

## APPLICATIONS OF SUFFOLK COUNTY'S FINITE ELEMENT GROUNDWATER MODEL

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### ABSTRACT

Suffolk County's 1.3 million residents rely upon groundwater stored in the productive aquifers beneath them as their only source of potable water. Groundwater discharges also provide the baseflows for fresh surface water resources throughout the County, maintaining streams, ponds and wetland areas. Recognizing the need to understand, and wisely manage this irreplaceable resource, the Suffolk County Department of Health Services, the Suffolk County Department of Public Works, the Suffolk County Water Authority, the Suffolk County Planning Department and the New York State Department of Environmental Conservation worked together cooperatively to develop and calibrate a three-dimensional groundwater flow model of the main body of Suffolk County. Over the past year, several members of the group have continued to work closely together to use the groundwater flow model and companion contaminant transport codes to address current groundwater concerns. Recent applications have focused upon estimating recharge areas for Suffolk County Water Authority wellfields, estimating the contributing areas for groundwater discharge to Long Island Sound and north shore harbors, the Peconic Estuary, and south shore streams and embayments. The model has also been used to simulate areas of observed groundwater contamination, to aid in the identification of possible sources, and to estimate potentially impacted areas.

Under natural, or undeveloped conditions, precipitation recharging Suffolk County's aquifers ultimately discharged from the groundwater system to the surrounding surface water system, either as streamflow, or as underflow. Today, groundwater may also be withdrawn from the aquifer system by water supply wells. The recharging precipitation may carry a variety of dissolved contaminants (such as nitrates from human wastes or fertilizers, petroleum products, or other organic chemicals) introduced by human activities down to the aquifer. It is useful for water resource managers to be able to identify the land surface providing recharge water to a particular water supply well or surface water feature. The types of land uses and waste management activities found within the recharge zones can provide insight into the resulting water quality at a water supply well. From a planning perspective, desired water quality may sometimes be achieved by land use and waste management within a particular recharge area.

Programs such as USEPA's Source Water Assessment Program require that the land areas contributing water to public drinking water supplies are identified, actual and potential contaminant sources within these areas are inventoried, and the likelihood that the contaminants could reach the drinking water supplies be evaluated. Similarly, regulators and planners are seeking to protect water quality of resources such as the Long Island Sound and the Peconic Estuary by managing the quality of the water discharging to those surface water bodies. Suffolk County is using the groundwater model to help support these programs by estimating source water areas, and by estimating the time it takes for recharging precipitation to travel through the aquifer to discharge at supply wells or surface waters.