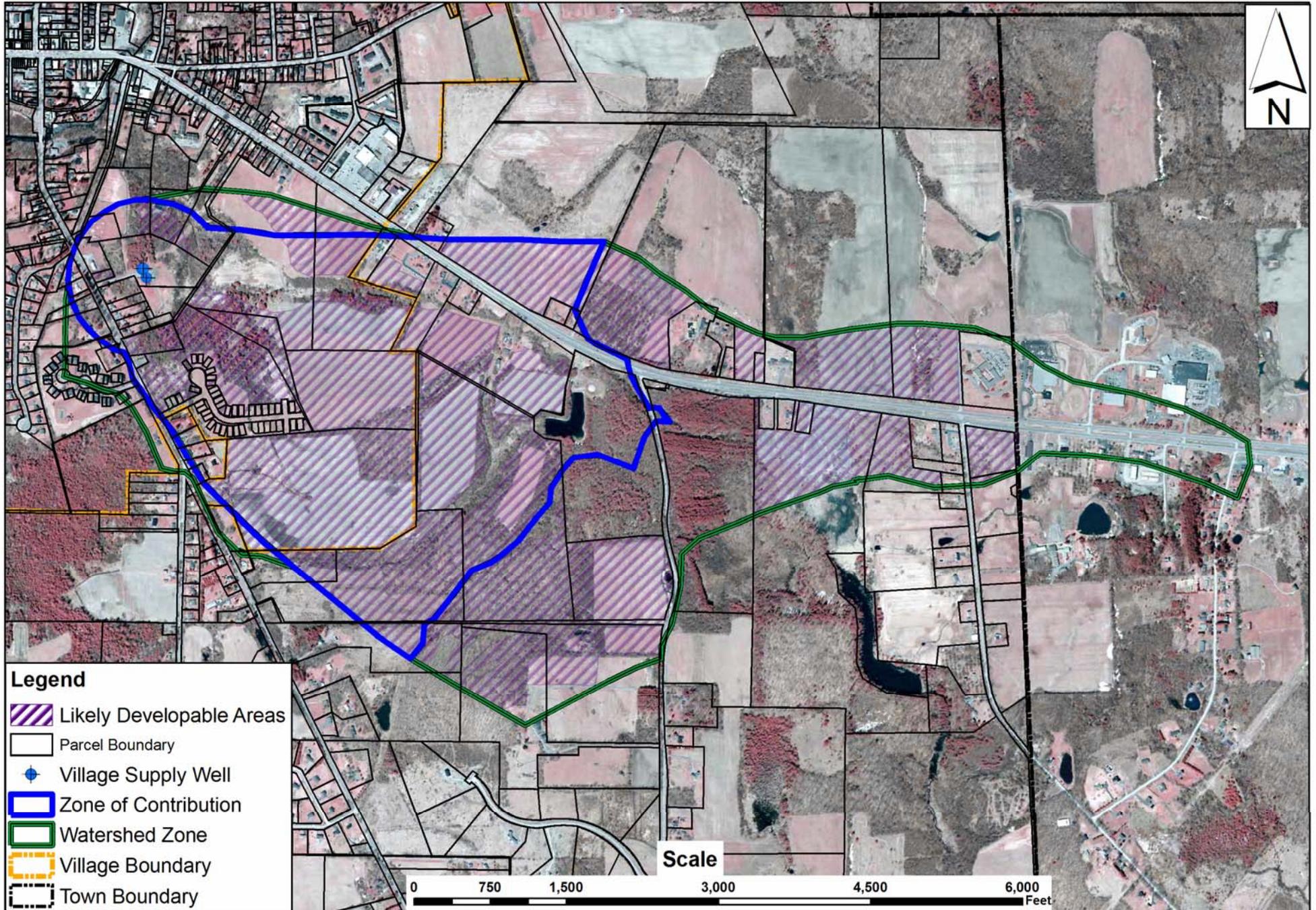
# Likely Developable Areas

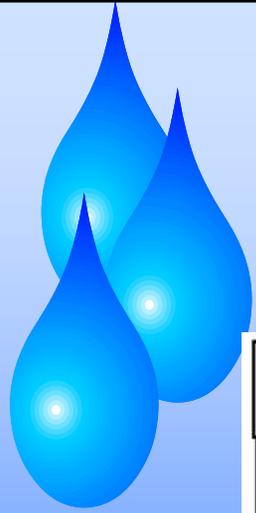
| Zone                        | Total Area<br>(acres) | Likely Developable Area<br>(acres) | % Likely Developable Area |
|-----------------------------|-----------------------|------------------------------------|---------------------------|
| <u>Zone of Contribution</u> | 346.7                 | 228.9                              | 66.0%                     |
| Watershed Zone              | 327.0                 | 154.0                              | 47.1%                     |

- Privately-owned, undeveloped areas with no physical site constraints for development (wet soils, wetlands, flooding, steep slopes, etc.).



