

**Progress Report
of the
NEW YORK STATE LEGISLATIVE
COMMISSION ON
WATER RESOURCE NEEDS
OF LONG ISLAND
1982**

**Senator Caesar Trunzo
Co-Chairman**

**Assemblywoman May W. Newburger
Co-Chairwoman**

SELDOM IF EVER DOES NATURE OPERATE IN CLOSED AND
SEPARATE COMPARTMENTS, AND SHE HAS NOT DONE SO IN
DISTRIBUTING THE EARTH'S WATER SUPPLY... AND SO,
IN A VERY REAL AND FRIGHTENING SENSE, POLLUTION
OF GROUNDWATER IS POLLUTION OF WATER EVERYWHERE.

Rachel Carson
Silent Spring, 1962

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March 31, 1982

The Honorable Hugh L. Carey
Governor of New York State
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The Honorable Warren M. Anderson
Senate Majority Leader

The Honorable Stanley Fink
Speaker of the Assembly

The Honorable Manfred Ohrenstein
Senate Minority Leader

The Honorable James L. Emery
Assembly Minority Leader

Dear Sirs:

The second report of the New York State Legislative Commission on Water Resource Needs of Long Island is submitted herewith in accordance with the provisions of Chapter 50 of the laws of 1980, which, as amended, established the Commission.

The second year of the Commission's tenure has been an especially active one. In implementing a Community Awareness Program, the Commission has expanded its efforts at meeting with citizen groups, service clubs, and public organizations, explaining the fragile nature of Long Island's groundwater resources and the programs that have been developed to insure their integrity.

The Commission has continued as an active participant in the many programs that have been established to better protect and manage Long Island's only source of water--its groundwater reservoir. Meetings, seminars, workshops, and conferences on a variety of issues affecting Long Island's water resources have been attended by the Commission.

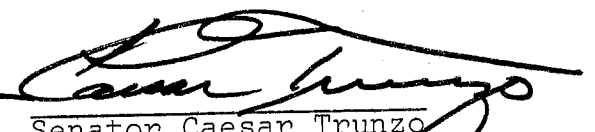
Notably, the Commission has continued its active involvement in the critically important New York State Groundwater Management Program.

As provided in the mandates of the enabling legislation, the Commission has furthered its literature search of papers and reports on the topic of Long Island's water resources.

As can be seen by the contents of the second Report, the Commission has continued making numerous legislative and administrative recommendations to conserve, protect, and manage the Island's water supply. The necessary foundation has been established, but there is still a great deal more work that must be done if we are to be successful in fulfilling the Commission's mandates.

Respectfully submitted,


Assemblywoman May W. Newburger
Co-Chairwoman


Senator Caesar Trunzo
Co-Chairman

In the memory of Edward N. Cantor, who faithfully served
the Commission, 1980-1982.

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LEGISLATIVE COMMISSION ON WATER RESOURCE NEEDS OF LONG ISLAND

(CHAP 50)

The legislature hereby finds and declares that the state has the sovereign power to regulate and control the water resources of this state, including the counties of Nassau and Suffolk and an adequate and suitable water supply for two such counties for water supply, domestic, municipal, industrial, agricultural and commercial uses, power, irrigation, transportation, fire protection, sewage and water assimilation, the growth of the forest, maintenance of fish and wildlife, recreational enjoyment and other uses is essential to the health, safety and welfare of the people and economic growth and prosperity of two said counties.

Recent studies and reports have been made which indicate that due to many diverse reasons, the water supply and water resources of the two said counties may be in jeopardy.

Accordingly, a legislative commission is hereby established: (a) to investigate and evaluate said reports; (b) to make recommendations for provisions to be made for the regulation and supervision of activities that deplete, defile, damage or otherwise adversely affect the waters of the two said counties, and the land resources associated therewith; (c) to determine where uncontaminated or virgin sources of water exist in both counties; and (d) to recommend legislative or administrative actions that are required to preserve and protect such resources for future use.

Such commission shall consist of six members to be appointed as follows: two members of the senate shall be appointed by the temporary president of the senate; two members of the assembly shall be appointed by the speaker of the assembly; one member of the senate shall be appointed by the minority leader of the senate; and one member of the assembly shall be appointed by the minority leader of the assembly. Any vacancy that occurs in the commission shall be filled in the same manner in the original appointment was made. Co-chairmen of the commission shall be designated by the president pro-tem of the senate and the speaker of the assembly respectively. No member, officer, or employee of the commission shall be disqualified from holding any other public office or employment, nor shall he forfeit any such office or employment by reason of his appointment hereunder, notwithstanding the provisions of any general, special, or local law, ordinance, or city charter.

The commission may employ personnel required and fix their compensation within the amount appropriated therefor. The commission may meet within and without the state; hold public and private hearings and otherwise have all of the powers of a legislative committee under the legislative law. The members of the commission shall receive no compensation for their services but shall be allowed their actual and necessary expenses incurred in the performance of their duties hereunder.

The commission may request and shall receive from any subdivision, department, board, bureau, commission, office agency or other instrumentality of the state or of any political subdivision thereof, such facilities, assistance and data as it deems necessary or desirable for the proper execution of its powers and duties.

The commission is hereby authorized and empowered to make and sign any agreements, and to do and perform any acts that may be necessary, desirable or proper to carry out the purposes and objectives set forth herein.

The commission shall submit a report to the governor and the legislature containing its findings on or before March thirty-first, nineteen-hundred eighty-two. The commission shall continue in existence until March thirty-first, nineteen-hundred eighty-two.

EXPRESSION OF APPRECIATION FOR THE COOPERATION
AND PARTICIPATION OF PERSONS AND ORGANIZATIONS
IN THE WORK OF THE COMMISSION

This Commission gratefully acknowledges the help so generously provided by the many agencies, groups, and individuals, both governmental and private, with whom this Commission has worked over the past year.

EXECUTIVE SUMMARY

The Progress Report of the New York State Legislative Commission on Water Resource Needs of Long Island documents the work of the Commission during its second year of existence. Commission activities during the legislative year 1981-1982 have addressed a wide range of water resource issues which will continue to be of major concern for years to come. Though progress has been made in many areas during the past two years, additional work needs to be done in order to lay the groundwork for the adoption of Commission recommendations.

As was implicitly recognized in the establishment of this Commission by the New York State Legislature, the water resources of Long Island have certain qualities which render the area's water supply especially vulnerable to contamination and over-use. Since all Long Island residents rely on one source of water -- Long Island's subsurface aquifer* system -- evidence that that source is in jeopardy is cause for great concern. Section I of this Report, Review of Events, illustrates the extent of the threat to water resources on Long Island, and cites some of the attempts to counter them.

Sections II, III, IV and V of the Report represent the results of in-depth investigation into those areas identified in the Commission's 1980-1981 Report as the major water resource issues for Long Island. The work of the Commission over the past year has included studies of various approaches to water resource management nationwide. It is hoped that the results of our investigations, which are presented in this Report, will provide models for the development of regional management and aquifer protection programs in the State of New York.

Section II addresses the need for a regional management program for groundwater resources on Long Island, and presents goals for such a program. The water supply problems and the threats to groundwater quality cited in last year's Commission Report have not been alleviated. Of course, the regional nature of the aquifer system has not and can not be changed. Only our way of dealing with that system can change, and must change if Long Island's underground reservoir is to serve its population well now and in the future. Protection, conservation and efficient

*aquifer: a geological formation which can hold and transmit water.

distribution of water can be achieved only through a management program which responds to the natural characteristics of the aquifer system, and, on an areawide basis, to the economic, technical and social circumstances which affect our utilization of water resources.

CONCLUSIONS AND RECOMMENDATIONS FOR REGIONAL GROUNDWATER MANAGEMENT

- . The Commission finds that those problems emphasized in its first Report -- groundwater mining, balkanization of water supply companies, lack of incentive and framework for watershed management, and lack of an integrated water conservation program -- all continue to highlight the urgent need for a system of regional management of the groundwater resource on Long Island.
- . Reports from both the private and public sectors have stressed the need for areawide management, citing the nature of the groundwater resource, the multiplicity of threats to groundwater quality, the patterns of generally unregulated development on Long Island, and inconsistent and irregular service.
- . A regional approach to groundwater management will aid not only in the protection and preservation of our water resources, but in the provision of the best possible water supply service to all Long Island residents as well. A survey of regional water management programs nationwide demonstrates that such programs can be successful and can function within many different frameworks.
- . The Commission recommends cooperation among all interested parties in the development and implementation of a regional management program which will embrace those goals enumerated in Section II of this Report, which will achieve long term protection of the groundwater resource, and which will facilitate the provision of the best water supply service possible to all Long Islanders.

Section III, which deals with critical watershed protection, cites the growing problem of contamination of Long Island's water supplies and suggests the development and implementation of a program of watershed protection, i.e. regulation of land surface activities in order to protect water resources. The

entire land surface of Long Island is a catchment area and pathway for all of the water that is eventually used and consumed by area residents. Contaminating residuals generated from substances put on or into the land can enter the groundwater easily. This necessitates the maintenance of clean land as a precondition of clean water.

Certain areas on Long Island are particularly important for their role in recharging pure water and for serving as source areas from which water flows to other parts of the aquifer system. These areas are referred to in this Report as critical watersheds or special protection areas, and they require comprehensive management if the quality of water is to be maintained. It is in these critical areas that the implementation of a clean land policy is of particular importance.

CONCLUSIONS AND RECOMMENDATIONS FOR CRITICAL WATERSHED PROTECTION

- . The Commission finds that the prevention of water quality deterioration is a more attractive and cost effective alternative than expensive treatment or development of other sources after a water pollution problem arises. A watershed protection strategy involving regulation of land surface activities is essential for the protection of Long Island's groundwater.
- . Watershed protection programs are already in place at the Federal level in the form of the Sole Source aquifer program under the Environmental Protection Agency, and at the State level in the form of the Department of Health's Rules and Regulations program. The scope of both of these programs is currently limited; neither provides comprehensive protection of Long Island's aquifer system.
- . Aquifer protection programs have been proposed and/or implemented in other areas and have demonstrated methods of regulating land uses on a regional basis in the interest of protecting water resources.
- . The Commission recommends that the County of Nassau initiate a watershed management district program to protect the recharge sites of key sections of the deep flow recharge zones such as exist in the northern half of the County.
- . The Commission supports the use of a non-degradation policy as the basis of critical watershed protection programs.

The Commission recommends the passage of legislation at both the State and Federal levels which will broaden the scope of both the Rules and Regulations program and the Sole Source aquifer program so they will provide for the management of critical watershed areas.

The Long Island Pine Barrens, addressed in Section IV of this Report, is the largest pristine recharge area in the bi-county region. This largely undeveloped natural area is currently the subject of numerous studies which are compiling data which will enable planning and management in the area to proceed on the basis of full information regarding hydrogeology, water quality and land use. The Commission has cooperated with several groups in the compiling of data and in considering alternatives for the protection and management of the Pine Barrens. Additionally, the Commission has prepared draft legislation which will help protect the Pine Barrens and has been involved in efforts to insure long-term public ownership of the Oak Brush Plains.

CONCLUSIONS AND RECOMMENDATIONS FOR THE CENTRAL PINE BARRENS

- The Commission recognizes and commends the efforts of the New York State Department of Environmental Conservation, the Long Island Regional Planning Board, and other governmental and non-governmental entities that have contributed to the study of the Long Island Pine Barrens for the purposes of planning its wise management and preservation.
- The Commission finds that the Pine Barrens of Suffolk County, Long Island's cleanest and most efficient recharge area, is increasingly subject to development pressures.
- Documentation of accidental spills of toxic and hazardous materials within the Pine Barrens indicates that present practices of land use and development result in unavoidable water quality problems which can not be fully mitigated by the use of cleanup and treatment technologies.
- The Commission recommends that those areas of the South Fork of Long Island identified in this Report as critical watershed areas be included in all efforts at the management and protection of the Long Island Pine Barrens.
- The Commission recommends that the transfer of ownership of the Oak Brush Plains be expedited and that following the transfer of ownership there be

created, in recognition of the area's hydrogeological and ecological significance, an Oak Brush Plains Pine Barrens Preserve.

Solid waste disposal on Long Island is addressed in Section V of this Report. Nationwide, solid waste disposal facilities pose serious threats to environmental quality. As of 1976, only 35% of the Country's 16,000 active municipal landfills were operating in compliance with state regulations. Municipal landfills on Long Island are recognized as significant and pervasive point-sources of groundwater contamination. Leachate plumes emanating from numerous Long Island landfills have necessitated the extension of public water to serve private residences where well water has been contaminated.

CONCLUSIONS AND RECOMMENDATIONS FOR SOLID WASTE DISPOSAL

- The Commission finds and commends the fact that many of the towns on Long Island are in the process of moving away from the land burial of raw garbage and toward the development of recycling and/or resource recovery programs.
- Shifts away from landfilling practices notwithstanding, problems identified in the Commission's Report of last year as associated with land burial of solid waste continue to be causes for serious concern. These include:
 - 1) methane generation and off-site migration;
 - 2) vinyl chloride gas generation;
 - 3) noxious odors;
 - 4) leachate generation
 - 5) major groundwater contamination with leachate plumes up to one mile long;
 - 6) pests and disease vectors;
 - 7) hazardous waste mixed with garbage; and
 - 8) location of many landfills, active and inactive, within the primary groundwater recharge areas.
- The Commission takes this opportunity to re-state its recommendations of last year regarding landfills on Long Island, as follows:

The Commission finds that landfills must be managed, not only as to what they receive, but also as to where they are built.

The Commission recommends that landfills of municipal or industrial waste be prohibited

from the hydrogeologic zones I, II and III as defined by the Long Island Comprehensive Waste Treatment Management Plan. All landfills presently operating within these zones should be properly vented, capped, and securely closed.

The Commission also recommends that all landfills outside zones I, II, or III which do not meet the highest standards of safety and construction be closed and that newer, environmentally secure landfills be built in their place. These will receive only those wastes that are the residues of such processes as incineration, resource recovery, or composting.

Sections VI and VII of the Report deal with public education and with water contamination and supply problems. Section VIII is the Executive Summary of the public hearing held jointly by the Legislative Commission on Water Resource Needs of Long Island and the Legislative Commission on Economy and Efficiency in Government to address the State's organization to deal with water resource issues. Section IX presents legislation drafted by the Commission.

SECTION I

REVIEW OF EVENTS
MARCH, 1981, MARCH, 1982

REVIEW OF EVENTS
MARCH, 1981-MARCH, 1982

In recent years, environmental quality has become a subject of great concern on Long Island. With the rising number of incidents of groundwater contamination and other types of environmental degradation has come an intensification of efforts to prevent and correct such problems. The Commission has been involved in many of these efforts, and has compiled the following list of significant environmental happenings over the past year in order to depict both the types of problems experienced and the types of responses which have arisen to manage and protect Long Island's natural resources.

RECORDS ON OIL SPILLS:

The Oil Spill Prevention and Control Bureau of the Department of Transportation has compiled data on oil and gasoline spills on Long Island during the period April 1, 1980-April 1, 1981. Almost 100,000 gallons of petroleum were released in spills involving more than 100 gallons in the Nassau-Suffolk area during the period studied. About 30-40% of the spilled chemicals were ultimately recovered. Cleanup and recovery efforts have generally been paid for by the oil company or other responsible involved parties. Department of Transportation figures for Nassau show 19 spills involving 24,000 gallons of petroleum during the period studied. The Suffolk figures list 39 spills totalling 72,000 gallons.

CONTAMINATION BLAMED ON 1960's SPILL:

Contamination of a private residential well in Quiogue is believed by the Suffolk County Health Department to be the result of a massive Air Force jet fuel and gasoline spill in the 1960s. In 1977, about 30 nearby wells were believed to have been contaminated by that earlier spill. The hydrocarbon contamination discovered in February is the only such incident in the area in the past five years. The homes that experienced contamination in the late 1970's have been hooked up to a public water system since that time.

EXPLOSION NEAR HUNTINGTON LANDFILL:

An underground gas buildup caused an explosion which injured two workers while they were repairing a water tank. The incident occurred in February at the site

of a well across the street from the Huntington Town landfill. Investigation at the well site the day of the explosion and the following day showed dangerous levels of a flammable gas, believed to be methane. The methane may have migrated from the nearby landfill, though that facility has special wells to prevent off-site migration of the flammable gas.

MULTI-TOWN CHANGES:

Revised specifications for the Multi-Town resource recovery plant have been developed following the withdrawal of the Town of Islip from the project. Modifications in design will lower the plant's processing capacity from 3,400 tons of solid waste per day to 2,250 tons per day. Financial difficulties, along with Islip's withdrawal, necessitated the passage of State legislation to reorganize the Multi-Town Authority so that only the Towns of Huntington and Babylon belong. Additionally, the legislation facilitated the Authority's financing so that the plant's planning and construction can continue (as planned).

U.S. GEOLOGICAL SURVEY STUDIES:

The U.S. Geological Survey has been an important source of information on Long Island's water resources. The Survey, with cooperating agencies including the Nassau County Department of Public Works, the Suffolk County Department of Health Services, the Suffolk County Water Authority, the Town of Brookhaven, the New York City Department of Environmental Protection, the Long Island Regional Planning Board, and the New York State Department of Environmental Conservation, is conducting eight ongoing studies addressing water issues on Long Island. These include projects addressing the impact of urban runoff on groundwater quality; the impact of aldicarb in eastern Suffolk County and an assessment of groundwater resources in the Montauk area. The Geological Survey is also engaged in a regional study of all of Long Island's aquifers. Recent and upcoming publications from the Survey relate to the groundwater resources of Kings and Queens Counties; groundwater pumpage in Nassau County, 1920-1977; and the geohydrology of Long Island's South Fork.

OYSTER BAY PROPOSES A RESOURCE RECOVERY PLANT:

In early February, 1982, the Town of Oyster Bay, in Nassau County announced plans for a resource recovery plant slated to be in operation by 1985. Total costs of the plant, which will be sited at the Old Bethpage landfill, are expected to approach \$117 million. The plant will use technology developed by a Danish firm, and will be constructed by Waste Management, Inc. of Oak Brook, Illinois. The plant is designed to handle 1,000 tons of garbage a day, and will produce heat which will be used to generate electricity to be sold to LILCO. Residual ash from the process, approximately 5% of the volume of the original garbage, will probably be landfilled.

EPA STUDY ON DIOXIN EMISSIONS:

A federal Environmental Protection Agency report released in November, 1981, established guidelines for dioxin emissions based on results of tests at three resource recovery plants. The EPA study did not include testing at the Hempstead Resource Recovery Plant, where trace levels of dioxin were detected prior to the plant's closing in March, 1980. The EPA study concluded that dioxin emissions from the three plants it studied are not dangerous to the public health. Though the Hempstead plant has a different technology than those studied, an EPA official noted that "there is reason to believe that the dioxin concern would not be great at Hempstead." The EPA's conclusions have been sharply criticized by both local citizens in the Hempstead area and by professionals in the environmental sciences, who have questioned the validity of assumptions and experimental techniques used in the study.

AGRICULTURAL PESTICIDES CONTAMINATE GROUNDWATER IN SUFFOLK:

Aldicarb is a highly toxic pesticide which was in widespread use in Suffolk County until it was found to be a cause of extensive groundwater contamination. Aldicarb contamination is a principal cause of current concern regarding the future of the North Fork's water supply. Studies by the Suffolk County Department of Health Services have found that Aldicarb is one of several contaminating chemicals used in eastern Long Island. Groundwater samples have been tested for 10 of the more than 100 pesticides used in significant amounts by Suffolk farmers from 1975-1980. In addition to Aldicarb, tests have identified carbofuran (Furadan), a pesticide used on potato beetles, and 1,3, dichloropropane, a fumigant, as harmful compounds concentrated in the area's groundwater.

PLANS UNDER CONSIDERATION FOR NORTH FORK WASTE PLANT:

Officials from the towns of Riverhead and Southold in Suffolk County are studying a joint plan to construct an incinerator for the disposal of solid waste. The plan for the waste plant was initiated in Southold; due to that Town's seasonal population it is believed by some that Riverhead's solid waste would be needed to keep the facility operating year-round. The facility will produce electricity to sell to LILCO. The steam-powered generators of the incinerator require large amounts of water, a factor of some concern to Southold residents and officials. The plant would be sited in Cutchogue, and would probably be constructed and operated by a private firm which would charge the town(s) tipping fees, as well as using town funds to cover part of construction costs.

LAWSUIT FILED FOR CONTAMINATION AT MITCHEL FIELD:

New York State has filed charges against a California-based corporation in a \$50 million law suit, charging that toxic chemicals emitted by a chemical storage facility operated by a subsidiary of the Purex Corporation have polluted Nassau County's groundwater. The chemicals include toluene, xylene, and trichloroethylene, all of which can cause cancer or damage to the liver and central nervous system. The contamination was detected when wells were dug near the storage facility in 1977. The chemical levels in groundwater at the site upon discovery were 2,400 times higher than permitted by State law. The suit seeks to compel the Purex Corporation to clean up the site and to decontaminate the aquifer.

FUNDS WITHHELD FOR SHREDDER-BALER AT NORTH HEMPSTEAD LANDFILL:

State conservation officials are withholding more than \$2 million earmarked for the Town of North Hempstead's garbage shredding facility in an effort to force the Town's compliance with the conditions of its operating permit for the Port Washington landfill in Nassau County. Minor methane gas explosions and fires in several homes in Port Washington may have resulted from the closing of vents at the nearby landfill. The vents were closed because of homeowners' complaints about foul odors. A Town consultant said the methane migration was brought on by the combination of closed vents and a layer of frost on the ground, which together trapped the methane underground, forcing it to migrate laterally rather than upwards where it would be dispelled in the air.

NORTH FORK WATER PLAN ENACTED:

The Suffolk County Legislature unanimously approved a \$105,000 plan to develop alternative water supplies for

Riverhead and Southold town residents whose private wells have been contaminated by farm chemicals, primarily aldicarb and vydate. A study by ERM Northeast, which began in January, 1982, will cover several water supply alternatives, such as extension of public water from the Pine Barrens, small municipal water supply systems, desalinization, treatment, and creation of water treatment management districts.

NATIONAL URBAN RUNOFF PROGRAM:

The National Urban Runoff Program (NURP) is being sponsored by the Environmental Protection Agency to study stormwater runoff in commercial areas and on highways, as well as runoff entering recharge basins from low and medium density residential areas. A surface water segment of the NURP program is investigating the introduction of bacteria into surface waters through urban runoff. At a recent NURP conference in Seattle, reports indicated that street sweeping has been unsuccessful in stopping contaminants from being carried by road runoff into surface waters.

SOUTHWEST SEWER DISTRICT:

Suffolk County's Southwest Sewer District began operations in October, 1981, 19 years after the district's creation was first proposed. It is hoped that elimination of cesspools throughout the district will have a cleansing effect on the polluted Upper Glacial aquifer. Throughout the 57 square mile district there are more than 750 miles of pipes which transport sewage to the treatment plant. The plant is designed to treat 30 million gallons of wastewater daily by removing solids and using an activated sludge process, in which microorganisms break down most harmful organic material. The plant will also handle 500,000 gallons of scavenger waste from cesspools and industrial sources. The sludge created from both processes will be burned, leaving a harmless ash. The buried outfall pipe from the plant goes 2.5 miles across Great South Bay and 3.5 miles into the ocean; it will discharge treated waste into the ocean at a depth of 52 feet.

