GROUND-WATER FLOW MODELING AT THE PORT WASHINGTON L-4 LANDFILL SUPERFUND SITE

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Ground-water flow modeling was performed using a three-dimensional, regional scale, finite-difference ground-water flow model to aid in the design of a ground-water extraction system at a former municipal landfill in Port Washington, New York. MODFLOW (McDonald and Harbaugh, 1988) was selected as the code for the model because it is widely used, well documented, and accepted by the United States Environmental Protection Agency. The model domain consists of an approximately 20,000 feet (ft) by 20,000 ft region that covers the southern portion of Manhasset Neck. The model grid was vertically discretized into five layers with non-uniform interface elevations. Each layer represents various packages of hydrostratigraphic units as a function of elevation. Model boundaries consisted of no-flow boundaries around the periphery of the model domain, except Layer 5 (Lloyd Aquifer), as well as at the bottom of Layer 5, where bedrock is presumed to occur throughout the domain. Constant head cells were used at the periphery of Layer 5 to simulate observed downward hydraulic gradients through Layer 4 (Raritan Clay), and at the east and west edges of Layer 1 to simulate the shorelines of Hempstead Harbor and Manhasset Bay. Because treated water was required to be returned to the ground-water system, the model was used to simulate two recharge scenarios. The first scenario entailed recharging the treated water through an on-site recharge basin. The second scenario consisted of using a fraction of the treated water to irrigate the adjacent golf course and returning the balance to the ground-water system through the recharge basin. Subsequent study of tracers dissolved in ground water at the site found the distribution of tracers downgradient of the site was consistent with ground-water flow directions simulated by the model.

Reference:

McDonald, M.G. and A. W. Harbaugh (1988) A modular three-dimensional finite-difference ground-water flow model, USGS TWRI Chapter 6-A1, 586 pp.