# Wellhead Protection Area Likely Developable Areas Cazenovia, New York





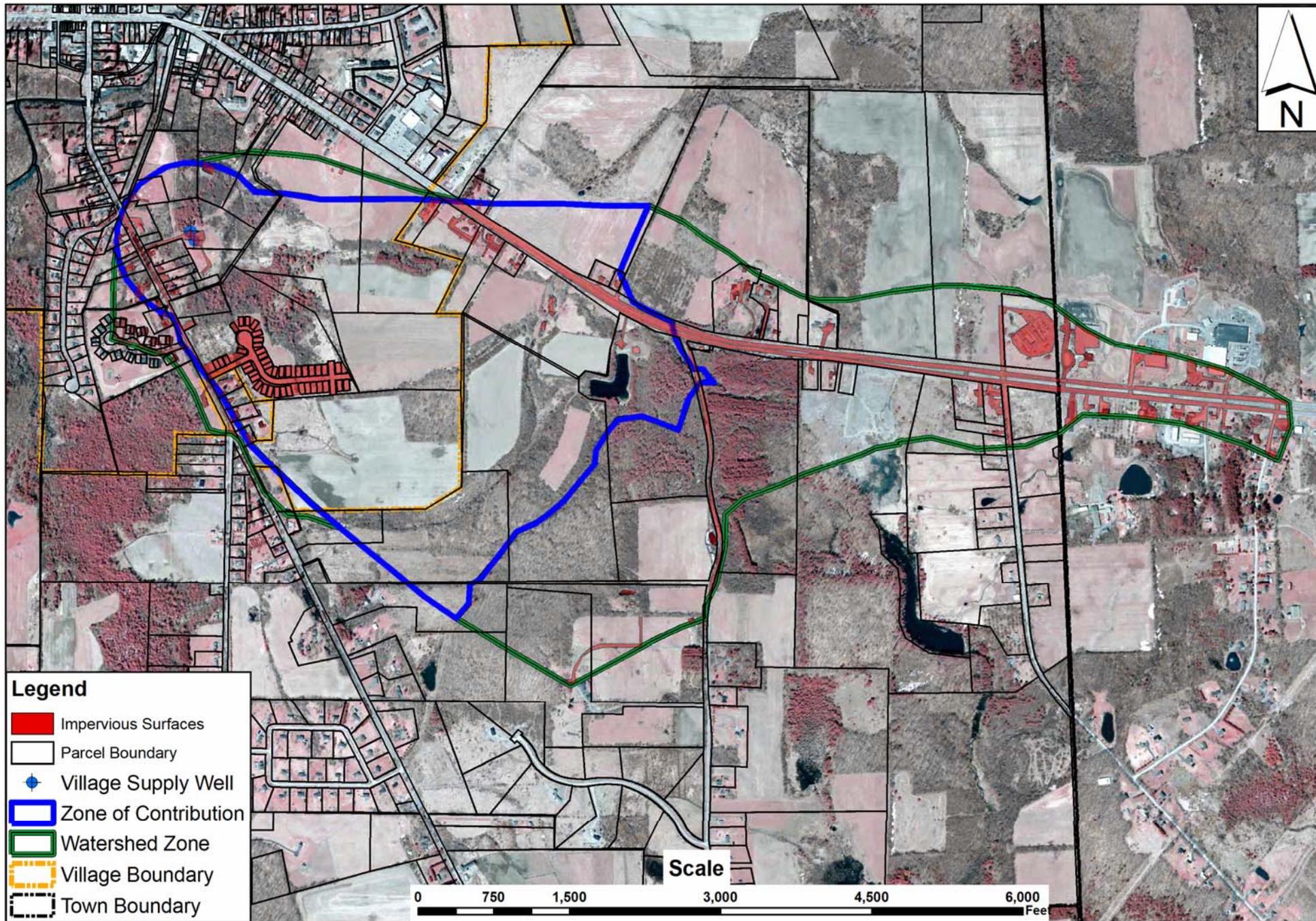
# Impervious Surfaces

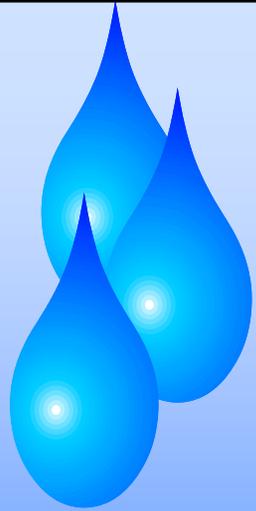
| Zone                 | Total Area<br>(acres) | Existing Impervious Area<br>(acres) | Existing Impervious % |
|----------------------|-----------------------|-------------------------------------|-----------------------|
| Zone of Contribution | 346.7                 | 24.1                                | 7.0%                  |
| Watershed Zone       | 327.0                 | 36.7                                | 11.2%                 |

- Material that substantially reduces or prevents the natural percolation of precipitation and melted snow into the soil (structures, roofs, parking areas, driveways, pools, etc.)
- Research shows that water quality and quantity impacts begin at around 10-15% impervious area of an area.
- The overall Wellhead Protection Area is now at 9.0% impervious cover.