REQUIREMENT FOR "SUPER CESSPOOLS" IN SUFFOLK COUNTY:

The Suffolk County Board of Health has passed a regulation requiring builders to add a biological treatment system to septic tanks to reduce the nitrate contamination of drinking water. The system uses bacteria to convert nitrates in human wastes into harmless nitrogen gas, thus preventing most of the potentially harmful nitrates from reaching the groundwater. It is expected that compliance with the regulation could double the cost of a septic system and cut the amount of nitrates reaching the groundwater by half.

OIL-TO-COAL CONVERSIONS FOR SUFFOLK COUNTY POWER PLANTS:

The New York State Energy Master Plan calls for the conversion of 6,000 MW of electric generating capacity from oil to coal by 1991. LILCO facilities at Port Jefferson, Northport and Island Park have been slated for conversion. The federal Department of Energy targeted the Northport plant for conversion in 1980, but rescinded its order this year because of prohibitive costs. Proposals for the conversion of the other Long Island sites to coal-burning facilities are under consideration. Concern over negative environmental consequences such as acid precipitation, and over the problems associated with disposal of coal ash, which contains heavy metals, has been expressed by many who have reviewed LILCO's proposals.

NUCLEAR WASTE TRANSPORT:

The Town of Brookhaven and the State and City of New York have challenged new regulations established by the U.S. Department of Transportation regulating the transport of nuclear waste. Brookhaven Town Council member Neal Capria argues that the Department of Transportation regulations authorize shipment of radioactive materials without adequate consideration of the associated risks to public health and safety. Officials of the State and City of New York, as well as the Town, believe that the Transportation Department has exceeded its authority and that it has invaded traditional local jurisdiction in this area. The only shipper of nuclear waste on Long Island is the Brookhaven National Laboratory, located in Suffolk County, which ships waste to a reprocessing facility in Aiken, South Carolina.

CONFERENCE ON LANDFILLS:

The Long Island Regional Planning Board, which has criticized the siting of landfills in certain of Long Island's hydrogeologic zones, sponsored, in conjunction with two Suffolk County legislators, a conference on the design, construction, and closure of sanitary landfills. Speakers at the conference evaluated different types of liner materials--plastic, natural clay, and bentonite, a volcanic ash--and explored different capping techniques. Also addressed at the day-long Fall seminar was the venting of methane gas from landfill sites, and the monitoring and collecting of leachate.

STUDY ON SALMONELLA:

The Long Island Regional Planning Board is conducting a \$2.3 million study to investigate possible negative health effects of Salmonella bacteria in Long Island's

bays. The federal government will contribute about \$1.5 million to the study, and Nassau and Suffolk Counties will provide the remainder of the required funds. Salmonella bacteria are parasites that live in some animals and in eggs, meat and dairy products; the bacteria are washed into Long Island's bays with storm water runoff. The study will address the possible spread of infection through the route of the Salmonella into the area's waters.

ISLIP LANDFILL:

New York State brought suit against the Town of Islip in October, 1981, charging the Town with violating its agreement to clean up its Hauppauge landfill, which has been cited by the State as dangerous to the health and welfare of area residents. This is the first time that the State has sued a municipality over the condition of a waste disposal facility. The State charges the Town with violating State environmental standards and with non-compliance with numerous deadlines specified in the Town's consent order with the State. Town officials have noted that there is no proof of the alleged violations. Following water and air quality tests at the site, EPA officials stated that the Hauppauge landfill in Suffolk County did not indicate the presence of any health hazards. The Town is in the process of installing methane vents, and hopes to begin the capping and closing of the landfill within a year.

RESIDUE FROM IRON TREATMENT CLOGS PIPES IN NASSAU COUNTY:

Many residents of the New York Water Service Corporation's service area have experienced problems with a viscous goo in their hot water pipes which clogs pipes and hot water heaters, and turns running water from hot to cold. The problem has affected approximately 40,000 residents of the towns of North Hempstead and Hempstead. Following complaints by area residents, it was discovered that the gelatinous substance clogging pipes is caused by the addition by the water company of sodium hexameta-phosphate to the water. The chemical is used to avoid the precipitating out of iron from the water, which causes an unpleasant color and stains clothing. When sodium hexametaphosphate reacts with iron at a temperature of over 150 degrees within the heating coils of hot water heaters, the goo is produced. The goo is not a health hazard and the nuisance it creates can be mitigated by home owners through various techniques, most of which require some expenditure.

CLUSTERING MANDATED IN EAST HAMPTON:

In July, 1981, the New York State Legislature passed a bill that gave East Hampton's Town Board the power to grant the Town Planning Board the authority to mandate cluster zoning. Signed into law in August, the bill enabled the requiring of cluster zoning, which demands the preservation of a significant portion of a parcel of land while dwelling units are grouped closely together on a developed portion. Clustering will preserve open space and protect environmentally sensitive areas in East Hampton in Suffolk County, which is the only township in the State which has a mandatory clustering provision. The Town of Southampton has taken preliminary steps towards promulgating a similar regulation.

RESTRICTIONS IN PESTICIDE USE SOUGHT:

Researchers are doubling their efforts to find methods to reduce the amount of pesticides used on potato farms in the East End. As Suffolk County begins a study of alternative water supplies for the North Fork following findings of serious chemical contamination of groundwater, skyrocketing pesticide costs are presenting another obstacle to their use. The Long Island Horticultural Research Laboratory in Riverhead, a branch of Cornell University, is investigating the alternative of integrated pest management, which minimizes chemical use and emphasizes techniques such as crop rotation.

FISH KILL IN AGAWAM LAKE:

Long Island's worst recorded fish kill was reported last June at Agawam Lake in Southampton. Several hundred thousand fish were killed as a result of dramatically reduced oxygen levels in the lake. The oxygen supply was depleted largely because of the role of the lake as a catch-basin for runoff from the village roads. Road runoff causes a build-up of sediment, speeding up the rate of oxygen-consuming decomposition in the lake. In investigating the fish kill, the Department of Environmental Conservation discovered unusually high quantities of pesticides and herbicides in Lake Agawam, but it is not clear whether or not the presence of those chemicals was related to the devastation of the fish population.

STATE BOTTLE BILL DEFEATED:

A proposed New York State "bottle bill," which would have required deposits on beer and soft drink containers, was defeated in the Assembly Commerce Committee by a vote of 16-6. Opponents of the legislation believed it would

result in a loss of jobs in the container industry as well as increased costs. The bill's supporters argued that the bottle bill would reduce roadside litter and waste being buried in landfills, conserve energy, and promote recycling. The bottle bill was re-introduced with minor changes in 1982 and at this writing is again being considered by the Commerce Committee.

DEVELOPMENT PLANNED FOR TEAMSTER'S PINE BARRENS PROPERTY:

A 1,646 acre housing and hotel development on land owned by the Teamsters Local 282 has been proposed for construction in the Southampton Pine Barrens. The Teamster's proposal requests three zoning changes to allow the development. A report by Southampton's planning board staff has strongly opposed granting the changes in zoning, concluding that the proposed uses of the area are inappropriate "with regard to the (Southampton) Master Plan and finally with a heightened awareness of the sensitivity of the Pine Barrens in relation to groundwater quality."

EXTENSION OF SUNRISE HIGHWAY PROPOSED:

Plans for a new South Fork Highway extending from Shinnecock to Amagansett have been announced by Governor Carey and the State Department of Transportation. The highway has been proposed in the hope of relieving traffic and congestion and is planned to run along the lines of a previously proposed extension of the Sunrise Highway. The proposal is now being studied. Opposition to the plan has been strong, focusing on the damages such a highway could bring to the area's environment and groundwater supplies. The highway is planned to go along the spine of Long Island's geological moraine, an area of rapid and high quality recharge to the aquifer below.

SEMINAR ON LANDFILL GAS:

In May, 1981, the New York State Energy Office sponsored a seminar on the production of energy from solid waste. The meeting was the first in-depth East Coast seminar on landfill gas recovery, and featured presentations by several landfill gas recovery experts working in California. Individuals working in both the private and public sectors participated in the meetings, which addressed utilization and market alternatives; reviewed landfill gas recovery projects nationwide; discussed institutional and regulatory constraints and evaluated landfill gas recovery potential for projects in New York State.

PLANS TO DEVELOP OLD LANDFILL SITE IN NORTHERN NASSAU:

The City of Glen Cove has signed a conditional contract for the sale of a former landfill site at Garvies Point. Though records are incomplete, it is known that the site has been inactive for at least ten years, and that the dumping was initiated in a tidal wetlands area. The sale of the land to a developer is predicated principally on the clearing of title to the land, on investigation into possible methane problems at the site, and on approval from EPA and the State agencies.

BOWLING GREEN WATER CONTAMINATED:

After residents complained of an oily smell from their water, Hempstead Town officials discovered that a 1.5 million gallon water storage tank and a smaller tank storing chemical purifiers had been contaminated by diesel fuel. The 12,000 residents of the Bowling Green Estates Water District in Nassau County had their service cut off for over 24 hours. While investigation and cleanup proceeded, area residents received water from the Roosevelt Field and East Meadow Water Districts. It was discovered that the contamination was caused by a misdelivery of diesel fuel. Total clean up and associated costs resulting from the incident amounted to approximately ten thousand dollars.

OIL SPILL AT SADDLE ROCK:

The complaints of tenants at a Village of Great Neck apartment complex in Nassau County led to the discovery of a fuel oil spill in the Village of Saddle Rock in February, 1981. The oil had begun to move into Little Neck Bay when the spill was detected. Cleanup began the day of the discovery and recovery of from 1,500 to 2,000 gallons of fuel oil spilled into Udall's Cove at the Saddle Rock Grist Mill was completed within a week.

PROPOSAL TO IRRIGATE GOLF COURSE WITH SEWAGE EFFLUENT:

The Suffolk County Parks Department has proposed using sewage effluent from the Riverhead sewer treatment plant to irrigate the County's Indian Golf Course. Currently, all 900,000 gallons of sewage effluent from the plant are discharged into the Peconic River. The technique of irrigating golf courses with sewage effluent has been used successfully in other areas of the Country, and has the advantage of conserving water in two ways--through not using drinking quality water for irrigation, and through facilitating recharge of sewage effluent which would otherwise be discharged to marine waters.

HEARING ON GROUNDWATER PROTECTION:

The Northeast-Midwest Senate Coalition held a hearing on groundwater protection in October, 1981. Senator Daniel Patrick Moynihan, Rep. Gregory Carman and Rep. Geraldine Ferraro presented opening remarks and received testimony from county and state legislators, officials of state and county Departments of Health, and experts in the field of water resources. At the hearing, Senator Moynihan expressed strong support for legislation which would protect the Long Island Pine Barrens. Representing Assembly Speaker Stanley Fink, Assemblywoman May Newburger spoke about developing a clean land policy for New York State, noting that "one of the most significant benefits of a clean land policy would be the protection and management of primary recharge watershed areas for groundwater such as the Long Island Coastal Pine Barrens, which cover the largest pristine water supply on Long Island."

STATE DENIES APPLICATION TO TAP LLOYD AQUIFER IN NASSAU:

In May, 1981, State Department of Environmental Conservation Commissioner Robert Flacke denied a permit application requested by the Roosevelt Field Water District to draw water from the Lloyd aquifer. The well would have been used in part to provide water to air-condition the Roosevelt Field shopping mall. Commissioner Flacke determined that the critical importance of the Lloyd as a source of pristine water makes its use in the Roosevelt Field case, where other sources are available, inappropriate. In making his decision, Commissioner Flacke directed his staff to develop a comprehensive strategy and policy for use of the Lloyd aquifer. As of this writing, that policy has not been issued.

REPORT ON DEPARTMENT OF HEALTH RULES AND REGULATIONS:

A report done at the State University of New York at Syracuse for the State Department of Health recommended an extension of the State's rules and regulations program for watershed protection. The rules and regulations program has been in existence since 1885 as a system of preventive measures to avoid water contamination. The report recommends an updating of the rules and regulations to address the problems of contamination by herbicides, pesticides, toxics, and nutrients and organic material from onsite disposal systems. Additionally, the report emphasizes the need for a broadening of the rules and regulations so that they will be equally protective of groundwater and surface water watersheds.

HEARING ON USE OF CONTAMINATED WATER FOR AIR CONDITIONING:

In November of last year, the Department of Environmental Conservation held a hearing to receive testimony regarding the development of a policy on the use of contaminated groundwater in cooling air conditioning systems, with special attention to the Roosevelt Field area. Questions posed by the Department addressed the uses of contaminated and drinking quality water, the impact of deep withdrawal and recharge on groundwater quality, alternative schemes for cooling wells, and feasible treatment alternatives for contaminated groundwater before recharge. Testimony by the Commission emphasized that the use of groundwater for non-potable needs should be regulated in a way which will provide the greatest protection to the quality and quantity of water in the aquifer system.

SUFFOLK COUNTY'S NORTH FORK WATER FACES CRISIS:

Officials project that almost every well on Long Island's North Fork will experience some contamination in the next 20 years. Water degradation on the North Fork is not transient; it may persist for up to 100 years. The North Fork's only potable water is found at depths of 150 to 200 feet. Major causes of water quality problems in the area are farmers' use of synthetic toxic chemicals on their fields, and land use patterns in the area, which, coupled with the North Fork's geology, have contributed to salt water intrusion and greatly reduced the area of pristine watershed land remaining on the North Fork.

LIFTING OF EPA SLUDGE DUMPING BAN:

The U.S. Environmental Protection Agency lifted its ban on the dumping of 1.4 billion gallons of sewage sludge in the ocean annually. The agency had earlier ordered local municipalities to switch to land disposal or incineration of sludge, but instead will allow dumping to continue. The EPA will close down the current dumping site 12 miles offshore and shift the dumpsite to a point 106 miles out to sea. Localities using the new site will be required to monitor environmental changes therein. The current site, 150 feet deep, is known as the Dead Sea, because of its accumulated sludge.

SUFFOLK COUNTY DETERGENT BAN LIFTED:

The 1971 Suffolk County detergent ban was lifted in 1981, largely because of a change in the products' composition. While manufacturers formerly used "hard," or non-biodegradable chemicals in detergents, "soft," or biodegradable compounds are now prevalent.

PUBLIC HEARING ON A PINE BARRENS RESERVE:

Congressman William Carney conducted a public hearing on the then proposed Coastal Pine Barrens Reserve on Eastern Long Island. Mr. Carney's draft of a bill calling for protection of 86,000 acres of pine barrens in Southampton, Riverhead, and Brookhaven Towns received wide support at the hearing. Public officials on State, county and local levels supported the plan, while environmentalists from East Hampton urged consideration of the East Hampton pine barrens in the proposed reserve. Subsequent to the hearing, Rep. Carney withdrew his support for this approach to pine barrens preservation in response to negative responses to the legislation from federal officials.

TOWN OF SOUTHOLD AGREES ON LANDFILL PROPOSAL:

State and local officials have agreed on tentative conditions that would enable the Town of Southold's landfill to avoid possible closure or severe fines by 1984 because of failures to meet federal environmental standards. The western area of the Cutchogue site has shown high methane readings. The landfill has generated a leachate plume which flows northwesterly with groundwater. To upgrade the landfill to State and federal standards, including capping and lining, Southold will have to spend over \$1 million. If all standards are met and present operations continue, the landfill will be in use for another two years.

SUFFOLK COMPANY CHARGED WITH VIOLATIONS IN TOXIC WASTE DISPOSAL:

Lawrence Aviation Industries, Inc. of Port Jefferson Station, two employees and a subcontractor have been indicted on 26 charges related to the company's handling of toxic waste disposal in the Fall of 1980. The district attorney charged that the company crushed more than 500 fifty-five gallon drums on site. The drums contained acids and strongly alkaline substances as well as trichloroethylene, a carcinogenic and toxic compound used for cleaning. The company stated that it was following the advice of a New Jersey waste disposal contractor, and that they were told to crush the drums and cover them with lime to neutralize the chemicals. All this was done without consulting the County's Environmental Pollution Control Unit, which observed and changed the company's procedures when it became aware of its waste disposal practices.

NORTH HEMPSTEAD EXPLORES THE SALE OF LANDFILL METHANE:

The Town of North Hempstead expects to become the first municipality on Long Island to sign an agreement leasing methane rights to a commercial interest. Based on current market prices, North Hempstead expects to earn between \$30,000 and \$50,000 a year from a 6%

share of sales of the natural gas processed from the methane produced at the Port Washington landfill. Getty Synthetic Fuels, Inc., a subsidiary of Getty Oil Co., expects to sign an agreement later this year to design, build and operate, at no cost to the Town, the methane recovery facility. Most of the systems that Getty Synthetic Fuels operates draw gas through wells in the landfill, then carry the gas through an underground collection system to the processing plant where it is compressed, vacuumed and refined.

TOXIC CHEMICAL SPILL IN HICKSVILLE:

A 7,000 gallon trailer tank tipped on its side in a Hicksville parking lot in mid-February, 1982, and spilled 3,700 gallons of a highly flammable and toxic chemical onto the ground and into four nearby drains. The chemical, methyl-ethyl ketone, is used as a solvent in paint removers and cleaning fluids, as a component in other industrial materials, and is considered to be a toxic organic compound. Cleanup at the spill site began immediately after the spill, and included pumping of the nearby drains. The firm that owns the truck participated in the cleanup along with volunteer fire fighters and county and state employees.

BUDGET CUTS WILL AFFECT WATER LEVELS:

County and State officials anticipate a substantial drop in the water levels in most of the Island's heavily populated areas over the next eight years. The NYS Department of Environmental Conservation disclosed in February that virtually no federal funds will be available for construction projects aimed at augmenting recharge in sewer areas, and that sufficient funds are not available at the local, county or State levels without substantial federal support. Lowering of water levels is expected to be most noticeable in lakes and creeks in developed sewer areas, and may affect water-dependent plant and animal life. Lowered groundwater levels may have some impact on the intrusion of salt water into subsurface reservoirs.

ADVICE TO BOIL WATER:

Residents of about 80 homes in a subdivision in Mattituck were instructed by the Suffolk County Department of Health Services in February to boil their water before using it. The order was issued because of the presence of coliform bacteria in the water supply. Coliform bacteria are found in human and animal intestinal tracts, and while not dangerous in themselves, are regarded as an indication of the presence of other, more dangerous, forms of bacteria.

LANDFILL STUDY OPPOSED:

A proposal by the Brookhaven Town Board that would commit \$100,000 of Town monies into a \$200,000 cooperative agreement with the U.S. Geological Survey to study the Brookhaven landfill over a two and a half year period was strongly opposed by a group of Brookhaven citizens. Town residents opposed to the landfill's extension presented a petition with 1,000 signatures, requesting that the Town not expand the landfill off Woodside Avenue. The residents believe that a study of the landfill would represent a commitment to the continued operation of the facility, which they oppose.

NASSAU HEALTH DEPARTMENT GROUNDWATER STUDIES PROGRESS

The Nassau County Department of Health reports progress on the series of special groundwater projects being funded through the State Department of Health. The first phase of the Priority Pollutant Survey is nearing completion with nearly all of the 30 public and private wells being tested for the priority pollutants of concern. Phase two, where 300 wells will be tested for a reduced list of chemicals developed from the results of phase one, will begin soon. The second project is a hydrological investigation of a highly contaminated portion of the aquifer around the Roosevelt Field Shopping Center, located in the middle of Nassau County. Twelve monitoring wells will be installed. The project attempts to define the outline the contamination and to understand the dynamics of the contamination movement. A problem has arisen in gaining permission to place monitoring wells on shopping center property. The third project, the development and implementation of a water quality data base management system, is nearly complete. Five years of information will be stored in the system as the baseline data to which all future data will be added. Two other projects are moving ahead, slowly. The expansions of the Upper Glacial aquifer monitoring well system and a sampling program for contamination is one such project. The other project is the investigation of the New Hyde Park and the Syosset landfills. This project will determine the existence, direction and magnitude of any leachate plumes and will provide on-going monitoring for groundwater quality.



SECTION II

REGIONAL GROUNDWATER MANAGEMENT



REGIONAL MANAGEMENT OF WATER RESOURCES

The Commission's 1981 Progress Report identified regional management as one of Long Island's major water resource issues. The importance of developing a regional approach for groundwater management becomes increasingly clear with the passage of time, as do the problems associated with haphazard water supply development and localized approaches to groundwater management. Those problems emphasized in the Commission's first report -- groundwater mining, balkanization of water supply companies, lack of incentive and framework for watershed management, and lack of an integrated water conservation program in the area -- all continue to suggest the need for a system of regional management of the groundwater resource on Long Island.

Over the past year, the Commission has studied many publications addressing water management on Long Island; some of the conclusions and recommendations put forth in those documents are presented below. Additionally, members of the Commission staff have conducted a survey of regional water management programs nationwide. These programs address a wide variety of water issues, and take different approaches to managing the resource. The summaries of different states' programs that follows this overview of the issue of regional management on Long Island present several models for regional management which should prove helpful in the development of a program for Long Island.

REGIONAL WATER MANAGEMENT ON LONG ISLAND

The most fundamental rationale for implementing a program to manage groundwater on a regional basis stems from the nature of the resource itself. This has been strongly emphasized by those involved in water resource planning and management. A 1970 report of the New York State Conservation Department points out that:

Water does not follow political boundaries. On Long Island, the groundwater resources are common to the entire island, part of the hydrogeologic system that functions as a single unit. Historically, various portions of the island have progressed through different stages of development and exploitation of its resources. In broad terms, overdevelopment and exploitation in Kings and Queens Counties, nearly full development in Nassau County and partial development in Suffolk County, although western Suffolk is rapidly approaching the nearly full development stage of Nassau County. This pattern suggests that the counties have a common interest in conserving, developing and wisely using the basic groundwater resources, and that they should plan and work together to utilize the tremendous fresh water supply for optimum mutual benefits to people in both counties.¹

¹ Division of Water Resources, State Conservation Department, Long Island Water Resources, (State of New York, 1970), pp.48-49

Even earlier than 1970, it was clear to many that the importance of Long Island's aquifer system coupled with patterns of generally unregulated development warranted a program of comprehensive management. The essential role of groundwater on Long Island was highlighted by its receiving, in 1978, designation by EPA as a sole source aquifer. Over a decade before, the water management issues in the region were already considered a critical issue for the future. In a 1967 article entitled "Long Island, New York -- A Challenge To Man's Water-Management Skills," B.L. Foxworthy explains that:

Long Island's groundwater reservoir probably supplies more water for high priority human requirements than does any other single, well-defined aquifer system in the world, and it is destined to supply water for countless millions of people in the future. However, its usefulness to man can be greatly diminished by indiscriminate or unwise development within a few decades; conversely, its value can be greatly enhanced by wise management.²

Wise management of Long Island's water resources would address a wide range of factors that affect the quality and quantity of the water available to us. With the growth of many areas on the Island, as well as frequent incidents of water contamination, protection and conservation of water resources become increasingly important. The concept of regionalization of water supply development in the Nassau/Suffolk area has been supported as possibly "the only option available that would provide feasibility to such conservation techniques as optimum pricing, large scale interconnections of the island-wide distribution system, and the shifting of patterns of pumping to undeveloped aquifer areas."³

In addition to the benefits to water conservation efforts that would be provided by a regional management program, water supply issues could be addressed. The fragmentation of water supply operations in Nassau and Suffolk presents many problems, chief among which are inadequate water pressure, lack of water and fire capacity altogether, undependable service, refusal of service, and inadequate record keeping. This means that comparable service is not available to all Long Islanders -- that even adequate service may not be available to all.

