

PROTECTION OF A MUNICIPAL WELL-FIELD ON THE FLOODPLAIN TO THE MOHAWK RIVER: A CASE STUDY OF THE TOWN OF GLENVILLE'S WELL-FIELD PROTECTION COMMITTEE(GWPC)

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MOHAWK RIVER FLOODING - HURRICANE IRENE, 2011



Times Union Photo by Will Waldron, August 28, 2011, used by permission

INTRODUCTION

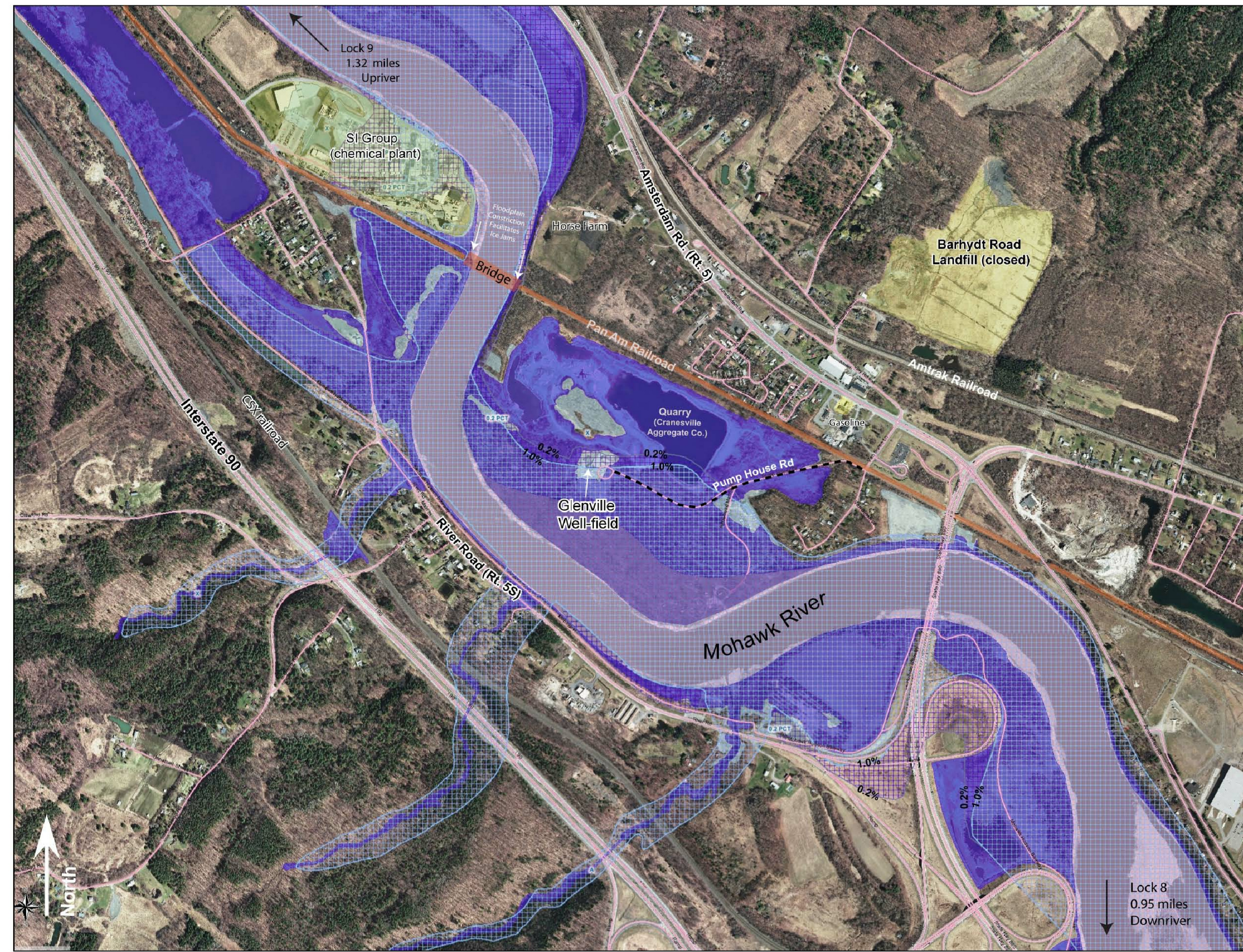
This is an important time of change and the State of New York is in the early stages of assessing critical infrastructure and how to better prepare that infrastructure for what may be a continuation of damaging storms and extreme weather events. Planning and preparation at the local level is going to be an important part of the overall state assessment and approach.