# Wellhead Protection Area Impervious Surfaces Cazenovia, New York





# Impervious Surfaces and Future Planning

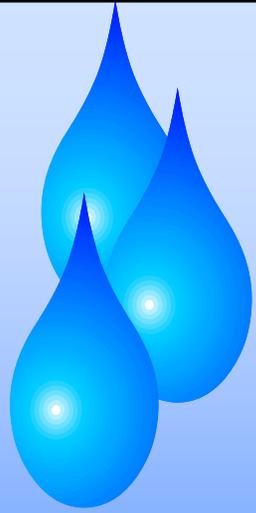
Question:

What % impervious surface coverage should future development have in Wellhead Protection Area?

Answer:

Calculations indicate that the impervious cover percentage for new development should be 10%.

| Zone                     | Overall % Imperviousness for Area<br>If Likely Developable Areas Are Completely Developed at 10% Impervious Cover |
|--------------------------|---|
| Wellhead Protection Area | 14.5%   |



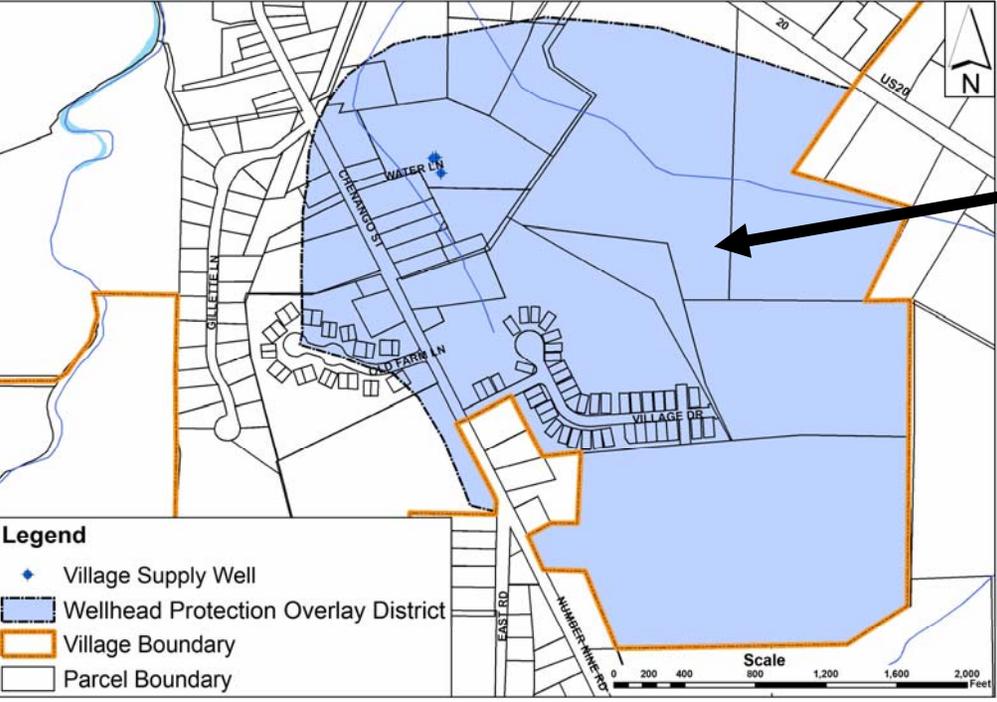
# How to Protect the Wellhead Protection Area and Allow Future Development?

Proposed Solution:

Enact a Wellhead Protection Overlay District in the Village and Town Zoning Code (maybe in Nelson as well).

An overlay district would place additional restrictions and requirements on uses and activities.

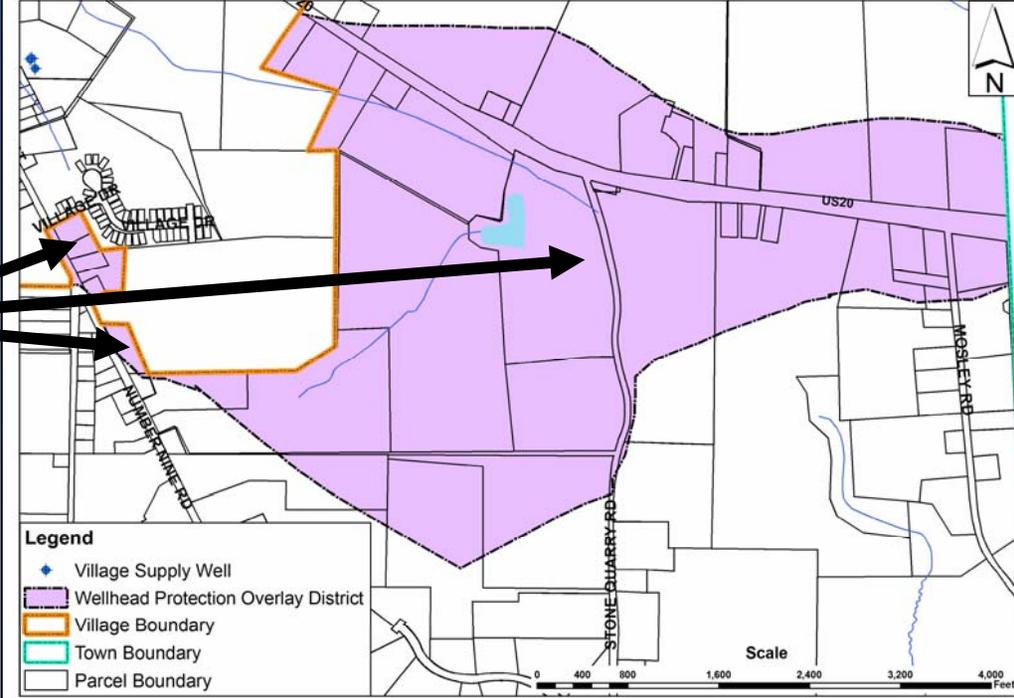
**Proposed Wellhead Protection Overlay District  
Village of Cazenovia, New York**

