Prepared in cooperation with the

Naval Facilities Engineering Command

Simulation of Zones of Groundwater Contribution to Wells at Site GM-38, Naval Weapons Industrial Reserve Plant, Bethpage, New York

By using numerical groundwater flow modeling techniques, this USGS study will provide a better understanding of capture zones of wells.

Summary

Within Bethpage, N.Y. (fig. 1) the area identified as GM-38 is a distinct shallow plume with concentrations of volatile organic compounds (VOCs) in groundwater of more than 500 parts per billion (ppb), about 8,000 feet (ft) to the southeast of another contaminant plume defined by the New York State Department of Environmental Conservation (NYSDEC) as operable unit 3 (OU3). The GM-38 contaminant plume is currently (2014), being remediated by a treatment system that has been operated by the Navy since 2009. The GM-38 remediation system consists of two extraction wells, RW1, which pumps 800 gal/min, and RW3, which pumps 300 gal/min. Groundwater captured at these two remedial wells near GM-38 is piped to an air stripping and liquid phase granular activated carbon adsorption plant, treated to NYSDEC State Pollutant Discharge Elimination System standards, then transferred to a nearby recharge basin where the effluent percolates downward and reenters the groundwater system. To operate the GM-38 remediation system effectively, the pumping rates of RW1 and RW3 may be optimized using the U. S. Geological Survey (USGS) groundwater flow model MODFLOW.

In addition to understanding the effect of the GM-38 system on containment of the contaminant plume, it is also desirable to understand how the GM-38 system affects hydraulic interference and zones of contribution (ZOCs) to nearby production wells. Furthermore, it is desirable to understand how other factors affect GM-38 ZOCs, such as: other pumping wells associated with the Naval Weapons Industrial Rerserve Plant, groundwater recharge from precipitation, and the regional flow system of

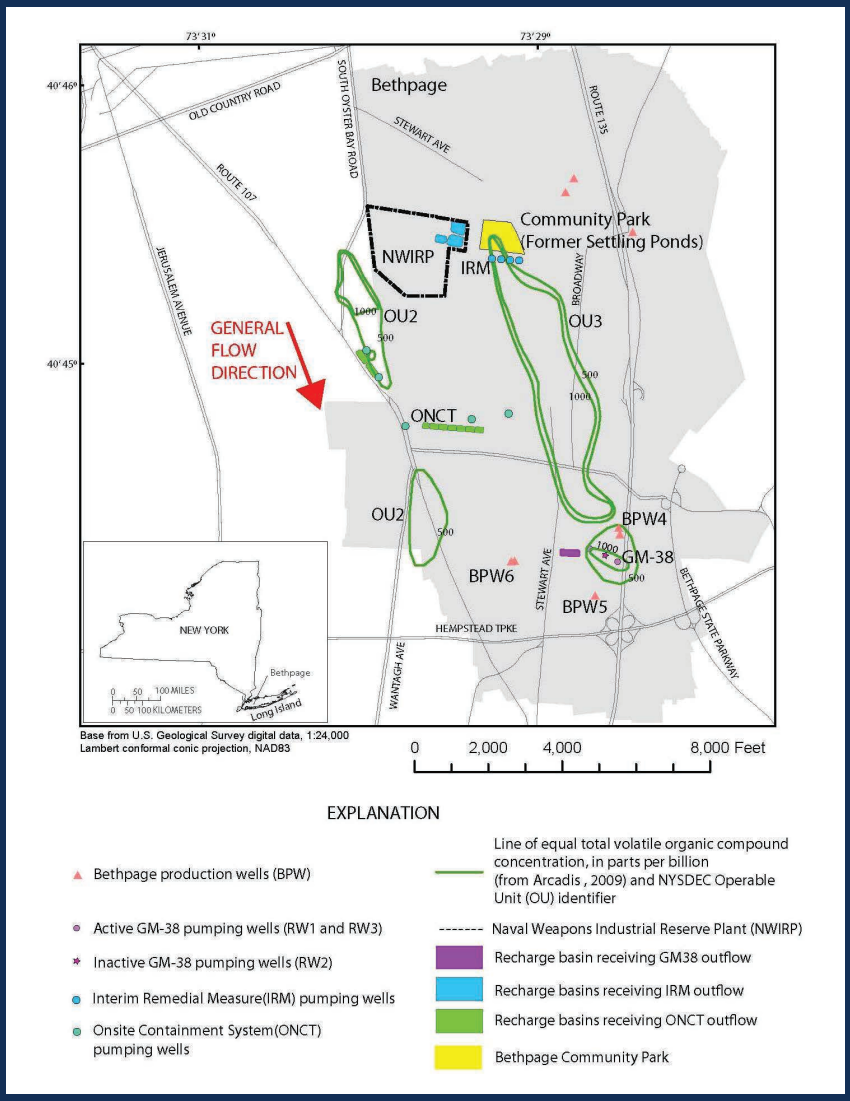

Figure 1. Map showing generalized groundwater- flow direction, production wells, recharge basins, mapped volatile organic compound plumes adjacent to the Naval Weapons Industrial Reserve Plant (NWIRP), and other local features

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Long Island. Production wells in the vicinity include a well upgradient of the GM-38 site; and a well downgradient of GM-38, and a well about equidistant between the GM-38 plume and another contaminant plume to the west.