² Foxworthy, B.L. "Long Island, New York -- A Challenge to Man's Water-Management Skills," in Regional Problem Situations (New York: U.S.G.S., 1967), p.216.

³ Personal Communication from David Miller, 2/22/82.

These issues were emphasized by the 1973 Temporary State Commission on the Water Supply Needs of Southeastern New York, which described the situation in the following way:

The region's water supply needs are met with a jig-saw puzzle of institutional arrangements that operate at best, inefficiently. This mix of institutions, including city, town, village and investor-owned systems developed over the years in ad hoc fashion to meet individual group water needs. The result has been diversity; diversity in the degree of involvement and functions performed by various levels of government, in the types of institutions responsible for the area's water systems, in methods of financing water systems, and perhaps, most importantly, in levels of service and consumer cost. This diversity in turn, has generally precluded a unified effort to meet what has become a regional need.⁴

The Commission on Water Resource Needs of Long Island advocates the institution of a system of regional groundwater management on Long Island, as did the 1973 Commission. We believe that a regional approach to groundwater management is even more urgent now, and that such an approach will aid greatly not only in the protection and preservation of our water resources, but in the provision of the best possible water supply service to all Long Island residents as well.

Given the major water problems referred to above, and addressed elsewhere in this report, the Commission has begun to identify goals for a water management program for all of Long Island. With these goals in mind we are working with members of all interested parties: water suppliers, citizen's groups, local governments, state agencies and others, to design a program for Long Island. We have been actively involved in a \$1.2 million study being conducted by the Department of Environmental Conservation to examine groundwater management in New York. Most of the study funds are going to the development of a special groundwater management strategy for all of Long Island -- Kings and Queens Counties as well as the Nassau/Suffolk region. Whatever the precise form of the area's regional management program, we hope it will achieve those goals listed below.

⁴ 1973 Temporary State Commission on the Water Supply Needs of Southeastern New York, Water For Tomorrow: Recommendations of the Commission, p.21

GOALS FOR REGIONAL GROUNDWATER MANAGEMENT ON LONG ISLANDPolicy and General Goals

Comprehensive groundwater withdrawal policy and guidelines for all state regulated withdrawals, based upon the characteristics of the hydrogeologic zones, the recharge characteristics, the associated effects on water-dependent vegetative and animal communities, and other pertinent concerns.

Policy for the protection of the Lloyd aquifer and the reservation of the Lloyd water for emergency drinking uses only.

Policy established with regard to the management of contaminated aquifer sections.

Policy established for appropriate use of public water extensions, and for the development of alternative solutions to water quality problems where public water extensions are inappropriate.

Expanded utilization of state jurisdiction to assure the setting of equitable fees for the exchange of water between water districts.

Encouragement of a more diversified agricultural industry which would alleviate the problems related to a single crop system.

Policy for the protection of the Upper Glacial aquifer from further pollution in recognition of the fact that this uppermost aquifer is, in addition to its important groundwater storage function, the sole pathway for water and therefore for contaminants recharging to all aquifers.

Organizational/Administrative Goals

Formalized communication and coordination among the involved agencies and organizations.

Dialogue and negotiation between Nassau and Suffolk Counties for the exchange, purchase, and transport of water from one county to the other.

Administrative coordination of all water suppliers in Nassau County through uniform withdrawal, maintenance, treatment, and interconnection policies.

Better performance by the PSC in the execution of its powers over private water suppliers so that the private suppliers must meet the safe and adequate service requirement.

Creation of a tracking system that maintains accurate records on the location and operations of all industrial/commercial facilities in the region.

Goals For Management of Critical Watershed Areas

Identification, protection, and management of critical watershed areas within the region, in order that such areas will provide a perpetual supply of clean and abundant water -- this will include areas in both Nassau and Suffolk Counties.

The adoption of a non-degradation policy in critical watershed areas (Such as the Long Island Pine Barrens), which include the development of strict groundwater standards designed to maintain or improve ambient water quality.

Establishment of a trust fund for the bi-county region to purchase watershed areas for present and future water supplies. Such a fund could be supported through various water utilization fees.

The acquisition and protection by water supply companies of critical watershed areas which are and will continue to be principal sources of high quality water.

Informal/Analytic Goals

Better definition and codification of the hydrogeologic zones of Long Island.

Development of improved evaluative procedures which will assist reviewers of land development proposals in providing protection of the groundwater supply through consideration of long term, cumulative impacts of land uses on water quality.

Development of improved techniques to predict contamination problems, studies focusing on the soil column, the unsaturated zone and their assimilative capacities, which will assist agencies and municipalities in making land use decisions.

Better understanding of the movement of synthetic organic chemicals within an aquifer.

Study of the best treatment technologies for purifying contaminated water and a cost evaluation of the technologies for use by individuals and water suppliers.

The establishment and funding of a regional testing facility to process unusual analytical problems, offer assistance to local health departments, provide quality assurance, and establish guidelines for sample collection and analysis.

A redesign of groundwater monitoring strategies in order to provide a more accurate depiction of general and specific water quality.

Goals For Waste Disposal And Resource Recovery

The prohibition of the land burial of solid waste (municipal) inside the deep flow recharge areas (DRFA), and the improved construction and operation of such facilities outside the DRFA.

Program for disposal of hazardous materials collected in households throughout the region so that these substances do not go to landfills.

Encouragement of resource recovery and solid waste source separation programs as alternatives to the burial of raw garbage.

Passage of a "bottle bill" for New York State and Nassau County, and continued support of a "bottle bill" in Suffolk County.

Regulatory Goals

Improved enforcement of regulatory discharge programs and the State Sanitary Code.

Expansion of DOH Watershed Rules and Regulations program to protect critical recharge areas.

Better and more uniform requirements and enforcement of industrial pretreatment programs.

More stringent discharge requirements for community waste systems which discharge to groundwater.

Increased financial and personnel support for the NYS-DEC region one, to better enable it to carry out its legal mandate.

Promulgation and enforcement of regulations requiring spent cooling water recharged to the Upper Glacial aquifer to meet groundwater discharge standards.

Goals For Education and Public Awareness

Public education programs on groundwater which reach area residents of all ages and which foster better and wider understanding of the relationship between water quality and activities on the land surface.

Concerted effort by all water suppliers to encourage water conservation through changes in rate structures, mailed literature, and other means.

Techniques For The Protection Of Water Resources

Requirements for the installation of water conserving appliances in all new construction.

Requirements for separate piping systems which use non-potable water in water-dependent cooling systems in order to preserve water quality, and for all cooling systems using water to recharge spent water to the Upper Glacial aquifer.

Expanded use of waste water management districts.

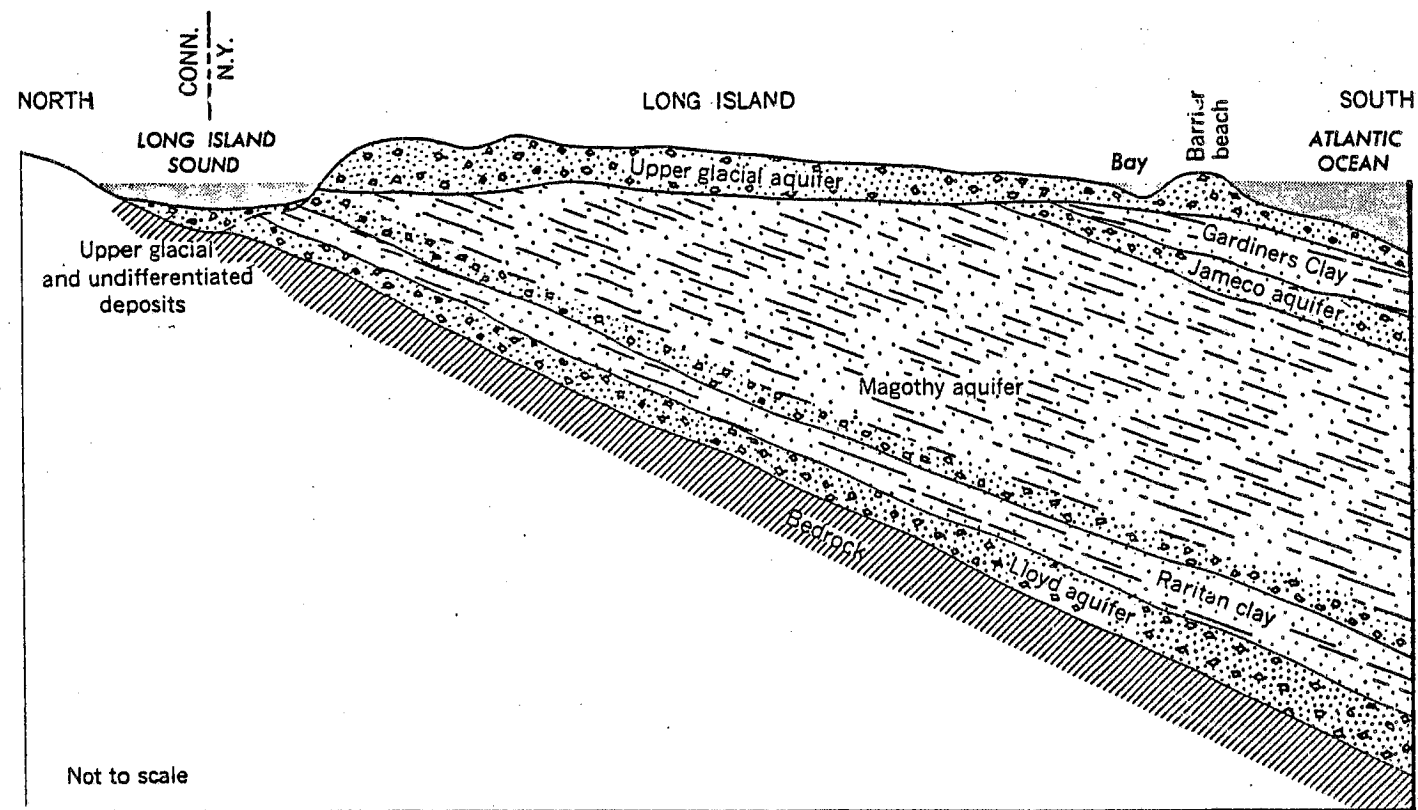
Creation of water quality treatment districts for those areas where numerous residents are utilizing home water treatment units.

Encouragement of low maintenance outdoor landscaping and the avoidance of fertilizer and pesticide applications.

Stricter regulations on golf courses and the use of non-potable water for irrigation.

The adoption of a mandatory clustering provision in each town as a means of preserving valuable open space and protecting groundwater quality.

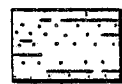
CROSS-SECTION OF THE LONG ISLAND AQUIFER SYSTEM



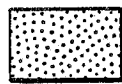
EXPLANATION



Clay



Sandy clay, clayey sand, and silt



Sand



Gravel



Consolidated rock

Reprinted from "Summary of the Hydrologic Situation on Long Island, New York, as a Guide to Water-Management Alternatives," U.S. Geological Survey Professional Paper 627-F.

SURVEY OF REGIONAL MANAGEMENT PROGRAMS IN OTHER STATES

The diverse strategies which can be adopted to manage water resources are illustrated by the following summaries of regional management programs nationwide, as the potential success of such programs. Regional management programs have been developed and implemented in response to a wide range of water resource issues and problems, and they have generally been designed to best accommodate existing water supply capability and arrangements.

Our survey has shown not only that regional water management can be successful, but that it can work within many different frameworks as well. In California, Florida and Texas, water districts have been created to deal with regional problems and to either supply or directly oversee the supplying of water in their service areas. Elsewhere, as in Arizona and Washington, special management areas are created when a regional problem exists. Water management plans are developed in the areas and implemented to address areawide problems. The plans address the activities of existing water suppliers.

The Delaware River Basin Commission is unusual because it addresses a surface water resource shared by four states, all of which are involved in the Commission. Though this situation differs greatly from that on Long Island, the form and activities of that Commission offers some ideas for water management within other areas.

Each summary includes a list of sources and a contact person who can be reached for further information.

ARIZONA
REGIONAL MANAGEMENT

ENABLING LEGISLATION:
ARIZONA GROUNDWATER MANAGEMENT ACT OF 1980

PURPOSE: To institute comprehensive groundwater conservation and management in Arizona, and to provide a framework for the "Management and regulation of the withdrawal, transportation, use, conservation and conveyance of rights to the use of groundwater."

To provide for the designation of groundwater basins and Active Management Areas.

POWERS: The State Director of Water Resources under the Act has powers to require permitting of groundwater withdrawals, to acquire property and water rights for management purposes, to regulate well location, spacing and pumping patterns.

The Act requires the Director to impose increasingly stringent mandatory conservation on all groundwater users.

LIMITATION ON POWERS: The Act does not allow for the interruption of existing uses, called Grandfathered Rights. Small capacity domestic wells are also exempt from the permit requirements.

OF PARTICULAR INTEREST OR APPLICATION FOR LONG ISLAND:

The Act is an attempt to assure that growth and development as well as expansion of agricultural areas, will not occur unless it can be accommodated within the water resources capabilities of the area. This is achieved through, among other policies, a requirement that a Certificate of Assured Water Supply be issued before subdivided or undivided land can be sold or leased.

There is an effort to investigate possible water quality and supply problems before subdivision and construction begin.

Special permits are issued for industries which can use degraded water unsuitable for drinking or irrigation. If water quality improves the permit will be terminated.

ARIZONA
REGIONAL MANAGEMENT, con't.

ENTITY ESTABLISHED:
ACTIVE MANAGEMENT AREAS IN
PHOENIX, TUCSON, PINAL AND PRESCOTT

CURRENT POPULATION: The four areas include over 80% of Arizona's population.

ESTABLISHED BY: The four Active Management Areas were created by the 1980 Statute. Provision is made in the Act for the designation of additional Active Management Area(s) in the future.

PURPOSE: The Active Management Areas are subject to all of the provisions of The Groundwater Management Act, regulating use of groundwater resources. The Areas have been established in areas of particularly serious groundwater overdrafts to establish and implement groundwater management plans which will achieve safe yields.

CIRCUMSTANCE(S) LEADING TO ESTABLISHMENT OF MANAGEMENT ENTITY: The major impetus to the development of a groundwater management program in Arizona was the increasingly dramatic overdrafting of groundwater supplies.

PRIMARY CONCERNS AND WATER RESOURCE ISSUES: Estimated annual groundwater overdraft of 2,200,000 acre-feet in Tucson, Arizona's largest metropolitan area, is a source of great concern. Groundwater withdrawals in the area are estimated to be five times greater than recharge.

Water quality has not historically been of great concern, but incidence of degradation of water quality is increasing, especially in urban areas.

PARALLELS TO, DIFFERENCES WITH LONG ISLAND SITUATION:

Much of the Arizona program is directed towards managing use of groundwater for agricultural irrigation. The focus of the program is on reducing use of groundwater; the program does not address many concerns on Long Island dealing with water supply, distribution and quality issues.

ARIZONA
REGIONAL MANAGEMENT, con't.

OPERATIONS OF ACTIVE MANAGEMENT AREAS:

ORGANIZATION: Area directors are responsible for hiring staff. Staffs are not yet fully established. Management plans will be developed and enforced at the state level and implemented at the local level.

FINANCES: The program is now being fully funded through the state's general fund. Provisions in the Act require the metering of wells and the institution of a groundwater withdrawal fee which will pay for 50% of the costs of the area's management. The groundwater withdrawal fee will be a pump tax collected from all persons withdrawing groundwater in Active Management Areas for each acre foot of groundwater withdrawn. The pump tax will not apply to individual domestic wells.

FUNCTIONS, RESPONSIBILITIES, AREAS OF ACTIVITY:

The Director is required to promulgate management programs for each Active Management Area, to be implemented over 45 years in five successive management periods.

The program centers around the registering and verification of groundwater rights and the subsequent preparation of water management plans for each area. The plans will emphasize conservation and will be updated approximately every five years. It is expected that each plan will become increasingly restrictive, leading to the ultimate goal of safe yield.

In areas such as Tucson, where groundwater quality is a growing concern, planning will try to confine potentially contaminating activities to areas where water quality is already degraded, and to facilitate the use of poor quality water for other than residential water supply purposes.

SOURCES:

Final Report, Arizona Groundwater Management Study Commission, June, 1980.

ARIZONA
REGIONAL MANAGEMENT, con't.

Johnson, James W., Summary of the 1980 Arizona Groundwater Management Act, State Bar of Arizona, 1980.

McGowan, Dan. "State's New Groundwater Law Imposes Water-Frugal Lifestyle,:" in the Phoenix Business Journal, June 29, 1981, pp. 5-11.

Telephone conversation with C. Laurence Linser, 1-8-82.

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CALIFORNIA
REGIONAL MANAGEMENT

ENABLING LEGISLATION:

1887 Wright Act, allowing formation of public irrigation districts, and Assembly bill #1329, Chapter 527 California Law of 1977

PURPOSE: To provide integrated management of water supply in the Monterey Peninsula, "For control and conservation of storm and wastewater, and for the promotion of the reuse and reclamation of water...and to conserve and foster the scenic values, environmental quality, and native vegetation and fish and wildlife and recreation in the Monterey Peninsula and the Carmel River Basin." Sec. 2, Ch.257

POWERS: Powers of the Water District are extensive, including the power to establish rules and regulations for protection of public health; sell and lease water; collect rates and charges for its services; control flood and storm waters; levy and collect fees for groundwater protection; conserve and reclaim water for use in the district; acquire public or private water systems; and appropriate and acquire water and water rights.

LIMITATIONS ON POWERS: The district has no power to intervene or take part in actions or controversies between the owners of land or water rights which do not affect the interests of the district.

OF PARTICULAR INTEREST OR APPLICATION FOR LONG ISLAND:

As on Long Island, the multiplicity of small water companies, sometimes with unclear or overlapping jurisdiction, is a concern on the Monterey Peninsula. The Water District has the power to acquire small companies, a power which, it is believed, acts as an incentive to those companies to act in the best interest of the residents of their service area and in cooperation with other companies in the District.

ENTITY ESTABLISHED:

Monterey Peninsula Water Management District

AREA SERVED: Monterey Peninsula (approximately 140 square miles)

CALIFORNIA
REGIONAL MANAGEMENT, con't.

ESTABLISHED BY: Chapter 527, California Law
General election, June 6, 1976

PURPOSE: To improve water supply on the Monterey Peninsula, protect water quality and control demand so that it is at a level that can be accommodated by the area's resources.

CIRCUMSTANCE(S) LEADING TO ESTABLISHMENT OF MANAGEMENT ENTITY:

The 1976-77 drought necessitated strict limitations on water use. Water companies on the peninsula had not invested in the infrastructure that would have protected their area from shortages as storage and distribution systems had protected other areas, so the Monterey area was hard hit during the drought.

PRIMARY CONCERNS AND WATER RESOURCE ISSUES:

Problems and concerns addressed by the creation of the MPWMD include drought and water shortages, shortage of storage facilities, and increasing demand due to the area's growth.

The Peninsula has one large public water supply company, 14 mutual water companies, two small private companies, approximately 400 private wells and a publicly owned water system.

PARALLELS TO, DIFFERENCES WITH LONG ISLAND SITUATION:

Similarities with Long Island include concerns with the balkanization of water supply companies; management district in an area that is politically fragmented; management of water supply in an area which, like parts of eastern Long Island, has much agricultural activity but faces development and growth.

CALIFORNIA
REGIONAL MANAGEMENT, con't.

OPERATIONS OF THE MONTEREY PENINSULA WATER MANAGEMENT DISTRICT:

ORGANIZATION: The District has a Board of Directors and staff, five members of the Board are appointed by the Citizenry, and two elected officials are appointed by the Board of Supervisors. The Board is divided into four committees: demand management, augmentation, reclamation, and present resources.

FINANCES: The District is partially funded through property taxes. Additionally, it can interject assessments and fees as well as sell water to the public. Capital projects of the District can be funded through general obligation bonds or revenue bonds.

FUNCTIONS, RESPONSIBILITIES, AREAS OF ACTIVITY:

The District has conducted research into rainwater collection and sewage water reclamation. Work is now being done to select a major project which will help the area guard against water shortages. Such a project will have to be approved by the electorate before it is commenced.

SOURCES:

California Chapter law 527

Smith, William. "Regional Allocation of Water Resources," in Journal of the American Water Works Association, March 15, 1981, pp. 226-231

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DELAWARE, NEW JERSEY, NEW YORK AND PENNSYLVANIA
REGIONAL MANAGEMENT

ENABLING LEGISLATION:
ARTICLE 21, CONSERVATION LAW, DELAWARE RIVER
BASIN COMPACT OF 1972

PURPOSE: To promote interstate comity; to remove causes of controversy, to encourage and provide for the planning, conservation, utilization, development, management and control of the water resources of the basin; to provide for cooperative planning and action by the signatory parties with respect to water resources, to apply the principle of equal and uniform treatment to all water users who are similarly situated and to all users of related facilities, without regard to established political boundaries.

POWERS: The Delaware River Basin Commission has extensive powers, including the power to plan, construct, own and operate any facilities to achieve its purposes; establish standards of planning and operations of projects and facilities in the basin; conduct and sponsor research; review projects affecting water resources, enforce its regulations; develop and operate hydroelectric facilities; and to control water use in specially designated "protected areas."

OF PARTICULAR INTEREST OR APPLICATION FOR LONG ISLAND:

The Delaware River Basin Commission recognizes, in its work, the existence of areas which are of special importance in the recharge of groundwater, and the existence of hydrogeological distinctions as well as differences in land use which create a need for special examination and treatment of different areas. The groundwater study of the Commission divides its study area into three regional areas based largely on regional similarities. The "Plan of Study" points out that "Management should be based on natural hydrogeologic systems rather than arbitrary civil boundaries." This perspective is one which is important for those engaged in planning for and managing Long Island's water resources.

ENTITY ESTABLISHED:
DELAWARE RIVER BASIN COMMISSION

ESTABLISHED BY: Agreement between the five member states and the United States Government; Article 21 of U.S. Environmental Conservation law.

DELAWARE, NEW JERSEY, NEW YORK AND PENNSYLVANIA
REGIONAL MANAGEMENT, con't.

PURPOSE: To formulate and adopt 1) a comprehensive plan for the immediate and long range development and uses of the water resources of the basin, and 2) a water resources program assessing the area's water resource needs and the existing and proposed projects required to satisfy such needs.

The powers of the Commission enable it to not only develop a management plan, but to adopt it as well, thereby assuring its implementation and the fulfillment of the Commission's mandate.