Recent flooding in the Mohawk watershed should be evaluated in the context of a changing hydrologic system and it would be wise to consider how our future planning considers change recognized in the basin (Garver and Cockburn, 2011, 2012 and references therein). Hydrologic data suggest that important changes have occurred in NY State in the past few decades and it is important to understand what these changes mean in different sectors of the State (Rosenzweig et al., 2011). The recently released ClimAid study (Rosenzweig et al., 2011, and see Shaw et al., 2011) notes that there has been an increase in the frequency of heavy rainfall that is especially pronounced in the Northeast (summarized in Shaw et al., 2011). The soon-to-be released Third National Climate Assessment (2013) report notes that: "The Northeast has experienced a greater increase in extreme precipitation over the past few decades than any other region in the U.S.; between 1958 and 2010, the Northeast saw a 74% percent increase in the amount of precipitation falling in very heavy events" (Horton and Yohe, 2013, in review).

Municipalities throughout the watershed have critical infrastructure that are central to their primary mission, and it is important to consider floods in planning. Important component of the infrastructure matrix are well fields, and sewers that may be in low lying areas and thus affected by floods. Following flooding driven by the remnants of Hurricane Irene (August 2011), the Town of Glenville appointed, in early January of 2012, the Glenville Well-field Protection Committee (GWPC), to provide guidance and advice on protection of the Glenville well-field, which sits on the floodplain of the Mohawk River adjacent to residential and industrial areas. This committee has worked for about one year to look into a variety of threats or potential threats to the well-field and then the committee made recommendations to the town council in Feb 2013. While the work of the committee included a variety of topics, we focus in part here on issues related to floods. This committee, its work, and the document and suggestions that resulted from this work may serve as a useful model for how other municipalities can adapt to change and build resilience to infrastructure in the watershed that may be prone to flooding.

RESEARCH AND FINDINGS

The Glenville water supply system draws from its well-field, situated near the western end of the Great Flats Aquifer. It is the sole-source of water for some 16,000 residents in the town of Glenville NY. Its location on the floodplain of the Mohawk River with nearby industrial, and transportation activities, as well as human occupation, makes it susceptible to impairment by a number of potential and unpredictable threats. The Glenville Well-field Protection Committee investigated the range of these threats, and developed a set of conclusions and recommendations to address the threats. Six principal areas of concern were identified: 1) Flood-mitigation; 2) Post-event restart of facilities; 3) Interconnect to adjacent systems; 4) Recharge monitoring and aquifer quality; 5) Education protection of resource; and 6) Regional planning.



Map based on Schenectady Co. GIS layers for Orthophoto and flood zone overlaps. Orthophoto taken October, 2011. Purple cross-hatch is area of 0.2% annual probability of inundation, and light blue cross-hatch is the zone with a 1% annual probability of inundation. Purple-blue shading is the new proposed area of 1% annual inundation (aka 100 year flood plain). Prepared by J.I. Garver, Union College, January 2013.