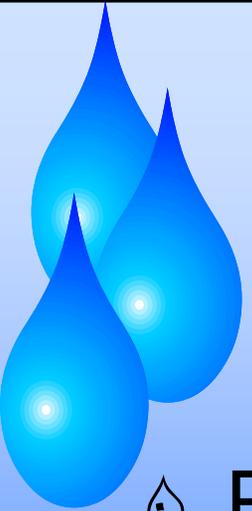


**Proposed Village Wellhead Protection Overlay District**

**Proposed Town Wellhead Protection Overlay District**

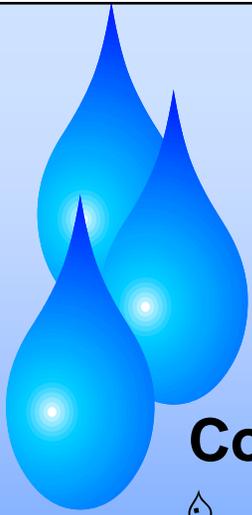
**Proposed Wellhead Protection Overlay District  
Town of Cazenovia, New York**





# Draft Wellhead Protection Overlay District

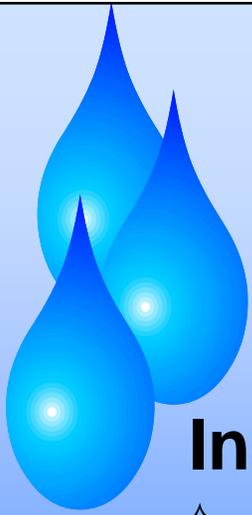
- ⦿ Prohibit certain high-risk land uses and activities in the Zone of Contribution and Watershed Zone (uses associated with groundwater/stormwater contamination).
- ⦿ Place limits on % impervious cover and specify minimum lot size.
- ⦿ Develop stormwater management standards.
- ⦿ Require site plan review.
- ⦿ Establish standards for site plan review and approval.



# Proposed Prohibited Uses and Activities

## Commercial Uses:

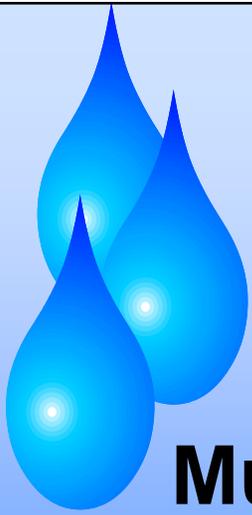
- ⦿ Airport, flying field, airport terminal, and/or airport maintenance area
- ⦿ Car or vehicle washing facility
- ⦿ Cemetery or crematory
- ⦿ Commercial nursery or garden center
- ⦿ Convenience store associated with a gasoline service station
- ⦿ Establishments for the cleaning/servicing of catch basins, cesspools, septic tanks, sewers, tanks and boilers, or tank trucks.
- ⦿ Fleet storage area (car, bus, truck, etc.)
- ⦿ Fuel oil dealer (petroleum wholesaler)
- ⦿ Gasoline service station
- ⦿ Golf course
- ⦿ Junkyard or vehicle salvage/recycling facility
- ⦿ Laundry, cleaning, or garment service, including dry cleaner
- ⦿ Maintenance and/or repair shop
- ⦿ Marina or boat service/maintenance facility
- ⦿ Motor freight transportation or motor vehicle passenger terminal
- ⦿ Motor vehicle service or commercial garage
- ⦿ Pest control services or establishments
- ⦿ Pet cemetery or pet crematory



# Proposed Prohibited Uses and Activities

## Industrial Uses:

- ⦿ Bottled water or bulk water facility.
- ⦿ Facility with exterior storage or loading, unloading of hazardous substances.
- ⦿ Industrial or manufacturing facility subject to stormwater regulations.
- ⦿ Pipelines that carry petroleum (other than natural gas) or hazardous substance/waste.
- ⦿ Quarry.
- ⦿ Stockpiling or storage of bulk chemicals except in designed structures.
- ⦿ Wells or any other facility for oil, gas, gas storage, solution mining, brine disposal, or geothermal resources.
- ⦿ Any use or activity that involves the on-site disposal of solid waste, pathological or medical waste, petroleum, radioactive material, hazardous substances, hazardous waste, or process wastes, including aqueous-carried waste.