CIRCUMSTANCE(S) LEADING TO ESTABLISHMENT OF MANAGEMENT ENTITY:

The Delaware River Basin has experienced rapid growth which has been accompanied by duplicating, overlapping and uncoordinated administration leading to a splintering of authority and responsibilities. These problems compounded with the difficulties inherent in managing resources across state borders prompted the establishment of the Delaware River Basin Commission.

PRIMARY CONCERNS AND WATER RESOURCE ISSUES:

The area has experienced drought, periodic lowering of water tables, dry wells, and contamination of groundwater by a wide range of contaminants. There is concern about the risk of salt water intrusion during drought periods, though insofar it has not been a recurring or serious problem.

PARALLELS TO, DIFFERENCES WITH LONG ISLAND SITUATION:

The DRBC addresses itself to water resources that are shared by several states, unlike the aquifer system underlying Long Island.

Like the Long Island case, the River Basin Commission faces a situation where many agencies and organizations are concerned with water resources in an area that is fragmented politically while sharing similar hydrogeologic characteristics and boundaries.

DELAWARE, NEW JERSEY, NEW YORK AND PENNSYLVANIA
REGIONAL MANAGEMENT, con't.

OPERATIONS OF THE DELAWARE RIVER BASIN COMMISSION:

ORGANIZATIONS: The Commission is composed of five commissioners, their alternates and staff. Commissioners are the governors of the signatory states, ex officio, and one member appointed by the President of the United States.

FINANCES: The Commission operates on funds from each of the member states, the federal government and grants from the U.S. Water Resource Council and other entities concerned with water resource issues.

FUNCTIONS, RESPONSIBILITIES, AREAS OF ACTIVITY:

The Commission is concerned with flood damage, conservation and development of ground and surface water supplies, development of hydroelectric power potentialities, development of recreational facilities in relation to reservoirs, lakes and streams.

The Commission is engaged in a three-year comprehensive investigation aimed at producing a management program to protect the area's ground waters from depletion and deterioration. It is also studying alternatives for the handling of toxic wastes.

The Commission has designated a large part of Southeastern Pennsylvania as a ground water protection area. Within the area a set of regulations are in effect, which include conservation and special permitting requirements.

SOURCES:

Delaware River Basin Commission, Annual Report, 1979

Delaware River Basin Commission, "Delaware Basin Special Ground Water Plan of Study," October 1979.

Delaware River Basin Commission, Ground Water Protected Area Regulations, Southeastern Pennsylvania, adopted October 8, 1980, amended Dec. 16, 1980.

Environmental Conservation Law, Article 21

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FLORIDA
REGIONAL MANAGEMENT

ENABLING LEGISLATION
CHAPTER 373, Water Resources, October 1, 1974

PURPOSE: To allow for the creation of regional water supply authorities for "developing, storing, and supplying water for county or municipal purposes in such a manner as will give priority to reducing adverse environmental effects of excessive or improper withdrawals of water from concentrated areas" (373.1962), and to give municipalities and counties the primary responsibility for water supply."

POWERS: To "acquire water and water rights; develop, store, and transport water; provide, sell and deliver water for county or municipal uses and purposes; provide for the furnishing of such water and water service upon terms and conditions and at rates which will apportion to parties and nonparties an equitable share of the capital cost and operating expense of the authority's work to the producer." 373.1962

LIMITATION OF POWERS: "The authority may not engage in local distribution." 373.1962

OF PARTICULAR INTEREST OR APPLICATION FOR LONG ISLAND:

The legislation provides that "In carrying out the provisions of this section, any county wherein water is withdrawn by the authority shall not be deprived, directly or indirectly, of the prior right to the reasonable and beneficial use of water which is required adequately to supply the reasonable and beneficial needs of the county or any of the inhabitants or property owners therein." 373.1962 Such provision might make the establishment of a regional authority more agreeable to those in Counties that are concerned that their water supply will be exploited unfairly when used as the basis of regional supply.

ENTITY ESTABLISHED:
WEST COAST REGIONAL WATER SUPPLY AUTHORITY

AREA SERVED: Counties of Hillsborough, Pasco and Pinellas

CURRENT POPULATION: 1,400,000 (1975)

FLORIDA
REGIONAL MANAGEMENT, con't.

PROJECTED POPULATION: 2,500,000 (2000)

PUMPAGE: 1980 ave-274.4
 peak-366.6
 projected, 2000 ave-326.7
 peak-537.3

ESTABLISHED BY: Five Party Agreement among the three counties and the municipalities of Tampa and St. Petersburg.

PURPOSE: to develop "regional water supplies and supplying water at wholesale to counties and municipalities" (5 Party Agreement, p.3)

CIRCUMSTANCE(S) LEADING TO ESTABLISHMENT OF MANAGEMENT ENTITY:

The counties of Hillsborough, Pasco and Pinellas have experienced competition for rights to remaining undeveloped sources, increased price of water, and the need to transport water from greater distances or treat water from nearby sources.

Extension of the functions of the Southwest Florida Management District to include water supply was considered, as an alternative to the establishment of the West Coast Regional Water Supply Authority, but rejected as it would require the district to regulate withdrawal through issuance of permits as well as supplying water which was seen as a conflict of interests. Hence the idea of a single-purpose agency, such as the WCRWSA, responsible only for water supply.

PRIMARY CONCERNS AND WATER RESOURCE ISSUES:

Problems in the area date from the late 1920s when the Tampa and St. Petersburg systems experienced salt water intrusion. Tampa expanded its surface water system and St. Petersburg drilled wells in Northwest Hillsborough County. Subsequently the major regional water sources have undergone considerable development, and concern has grown that water demand will outpace water supply.

FLORIDA
REGIONAL MANAGEMENT, con't.

PARALLELS TO, DIFFERENCES WITH LONG ISLAND SITUATION:

As on Long Island, there is concern that continued economic development might be constrained by insufficient quantities of good quality water. Such concerns about the area's future precipitated the establishment of the water supply authority.

Unlike Long Island, both surface and ground water sources are utilized in the service area of the water authority.

OPERATIONS OF THE WEST COAST REGIONAL WATER SUPPLY AUTHORITY:

ORGANIZATION: The Board of Directors consists of one representative of each of the parties (i.e. the Counties of Hillsborough, Pasco and Pinellas, and the municipalities of Tampa & St. Petersburg)

The Authority's staff is essentially composed of three directors (of operations, engineering and planning, and finance) who report to a general manager.

FINANCES: Insofar as is possible, water and service provided by the Authority shall be financed through revenue derived from the sale of water.

For not more than five years from creation of the Authority each county will contribute annually to the Authority, as determined by formula presented in the Agreement.

FUNCTIONS, RESPONSIBILITIES, AREAS OF ACTIVITY:

The Water Authority expanded its role in 1976 to achieve its "ultimate mission" of providing wholesale water economically for local distribution via existing city and county facilities.

The Authority has conducted studies to determine future water requirements and investigate regional supply sources.

The Authority has acquired and developed several wellfields, and conducts hydrological monitoring and periodic environmental assessments in addition to operation of the wellfields.

FLORIDA
REGIONAL MANAGEMENT, con't.

"An Authority/St. Petersburg Agreement to provide for management and operation of the Section 21 and Cosme Odessa Wellfields and pipeline was executed September 17, 1980. An Authority/Hillsborough County Agreement to develop future water supplies and manage the water resources in the County was executed August 28, 1980. These Agreements permit the Authority to take a giant step towards providing regional water supply benefits throughout the Authority area. Since these Agreements were executed the Authority has initiated water supply projects in Northwest and South Central Hillsborough County." (1980 Annual Report, p.2)

The WCRWSA uses a computer-based wellfield monitoring system in its Cross Bar Ranch wellfield which can analyse real time or projected information to show current or future conditions, forecast permit violations, and print out all required regulatory reports.

SOURCES:

Chapter 373, Florida Law

Chapter 16-M, rules of the West Coast Regional Water Supply Authority

West Coast Regional Water Supply Authority Report, January 1, 1981

CDM News, published by Camp Dursee & McKee, Inc. Vol. 14; No. 2, April 1981 pp. 5-8

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TEXAS
REGIONAL MANAGEMENT

ENABLING LEGISLATION:

Underground Water Conservation Districts Act of 1949

PURPOSE: "To provide for the conservation, preservation, protection, recharging, and prevention of waste of the underground water reservoirs or their subdivisions" by providing for the creation of underground water conservation districts.

POWERS: Water conservation districts have extensive powers, including those to conserve, preserve, protect and increase the recharge of and prevent the waste and pollution of the underground water; to acquire lands and easements by purchase or by exercise of the power of eminent domain for the erection of dams, the drilling and equipping of wells, the installation of pumps, etc; to develop comprehensive plans for the most efficient use of groundwater, and the prevention of its waste and pollution.

LIMITATION ON POWERS: Groundwater law in Texas gives the surface landowner the right to capture and beneficially use underground water. The water district may not deprive landowners of such rights; the water district cannot exercise any control over groundwater pumping and use.

OF PARTICULAR INTEREST OR APPLICATION FOR LONG ISLAND:

The Water District includes parts or all of five counties. These counties have equal representation on the board, which is composed of directors elected within each county.

ENTITY ESTABLISHED:

Edwards Underground Water District, 1959

AREA SERVED: Counties of Bexar, Comal, Hays, Medina and Uvalde.

CURRENT POPULATION: Approximately 1 million people

PUMPAGE: 1977 - 380,600 acre feet, well discharge
580,300 acre feet, spring flow

TEXAS
REGIONAL MANAGEMENT, con't.

Total demand on the Edwards Aquifer is projected to be 777,000 acre feet per year by 2020, exceeding current average annual recharge by approximately 200,000 acre feet per year.

ESTABLISHED BY: Article 8280-219 Texas Law 1959 (amended 1979)

PURPOSE: To create the Edwards Underground Water District for the purpose of "conserving, protecting and recharging the underground water-bearing formations within the District, and for the prevention of waste and pollution of such underground water."

CIRCUMSTANCE(S) LEADING TO ESTABLISHMENT OF MANAGEMENT ENTITY:

The Water District was created largely as a result of the conditions during the area's drought in the mid-50s.

PRIMARY CONCERNS AND WATER RESOURCE ISSUES:

Parts of the area are generally water short. Springs from the aquifer are important for recreation, for the ecology of the rivers, and for downstream water uses. Maintenance of spring flow is a goal of resource management in the area:

Though contamination has not been a problem there is concern about the impact of development over the aquifer as well as about the possibility of pollution of surface water affecting groundwater quality.

PARALLELS TO, DIFFERENCES WITH LONG ISLAND SITUATION:

Like Long Island, the Edwards Aquifer is a designated sole source area. Though it shares its dependence on groundwater for residential, agricultural, and industrial use with Long Island, the Texas Water District has more surface water issues to deal with as well as greater problems of water shortages.

TEXAS
REGIONAL MANAGEMENT, con't.

OPERATIONS OF EDWARDS UNDERGROUND WATER DISTRICT:

ORGANIZATION: The district is governed by a 15 member Board of Directors, 3 elected from each of the five counties in the district.

FINANCES: Revenues to the Water District are from a tax of 2¢/\$100 property valuation in the five-county area. The district has the power to issue bonds provided their issuance has been approved by a majority vote of the property tax-paying voters of a county area included within the district.

FUNCTIONS, RESPONSIBILITIES, AREAS OF ACTIVITY:

The Water District carries out an extensive surface and groundwater quality monitoring program. This program provides for monitoring of major streams recharging the Edwards Aquifer, numerous wells for groundwater quality and storm runoff from urban areas.

Additionally, with USGS programs including stream gauging and water level requirements; and recharge and discharge measurements generate an extensive data base for planning for the area's water supply. Studies have resulted in the artificial recharge program the District is conducting. Dams have been constructed to increase recharge; additionally, some of the facilities have been part of flood control and soil conservation programs.

SOURCES:

Fox, Thomas. "Edwards Underground Reservoir Water Supply" paper for the Southwest-Texas sections, AWWA Annual Conference, Oct. 16, 1979.

Correspondence from Thomas Fox, general manager, Edwards Underground Water District.

Article 8280-219, Texas Law

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WASHINGTON
REGIONAL MANAGEMENT

ENABLING LEGISLATION:
Public Water System Coordination Act of 1977

PURPOSE: The Act, chapter 70.116, establishes procedures for the establishment of Water Utility Coordinating Committees and Critical Water Supply Service Areas (CWSSA's). The act created a step-by-step process to assure coordinated planning, and thereby assist water utilities in providing future water service in the most efficient manner possible.

POWERS: The power to designate CWSSA's rests with the State or Counties. The Act gives water systems and local governments authority to implement the plans designed by the WUCC.

OF PARTICULAR INTEREST OR APPLICATION FOR LONG ISLAND:

As on Long Island, decisions about growth and land use in Washington need to be made in conjunction with water resource planning and management. Many areas of the State are anticipating growth which may stress water supply capabilities. The Act is an attempt to facilitate and encourage coordination and cooperation between land use planners and those planning for water system development.

The program encourages long-range planning to assure efficient and high quality water supply over an extended period of time.

ENTITY ESTABLISHED:

Water Utility Coordinating Committees of Critical Water Supply Service Areas (Approximately ten CWSSA's have been established throughout the state)

ESTABLISHED BY: Decision of County or State Department of Social and Health Services.

PURPOSE: The goals of the CWSSA's are to achieve organized development of water utilities within a given geographical area, and to integrate water system development with land use planning in a given geographical area.

WASHINGTON
REGIONAL MANAGEMENT, con't.

CIRCUMSTANCE(S) LEADING TO ESTABLISHMENT OF MANAGEMENT ENTITY:

Principle factors have been concern over the proliferation of small systems, inconsistent design, overlapping service areas, duplication of facilities, and conflicts between land use and water system plans.

PRIMARY CONCERNS AND WATER RESOURCE ISSUES:

The primary concerns of a designated area are delineated in a preliminary assessment, which is the first step in implementation of the Public Water System Coordination Act. The assessment identifies problems associated with water quality, regularity of service and lack of coordinated planning, among other problems.

PARALLELS TO, DIFFERENCES WITH LONG ISLAND SITUATION:

As on Long Island, proliferation of many small water companies raises concern about regularity and quality of service as well as the ability of water suppliers to serve expanding areas. Conflicts between land use and water system plans are common, with concern about both water supply potential in growing areas and the potential for water contamination.

Several of the CWSSA's are in areas where irrigated agriculture is of great importance and has far-reaching implications for water system planning. The Public Water Systems Coordination Act is designed so that the specific problems of each area can be addressed within the framework of the Water Utility Coordinating Committee's work.

OPERATIONS OF WATER UTILITY COORDINATING COMMITTEES:

ORGANIZATION: The Water Utility Coordinating Committee establishes boundaries for the CWSSA, and prepares a Coordinated Water System Plan. Committee members are appointed by the entity that declared the Critical Area, and must at least include representatives from County legislative authority, County planning agency, health agency, water purveyors with over 50 service connections, and the department of Social and Health Services.

WASHINGTON
REGIONAL MANAGEMENT, con't.

FINANCES: The work of the WUCCs is funded jointly (50%-50%) by the State Department of Social and Health Services, and by the localities. The funding from the state comes from a \$125 million fund approved by the electorate with the passage of referendum 38 in 1979.

FUNCTIONS, RESPONSIBILITIES, AREAS OF ACTIVITY:

The work of the WUCC centers around the development of a Coordinated Water System Plan, followed by its implementation. The plans normally have two parts: (1) An individual Water System Plan for each water utility, and (2), an areawide supplement addressing concerns pertaining to the area as a whole.

The Individual Water System Plan includes basic planning data, an inventory of existing facilities, a schedule of system improvements, and discussion of watershed control programs, relations between water and land use plans and operations programs. The Areawide Supplement discusses future service areas, minimum areawide design standards, plans for developing joint use or regional facilities and other topics pertaining to the region.

Besides establishing standards, service areas and criteria for new systems, the coordinated plan must be based upon local land use plans and policies. Local governments and the WUCC oversee implementation of the plans.

SOURCES:

Handbook, Public Water System Coordination Act, State of Washington Department of Social and Health Service, June, 1980.

Telephone Conversation with Richard Siffert, 1-8-82.

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CONCLUSIONS AND RECOMMENDATIONS FOR REGIONAL GROUNDWATER
MANAGEMENT

- The Commission finds that those problems emphasized in its first Report -- groundwater mining, balkinization of water supply companies, lack of incentive and framework for watershed management, and lack of an integrated water conservation program -- all continue to highlight the urgent need for a system of regional management of the groundwater resource on Long Island.
- Reports from both the private and public sectors have stressed the need for areawide management, citing the nature of the groundwater resource; the multiplicity of threats to groundwater quality; the patterns of generally unregulated development on Long Island; and inconsistent and irregular service.
- A regional approach to groundwater management will aid not only in the protection and preservation of our water resources, but in the provision of the best possible water supply service to all Long Island residents as well. A survey of regional management programs nationwide demonstrates that such programs can be successful and can function within many different frameworks.
- The Commission recommends cooperation among all interested parties in the development and implementation of a regional management program which will embrace those goals enumerated in Section II of this Report, which will achieve long term protection of the groundwater resource, and which will facilitate the provision of the best water supply service possible to all Long Islanders.

SECTION III

CRITICAL WATERSHED PROTECTION

CRITICAL WATERSHED PROTECTION

One approach to insuring water quality is watershed* protection, a preventive strategy which seeks to protect water quality through the control of potential contaminants. Watershed protection policies necessitate regulation of land-surface activities in order to protect both surface and groundwater supplies. Such policies have clear economic and environmental benefits, such as avoiding the costs of remedial clean-up and treatment efforts, and preserving the natural character of some critical areas for their ecological, aesthetic and recreational value. Long term benefits may be less obvious, but are of great importance.

The designation of special areas as critical watersheds, and the implementation of watershed protection programs in such areas, means that they will be protected for present and future use. As land use becomes increasingly intensive in many areas of the state, and as a great number of potential contaminants become associated with a wide variety of residential, industrial, and agricultural activities, citizens of New York are seeing their water supply threatened by a broad spectrum of substances. Contaminants are found in cleaning materials and solvents, fuels, industrial chemicals, pesticides and herbicides, as well as industrial waste, and are contained in leachate from landfills and other waste storage sites.

The despoiling of water supplies creates a risk to the quality of our health and environment. Additionally, it involves inconvenience and expense. Whenever a water source is abandoned due to contamination, another source must be developed, or an already utilized source must be further exploited to service a larger area. The prevention of water quality deterioration is a more attractive and cost effective alternative than expensive treatment or development of other sources after a water pollution problem arises. Consequently, land areas which affect aquifers and surface waters need to be carefully managed in the interest of protecting water resources.

*The term "watershed" is used throughout this paper to refer to an area where water drains into a specific basin or reservoir, or, for groundwater, a region where water is abundantly recharged to the subsurface groundwater reservoir.

Long Island is one of the areas of New York where contamination of water supplies is a serious and growing problem. Though the Island has three aquifer layers to draw on, the Upper Glacial aquifer is becoming heavily contaminated and the deeper layers (the Magothy and Lloyd aquifers) are showing increasing levels of contamination. In Nassau County, 54 wells out of approximately 450 have been abandoned or deepened due to contamination, and many more show an increase in pollutants.

With an increasing incidence of contamination, we discover that the law of diminishing returns looms over us. It becomes more and more difficult to supply high quality water, and efforts and expenditures increase as we must draw from deeper and less accessible sources of good quality water. We are at a crossroads now, facing numerous alternatives and difficult questions. Will we have to look further and further afield for pure water for New York communities, paying more and more as we pollute easily utilized sources, or will we act now in the hope of avoiding such exigencies?

It is the recommendation of the Commission that the State adopt a policy of critical watershed protection; a constructive and positive approach to preserving water quality. For groundwater, aquifer protection programs are in place in various forms in several states, and at the Federal level in the form of the Sole Source Aquifer program. Under this program, the U.S. EPA has designated eight Sole Source Aquifer areas nationwide. In New York State, the aquifer system underlying Nassau and Suffolk Counties was designated in June of 1978. Region II of US EPA is reviewing a completed petition for designation for the Brooklyn and Queens aquifers. Draft petitions are under review for the aquifers underlying Vestal and Sardinia, New York. The wide and complex range of water issues and problems in New York gives us cause to examine the usefulness of the Sole Source program, in itself and as a model for possible aquifer protection programs at the State level.

The Federal Sole Source Aquifer program was authorized by Section 1424(e) of the 1974 Safe Drinking Water Act. This aquifer protection program, administered by the U.S. EPA, has two basic elements, as follows:

- 1) the designation as sole source aquifer, of aquifers which provide 50% or more of an area's drinking water and whose contamination would create a "significant hazard" to public health, and
- 2) the review of Federal financially assisted projects which may contaminate the designated aquifer.

The objectives of the Sole Source program are the recognition of the dependence of certain areas on a given groundwater resource, and the establishment of a program to ensure that Federal financially assisted projects are planned and developed so as to prevent contamination of the designated source.

It is important to note that the review process of the Sole Source program is limited to Federal financially assisted projects. If such a project poses a threat to the aquifer and to public health, further Federal assistance will be withheld. The review is intended to insure that groundwater considerations and protection are built into the design, construction and operation of Federal financially assisted projects. As of November, 1980, 115 phase I (informal) reviews were conducted under the program nationally. One project was reviewed in the formal phase, and no projects have been vetoed.

As mentioned above, contamination is caused by a wide variety of activities that are conducted at many levels: residential, commercial, industrial and agricultural activities all use and generate potential contaminants. Needless to say, not all of these areas are under the aegis of the federal government, and thus the Sole Source program does not provide thorough protection for groundwater, a vital resource. The gravity of groundwater quality problems in many areas of the country points to the need for an aquifer protection program that will have expanded jurisdiction.

The Sole Source designation itself is intended to emphasize the need for the protection of groundwater, and to have an effect beyond the use of the review process. The designation is an indication of an area's dependence on its underlying aquifer(s), and suggests the need for awareness and action which will protect the aquifer. The two principle criteria for designation are the percentage of an area's drinking water supplied by the aquifer, and the potential impact of contamination on public health. This approach to designation is one which does not allow for the protection of areas which have the potential to act as major sources, but which are not yet utilized. The major and the area of most important success of the program has been its ability to draw attention to the special importance of an aquifer.

It is vitally important that watershed protection programs take into account long term needs; only by acting now to maintain high quality resources can their future availability be assured. We therefore advocate an approach which uses as criteria for designation a detailed description of

the source, its hydrogeologic characteristics and water quality, its current contribution to water supply; its potential contribution; and any threat(s) to the currently utilized source(s) which might necessitate initial or further exploitation of the source being considered for designation.

The design of the current sole source program is one which does not include recognition of areas of different hydrogeology and land use patterns within the designated area. One way to broaden the program and increase its effectiveness in protecting water supply would be to amend The Safe Drinking Water Act to provide for the delineation of critical watershed areas within already designated sole source areas. This possibility is being pursued, and an amendment to The Safe Drinking Water Act, 1426, was submitted to the Federal legislature in February of this year. The amendment has been introduced in both the Senate and the House, and will be reviewed when The Safe Drinking Water Act is considered for reauthorization during the 1982 legislative session. Companion legislation for New York State has been developed by the Commission and is included in the "Legislation" section of this report.

