

## EMERGING CONTAMINANTS IN LONG ISLAND GROUNDWATER

By

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The drinking water supply for Long Island is determined by its almost unique geology which consists of three distinct aquifers. The Upper Glacial Aquifer lies at the surface in most areas and is immediately underlain by the Magothy Aquifer. A confining layer, the Raritan Formation (clay), separates the Magothy Aquifer from the Lloyd Aquifer. The Upper Glacial and Magothy Aquifers are under water-table (unconfined) conditions, whereas the Lloyd Aquifer is under artesian (confined) conditions in most locations.

All water for potable purposes, irrigation and industrial use for Long Island's 2.8 million residents is drawn from the three aquifers mentioned above. Approximately 1,500 public supply wells pump about 400 million gallons per day. Because Long Island's aquifer system is the only source of water available to its residents, the US Environmental Protection Agency has designated it a "sole-source aquifer" under the Safe Drinking Water Act. This requires the agency to review projects that receive federal funding for their potential to contaminate groundwater in the aquifer system.

In addition to using the sole-source aquifer system for a water supply, it is also used for waste disposal. In un-sewered areas, septic tanks and cesspools are used to dispose of sewage and waste water. There are approximately 510,000 septic tanks and cesspools still in use on Long Island, 360,000 of which are in Suffolk County. These local waste disposal systems, along with fertilizer use, legacy Superfund, Resource Conservation and Recovery Act (RCRA) and spill sites are major sources of contaminants to the groundwater system.

In addition to nitrates which now contaminate large areas in the groundwater system and are discharging to near-shore bays, several emergent hazardous organic compounds have started to appear in groundwater. Some of these compounds, such as 1,4-dioxane and perfluorinated compounds (PFAS) are present in consumer products and fire-fighting foams and are, at present, unregulated, although standards have been proposed by the New York State Drinking Water Council. Other compounds, such as endocrine disruptors and pharmaceuticals, originate in the drugs (or are metabolites of drugs) consumed by the population of Long Island.

The concurrent use of the aquifer system for both water supply and waste disposal is unsustainable. At best, hazardous contaminants will require advanced treatment of public water supplies. For example, removing 1,4-dioxane from the 185 contaminated wells on Long Island is expected to cost about \$1 billion in capital costs with millions more annually for operation and maintenance. Other compounds will require additional treatment. At worst, the disposal of these chemicals in addition to nitrates and other wastes may result in the ultimate unavailability of groundwater in the aquifer system over the coming decades.