RESEARCH & FINDINGS

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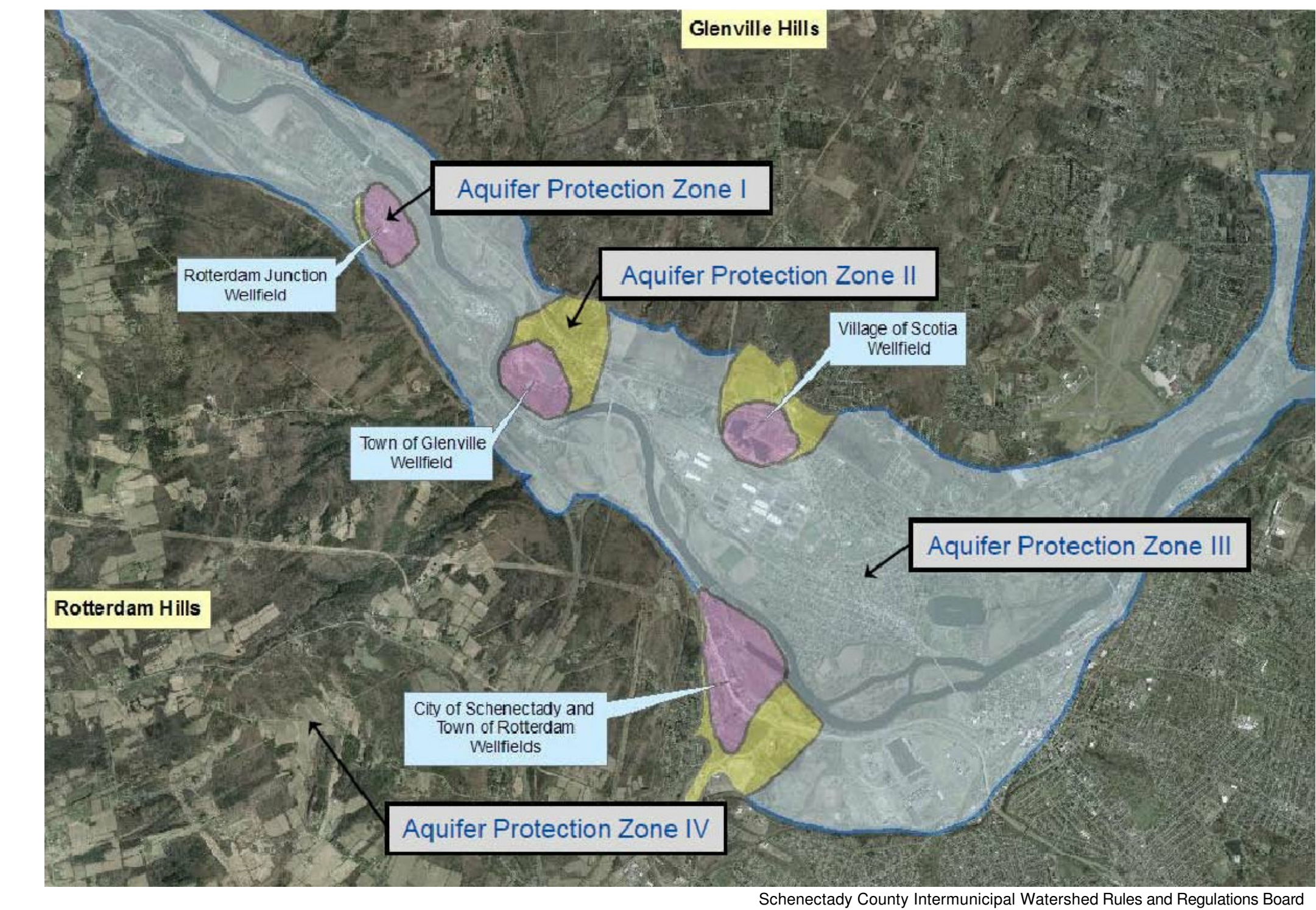
- 1) Flood-mitigation;
- 2) Post-event restart of facilities;
- 3) Interconnect to adjacent systems;
- 4) Recharge monitoring and aquifer quality;
- 5) Education protection of resource;
- 6) Regional planning.

SUMMARY OF CURRENT RISKS

Flooding from tropical and hurricane storms can significantly impact the operations of the physical plant. Storms Irene and Lee in the fall of 2011 caused damage to the WTP and came within a few feet of incapacitating the facility. During the high water of Irene, the plant was isolated, and flood-water damaged the access road. The ice jam of 2010 was also problematic as a rapid rise in water due to an ice jam in Glenville/Rotterdam Junction caused flood-water to rise high enough to cover the access road. Hurricane Sandy could have again had serious impact on the Mohawk watershed if its route had varied only slightly. Additional storms of such destructive magnitude seem destined for our region and we must work for mitigation.