1426 provides for the establishment of special protection areas* in sole source areas. Through a State-Federal Agreement, funds will be provided for the development and implementation of comprehensive management plans for "special protection areas", and for the acquisition of areas to be preserved in their natural state. The plans will be site-specific, and will embody and emphasize a policy of non-degradation, i.e. maintenance or improvement of existing water quality.

The expansion of the Sole Source program would mean a much greater degree of protection for those areas which are of crucial importance in maintaining high quality drinking water. The patterns of sub-surface flow of groundwater mean that the careful preservation of some areas will have a mitigating effect on the water problems in surrounding areas where land use may be more intense, or contaminant-generating activities more common. The Special Protection Area designation would mean assistance to local governments in planning future activity and development while preserving water quality, and in implementing plans which will accommodate social needs as well as insuring that resource needs will be met in the future with high quality water.

At the State level, watershed protection which affects surface as well as groundwater supplies could be achieved through a critical watershed protection program. Legislation implementing such a program is currently being developed by the Commission.

* The term "special protection area" means a recharge watershed area within a designated sole source area which is particularly critical for the maintenance of large volumes of high quality groundwater.

This legislation proposes the establishment of a program whereby critical watershed areas in the State would be designated by a joint committee with representatives from the Department of Health and the Department of Environmental Conservation. Once designated, the critical area would be subject to a set of watershed rules and regulations designed and administered by the Department of Health. These will carefully control the use of contaminating substances and contaminant-generating activities in the area, and will reflect the goal of non-degradation of water resources. The rules and regulations will promote what is essentially a "clean land" policy, one which restricts activities which are threatening to the natural environment and the public health. Such a clean land policy is a positive step toward protecting critical watershed areas and insuring recharge of clean, high quality water.

Efforts to preserve large natural areas such as the Long Island Pine Barrens, because of their value as groundwater watersheds, are of great importance in securing a supply of high quality water. The size and uniqueness of the Pine Barrens makes its management a dramatic issue. The importance of that area's protection should not, however, overshadow the role that smaller open areas play in maintaining the quality of water resources on Long Island. The following inquiry into the need for watershed protection in Nassau County, and the accompanying strategies suggested for such protection, highlight the importance of planning and managing small watershed areas in developed areas as well as protecting large tracts of undisturbed land in more rural areas.

CRITICAL WATERSHED PROTECTION IN NASSAU COUNTY

TURNING POINT

The future of the Long Island region has come to a cross-road as the twentieth century draws to a close. This region has weathered well the economic downturn acutely felt in many other areas of the country. And, as the national economy gradually recovers, Long Island seems poised on the edge of a burst of growth that may mirror the boom period of the late 1940s and 50s. The trends are already emerging, as Nassau County Executive Francis Purcell noted in a recent article in The New York Times (Jan. 17, 1982). Mr. Purcell painted this portrait as he cited the facts:

- The presently stabilized Nassau population of 1.3 million people, living within a 289 sq. mile area, may soon be spurred upward as young families choose Nassau County as their home.
- The construction industry is booming in Nassau with building and development noticeable nearly everywhere.
- New housing starts are high, with condominiums leading the way. According to Purcell, "Condominiums are rising more and more all over -- in Woodbury, North Hills, East Hills, at very high prices. We're going to see condominiums become a concept of life a great deal more than they have been."
- Business and corporate growth is on the rise. Four major banks are relocating here. The County property at Mitchell Field is being leased for \$500 million worth of construction and development.

In summary, Purcell says, "Nassau County, today, is a very, very hot item."

According to the Nassau County Planning Commission, 84%* of the County is already developed. The land still remaining relatively undisturbed is principally found in the northern half of the County. This is the morainal area and the hills -- the high points of the County. It is also the area most critical to the groundwater flow system.

If the scenario which Mr. Purcell paints does materialize, it is only a matter of time until the remaining areas of rural land and large estates of the County respond to the lure of developers. While the financial profits to be turned are enticing and spell rosy benefits to the economic health of the County, we need to ask what all this means in the larger context of the environmental health of the community of Nassau. Can the water supply sustain such demands? Will the water we all depend on be available fifty or one hundred years from now? Why should we look so far into the future when it comes to water planning?

THE WATER PICTURE

Nassau County, at its stabilized population of 1.3 million people, is mining its water resources. This means we are taking water out faster than nature can replace it. The Nassau County Master Water Plan,¹ released as a draft document in the fall of 1980, set a limit of 180 million gallons daily (consumptive use)** as the maximum amount which can be safely withdrawn from the aquifer system without inducing undesirable effects such as further stream flow losses or salt water intrusion. ***

*The remaining 16% represents approximately 33,000 acres of available land that is either undeveloped or capable of being redeveloped.

** (consumptive use) - The use of water in a manner (such as discharge to sewer lines) that permanently removes it from the hydrologic cycle of the groundwater system.

*** Queens County Extracts 60 million gallons/day (mgd) for consumptive use, probably beyond the "Safe Yield" of that portion of the aquifer. As a result, Nassau County loses approximately 10 mgd of groundwater from underflow to Queens.

¹ Master Water Plan, Nassau County, State of New York, 1980. Vol. I & II, Holzmacher, McLendon, and Murrell, Melville, N.Y.

According to a report from the Nassau County Department of Health entitled Review of Groundwater Management, Nassau County, 1981, the average daily pumpage of groundwater in 1980 was 194 million gallons per day (mgd).² While this total is not all consumptive use, it is clearly at the threshold beyond which major effects to the aquifer are projected. In fact, that threshold has almost certainly been repeatedly crossed in the past. 1973 reported 214 mgd as the average rate of groundwater withdrawal. In 1979 the pumpage was 204 mgd with the uses falling into the following categories:

	176 mgd for public use
	24 mgd for industrial/commercial use
	<u>4 mgd for individual domestic and agricultural use</u>

Total: 204

As a consequence of such groundwater mining practices, the Nassau County Master Water Plan projects a water supply deficit of 21 mgd for Nassau County by the year 2020,

The level of the water table and the hydrostatic head of the deeper aquifers in the western and southwestern portions of the County have also been declining for some time. Groundwater mining caused by excessive pumping and sewerage has produced this effect. By the year 2020, The Nassau County Master Water Plan predicts the water table will have fallen by 75% of its original level as measured at the start of the century.

The impact of mining water coupled with the long standing practice of unfettered development of all available land in the County extends beyond the lowering of the water table and the drying up of streams. The rapid drawdown of contaminants to the deep aquifer is also a consequence of such practices.

Today, 90% of Nassau's drinking water is withdrawn from the Magothy Aquifer. The overwhelming reliance on the Magothy is due to the extensive pollution of the shallower water table aquifer known as the Upper Glacial. The significance of this dependence on The Magothy is better understood by considering the slow rate of water movement in the aquifer. In the Magothy, it takes approximately 800 years from the time rain falls on the center of the island for water to sink into the ground, join the groundwater and slowly move to a point seaward of the southshore barrier islands such as Jones Beach. In the Lloyd Aquifer, the cleanest and deepest of the three major aquifer layers, the same process takes 3000 years.

² Dowling, Dr. John, Review of Groundwater Management, Nassau County, 1981, Mineola, New York., Nassau County Dept. of Health, October 23, 1981.

Thus, once contaminated it takes hundreds to thousands of years for an aquifer to naturally purge contaminants. The water most Nassau residents drink is hundreds to thousands of years old. For the most part, the quality of this "old water" reflects the conditions of the land when the water first fell to earth as precipitation. Today, the public water supply wells in The Magothy have kept ahead of the contamination by drilling deeper or relocating when they violate the standards. This strategy, however, can supply clean water for only so long because the water moving slowly deeper into The Magothy is not the clean water of several hundred years ago, but the contaminated water of the past few decades. Thus, in time the dirty water we have abandoned in the Upper Glacial will have spread throughout much of The Magothy. Naturally pure water may then become a thing of the past. The Nassau Master Water Plan seems to confirm this by its projection that in the future 57% of the water districts can expect serious problems of organic contamination.

The most recent information on the water quality of The Upper Glacial Aquifer in Nassau County shows that of 157 monitoring wells:

- 13% exceeded the State organics guidelines of 50 parts per billion (ppb);
- 20% had levels between 10 and 50 ppb;
- 27% had less than 10 ppb, and
- 40% had no detected organics.

By comparison, 72% of 188 Upper Glacial monitoring wells in Suffolk County showed no traces of organic contaminants.

Nitrate/nitrogen is a contaminant which has repeatedly been selected as an indicator contaminant. Its presence is used to signal that land surface activities are contributing to water contamination and that other chemicals may also be reaching the groundwater. According to the Review of Groundwater Resource Management, Nassau County, 1981 (p.8), the data for nitrates for 1980 supplied from both public water supply wells and monitoring wells showed the following levels:

Aquifer	Wells Tested	Wells Detected		
		1.0 mg/l	1.0 to 10.0 mg/l	10.0 mg/l
Glacial	182	31 (17%)	125 (69%)	26 (14%)
Magothy	423	170 (40%)	235 (56%)	18 (4%)
Lloyd	47	37 (79%)	10 (21%)	0 (0%)

Results show that of the wells surveyed, nearly 75% of The Upper Glacial sites contained some level of contamination. 60% of The Magothy wells showed some nitrates, while the Lloyd aquifer had only 21% of its wells contaminated.

In terms of synthetic organic chemical contamination in public supply wells, the statistics are equally significant. Using information from all aquifers grouped together, the organic chemicals in 368 wells tested in 1980 produced the following results:

233 wells (63%)	not contaminated to the detection level of 1 ppb
97 wells (26%)	contained between 1-10 ppb
24 wells (7%)	contained between 10-50 ppb
14 wells (4%)	contained greater than 50 ppb.
<u>368</u>	<u>100%</u>

By looking at organic contamination by aquifer, the concentration of pollutants in the Upper Glacial is highlighted.

21 out of 34 (62%)	of Glacial wells are contaminated to some degree
107 out of 305 (35%)	of Magothy wells are contaminated to some degree
7 out of 29 (24%)	of Lloyd wells are contaminated to some degree

At present the worst cases of contamination stretch across the middle of the County approximately following the trend of the Hempstead-North Hempstead Town Line. This front of organic contamination which coincides with the most industrialized-commercialized portion of the County can be expected to continue to be a problem. Rain recharged here will continue to carry toxic contaminants deep and far into the system and move these toxics southward to become a potential threat to users now downstream and to the south of the front.

While the preceding data on water quality certainly produces a disturbing picture of significant contamination, we may not be perceiving the full extent of the water quality situation. Several papers address the problem of designing a water quality monitoring program so that the data provided accurately represents water quality. Dr. Jerry R. Stedinger of Cornell University, in a paper entitled, "Dealing With Uncertainty: The Meaning of Groundwater Quality Measurements"³ examines the factors which influence the interpretation of monitoring data. It distinguishes between two types of

³Stedinger, Jerry R., "Dealing with Uncertainty: The Meaning of Groundwater Quality Measurements," Ithaca, N.Y., Cornell University, 1981.

monitoring and explains the uses of each. Stedinger writes:

Clearly, one should sample from as many wells as possible if their aim is to determine ambient concentrations. However, if their aim is to detect trends, then it is advantageous to have a large number of observations over as long a period as possible from the same well. Such single-well time series are most appropriate for trend analysis because trends are not hidden by between-well differences. Here is a clear conflict in groundwater monitoring system design. One needs many observation wells at a few key wells to document or discover water quality trends. However, one wants to sample as many wells as possible to best assess average regional ambient conditions. (p.16)

Keith Porter, also from Cornell University, observes in a paper entitled, "Monitoring for Groundwater Management: Basic Issues and Questions"⁴ that:

...The quality and quantity of recharge and its impact on the groundwater is obviously the central issue in monitoring strategies for purposes of maintaining water supplies and sustaining ecological dependence on the groundwater...Implicit in the discussion is the need to base monitoring on a recognition of cause and effect relationships. (p.15).

In a discussion on nitrate-nitrogen monitoring, Porter notes,

...The point to be emphasized is that a groundwater sample evaluated without some information regarding the original source and place of recharge is virtually non-informative except in providing a determination of whether or not the sample meets a proscribed standard. (p.13)

The paper stresses that both spatial and temporal aspects of monitoring are important to the interpretation and value of monitoring data.

One of the principal sources of information of water quality for Nassau County comes from public water supply wells. Such data may not be providing a truly representative picture of the quality of the aquifer. Porter writes,

To use data from water supply wells to represent the condition of the aquifer itself should be

⁴Porter, Keith S., "Monitoring for Groundwater Management: Basic Issues and Questions," Ithaca, New York, Cornell University Center for Environmental Research, September 30, 1981.

done only with caution. Water supply wells, by definition, generally produce good quality water and therefore may represent a biased sample. (p.21)

Porter refers to the practice of locating public supply wells in areas where water quality is high and problems are not expected; therefore, water quality data from them is likely to indicate better water quality than may generally exist.

The conclusion we can draw from these two papers is that the data we have at hand is a mixed bag that may produce an unintentionally biased and understated understanding of the extent of groundwater contamination. Thus, contamination may be worse than we presently believe. It may also be difficult to predict changing water quality trends with sampling programs now in use. Finally, our sampling is not designed to help us relate cause and effect -- land use practices that lead to contamination or the movement of contamination from the point of recharge.

MASTER WATER PLAN

Although there may be reservations regarding the most correct and fullest interpretation of the water quality data at hand, the water resources picture is probably in sharper focus in Nassau County than in any other groundwater supply in the nation. This is due in large measure to the cooperative investment of money and personnel made by the Federal, State, and local levels of government. Considerable effort has been made to collect water quality data from monitoring programs as well as from specific projects such as the Consumer Products Survey, the Roosevelt Field Study, the New Hyde Park and Syosset Landfills Study, and the Priority Pollutants Survey. Few projects, however, have been undertaken which propose solutions to the increasingly well documented problems. The Nassau County Master Water Plan, 1980, has been a singular attempt by the County to provide some means of coping with the likely prospect of diminishing water quantity.

The Master Water Plan assembles an impressive collection of information and engineering facts about water suppliers and their distribution system. The emphasis of this information is to completely understand the capacity of water suppliers to move water around the County and to identify where water quantity shortages are likely to occur. Thus, it is not surprising that the essential thrust of the Plan is the design of further engineering systems to allow the County to

drill and pump its way out of its impending water supply problem.

In order to understand the approach proposed by the Master Water Plan, one needs to create a metaphor of the groundwater system. One might think of the aquifer as a giant piping system. The beginning of the pipe starts when rain hits the earth and is absorbed into the ground (i.e. the recharge process). Groundwater moves slowly through the aquifer, nature's pipeline, for years until humans tap it and withdraw the water, moving it into surface pipes and onto the customers at the end of the line. Every alternative action listed by the Master Water Plan except for the first alternative which is "no action" proposes a remedy which operates at the end of our mythical pipeline, i.e. once the water is pumped from the ground.

In brief, the Master Water Plan examines six alternative ways to maintain water quantity. They are:

1. Water conservation;
2. Redistribution and special well development within Nassau County;
3. Wastewater renovation and recharge;
4. Desalinization;
5. New York City as a supplemental source; and
6. Suffolk County as a supplemental source.

Each alternative in its own way, looks not to manage the water supply system, but to manipulate water through the "technological fix." "Water conservation", a valuable tool, is used here to manage demand at the end of the pipeline. The "redistribution and special well field" proposal is a strategy to continue water mining, using a major piping network. It intends to augment the total safe yield of Nassau County using water derived by underflow from Suffolk County. "Wastewater renovation and recharge" is another technological remedy to reclaim used water. "Desalinization" is an expensive, energy intensive technology which can produce fresh water from the ocean. The idea of using "New York City as a supplemental supply" is again a major piping project which will rely on drought plagued surface water supplies transported by the proposed third city tunnel. The suggestion to use "Suffolk County as a supplemental source" is certainly a more logical approach if importing water is necessary. It too is a piping proposal. It relies on the good will of a neighboring county. However, it is about time for Nassau and Suffolk to open a formal dialogue regarding the water supply problems and prospects for the region.

The interconnection of the County's many water distributors was considered to be practical merely as an emergency backup system. The Plan relies on the major county distribution network as the principle means of exchanging water. In addition, the Plan anticipates that the artificial recharge of treated waste water will be the "foundation for Nassau County to remain self-sustaining beyond the year 2020." (page S-7)

The Master Water Plan also examines alternatives which are related to water quality problems. They are:

1. "Utilization of the Lloyd" -- a proposal that would mine the Lloyd Aquifer, eliminate its use as an emergency supply, and jeopardize the water of coastal communities now reliant on the Lloyd;
2. "Wellhead treatment" -- a technological fix when clean water is no longer available; and
3. "Centralized treatment plants" -- an expensive structural solution that would require the redesign of certain water systems.

The Nassau County Master Water Plan presents a short term solution to water problems. It relies on technological solutions such as continued mining of the resource in order to change the water table gradient and various treatment processes. In searching for solutions to the County water problem, the Plan ignores the dynamic water movement patterns of the aquifer system as well as the relationship of land use practices to water quality and quantity. It takes an engineer's approach to water problems and postpones important management decisions. As a result, future options will be sharply limited. Continued development of the remaining open spaces, increased water demand, and wider contamination will all preclude future leaders' ability to choose any options other than those discussed in the Plan. Thus, the Plan does not propose to manage the resource, rather it offers a strategy for more efficient exploitation.

A Case in Point - Mitchel Field

Nassau County has undertaken a major new development program for the remaining 500 acres of the 1200 acre Mitchel Field area in Uniondale. The development plans for Mitchel Field call for the creation of the largest office center in Nassau County. On Long Island it will rank second in size only to the Route 110 corridor in Suffolk County once it is completed. The County anticipates sizable tax revenues (\$4.6 million, the first year), rental fees (\$2.9 million, the first year), jobs (20,000), construction business (\$500 million), and traffic congestion to be generated by this planned development.

Upon completion, the Mitchel Field-Roosevelt Field office, business, and recreational center, including the raceway area, will exceed anything else of its kind on the Island.

The creation of a complex this size has been highly touted for its positive benefits of increased employment, reduced tax burden, and a boost to the overall economy of the County. Little attention, however, has been paid to the less obvious though no less important issue of water supply adequacy and protection. The groundwater beneath Mitchel Field is known to be highly contaminated in certain sections.

A site in the northwest corner of the area has shown 2,400 times the permitted level of 50 ppb of organic chemicals. This condition exists within 20 feet of the land surface. To the north, in the adjacent Roosevelt Field area, the water district there has been plagued by a history of serious contamination. The contamination at one site has travelled to the very deepest part of the main water supply aquifer, 560 feet deep in the Magothy. It can be anticipated that the increased water demand arising from development at Mitchel Field will promote the spread of contamination and lead to an increased demand for clean water from neighboring water districts. Therefore, every effort to conserve and control water use in this area should be explored.

The County of Nassau is currently considering the use of nonpotable water to service the irrigation of the recreation field and the central utility plan at Mitchel Field. Other ideas the County or one of its appropriate subsidiaries should vigorously pursue are:

- the use of nonpotable water for all air conditioning systems which use water;
- the use of nonpotable water for all process water needs;
- the use of nonpotable water for all irrigation;
- the practice of frequent cleaning of parking areas to remove car-derived fluids from the pavement rather than letting precipitation wash them into storm drains;
- the use of water conserving appliances (faucets, toilets, etc.) in all buildings, especially by large water users such as the hotel; and
- the use of dual plumbing systems where feasible.

These practices are important to implement now. It is easier and less expensive to institute water conservation in the original design and construction of a facility than it is to retrofit it. Under the terms of their lease, these new neighbors, using County owned land will be with us for 99 years. It is hoped they will be good neighbors and that through the use of the suggestions mentioned, they will not hasten the water problems that are expected in only 38 years.

Mitchel Field - A Hidden Silver Lining

Finally, although the development of Mitchel Field presents certain challenges to the water supply of Nassau County, it could also contain a seed of hope. One strategy for providing clean water to the County for many years to come would be to set aside, in a trust fund, a small percentage of the income from the Mitchel Field complex to help pay for watershed acquisition, protection, and management for the future. Certainly it would seem fair to allow the residents of today to assist the residents of tomorrow who will inherit a less than healthy water resource through actions not their own. Such a fund would also provide current and future leaders with new options for water supply and groundwater management which they would not have by any other means save raising taxes or borrowing money through bonds or loans.

A New Approach

This paper has looked at the current status of water quality and quantity in Nassau County. It has attempted to identify problems inherent in the prevailing approach to water concerns. The dependence on technological and structural answers to the water problems of the County places an unacceptable dependence on unknown and untried technologies while it defers the expense of finding solutions to those not wholly responsible for the problems. It also dramatically limits the options from which future decision makers can select realistic solutions. A new approach is needed.

If one looks at a map of Nassau County, one sees an interesting pattern of land development. The south side of the county is heavily populated and developed while the north side of the county is still rich in open space, undisturbed woodlands, and large estates. It is not a coincidence that the best water quality in the County is found to the north, for the correlation between undisturbed land and pristine water has been repeatedly demonstrated on Long Island. The Master Water Plan itself recognized the water supply potential of the north shore by its proposal to establish two macro-well fields at Manetto Hill Park and Muttontown Preserve, each pumping 14 mgd of high quality groundwater for transport to other areas of the County. Unfortunately, the plan neglects to consider or discuss how that clean water from the north shore is to be kept clean. It is not enough to describe a scheme to further exploit the water supply. What must be devised is a plan to protect the water supply for all future generations to enjoy.

The following discussion therefore proposes a strategy for providing a clean supply of water for Nassau County residents for many years to come.