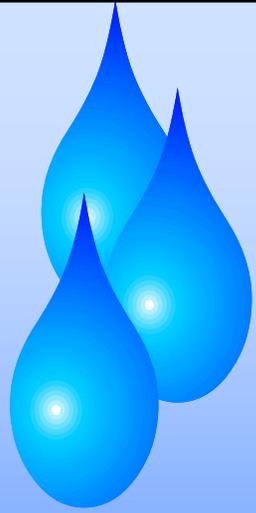
# Proposed Prohibited Uses and Activities

## **Municipal or Institutional Uses:**

- ☹ Municipal facility involving public works storage (except for drinking water)
- ☹ Municipal or industrial sewage treatment facility with disposal of primary or secondary effluent.

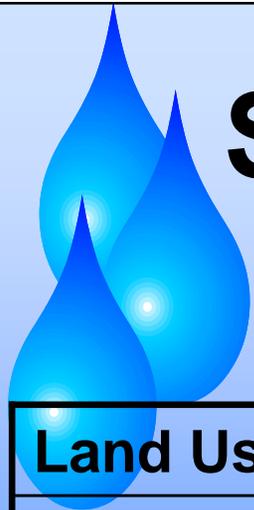
## **Agricultural-Related Uses:**

- ☹ Concentrated animal feeding operation.
- ☹ Storage of manure, except for the primary purpose of agricultural use.
- ☹ Surface land application of septage, sewage, sludge, or human excreta.



# Proposed Prohibited Uses and Activities

- ☹ High intensity use parking lots
- ☹ Having average vehicle trip generation rates of 1,000 or greater per day.
- ☹ These are widely regarded as stormwater “hot spots” – land uses or activities that produce higher concentrations of trace metals, hydrocarbons, or priority pollutants than normally found in urban runoff.



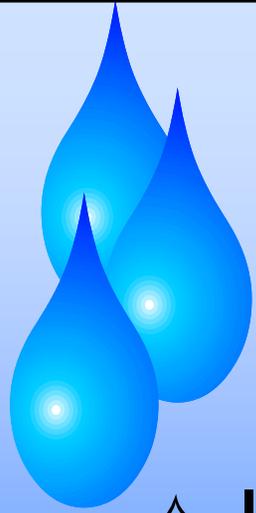
# Sample Average Daily Vehicle Trip Generation Rates

| Land Use               | Units                  | Avg. Trips per Unit | # of Units | Avg. Daily Trips |
|------------------------|------------------------|---------------------|------------|------------------|
| Single-family home     | /Dwelling              | 10                  | 1          | 10               |
| Condominium /Townhouse | /Dwelling              | 6                   | 50         | 300              |
| Hotel                  | /Room                  | 9                   | 60         | 540              |
| Drive-through Bank     | /1,000 ft <sup>2</sup> | 200                 | 3          | 600              |
| Drug store             | /1,000 ft <sup>2</sup> | 90                  | 14         | 1,260            |
| Fast food restaurant   | /1,000 ft <sup>2</sup> | 700                 | 3          | 2,100            |
| Sit-down restaurant    | /1,000 ft <sup>2</sup> | 100                 | 6          | 600              |
| Convenience store      | /1,000 ft <sup>2</sup> | 500                 | 2.8        | 1,400            |



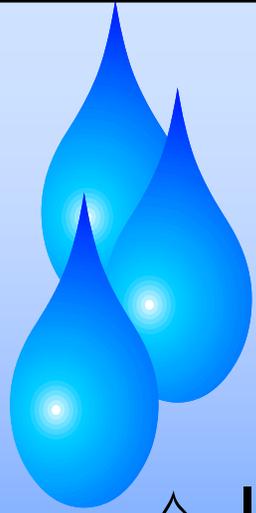
# Sample Average Daily Vehicle Trip Generation Rates

| <b>Land Use</b>              | <b>Units</b>           | <b>Avg. Trips per Unit</b> | <b># of Units</b> | <b>Avg. Daily Trips</b> |
|------------------------------|------------------------|----------------------------|-------------------|-------------------------|
| Supermarket                  | /1,000 ft <sup>2</sup> | 100                        | 50                | 5,000                   |
| Discount Super Center        | /1,000 ft <sup>2</sup> | 70                         | 200               | 14,000                  |
| Home Improvement Super Store | /1,000 ft <sup>2</sup> | 30                         | 150               | 4,500                   |
| Specialty Retail Center      | /1,000 ft <sup>2</sup> | 40                         | 20                | 800                     |
| Post Office                  | /1,000 ft <sup>2</sup> | 300                        | 4                 | 1,200                   |
| Medical Office Building      | /1,000 ft <sup>2</sup> | 50                         | 10                | 500                     |
| Commercial Office Building   | /1,000 ft <sup>2</sup> | 16                         | 50                | 800                     |
| Light Industrial             | /1,000 ft <sup>2</sup> | 7                          | 50                | 350                     |



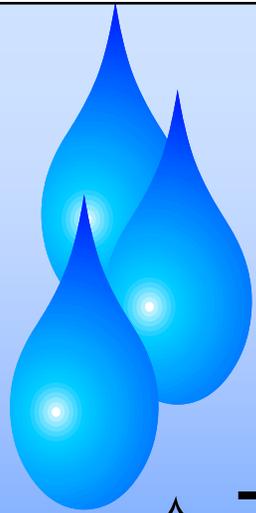
# Proposed Maximum Impervious Cover

- ⦿ In Village: ten percent (10%) or three-thousand (3,000) square feet of a single parent parcel or building site, whichever is greater.
- ⦿ In Town: ten percent (10%) or eight-thousand (8,000) square feet of a single parent parcel or building site, whichever is greater.