Potential **water-quality risks** are real and diverse: extraction of gravel from an adjacent quarry that is currently permitted to surround the WTP; the proximity of some 140 un-sewered homes and businesses including one gasoline station; a railroad right-of-way with rails born on thousands of ties laden with wood preservatives; the closed Barhydt Landfill; a major chemical plant (SI Group) across the Mohawk River from the Well-field; and an adjacent horse farm signal the need for extreme vigilance regarding pollution, decline in **yield capacity** and the alteration of pH, temperature, oxygen levels, water viscosity and other parameters, including the **as-yet undefined risk of pharmaceutical pollution**.

GREAT FLATS AQUIFER WELL-FIELDS AND RECHARGE ZONES



Schenectady County Intermunicipal Watershed Rules and Regulations Board

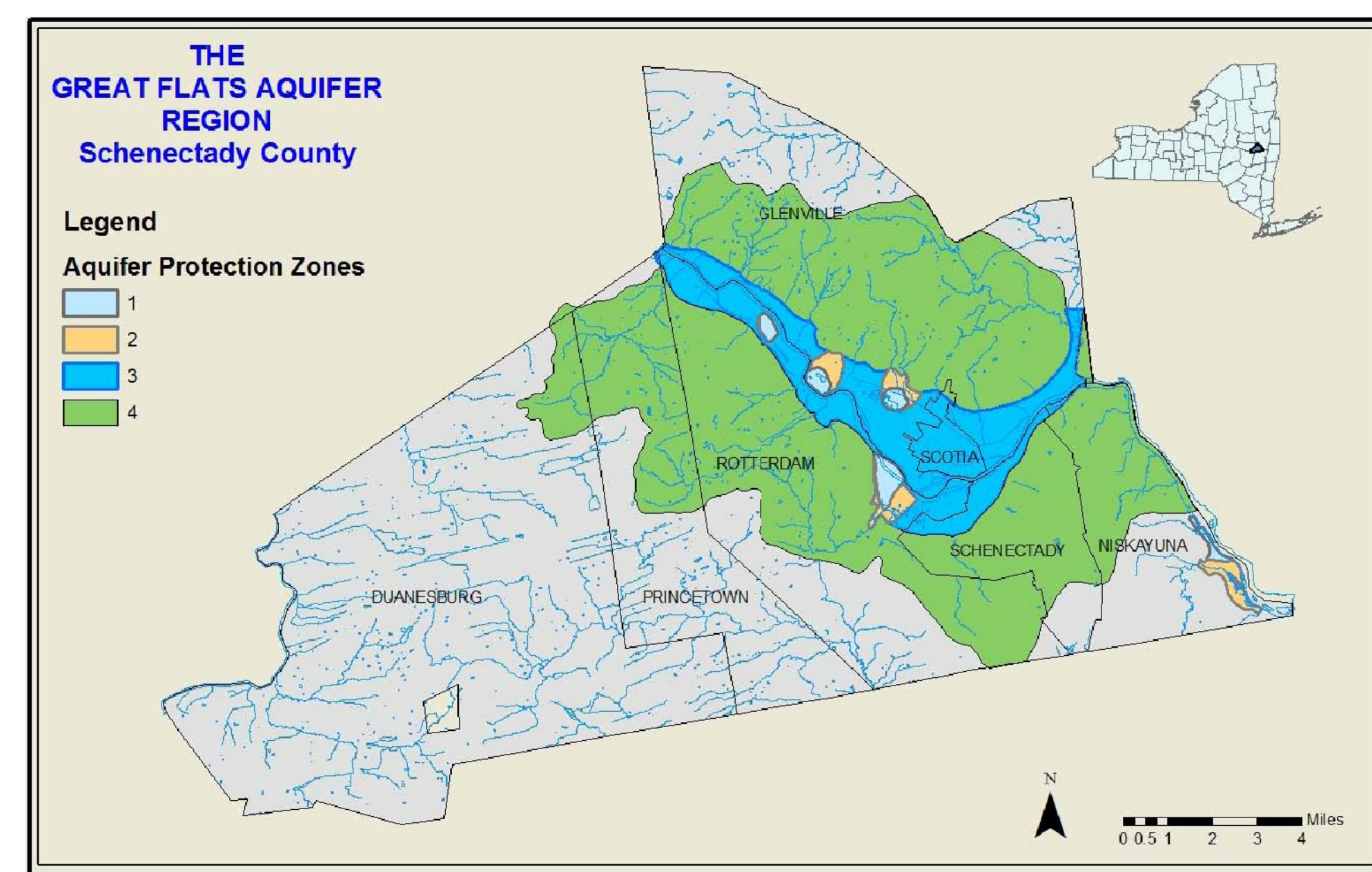
RECOMMENDATIONS

1) Water Treatment Plant and Supply System. These suggestions are in large part aimed at flood mitigation. They include: a) Determine elevations at key points around the well-field to facilitate flood mitigation efforts and real-time monitoring during flood events. Complete installation of gauged posts to monitor flood levels and electronic means of communication. b) Review and update emergency plans. Examine flood vulnerability of the power substation and emergency generator, including fuel capacity and duration. Examine WTP to determine if there are any unrecognized failure points, e.g. lightning strikes, hail, wind and fire. Review capacity and capacity reportage of the wells, two of which are nearly fifty years old. c) Equip WTP to better monitor key water quality parameters, including pH, water temperature, water level, turbidity, and oxygen at one or more of the four wells. Establish long-term monitoring sites to gather baseline data to assess key indicator chemicals. d) Consider the status of our current connections with other systems and the merit of adding or planning for emergency connections with the Schenectady-Niskayuna-Rotterdam system. e) Consider installation of an earthen dike surrounding the WTP, raising the grade of the access road, and raising the grade of the access road to provide secure vehicular access to the plant. Also, completion of the berm/dike along the south side of the Pan Am RR right-of-way toward containing derailed RR cars containing dangerous chemicals.