The purpose of this study is to provide a better understanding of the ZOCs to the GM-38 wells. The study evaluates advective groundwater-flow patterns through groundwater-flow simulation and particle-tracking analysis in forward and backward modes. The groundwater-flow simulation and particle tracking analysis has the following general objectives.

1. Delineate the GM-38 ZOCs during present conditions through backwards tracking of particles that are initiated at wells.

2. Determine the hydrogeologic and pumping-rate controls on the size and shape of the GM-38 ZOCs.

For Additional Information

Visit the New York Water Science Center Web site at:
http://ny.water.usgs.gov
Or contact Ward O. Freeman, Director
(518) 285-5665 dc_ny@usgs.gov

Primary Researchers

Paul E. Misut
U.S.Geological Survey
2045 Route 112, Building 4 Coram, NY 11727
pemisut@usgs.gov
Paul (631) 736-0783 ext. 106

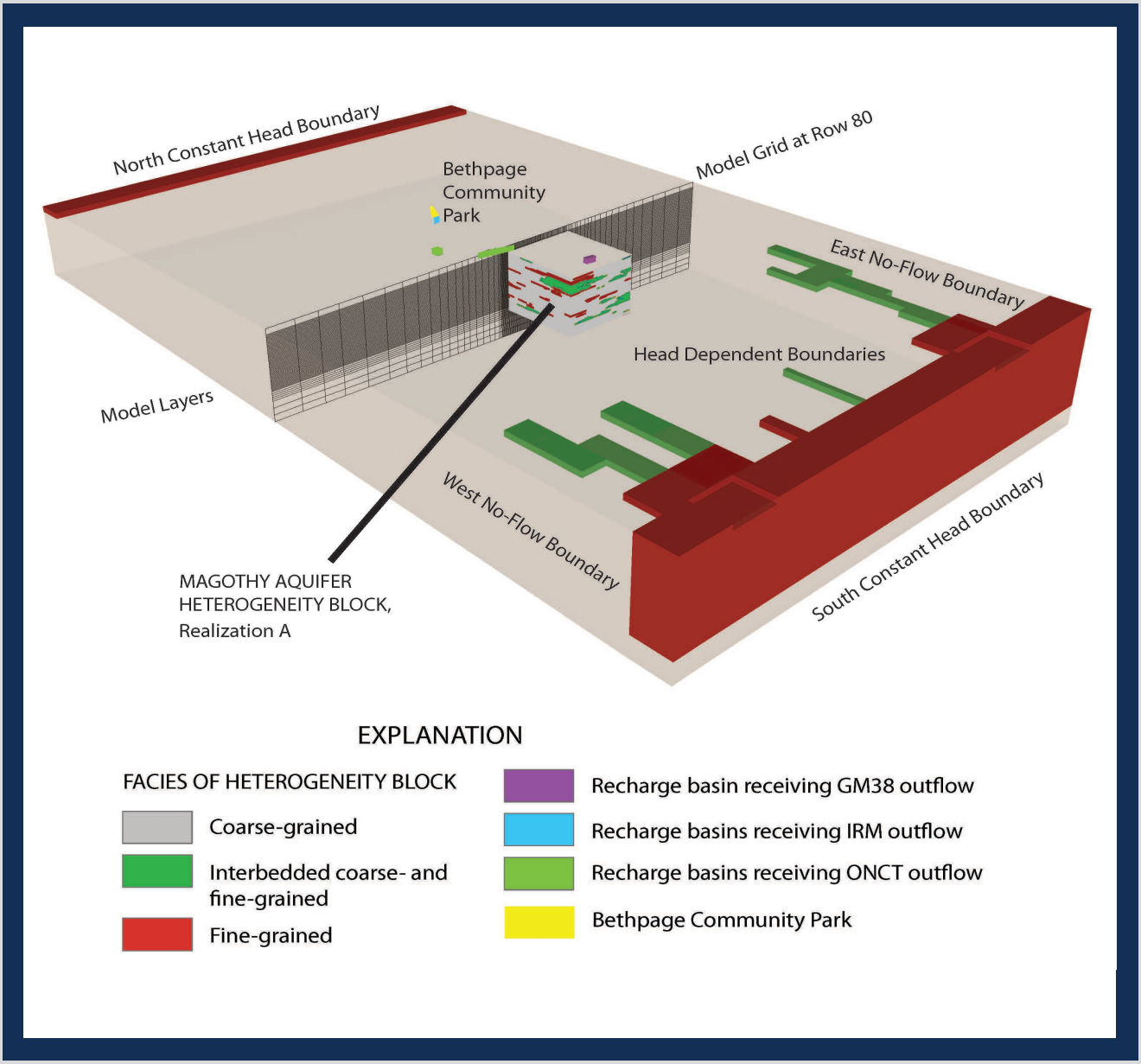

Figure 2. Block diagram showing conditional realization of Magothy aquifer heterogeneity within regional flow model with boundary conditions and model grid