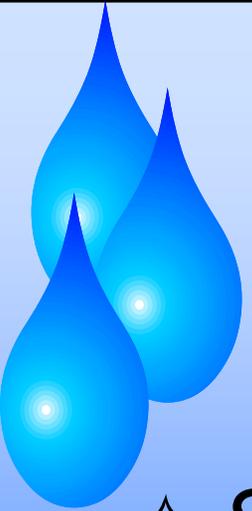
# Proposed Maximum Impervious Cover

- ⦿ Impervious coverage *may* exceed ten percent (10%) or 3,000 square feet (Village) or 8,000 square feet (Town) of a single parent parcel or building site (whichever is greater) **only if:**
  - A system of stormwater management and treatment is developed that results in the site's post-development annual stormwater recharge volume to ground water approximating the site's pre-development annual groundwater recharge volume.



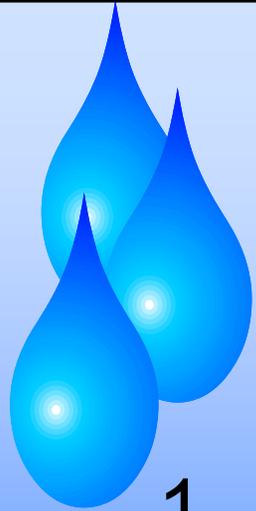
# Proposed Minimum Lot Size

- ⦿ The minimum size for lots served by private sewage disposal systems (i.e. septic systems) shall be eighty-thousand (80,000) square feet (1.8 acres).
- ⦿ In areas serviced by public sanitary sewer, the minimum size for lots shall be that for the underlying zoning district.



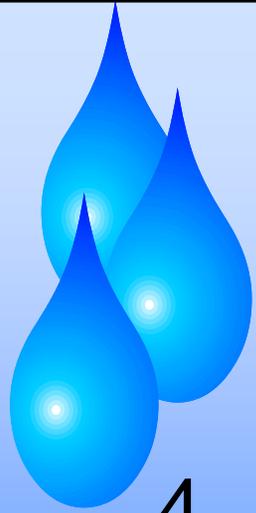
# Proposed Stormwater Management Standards

- ⦿ Standards would pertain to any projects that render impervious more than ten percent (10%), 3,000 square feet (Village), or 8,000 square feet (Town) of a single parent parcel or building site.



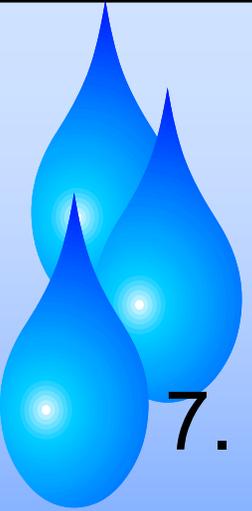
# Proposed Stormwater Management Standards

1. A Stormwater Pollution Prevention Plan (SWPPP) must be submitted.
2. The annual volume of groundwater recharge from the post-development site should reasonably approximate the annual recharge volume from the pre-development (existing) site conditions.
3. The volume of stormwater to be recharged on the site shall be determined by a method contained in the *“Wellhead Protection Plan for the Village of Cazenovia Water Supply”*.



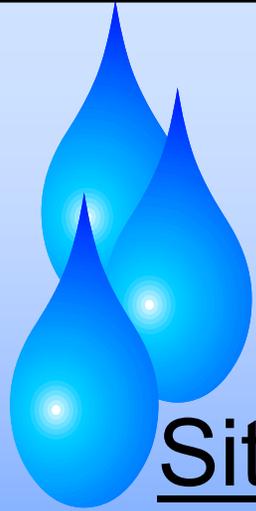
# Proposed Stormwater Management Standards

4. The hydrologic conditions of the developed site must closely resemble pre-development conditions.
5. Stormwater discharges to ground water shall not occur within a distance of 800 feet of any public water supply well operated by the Village of Cazenovia.
6. Stormwater runoff shall be directed to pretreatment device(s) to help trap coarse materials.



# Proposed Stormwater Management Standards

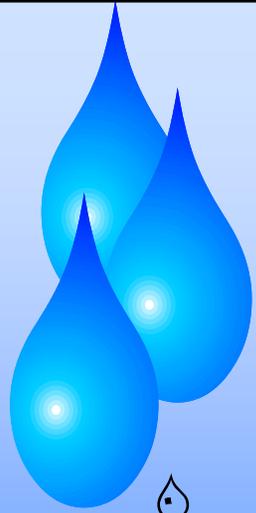
7. Systems should incorporate designs which allow for shut-down and containment in the event of an emergency spill.
8. Systems must have an operation and maintenance plan to ensure that system(s) function as designed.
9. The developer or contractor must provide, prior to construction, a performance bond.
10. The developer, prior to final approval of construction, must provide a maintenance bond, to ensure proper operation and maintenance for a twenty year period.