f) Review the means of metering of water distribution for the Town toward fostering more efficient monitoring and water use. Niskayuna's experience with drive by RFID meter reading has been good. g) Create a "Contingency Plan" in the event it becomes necessary to treat the groundwater source as "surface water" for removal of contaminants. Consider acquisition of a "backup site" for a new facility, possibly in cooperation with the Village of Scotia. h) Investigate funding sources to execute the various suggestions offered including the examination of water rates and the management and dedication of this income from user fees.

2) Managing Environmental and Physical Risks surrounding the WTP. a) Contract for technical expertise in the hydrology, geology and biology of water supply aquifers to evaluate the implications of extensive and expanding ponded water surrounding the WTP in terms of annual temperature regime and viscosity change and attraction of waterfowl that may be vectors of various bacterial forms including Salmonella spp. and Escherichia spp and the influx of colder winter water and warmer summer waters that may induce calcium and magnesium carbonate deposition at the wells points. b) Direct detailed letters of specific concern to each agency that might play a role in the protection of our well-field. This would include The NYS Canal Corporation, the NYSDEC, the NYCDEP, the NYPA, FEMA, US Army Corps of Engineers and the NYSDOH. c) Initiate long-term planning and oversight regarding the use of lands surrounding the WTP including adjacent flood plain, railroad right-of-way, horse farm, and array of homes and small businesses located between Route 5 and the railroad right-of-way north of the WTP. d) Seek input from the Schenectady Aquifer Inter-municipal Watershed Board and to stimulate its interest in the current challenges facing Glenville (and regional) water supply.

3) Educational – Outreach. a) Take actions to stimulate greater interest in the nature, importance, and vulnerability of the Glenville water supply through increased content in the annual report on Glenville's water service; construction of education kiosks in out town parks; outreach to the K-12 education system and local colleges and universities for education and research; occasional news releases to local newspapers from town officers regarding matters of concern; joint meetings with the managers of the other regional water-supply systems; and the hosting of the public at our WTP once or twice a year.



Schenectady County Department of Economic Development and Planning

HIGH-LIFT PUMPS INSIDE THE GLENVILLE WATER TREATMENT PLANT



Photo by John Garver

GWPC MEETING WITH GLENVILLE TOWN BOARD, FEBRUARY 2013



Photo by John Garver

GLENVILLE WELL-FIELD AND WATER TREATMENT PLANT OBSERVATION WELLS



Town of Glenville, NY