Critical Watershed Protection

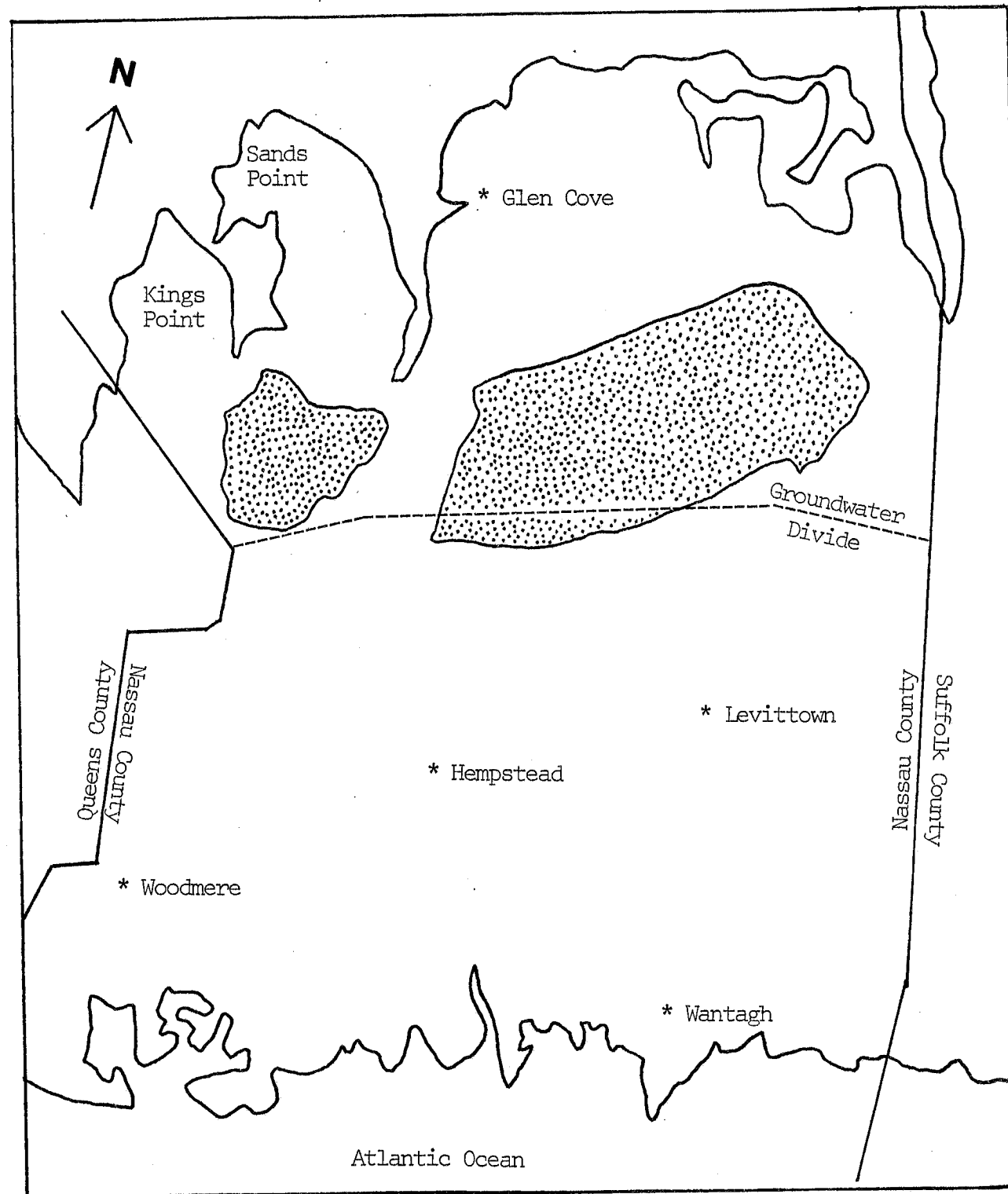
The Long Island Comprehensive Waste Treatment Management Plan,⁵ categorized the Long Island aquifer system into 8 individual sections based on groundwater flow. It further identified the Magothy aquifer as the main water supply aquifer for the entire island, both at the present and in the future. "Those areas contributing to this aquifer should be subjected to the strictest management control." (vol. 1, pp. 44-45). In Nassau County two zones, (I & II) make up the "deep flow recharge area" which recharges the Magothy and the deeper aquifer, the Lloyd. These two zones have the greatest impact on the quality and quantity of water in the aquifer system as a whole and act as the driving force for water movement throughout the system.

In terms of groundwater management, critical watershed areas of the aquifer can be identified due to the high quality and quantity of water they recharge and their amenability to successful groundwater strategies. One strategy to keep high quality groundwater recharging to the aquifer is to earmark recharge areas for protection. Such protection would apply the strictest land use management policies to these recharge areas. These watershed areas thus become "pure-water pumps" into the aquifer, which guarantee that at specific locations, the highest quality water is still moving through the system. A strategy of this type would allow future water supply plans that can count on a perpetual, high quality water supply.

Though Nassau County has two deep flow recharge zones, most of zone II is highly contaminated and will continue to feed contaminated water to the aquifer system for years to come. Zone one, which includes most of the northern half of the County, still possesses two major recharge areas which could be designated as "watershed management districts." The designation of such districts is appropriate for the North Hills area and the central section of the Town of Oyster Bay. These two areas generally straddle the groundwater divide and as such, would contribute clean water to both the north and south shores. The goal of watershed management districts established in these two areas would be to guarantee through the use of specific management policies that the quality and quantity of the water recharged is protected.

The management of critical watershed districts would rest on the concept of clean land. Strategies established in such districts would manage the total groundwater recharge. Such a philosophy would tend to minimize the discharge of all contaminants to the ground and would work with the soil column as the last layer which can treat contaminants. The value of natural, vegetated watershed areas would also be emphasized.

⁵Long Island Comprehensive Waste Treatment Management Plan, 2 vols., Nassau-Suffolk Regional Planning Board, 1978.



 -- **Critical Watershed Areas of Nassau County, Long Island**

Many strategies are available to mix and match for a watershed protection district. They could include:

- land acquisition
- transfer of development rights
- easements
- large-lot zoning
- tax credits
- land-use zoning
- stringent discharge standards
- water quality standards that reflect ambient quality
- requirements in landscaping design and maintenance
- product bans
- on-lot disposal system requirements
- stormwater runoff strategies
- fertilizer and pesticide regulations
- maintenance of as much natural, open space as possible
- passive recreational areas compatible with high quality groundwater recharge
- bans of solid waste disposal
- strict regulations on commercial/industrial development and types of products used, produced, stored, and waste generated
- mandatory clustering and dedication of open space with limitation on maximum percentage of area to be developed and landscaped
- expanded use of DOH watershed rules and regulations
- all development plans to become Type 1 SEQRA actions
- utilization of new Federal legislation for planning and acquisition under the Sole Source Aquifer program of the Safe Drinking Water Act.

This proposal stems from the simple realization that in order to protect groundwater quality one must begin at the beginning of the process that is recharge. Recharge quality is affected by land use practices. In addition, there is a growing understanding that the most effective means of controlling recharge is by setting aside certain areas to function as clean recharge sites. This concept has already been accepted by another community in New York, Schenectady County. Their experience may provide an inspiration to Nassau County.

A Case Study of a Critical Aquifer Protection Program

In Schenectady County, New York, 5 municipalities and greater than 80% of their residents rely entirely on groundwater. Recognizing the importance of the aquifer, Schenectady County directed a consulting firm to:

1. identify those land areas above the aquifer that should be protected to ensure future water supplies; and
2. recommend those techniques available to protect this valuable resource.⁶

The consultants recommended to Schenectady that... "ownership/land purchase be considered as the primary preservation mechanism for each Critical Aquifer Area since it is the only way to insure absolute control over the land. Other preservation mechanisms should be used in conjunction with ownership/land purchase if land purchase proves infeasible for any particular critical area." (p.1) The consultant's report included likely preservation mechanisms such as:

- transfer of development rights
- restrictive covenants
- watershed rules and regulations
- watershed conservation

The aquifer protection plan proposes the creation of a three-tiered system which will establish protection priorities for the site-specific Aquifer preservation strategy.

Tier one aquifer areas comprise those sites "most currently and potentially productive including all public water supply well fields." (p.7)

Tier two sites are identified for "preservation to ensure a resource for adequate future supply development. Although not yet exploited, these sites should be protected for future expansion of production to respond to increased demand, or for possible relocation as a result of well field contamination." (p.7)

Tier three sites contain "those remaining critical areas identified...for preservation because of their high productivity potential." (p.7)

The recommendations contained in the three tiers were considered by the consultants to be the "absolute minimum commensurate with long-range preservation of the Aquifer." (p.7) They emphasized that "...to preserve less than the areas designated is to preclude potable groundwater production at the sustained yield rates." (p.7)

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Schenectady County Aquifer Preservation Strategy Program, Schenectady County, New York, Schenectady County Planning Department and Schenectady County Environmental Advisory Council, August, 1980.

Site Specific Recommendations for Critical Aquifer Areas--

Proposed Schenectady County Aquifer Preservation Program

FIRST TIER AQUIFER AREAS

<u>NAME OF AREA</u>	<u>RECOMMENDED ACTION</u>
Area 1-S, Rotterdam and Schenectady Well Fields	-Purchase of 4 Parcels -Restrictive covenants on 9 parcels -Floodplain Zoning -Land Conservation Zoning -SEQRA Critical Area Designation
Area 1-N, Glenville Well Field	-Purchase of Restrictive Covenant -Floodplain Zoning -Land Conservation Zoning -SEQRA Critical Area Designation
Area 6-S, Niskayuna District 5 Well Field	-Land Conservation Zoning -SEQRA Critical Area Designation
Rotterdam Junction Well Field	-Land Conservation Zoning -Floodplain Zoning -SEQRA Critical Area Designation
Scotia Well Field	-Land Conservation Zoning -SEQRA Critical Area Designation

SECOND TIER CRITICAL AREAS

Area 3-S, Upstream from Rotterdam Junction	-Purchase of Restrictive Covenants on 6 Parcels
Area 2-N, North Side of River at Lock 8	-Land Conservation Zoning -Floodplain Zoning -SEQRA Critical Area Designation

THIRD TIER CRITICAL AREAS

Areas 2-S and 5-S, Near New York State Thruway Interchange	-Land Conservation Zoning -Land Conservation Zoning
Area 3-N, Town of Glenville	-Floodplain Zoning
Area 5-S, at Schenectady County Community College	-SEQRA Critical Area Designation

In addition to the site specific aquifer preservation recommendations, the consultants acknowledge that activities outside the preservation areas "can affect well water qualities if they contaminate land surfaces within the watershed that recharge the Aquifer. Therefore, actions must also be taken to protect the Aquifer from contamination originating outside of the critical areas." (p.23). The report therefore proposes broader actions which should be undertaken to "complete the protection of the aquifer's water supply capabilities." (p.23) These strategies include the following:

1. Creation of a County Water Council;
2. Adoption of State Health Department Watershed Rules and Regulations for all public wells in the County;
3. Designation of all aquifer preservation areas to become "critical zones" and therefore automatically eligible for Type One review under SRQRA;
4. Creation of a Land Conservation Zoning System which permits preservation and the maintenance of open space through low density use (typical minimum lot size is 5 acres);
5. Complete interconnection of adjoining water districts to permit efficient exchange of water;
6. Preparation and issuance of "letters of record" to the owners of any parcel of land owned by a governmental entity or private utility which states the interest of the County in any activity which might conceivably contaminate the groundwater; a second letter also asks for the right of first refusal at the time of sale of land; and
7. Creation of a public education program.

The Schenectady Program also analyzes alternative means for financing. They are: municipal bonds, both full-faith-and-credit and revenue obligations; Federal assistance from the Land and Water Conservation Fund, the National Natural Landmarks Program, or other programs; and dedication of acquired land for public parkland under Section 406 of NYS Real Property Tax Law to exempt lands for tax obligations.*

(Appended are samples of the Schenectady model ordinances for Land Conservation Zoning and Model Protective Covenant Agreement.)

* For Nassau County, proposed Federal legislation granting acquisition and planning monies for critical areas of Federal sole-source aquifers may be another possible source of Federal assistance.

The Schenectady County Aquifer Preservation Strategy Program puts into perspective the importance and the long term relevance of the financial commitment required for the program it recommends by stating "...when viewed as an investment in this community's future, amortized over a 20-25 year period, with payments shared by all those who benefit and anticipating some partial Federal assistance, this initiative is clearly warranted. The long-range return of high volume/high quality groundwater to current and future residents, commercial establishments, and industries, at low rates, is a persuasive argument for such a modest expenditure." (p.29)

The importance of the Schenectady County experience is its demonstration that other groundwater dependent regions of the state are recognizing the value of protecting critical recharge regions. For Nassau County, such a recognition must be made soon for as stated earlier, there are very few "pure water windows" remaining for which critical management strategies are easily implemented. As areas of perpetually high quality water, they can be counted on as guaranteed pure water sources where plans for treatment or abandonment need not be expected.

Efforts at critical watershed protection outside of New York State include a state-wide program in Connecticut. The Connecticut program, described in the following pages, is based on a categorization of all of the State's water sources. The Connecticut program, which is based on an anti-degradation policy, prescribes resource uses and discharges which are compatible with water quality and which, with few exceptions, will prevent the degradation of water quality.

GROUNDWATER PROTECTION -- STATE OF CONNECTICUT

In September 1980, the State of Connecticut adopted the revised Water Quality Standards and Criteria (WQS), which together form the basis for Connecticut's water protection program. The program includes the development of statewide surface and groundwater policies, as well as the classification of all of the waters of the state. The groundwater policies of the revised WQS were developed to facilitate consideration and treatment of surface and groundwaters as one system. The policy and program for groundwater protection is discussed below.

Connecticut's groundwater policy is to: Restore and maintain groundwaters to a quality consistent with its use for drinking without treatment except in certain cases where:

- a. groundwater is in a zone of influence of a permitted discharge;
- b. groundwater is suspected to be contaminated (GB) and there is no overriding need to improve; and
- c. the groundwater classification goal is GC.

This policy, which embodies a philosophy of non-degradation, is reflected in the classification of the state's groundwaters and in the WQS. The classification was completed following a mapping of all point source surface and ground discharges, all salt piles, lagoons, oil and chemical spills, and landfills. All surface water reservoirs and public water supply wells were also mapped. Following these inventories, hydrogeologic and soil information was gathered.

Once the above data was collected, existing conditions were evaluated and all groundwater supplies in the state were classified on the basis of existing water quality.

For each groundwater category, the water quality standards and criteria offer long range management goals and list appropriate uses and compatible discharges. The long range goals express the water quality to be maintained or achieved in all areas having a given groundwater classification. Associated with the goals are appropriate uses and discharges which will allow the long range quality goals to be reached. These allowable uses and discharges will be the driving force behind all of the water quality management activities of the Connecticut Department of Environmental Protection.

The WQS represent an attempt to form a program with far-reaching impact, and one which assures consistent protection of water resources. Under the WQS system, proposed water supply sources are given the same degree of protection as are existing water sources, creating preventive measures which will assure high quality water for the future. The program allows few exceptions to its standards. The presence of physical obstructions such as dams is not an acceptable reason for downgrading water quality downstream.

The program focuses on the maintenance or upgrading of existing water quality as is reflected by the water classification system.

The WQS work in conjunction with the permitting programs of the State's Department of Environmental Protection. The water quality policies and the classification system which established the water quality goals and the general criteria are intended to limit but not control actual discharge. Discharges are controlled by the Department of Environmental Protection's wastewater discharge permit and enforcement program.

Since the WQS do not specify actual levels of various chemical constituents, but rather goals for quality and use, they apply to all potential contaminants and do not need to be continually updated or revised. WQS are established for each classification category.

There are four classes of groundwater: GAA, GA, GB, and GC. GAA waters are of the highest quality; their uses are broadest and allowable discharges are the most restrictive, as is indicated by the chart below:

CLASS	RESOURCE USE	COMPATIBLE DISCHARGES
GAA	Public and private drinking water supplies without treatment	Restricted to wastewaters of human or animal origin and other minor cooling and clean water discharges.
GA	Private drinking water supplies without treatment	Restricted to wastewaters of predominantly human, animal, or natural origin which pose no threat to untreated drinking water supplies.
GB	May not be suitable for potable use unless treated because of existing or past land uses.	All the above plus it may be suitable for receiving certain treated industrial wastewaters when the soils are an integral part of the treatment system. The intent is to allow the soil to be part of the treatment system for easily biodegradable organics and also function as a filtration process for inert solids. Such discharges shall not cause degradation of groundwaters that could preclude its future use for drinking without treatment.

GC	<p>May be suitable for certain waste disposal practices due to past land use or hydrogeological conditions which render these groundwaters more suitable for receiving permitted discharges than development for public or private water supply. Downgradient surface water quality classification must be Class B or SB.</p>	<p>All the above plus other industrial wastewater discharges that do not result in surface water quality degradation below established classification goals. The intent is to allow the soil to be part of the treatment process.</p>
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The designations GB and GC are given to areas that have previously experienced serious water quality problems. Areas designated GB and GC are almost all in the same geographic region, many located along the Connecticut River.

The full WQS include evaluations of a wide range of discharges and their suitability or unsuitability for each category of groundwater. In addition to the standards, which are implemented and enforced through the DEP permitting process, the water supply protection program has several aspects which demonstrate the intensity of the state's interests and efforts in the area of groundwater protection. The state includes, in its handbook on the WQS, a summary of Best Management Practices for potential contaminants. As contamination of Connecticut's water supply can originate outside of the State, Connecticut has an express policy to pursue the adoption of compatible Water Quality Standards in neighboring states.

A RATIONALE FOR CATEGORIZING GROUNDWATER WATERSHEDS AND
PRIORITIZING THEIR RELATIVE QUALITY AND IMPORTANCE

The New York State Legislative Commission on Water Resource Needs of Long Island recognizes the need to expand the lessons learned on Long Island in order to help protect other critical groundwater watersheds throughout the State. In this context, the Commission has developed a basic outline for a program to classify and protect these critical areas. A brief discussion of this program is presented below.

For New York State, a central issue of concern should be the identification, prioritization, and appropriate protection for groundwater watershed areas. The quality of all surface and groundwater watersheds is ultimately dependent upon land use activities and the relative opportunity that they provide for accidental or purposeful contamination of groundwater supplies. Because of this, all efforts to protect the present or future potable supplies of groundwater in the State must focus both upon land use activities and preventive strategies for maintaining all major clean groundwater recharge areas in the State.

The following is a listing of the basic assumptions that should be made by government and municipal planners when initiating an effort to identify, prioritize, and protect the major groundwater watersheds if the State:

1. Groundwater watersheds can be generally identified using existing soil, geological, physiographic, and other data;
2. Groundwater watersheds are as important to the present and future economic and social well-being of the people of the State as surface water watersheds;
3. Groundwater watersheds are vulnerable to contamination from the same array of pollution sources that can negatively affect surface water watersheds but are, because of the relatively longer residence times of contaminants, more vulnerable to "permanent" loss of quality water for public supply purposes;
4. The public supply functions of groundwater watersheds in New York State depend upon five major variables, as follows: (1) average soil permeability; (2) aquifer storage capacity; (3) land uses; (4) proximity to a present or future population in need of potable water; and (5) the predictability of water quality on a time scale that approaches or exceeds the anticipated lifetime of our society; (See Figure 1)

5. Groundwater watersheds in New York State have not previously been adequately protected through land use controls designed for this purpose;

6. Groundwater watersheds should be protected as soon as possible through purposefully designed land use controls in a manner analogous to traditional watershed-land use controls within surface water watersheds that are used for public supply purposes;

7. Whenever possible, groundwater supply sources for public consumption should be planned for permanently high quality without the risk to those supplies that the "human factor" (accidents) or the "technological factor" (overconfidence) might otherwise create:

8. Existing inappropriate groundwater watershed land uses in the State already have, or will in the future, compromise the quality of present or future public water supplies in many areas of the State;

9. Existing appropriate groundwater watershed land uses can predict the relative longevity of a given groundwater watershed;

10. If the relative longevity of a given groundwater watershed in the State approaches "forever" and is located within 50 miles of a dense population center that has an uncertain water supply, then the State should consider that watershed as "highest priority" and act decisively to prolong and, if possible, improve the existing pattern of land uses within it;

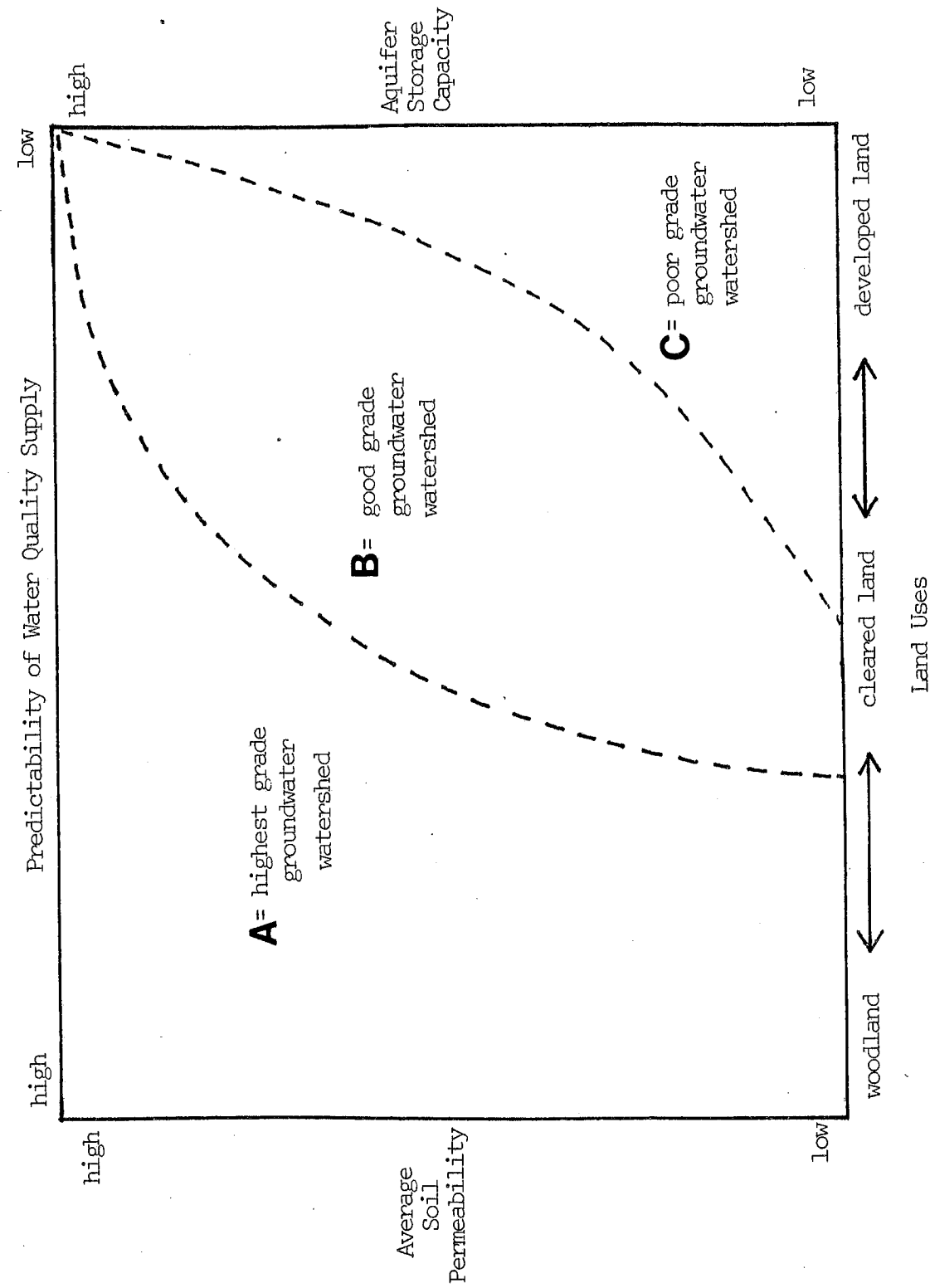
11. The economic costs to the citizens of New York State by implementing this policy will be significantly less than the inevitable technological or structural alternatives to groundwater watershed protection that will otherwise eventuate; and

12. Existing inappropriate watershed land uses in the State taken with soil permeability, the relative percent of natural surficial vegetation, and aquifer storage capacity, are particularly important criteria that can be used to evolve a defensible public policy regarding a Statewide groundwater watershed program within the context of a Statewide clean land program.