# Site Plan Review and Approval

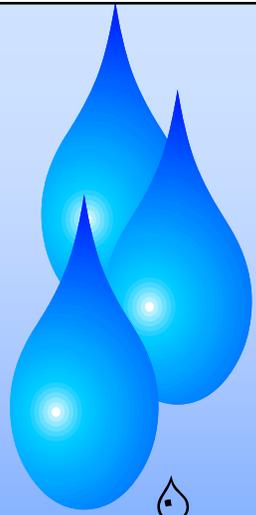
## Site Plan Review would be required for:

- ④ Any use or activity that would render impervious to infiltration ten percent (10%), 3,000 square feet (Village), or 8,000 square feet (Town) of a single parent parcel or building site, whichever is greater; **or**
- ④ Proposed uses or activities not served by public sanitary sewer that will generate more than a daily average of 1,000 gallons of wastewater; **or**
- ④ Proposed uses or activities that will extract more than 1,000 gallons per day of ground water.



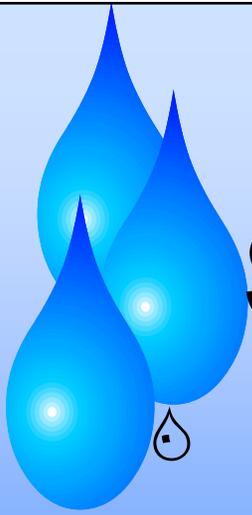
# Required to be Submitted as part of a Site Plan:

- ☹ Location of the proposed use or activity in relation to the Wellhead Protection Overlay District boundaries.
- ☹ Location and extent of existing (pre-development) and post-development impervious surfaces.
- ☹ Details regarding the proposed conveyance, storage, distribution, generation, handling, use, and/or treatment of any sewage, process wastes, aqueous-carried wastes, petroleum, hazardous substances, hazardous waste, solid waste, radioactive material, and/or incidental wastes. If necessary, a Stormwater Pollution Prevention Plan (SWPPP).
- ☹ A description of all pollution control measures and activities proposed to prevent on-site disposal and potential contamination of ground water or surface water, including spill response activities.



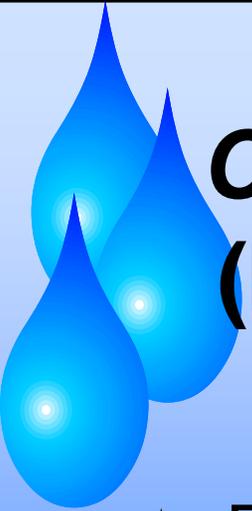
# Required to be Submitted as part of a Site Plan:

- ☹ A statement as to the degree of threat to groundwater and surface water quality that could result if the control measures failed.
- ☹ A description of the provisions for the off-site disposal of any solid waste, petroleum, radioactive material, hazardous substances, hazardous waste, process wastes, and/or aqueous-carried waste (except sewage).
- ☹ If an on-site water supply is to be utilized, provide a description of the proposed means of water supply, including if applicable an estimate of the total daily groundwater withdrawal rate.
- ☹ Other information as necessary to fully explain the project and evaluate its potential impact upon the Village of Cazenovia's public water supply.



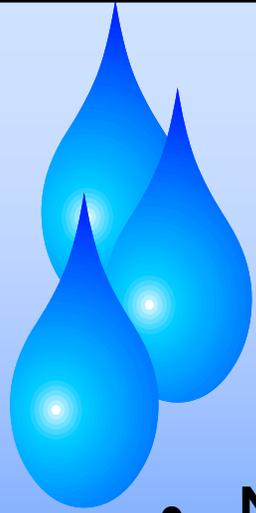
# Site Plan Approval Criteria

- ☹ Compliance with all regulations applicable to the Wellhead Protection Overlay District.
- ☹ Will not adversely impact the predevelopment hydrologic functions of the site.
- ☹ Will not adversely impact upon the pre-existing quality of ground water or surface water leaving the site's boundaries.
- ☹ The proposed use is to be located, developed, and maintained in such a manner as to not adversely impact the long-term quantity or quality of ground water available to public water supply wells operated by the Village of Cazenovia.



# **Examples of Uses That Could Be Permitted in Overlay District (If Allowed By Underlying Zoning and Meets all Standards):**

- ⦿ Residential development (most).
- ⦿ Office park, research and development, etc. (most).
- ⦿ Light industrial/manufacturing uses (not involving exterior storage or loading/unloading of hazardous substances, on-site disposal, or SPDES stormwater discharge).
- ⦿ Specialty retail (total < 50,000 ft<sup>2</sup> and not prohibited uses).
- ⦿ Lodging establishments (≤ 110 rooms).
- ⦿ Restaurants (most sit-down).
- ⦿ Recreational facilities (not golf courses).
- ⦿ Educational or institutional facilities (some).

