GEOLOGIC MAP GUIDES POWER PLANT DEVELOPMENT IN NEW YORK.

Dr. Alexander Gates, Rutgers University
Dr. David Valentino, SUNY Oswego
Dr. William Kelly, New York State Geological Survey

Introduction: A bedrock geologic map of the Torne Brook area, NY (inset, Figure 1) was key to identifying groundwater and surface water concerns at a proposed plant site. The site is twenty-three miles from New York City on the east side of a fault- and fracture-controlled, steep-walled valley where surface and groundwater drain directly into the Ramapo River. The proposed power plant is up gradient from a closed landfill. There was apprehension that construction and paving at the power plant site would lead to increased runoff through or over the landfill, contaminating Torne Brook and the Ramapo River. The geologic map provided the foundation needed to evaluate the possible impacts on ground and surface water quality of power plant development at this site.

The Geologic Map: Geological mapping disclosed that the bedrock comprises hard, impermeable rocks where faults and fracture zones control groundwater flow. Groundwater flow in NE-SW trending zones can be prodigious. The fracture zones and the density of joints per meter are shown on the geologic map (Figure 1). The river, the landfill, and the power plant site are in a northeasterly line, parallel to the trend of the joints.

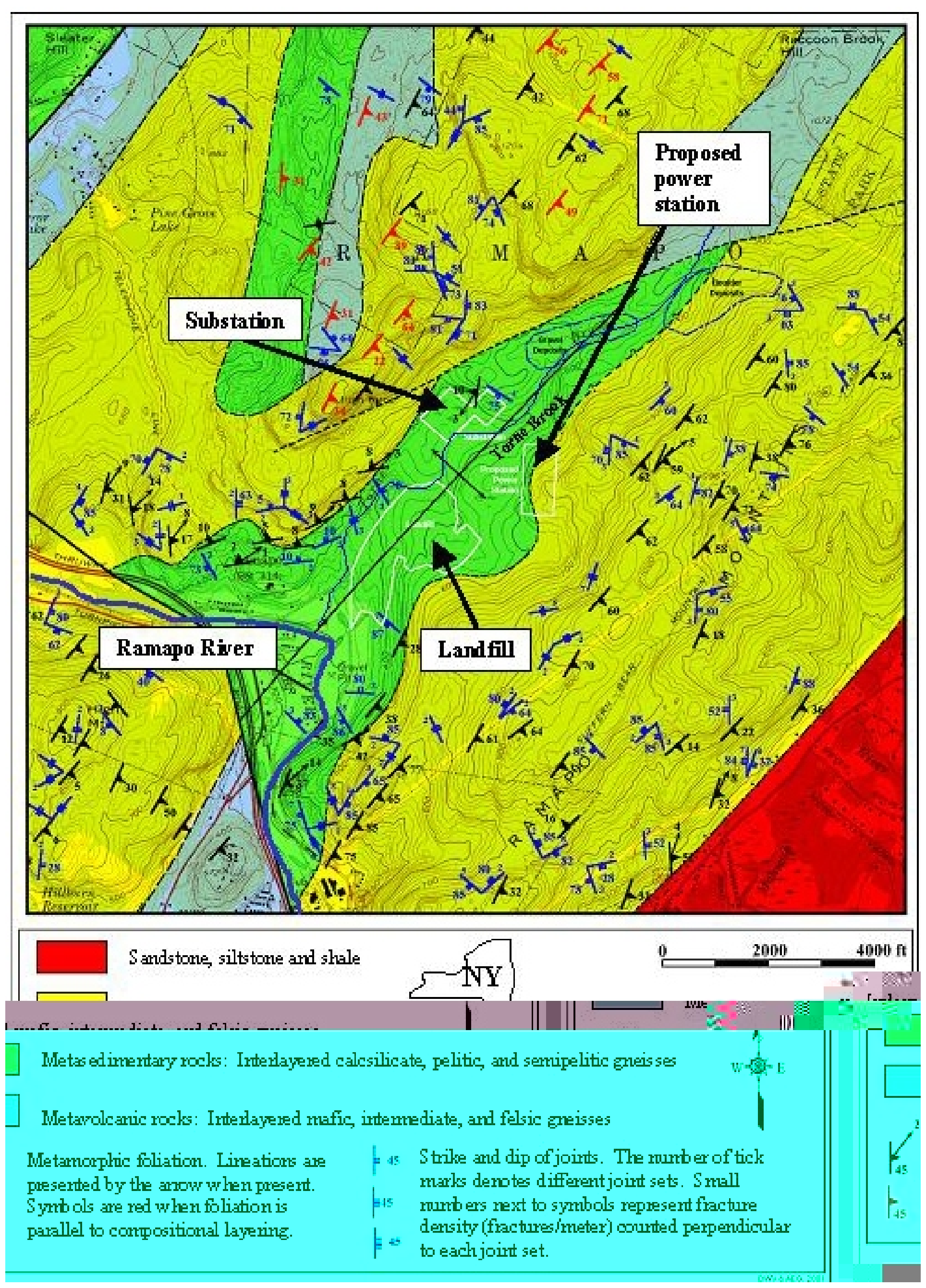

Figure 1. Portion of the geological map of the Sloatsburg, NY quadrangle (Gates et al) showing the type and configuration of bedrock, orientation of fractures and faults, and related features discussed in the text.

Discussion: Possible impacts of the proposed plan are the likelihood of increased infiltration of surface water during construction at the proposed power plant site and greater run-off from paved areas after completion. The geological map shows that surface and groundwater flow in the development area is directly to the landfill and thence directly into the recharge area of the Ramapo River. A one-inch rainfall could increase the amount of water passing over and through the landfill by 100,000 cubic feet. A tropical storm, such as the 1999 Hurricane Floyd, could add 500,000 cubic feet of increased flow. It is very likely that much of this flow would enter the groundwater through fractures, making its way to the Ramapo River. Construction engineering practices and final design can be tailored to prevent any increase in the amount of surface or sub-surface water movement in the direction of the landfill since the orientation and location of the faults and fracture zones in the valley are known.

Conclusion: The geologic analysis used in this study can be used elsewhere where new construction in areas of fracture-controlled groundwater flow may impact water quality. Such areas are likely to exist wherever hard, impermeable rocks such as metamorphic schist and gneiss comprise the bedrock.

REFERENCE:

Gates, A.F., Valentino , D.W., and Chairenzelli, J.R., 2001, Bedrock geologic map of the Sloatsburg, NY 7.5 minute quadrangle: New York State Geological Survey Open File.