CATEGORIES OF GROUNDWATER WATERSHEDS

- A - Highest Grade Groundwater Watershed
 An area that is a permanently secure public water source.
 Strategies: extensive public acquisition; upzoning; removal of certain governmental services; Type I SEQRA designation; retention of all tax-default properties; rigorous protection of all native vegetation cover; public education
- B - Good Grade Groundwater Watershed
 Water supplies that face an uncertain future due to mixed land uses within the watershed
 Strategies: select public acquisition; upzoning; critical review of development activities; holding of all existing large-scale public properties; retention of all undeveloped tax-default properties; maintenance of the longevity of the watershed through permit and other regulation procedures and public education
- C - Poor Grade Groundwater Watershed
 A water supply that faces certain long-term degeneration due to the loss of natural watershed characteristics
 Strategies: maintenance of the longevity of the watershed through permit procedures and other regulatory activities as well as public education programs; plan for alternate source of potable water now

CHART FOR CATEGORIZING GROUNDWATER WATERSHEDS



CONCLUSIONS AND RECOMMENDATIONS FOR CRITICAL WATERSHED PROTECTION

- The Commission finds that the prevention of water quality deterioration is a more attractive and cost effective alternative than expensive treatment or development of other sources after a water pollution problem arises. A watershed protection strategy involving regulation of land surface activities is essential for the protection of Long Island's groundwater.
- Watershed protection programs are already in place at the Federal level in the form of the Sole Source aquifer program under the Environmental Protection Agency, and at the State level in the form of the Department of Health's Rules and Regulations program. The scope of both of these programs is currently limited; neither provides comprehensive protection of Long Island's aquifer system.
- Aquifer protection programs have been proposed and/or implemented in other areas and have demonstrated methods of regulating land uses on a regional basis in the interest of protecting water resources.
- The Commission recommends that the County of Nassau initiate a watershed management district program to protect the recharge sites of key sections of the deep flow recharge zones such as exist in the northern half of the County.
- The Commission supports the use of a non-degradation policy as the basis of critical watershed protection programs.
- The Commission recommends the passage of legislation at both the State and Federal levels which will broaden the scope of both the Rules and Regulations program and the Sole Source aquifer program so they will provide for the management of critical watershed areas.

APPENDIX TO SECTION III

EXAMPLES OF THE LAND CONSERVATION ZONING ORDINANCE AND MODEL
 PROTECTIVE COVENANT AGREEMENT FROM THE SCHENECTADY COUNTY
AQUIFER PRESERVATION STRATEGY PROGRAM

LAND CONSERVATION ZONING

1. PURPOSE. The land conservation LC District is created to preserve and protect those areas where intense development should be prohibited due to:
 - (1) Special or unusual features of topography, drainage, floodplains, slope, or other natural features representing a hazard to buildings or structures.
 - (2) Potential soil erosion, stream or aquifer pollution, destruction of wildlife habitats, forests or other vital natural features which should be preserved for the welfare and enjoyment of all people.
2. PERMITTED PRINCIPAL USES. The conservation of land including bird sanctuaries, wildlife refuges, hiking trails, nature preserves, parks, and public preserves, scenic areas and similar uses.
3. PERMITTED BY SPECIAL USE PERMIT.
 - Commercial agriculture
 - Single-family dwellings
4. PERMITTED ACCESSORY USES. Any accessory use of building early incidental to the permitted principal use.
5. MINIMUM LOT SIZE. 5 acres
6. MAXIMUM SITE COVERAGE. 5%
7. YARD REQUIREMENTS:
 - Front-----100 feet
 - Side-----100 feet
 - Rear-----100 feet

MODEL PROTECTIVE COVENANT AGREEMENT

This agreement made this _____ of _____, _____, by _____ hereafter called owner of property located at _____ and _____ water district; a public corporation having offices for the transaction of business at _____ hereafter called the party of the second part.

Witnesseth:

Whereas, the _____ are the present owners of certain lands designated as _____ County Schenectady State of New York and shown on a map entitled _____ made by _____ dated _____, and duly filed in the Schenectady County Clerk's Office, and by designated in deed dated _____, and recorded in Schenectady County Clerks Office in book _____ page _____.

Whereas, water district, to protect ground water quality for their existing or future municipal wells, by acquiring restrictions and encumbrances on land use rights from owner upon those premises shown and covered by the afore-said deeds and maps.

Now therefore, by this agreement Witnesseth that the _____ owner in consideration of the sum of \$ _____ paid by _____ water district does hereby declare encumbrances and restrict the land use of all of the real property of said owner shown and designated upon that map of _____ dated _____ and made by _____ and recorded in the Schenectady County Clerks Office and described in deed dated _____ 19 _____ and recorded in Schenectady County Clerks in book _____ page _____ as follows:

1. Land Use:

No lot, or portion of said area shall be used except for recreational, agriculture and low density single family detached dwellings with a minimum lot size of 5 acres.

2. Extractive Activities:

No disturbance of the land surface within 4' of the mean high water table will be allowed.

3. Waste Materials:

No application, storage, consumption or disposal of any substance determined to be toxic, hazardous or radioactive, as presently or to be defined by federal and state authorities, will be allowed on the land or by percolation or injection on-or into the ground or ground water. Residential septic systems will be allowed under Town Permit.

4. Water Rights:

No withdrawal of ground water will be allowed for other than a single family residence or water district purposes.

The owner covenants that these restrictions are to run with the land and shall be binding on all parties and all persons claiming under them for a period of 99 years, from the date of these covenants are recorded; after which time, said covenants shall be automatically extended for successive periods of 10 years unless an instrument signed by the parties or their successors, have been recorded, agreeing to change said covenants in whole or in part.

It is provided that the invalidation of any one of these covenants by judgement or court order shall in no way affect any of the other provisions which shall remain in full force and effect.

It is further provided that these restrictions may be enforced by _____ water district, their successors and assigns.

_____ Dated _____ Owner _____

_____ Owner _____

The _____ water agrees to pay _____ owner the sum of \$ _____ on or before the filing of these restrictive covenants.

_____ Water District

2 acknowledgment as in deed



SECTION IV

THE LONG ISLAND COASTAL PINE BARRENS



PINE BARRENS ACTIVITIES UPDATE

The preservation of the Pine Barrens of Eastern Long Island, a watershed of critical import, has been a major concern of the New York State Legislative Commission on Water Resource Needs of Long Island during the past year. The patterns of groundwater degradation of Long Island highlight the need for preserving tracts of forested, undeveloped land as watershed recharge areas. The Long Island Pine Barrens, a region of about 110,000 acres, functions as the most important pristine groundwater recharge area in New York State. In recognition of the area's significance, the Commission has been an active participant in several working groups that have been established to develop techniques to preserve the Pine Barrens. The following is a synopsis of Commission involvement over the last year in pursuit of this important objective.

The collection of information regarding land use activities within the Pine Barrens is essential in order to determine whether or not they have had a detrimental effect on water quality. Although the groundwater underlying the Pine Barrens is generally of very high quality, localized areas have experienced some water quality degradation. Road salt storage yards, landfills, sewage treatment plants, and junkyards all have contributed to a limited decline in water quality in the area of such facilities. Road runoff is another important source of contamination, as are accidental spills of toxic and hazardous material. Between 1974 and 1981, there were 17 such spills documented by the Suffolk County Department of Health Services, ranging from 50-8,000 gallons in size. The data compiled to date suggests that present practices of land use and development inherently result in water quality problems. These water quality problems are not fully mitigated by the use of cleanup and/or treatment technologies. It has become clear that the only regions on Long Island that recharge pristine quality water into the aquifers beneath are those that remain undisturbed.

The Commission, in close cooperation with the staff of Senator Daniel Patrick Moynihan and other experts in the field of water resource protection, has prepared legislation which may be instrumental in preserving the Long Island Pine Barrens (see in depth discussion of the legislation elsewhere in this report). The bill, which is an amendment to the Federal Safe Drinking Water Act, allows any local unit of government within a Federally declared sole source aquifer area to petition the respective state governor to delineate a Special Protection Area within the established sole source aquifer area. If the governor approves the petition it is then submitted to the Environmental Protection Agency for approval/disapproval. If the administrator of the Environmental Protection Agency approves the petition, which includes the boundaries of the Special Protection Area and

a designated planning entity, then a comprehensive management plan is prepared. When completed, the comprehensive management plan is submitted to the governor for approval/disapproval. If approved, the plan is then submitted to the Environmental Protection Agency for approval/disapproval. Upon approval by the Environmental Protection Agency, the respective state and the Environmental Protection Agency enter into a cooperative funding agreement. Funds are then authorized to be appropriated for implementation of such plans and acquisition of critical watershed areas.

The Commission has drafted the state companion legislation, and will be introducing it shortly. This State legislation is needed because the federal bill calls for an even share of costs between the participating state and the Environmental Protection Agency. It is hoped that the work done by the Commission and other agencies on Long Island, which documents the critical significance of the Pine Barrens, will enable Long Island to be one of the first areas to qualify for this unique program.

Over the past year, the Commission has attended the monthly scheduled meetings of the Pine Barrens Task Force, which is run under the aegis of the Department of Environmental Conservation; and the Pine Barrens Planning Council, administered by the Long Island Regional Planning Board. The principle goal of the Task Force is to help the Department of Environmental Conservation develop a policy concerning the Pine Barrens. The group has also assisted the Department of Environmental Conservation in formulating a management plan for the 7,200 acres the department received from the R.C.A. Corporation in 1978. In addition, the Task Force has developed a list of priority acquisition areas in the Pine Barrens, in the event governmental monies became available for acquisition.

The Pine Barrens Planning Council is in the process of collecting material on various aspects of the Pine Barrens such as zoning, land use, municipal district boundaries, vegetation patterns, public/private ownership patterns, etc., to facilitate the development of a comprehensive planning effort for the Pine Barrens. Once the necessary baseline information is compiled, it can be used by the appropriate agencies in making management decisions that will preserve the ecological, hydrological, and recreational resources of the Long Island Pine Barrens.

U.S. GEOLOGICAL SURVEY GROUNDWATER MODEL RUN FOR THE LONG ISLAND
PINE BARRENS

In light of the significant water resource contained beneath the Long Island Pine Barrens, the Commission undertook a project to explore the precise nature of that resource using the best available technology. The digital, three-dimensional finite-difference model of the Long Island groundwater system, developed by the United States Geological Survey (USGA) was employed. For a precise understanding of this computer model one is directed to the publication, A Comparison of Analog and Digital Modeling Techniques for Simulating Three-Dimensional Ground-Water Flow on Long Island, New York.¹

This model simulates in a generalized manner changes in the groundwater system as a response to water entering and leaving the system. The results of any given model are influenced by the set of conditions and assumptions posed. Reviewing the sparse amount of data available on safe yield and expected consequences of major water withdrawals in the region, the Commission proposed a set of conditions that represented an extreme demand on the area in order to gauge in a rough way the system response.

Using projections from the CPWS-24 Study² of 1968 the Commission proposed a study of the effects of an extraction of 90 million gallons per day (mgd) from the Central Pine Barrens. The hypothetical withdrawal would be accomplished by 30 well sites, located in 2 clusters, one northwest and one south-southeast of the Peconic River. (see Figure 1) Each well would produce 3 mgd. The total withdrawal of groundwater was proposed to be consumptive use.* The wells were all screened in the lowest section of the Magothy Aquifer as defined by the model.

It is a general rule-of-thumb that approximately 1 mgd of groundwater is recharged per square mile of land surface on Long Island, assuming that approximately half of the 44 inches of precipitation per year is available for recharge.

¹ Thomas E. Reilly and Arlen W. Harbaugh, A Comparison of Analog and Digital Modeling Techniques for Simulating Three-Dimensional Ground-Water Flow on Long Island, New York, U.S. Geological Survey, Syosset, N.Y. 1980

² Comprehensive Public Water Supply Study, Suffolk County, New York, CPWS-24, Vols. 1, 2, & 3, Holzmacher, McLendon & Murrell, Melville, New York, 1968.

* consumptive use - The use of water in a manner (such as discharge to sewer lines) that permanently removes it from the hydrologic cycle of the groundwater system. In this case, it could also represent water exported from the Pine Barrens.

From Figure 1 it can be seen that the hypothetical well sites were located on nodes of the grid, each of which is 6000 feet apart. The string of 3 mgd wells located as they are will significantly exceed the recharge rate in that area.

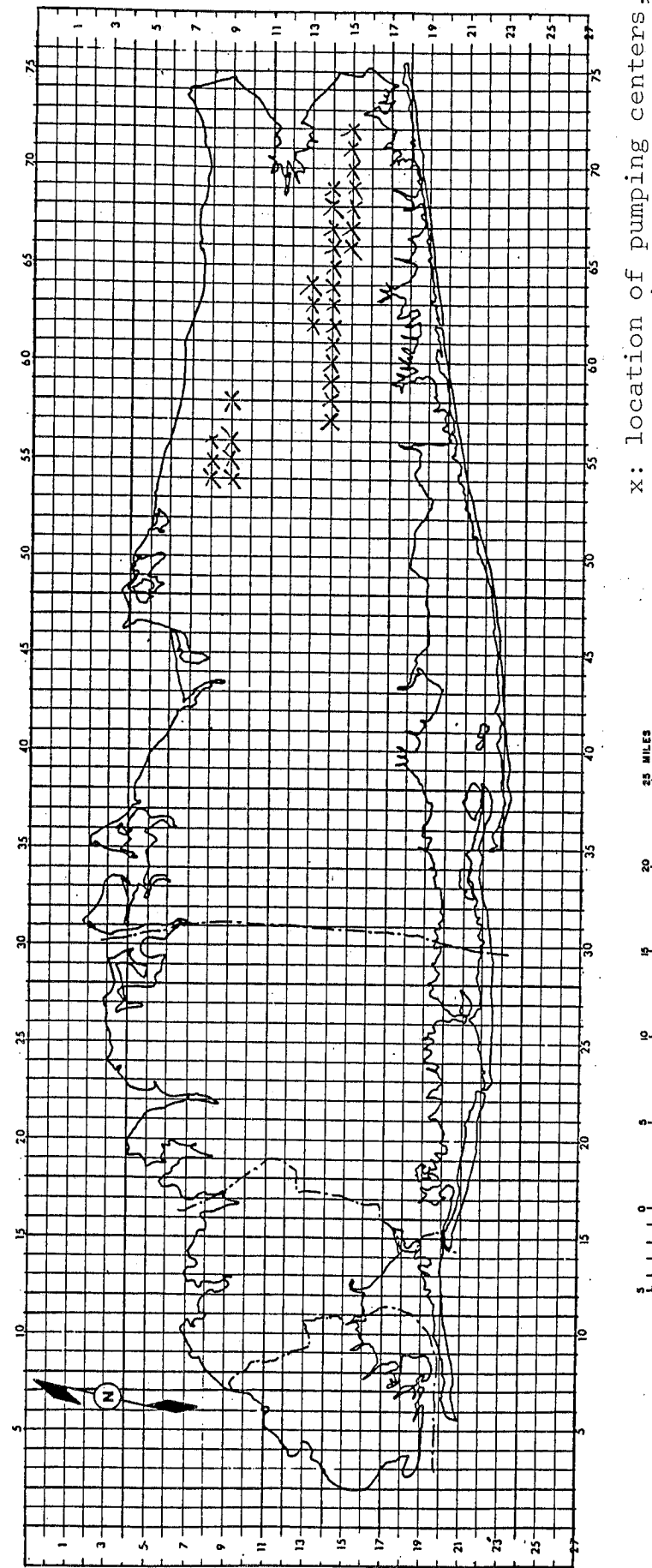
The results of the model run are indicated graphically in Figure 2. From it one can see a fairly well-defined drawdown effect in the area of the larger of the two water development areas. An effect would be felt by the Peconic River, Sawmill Creek, Little River, and White Brook, all of which would experience, according to the model, a 60% reduction in base flow.

The purpose of this model was to propose a hypothetical situation that would likely exceed or exaggerate any water development plan for the area and examine the response of the system. It must be cautioned that the results represent an average response for sedimentologically homogeneous individual aquifers and are not fine-tuned to site-specific soil and stratigraphic variability. However, one can conclude from this one hypothetical example that in fact the Central Pine Barrens does possess a significant capacity to provide water for many purposes in both a consumptive and non-consumptive mode.

From the dearth of detailed information on the hydrodynamics of the Pine Barrens area, a clear need for further data collection and more sophisticated and realistic situations regarding water supply situations should be explored.

The predicted decrease in river flows does not accurately reflect the full implications of drawdown in terms of effect to specific water dependent plant and animal communities. It also does not take into account the mitigating effect of local silt or clay horizons that help to maintain perched water table conditions. A drawdown of the magnitude indicated by the model is seen as encouraging in that other scenarios with lower consumptive use, different withdrawal patterns, and reduced pumping rates may provide a marked drop in surface water effects while still providing an abundant supply of high quality water.

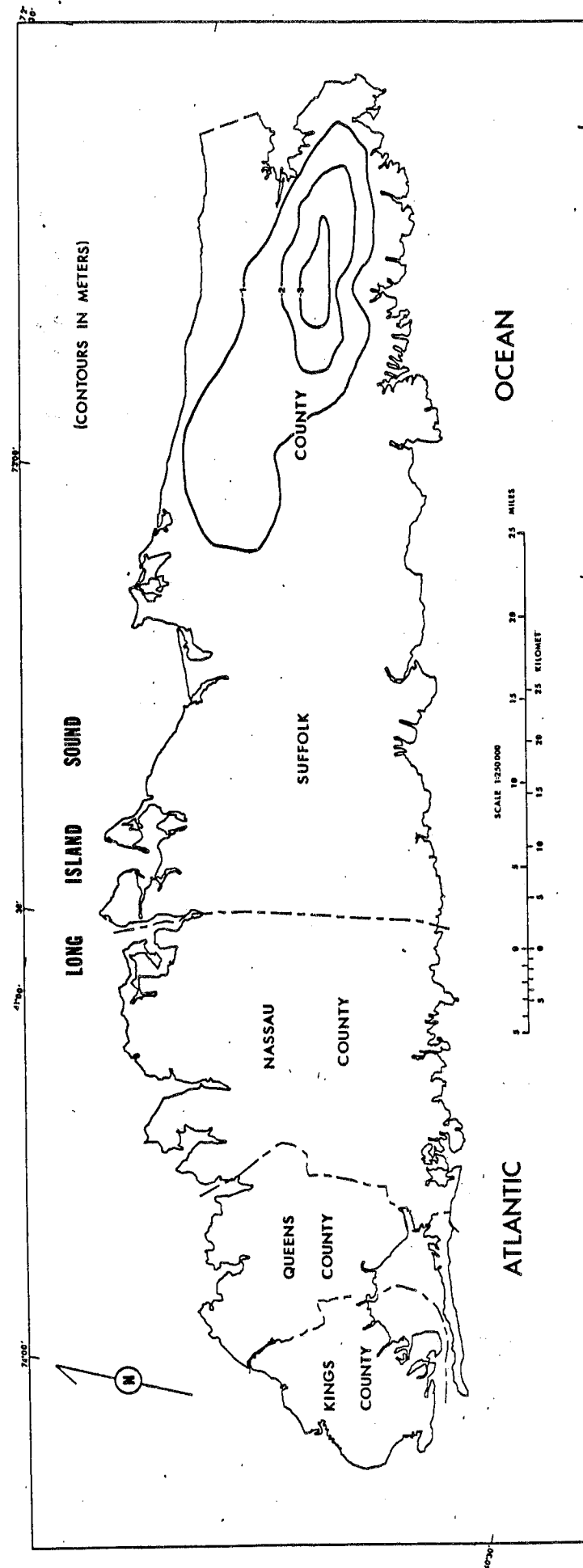
HYPOTHETICAL WITHDRAWAL SITES USED IN USGS GROUNDWATER MODEL RUN



Reprinted from personal communication from
the U.S. Geological Survey, 1981.

FIGURE II

REGIONAL DRAWDOWNS DUE TO PUMPING 90 MGD



Base from U.S. Geological Survey
1:250,000 edition: Hartford, 1962;
New York, 1957; Newark, 1947

Reprinted from personal communication from the U.S. Geological Survey, 1981

PINE BARRENS STATISTICS

The Commission's staff did a statistical study of the towns located within the Pine Barrens pine line. The Commission utilized the Long Island Regional Planning Board's pine line boundary information to determine the towns acreage in the Pine Barrens.

<u>TOWNS</u>	<u>TOTAL ACREAGE</u>
Approximate acreage of each town is as follows:	
RIVERHEAD -----	43,000
SOUTHAMPTON -----	78,397
BROOKHAVEN -----	180,884
QUOGUE -----	3,148
WESTHAMPTON BEACH-----	4,963
	<hr/>
	310,392 acres

ACREAGE WITHIN EACH TOWN

According to the perimeter study performed on the Pine Barrens "pine line" study area, there are approximately 96,035 acres of land. The perimeter study figures differ slightly from the Long Island Regional Planning Board figures in that the planning board states the study area to be approximately 98,340 total acres. The perimeter study was done to approximate how many Pine Barrens acres are located in each of the three towns.

The results are as follows:

<u>TOWNS</u>	<u>ACREAGE WITHIN PINE LINE</u>
BROOKHAVEN -----	62,090
SOUTHAMPTON -----	23,833
RIVERHEAD-----	10,112
	<hr/>
	96,035 acres

PINE BARRENS TOWN % (ACRES)

<u>TOWN</u>	<u>% PINE BARRENS</u>
RIVERHEAD -----	23.5%
SOUTHAMPTON -----	30.4%
BROOKHAVEN -----	34.3%

TOWN % NOT IN THE PINE BARRENS (ACRES)

<u>TOWN</u>	<u>% NOT PINE BARRENS</u>
RIVERHEAD -----	76.5%
SOUTHAMPTON -----	69.6%
BROOKHAVEN -----	65.7%

PINE BARRENS STATISTICS

DEVELOPED AND UNDEVELOPED LAND

There are between 98,279 and 98,340 acres within the Pine Line, of which 67,682 acres are undeveloped. Based on the 98,279 official Long Island Regional Planning Board figure the three (3) town acreage breakdown is as follows:

<u>TOWN</u>	<u>UNDEVELOPED ACREAGE</u>
BROOKHAVEN -----	37,874
SOUTHAMPTON -----	23,210
RIVERHEAD -----	6,598
TOTAL	67,682 acres

Undeveloped land according to the Long Island Regional Planning Board includes woodland, shrubs, grasslands and wetlands, as well as areas that have been disturbed, but not developed. Farmland, nurseries, underwater land, recharge basins and parking lots are NOT included as undeveloped land.

The amount of developed land in each town was arrived at, based upon the 96,035 acre perimeter figure. Each of the three (3) undeveloped acreage figures were subtracted from their respective town perimeter figures. The amount of developed land in acres is as follows:

<u>TOWN</u>	<u>DEVELOPED ACREAGE</u>
BROOKHAVEN -----	24,216
SOUTHAMPTON -----	623
RIVERHEAD -----	3,514
TOTAL	28,353 acres

NOTE: 39% of the Pine Barrens in Brookhaven is developed.
 2.6% of the Pine Barrens in Southampton is developed.
 34.7% of the Pine Barrens in Riverhead is developed.