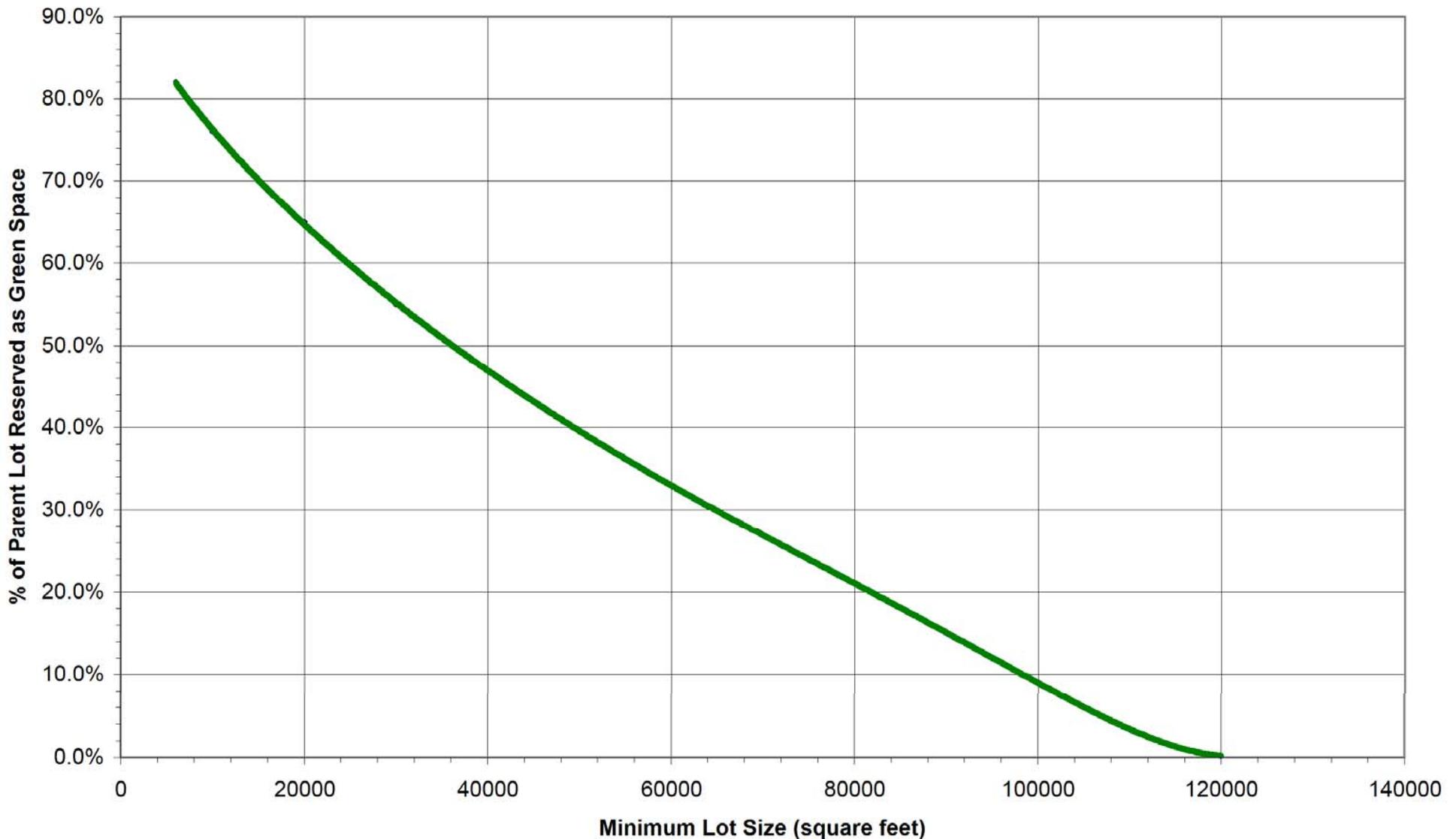


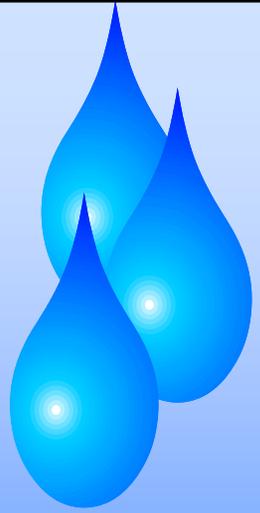
# What About Green Space Requirements?

- Not directly addressed in proposed Wellhead Protection Overlay District regulations.
- However, % impervious cover limits will likely result in considerable area to be devoted to green space.
- Specific green space requirements can be defined for the underlying zoning districts if desired, with reference made to overlay requirements.

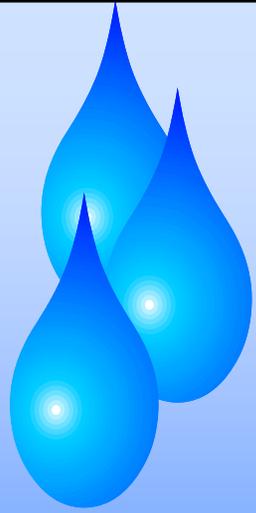
# How Much Green Space Could Be Generated in the Wellhead Protection Overlay District?

Necessary Green Space in Wellhead Protection Overlay District for Residential Uses  
(To Meet Impervious Limits)





**Questions ??**



**Comments ??**

**Steven Winkley**

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