OAK BRUSH PLAINS

The approximately 600*acre tract of Pine Barrens known as the Oak Brush Plains at Edgewood is the subject of another Commission effort at watershed preservation. Forming the western portion of the Long Island Pine Barrens, the Oak Brush Plains once stretched for 6,000 acres; today, the Edgewood property is the only sizable tract of that distinctive vegetative community.

The Commission, the New York State Department of Environmental Conservation, the Long Island Pine Barrens Society, and numerous concerned individuals, have been petitioning the State Office of General Services to transfer its title to the New York State Department of Environmental Conservation, to establish an Oak Brush Plains/Pine Barrens Preserve. Recent articles in Newsday and The New York Times indicate that such a transfer is supported by Governor Carey, Office of General Services Commissioner Egan, and Suffolk County Executive Cohalan. It is expected that once the necessary administrative and legal requirements are completed, the parcel will be transferred.

Adjoining the 600 publicly owned acres is a 414 acre tract of Pine Barrens, 300 of which is owned by Chase Manhattan Bank, the remaining by the Town of Islip. The Commission, the State Department of Environmental Conservation, the Nature Conservancy, and the Long Island Pine Barrens Society are presently exploring ways that this 414 acre parcel may be preserved for its hydrological and ecological value.

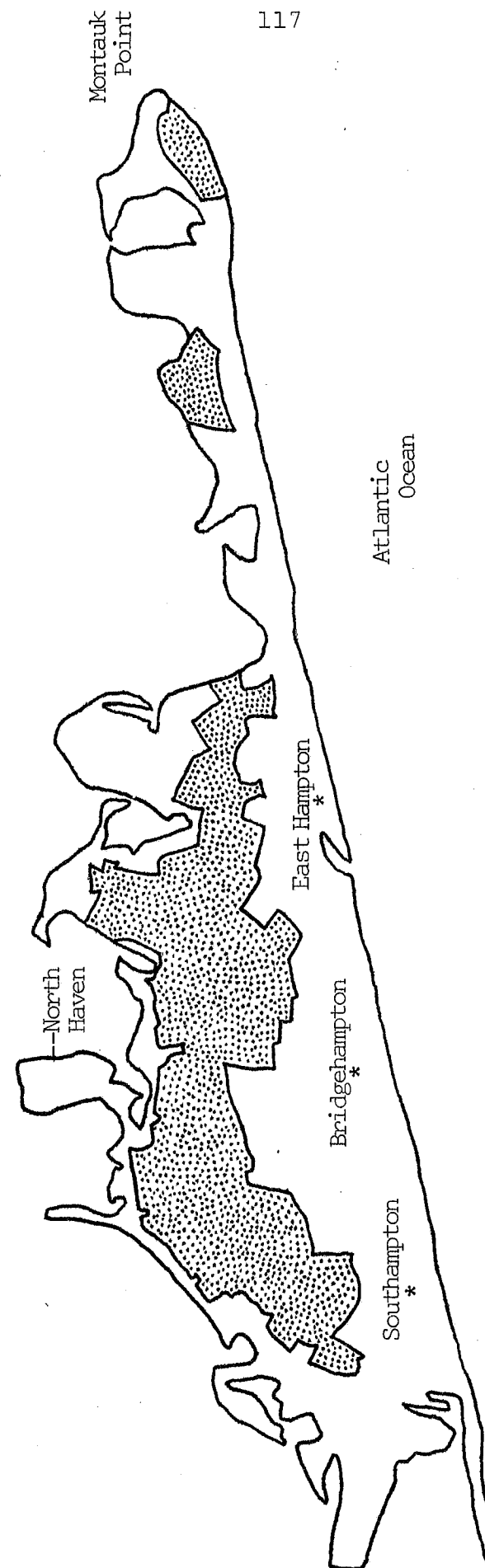
* erratum: 600 should read 60,000

DETERMINATION OF SOUTH FORK WATERSHED AREAS

The South Fork of Long Island, composed of the same unconsolidated sediments as the rest of Long Island, is totally dependent on its groundwater reservoir as the only source of water for residential, agricultural, and commercial consumption. The South Fork is beset by many of the same groundwater contamination problems experienced by the rest of the region. The image of an island unto an island underscores the precarious situation South Fork communities face if their groundwater supply is rendered unpotable due to contamination. The absence of alternative sources of potable water and the difficulty of transporting water from mainland Long Island means that the preservation of the South Fork water supply is of crucial importance. Due to this, the New York State Legislative Commission on Water Resource needs of Long Island and the Group for the South Fork, an environmental organization, undertook a comprehensive survey of the South Fork which delineated forested, undeveloped lands that are important groundwater recharge areas. It is expected that the identification of these areas will assist decisions concerning land use and zoning issues and their potential impact on the quality of the groundwater reservoir found beneath. (See map on page 117).

Not surprisingly, the watershed area that has been outlined is found primarily along the terminal moraine* of the South Fork. Stretching from Southampton to Montauk, this critical deep recharge area encompasses about 23,500 acres. Though a great deal of the vegetation found in these undeveloped parcels is Pine Barrens, the survey included other forest types. It is important to note that the value of these areas to recharge high quality groundwater, lies within the limited degree of development, not in the vegetation type.

* Terminal Moraine: A geological feature created by glaciation. As an ice sheet stagnates, materials pushed by and carried in a glacier are deposited, forming a row of hills parallel to the wasting ice front.



Boundaries compiled by the Commission and Nancy Kelley, Group For the South Fork.



--- Critical Watershed Areas of the South Fork, Long Island

UPDATE ON PROPOSED COASTAL PINE BARRENSPRESERVE LEGISLATION

In the enabling legislation that established the New York State Legislative Commission on Water Resource Needs of Long Island, two of the primary mandates were to "determine where uncontaminated or virgin sources of water exist in both counties" and "to recommend legislative or administrative actions that are required to preserve and protect such resources for future use". In accordance with these important responsibilities, the Commission delineated two major regions of Long Island that still have quantities of high quality groundwater; the Pine Barrens of central and eastern Suffolk County, an area of about 110,000 acres, and sections of northern Nassau County. In recognition of the importance of the Pine Barrens as a hydrological resource, Congressman William Carney announced his intention to introduce Commission-written legislation, into Congress to establish a Coastal Pine Barrens Preserve.

On May 8, 1981, Congressman Carney held a field hearing to solicit public comment on the draft bill. A number of individuals spoke at the hearing, including representatives of local government, Suffolk County Executive Cohalan, the Department of the Interior and the Environmental Protection Agency, and local and national environmental organizations. The overwhelming sentiment expressed by those who spoke was in favor of the proposed bill. Two issues most discussed and suggested as needing revision were the constituency of the management entity, and the areas to be considered for preservation. Many felt that certain portions of the South Fork should be included in the Pine Barrens Preserve as well as some areas of western Suffolk County. The Congressman agreed to accommodate these comments in the final bill.

Since the hearing, the Commission has made a number of minor revisions in the text of the bill, which have been forwarded to Congressman Carney. The Commission has also mapped out the boundaries of the Pine Barrens study area and the critical recharge regions of the South Fork for inclusion in the bill. (see in depth discussion of this activity elsewhere in this Report). This information has also been sent to the Congressman.

During this time, the Commission wrote the necessary companion state legislation to the federal bill and withheld introduction to the New York State Legislature pending the outcome of the federal bill.

Recently, Congressman Carney announced that he is not going to introduce his legislation to establish a Coastal Pine Barrens Preserve, in favor of the legislation to amend the Safe Drinking Water Act introduced by Senator Moynihan. This legislation, which the Commission helped author, is supported by the Congressman because it fares a better chance at becoming law due to its nationwide applicability. (Senator Moynihan's legislation is discussed elsewhere in the Report).

CONCLUSIONS AND RECOMMENDATIONS FOR THE CENTRAL PINE BARRENS

- . The Commission recognizes and commends the efforts of the New York State Department of Environmental Conservation, the Long Island Regional Planning Board, and other governmental and non-governmental entities that have contributed to the study of the Long Island Pine Barrens for the purposes of planning its wise management and preservation.
- . The Commission finds that the Pine Barrens of Suffolk County, Long Island's cleanest and most efficient recharge area, is increasingly subject to development pressures.
- . Documentation of accidental spills of toxic and hazardous materials within the Pine Barrens indicates that present practices of land use and development result in unavoidable water quality problems which can not be fully mitigated by the use of cleanup and treatment technologies.
- . The Commission recommends that those areas of the South Fork of Long Island identified in this Report as critical watershed areas be included in all efforts at the management and protection of the Long Island Pine Barrens.
- . The Commission recommends that the transfer of ownership of the Oak Brush Plains be expedited and that following the transfer of ownership there be created, in recognition of the area's hydrogeological and ecological significance, an Oak Brush Plains Pine Barrens Preserve.

SECTION V

SOLID WASTE DISPOSAL ON LONG ISLAND

SOLID WASTE DISPOSAL ON LONG ISLAND

The problems caused by the land burial of solid waste have exploded suddenly upon the American scene. In 1981, The Council on Environmental Quality reported that a recent national survey had identified approximately 16,000 active municipal landfills and as of 1976 only 35% were in compliance with State regulations.¹ The Council further stated that no good estimates existed on the number of abandoned, or closed municipal landfills, though the number might be as high as 16,000. In addition, there is no estimate of groundwater contamination from abandoned, closed, or operating municipal dumps and landfills. The Resource Conservation and Recovery Act (RCRA) will in time supply some of this data.

Municipal landfills are recognized as one of the most significant and pervasive point-sources of groundwater contamination on Long Island. So far five Long Island landfills have been closed or cited as "open dumps" after a RCRA review. Two landfills studied by the U.S. Geological Survey are the Islip and the Babylon facilities.² Each landfill has a well-defined leachate plume emanating from the bottom of the site. The Babylon plume extends nearly two miles to the south and is 1,900 feet wide. The Islip leachate plume is a mile long and 1,400 feet wide. The Babylon landfill is actually sitting in groundwater. Neither site is lined. The leachate plumes are characterized by high levels of sodium, potassium, calcium, magnesium, chloride, bicarbonate, sulfate, and specific conductivity. pH levels of the leachate range between 4.6-7.3 and elevated groundwater temperatures were 7-16°C above ambient. While the USGS study did not examine synthetic organic chemicals, other studies have shown three synthetic organics (trichlorethylene, trichloroethane, and tetrachloroethylene) to be typically associated with landfill leachate. There is evidence that 1,2 dichloropropane should also be added to this list.

¹ Contamination of Groundwater by Toxic Organic Chemicals, Council on Environmental Quality, Jan. 1981, p.12

² Leachate Plumes in Ground Water From Babylon and Islip Landfills, Long Island, New York, U.S. Geological Survey Professional Paper k085, 1980.

The Nassau Department of Health is presently involved in a study to determine whether leachate plumes are being produced by the closed landfills in New Hyde Park and Syosset. Contamination from these two sites could be especially damaging because they are located in the very heart of the deep flow recharge areas of the aquifer. Contamination here would feed the deepest and cleanest waters of the aquifer with leachate laden water. (See table one for the relationship of Nassau County landfills to the hydrologic zones).

Both public and private water supplies adjacent to landfill facilities are generally in jeopardy of contamination. Cases of suspected or proven contamination of water wells by landfills are documented in Garden City Park, Babylon, Islip, Port Washington, North Sea and Huntington.

The Annual Environmental Report for Suffolk County released in June of 1981 highlighted many of the problems associated with landfills. A county-wide survey of methane migration in 1980 for both active and closed landfills showed the Hauppauge, Holtsville, Huntington, and Old Smithtown landfills to exceed New York State Department of Environmental Conservation Part 360 and RCRA standards. With the discovery of vinyl chloride in wells at the Hauppauge landfill, a survey found that the Smithtown landfill also exceeded the State guidelines. Trace amounts of vinyl chloride were found at West Babylon, Holtsville, East Hampton, and Riverhead.

Table two shows the results of the Suffolk County Open Dump Review and the number of leachate plumes detected in landfills.

Since the discovery of the threat that landfills represent to the health and well-being of Long Island residents, many towns have begun to explore how they can manage the solid waste disposal problem. The following updates provide a look at the progress each town has made. Significantly, resource recovery and recycling are solutions that are being seriously considered by the majority of Long Island towns. This new development, along with Commission legislation to regulate landfills, adds an encouraging note to a serious groundwater problem.

³ Report to the Suffolk County Legislature, Annual Environmental Report, 1981, Peter F. Cohalan, County Executive

TABLE ONE

LOCATION OF NASSAU COUNTY LANDFILLS WITH REGARD TO DEEP FLOW RECHARGE ZONES

I. Abandoned Landfills in Deep Flow Recharge Zone

1. Coze Neck
2. Denton Avenue - New Hyde Park
3. Syosset
4. Elmont, Averal Boulevard
5. Garden City
6. Hempstead City
7. Uniondale - Commercial Avenue
8. Uniondale - Hempstead Turnpike

II. Abandoned Landfills -- Not in Recharge Zones

1. Roslyn
2. Glen Cove - Morris Avenue
3. Glen Cove - Garvies Point
4. Freeport - Albany Avenue

III. Operating Landfills -- in Recharge Zones

1. Valley Stream
2. Hempstead Lake State Park
3. Roosevelt Raceway
4. Mineola Village
5. Old Bethpage
6. Duffy Avenue - Hicksville in Bethpage State Park

IV. Operating Landfills -- Not in Recharge Zones

1. Oceanside
2. Merrick
3. Lawrence Village
4. Jones Beach
5. Port Washington - L-4
6. Planting Fields
7. Nassau County Public Works -- in Port Washington

TABLE II

SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES

OPEN DUMP REVIEW SAMPLING RESULTS

Township	Contaminants Noted	Sampling Well Types	Groundwater Flow (Plume Direction)	Comments
1. Babylon	Primary-Not exceeded Secondary - Iron Chloride Manganese	SCDHS Monitoring Wells Private Well Survey SCWA Well Survey USGS Study 1977	South, Southeast	A well developed extensive leachate plume exists. Documented by Kimmel and Braids 1977 and Dr. R. Cleary in 208 Study. Organic contamination in this area cannot necessarily be attributed to the Landfill.
2. Huntington.	Primary Standards: Selenium (2 Wells) Lead, Barium, Cadmium Secondary: Iron, Manganese, Zinc, Chlorides, Nitrates	Private Well Survey (13 Wells)	Northeast	A concentrated leachate plume is impacting private wells northeast of the Landfill. Heavy metals and organic chemicals are included in this plume.
3. Smithtown Balefill	Primary - Not exceeded Secondary - Manganese, Iron	SCDHS test well analysis Private well survey	Northeast	*This facility is lined and possesses a leachate collection system. There is no explanation for contamination
10. Blydenburgh Rd. Hauppauge, NY Islip Town	Guideline Violations: Vinyl Chloride Trichloroethylene Tetrachloroethylene Secondary - Iron, Zinc	Private well survey	Southeast	Town installed downgradient wells under construction
11. Lincoln Ave. Sayville, NY Islip Town	---	---	Southeast	No new data available
14. Brookhaven Town Horseblock Rd. Yaphank, NY	No leachate contamination noted.	Town installed wells	---	This site possesses one liner
19. Riverhead Town S/S Youngs Ave. Riverhead	Primary: Selenium Secondary: Iron, Zinc	On Site	North	*Further testing is necessary to determine extent of contamination
27. Southampton Town E/S Majors Path North Sea	Primary: Not exceeded Secondary: Iron, Manganese	SCDHS Monitoring Wells	Northwest	In house leachate study has been completed
28. Shelter Island Landfill	Primary: Cadmium (1 House) Secondary: Zinc, Iron	Private Well Study (10 Homes) SCDHS test well	West	---
31. East Hampton Springs/Fireplace East Hampton	Primary: Not exceeded Secondary: Iron	Private well survey Town installed monitoring wells.	---	No leachate contamination noted
32. East Hampton Main Road Montauk	None Indicated	On site	North	No dwellings downgradient
Fishers Island	---	---	---	---

Reprinted from Report To The Suffolk County Legislature, Annual Environmental Report, 1981 Peter F. Cohalan, County Executive, p.7

LANDFILLS - NASSAU COUNTY PERMIT STATUS

Landfill	Location	Type of Refuse	Date Appl. Submitted	Date Permit Issued	Comments
Oceanside (TOH)		All	2/78		Pending
Merrick (TOH)		All	2/78		Pending
Pt. Washington (TINH)		All	2/79	9/79	Permit expired 9/15/80
Old Bethpage (TOB)		All	4/78	8/79	
Valley Stream State Park		Agric.	2/80		Pending
Hempstead Lake State Park		Agric.	2/80		Pending
Jones Beach State Park		Agric.	2/80		Pending
NCDPW (County)	Pt. Washington	Agric.	2/78	12/80	
Mineola (Vill.)		Agric.	None		Legal Action Pending
NYS Planting Fields	Mill Neck	Agric.	2/80		Pending
NYS Dept. of Transportation	Hicksville	Agric.	None		Legal Action Pending
Bethpage State Park	Old Bethpage	Agric.	2/80		Pending
Beechwood (private)	Glen Cove	Agric.	None	None	
Roosevelt Raceway	Westbury	Agric.	None	None	

Information provided by the Nassau County Department of Health

SOLID WASTE DISPOSAL ON LONG ISLAND -- UPDATES FROM THE TOWNS

BABYLON

The Wyandanch landfill receives all of the Town of Babylon's solid waste. Babylon is involved in the Multi-Town project, and will phase out its use of the landfill when the resource recovery plant comes on line in 1985 or sooner.

The Babylon landfill has generated a plume of contamination which has necessitated an expansion of public water service. Approximately 125 homes in Wyandanch and West Babylon formerly served by private wells will receive public water at a cost of up to \$150,000 to the Town.

The Town currently landfills on 52 acres unlined acres of its 82 acre site in Wyandanch. The Town has applied for a waiver from the Department of Environmental Conservation to enable it to expand the area in use by 11 acres without installing a liner. The Town officials believe that water quality can be protected through capping of the new area as it is filled rather than by preliminary lining, which would be much more costly. The Town is now waiting for the ruling on its application for waiver.

The Wyandanch landfill reaches a height of 175 feet in some areas. In its Environmental Impact Statement addressing the expansion of the area in active use the town has made a commitment to cap the already filled area of the site by the time the Multi-Town plant is in operation.

BROOKHAVEN

The Yaphank landfill is the site for the disposal of all of Brookhaven's solid waste. The Town's Holtsville site, which is no longer in operation, has been a source of leachate which has contaminated private wells. Preliminary steps towards the development of a resource recovery program in Brookhaven have been taken.

The Town's landfill has been in operation since the mid-1950s. Though no serious contamination problems have arisen as a result of the site's operation, readings at monitoring wells have indicated trace organics and elevated sodium levels, suggesting that leachate has either permeated or spilled over the landfill's liner. A study is currently being conducted by the USGS to investigate the present conditions surrounding the landfill and to predict any further movement of the leachate plume. Contamination is not presently threatening quality of water from supply wells, but the town does anticipate expanding public water supply into those areas identified by the USGS as in danger of future contamination by the leachate plume.

Contamination of private wells has been a serious problem in the area south of Brookhaven's Old Holtsville landfill. Methane migration problems and evidence of contaminated leachate necessitated the expansion of public water supply to serve several hundred additional homes two years ago. Water quality is monitored regularly at the site, and the Town may have to put in a leachate collection or treatment system to avoid further contamination. The Town presently has no plans for capping the Old Holtsville site.

Reports commissioned by the Town of Brookhaven have advocated resource recovery. A 1978 report recommended the construction of a 2000 ton/day mass burn unit which would serve the Town's needs past the year 2000. An updated report issued last Summer, however, recommended the construction of two 700 ton/day units, with a third unit planned for construction when the additional capacity is needed. (The Town currently produces less than 1,400 tons per day). The Town is now beginning to contact private firms that might be interested in building the resource recovery plant, which is in the very early stages of planning.

EAST HAMPTON

East Hampton buries its solid waste at three landfill sites, one of which receives only construction refuse. Over the past two-three years the Town has attempted to bring its Montauk and East Hampton landfills into compliance with the Department of Environmental Conservation's Part 360 regulations. The Town has tested private wells near its sites; installed shallow and deep groundwater monitoring wells on site; installed methane monitoring wells and installed a liner in its newly excavated area. There have not been problems with methane migration or contamination affecting private wells near the landfill.

The Town anticipates using its Montauk and East Hampton sites until 1985 when it hopes to switch to an alternative solid waste disposal technique. In early Spring of this year, Town officials expect to receive a report from their consultants making recommendations for East Hampton's future solid waste disposal program. The report will consider recycling, incineration, and resource recovery alternatives.

HEMPSTEAD

Hempstead's resource recovery plant remains closed. Its future, as well as alternative solid waste disposal methods, is being considered by the Hempstead Advisory Committee on Solid Waste. Since the closing of the plant two years ago, the Town's solid waste has been disposed of in landfills in Oceanside and Merrick. Both landfill sites are approaching capacity limits.

Though both the Oceanside and Merrick sites originally had working incinerators, the Merrick facility was shut down in anticipation of the operations of the resource recovery plant. Now approximately 10% of the Town's garbage is incinerated at the Oceanside site, and the remainder is buried at the two sites. In July of 1981 the Oceanside site was found to be leaking ammonia, iron and other substances into a small South Shore canal. No imminent health hazards were created because there were no nearby drinking wells. That location has not been a source of contamination since the discharge of toxics during the Summer.

The debate over the future of the Hempstead resource recovery plant centers on concern about the traces of dioxin that were detected coming from the plant's smokestacks two years ago, as well as odor problems generated by the plant. The majority of the members of the Hempstead Advisory Committee on Solid Waste favor the reopening of the plant, believing that odor problems have been solved by renovations which have not yet been tested, and that trace readings of dioxin do not warrant the plant's continued shut down. The final decision regarding the plant will not be made until after a public hearing has been held, the date for which has not yet been set.

HUNTINGTON

Huntington is involved, with the Town of Babylon, in the Multi-Town resource recovery plant, which is expected to begin operations in 1984. The Town is now disposing of solid waste at its East Northport facility, which consists of three incinerators and a landfill.

The East Northport site is being expanded to put four acres of the original site into active use. With the use of the entire area and the Town's three incinerators, there is adequate space to receive the Town's solid waste until early 1987. During the past year, two of the Town's three incinerators were shut down for four months for renovations, thereby violating a consent order signed in January, 1981 that called for the Town's burning of garbage at the three incinerators 24 hours a day, six days a week. Late in 1981 discharge from the incinerators into a nearby lagoon was found to exceed state discharge standards for 20 materials. This problem has not yet been mitigated, though the Town does have a compliance schedule. The Town has applied for and been denied an extension on the maximum allowable height of the unlined East Northport landfill. Huntington officials are reluctant to spend money on re-tooling Town facilities or constructing a treatment facility when the Multi-Town plant is expected to come on line in two years.

When Multi-Town is on line the landfill will be shut down. The site has been considered for use as a transfer station when the plant becomes operational, but it is not certain that such a site will be necessary. The process of developing plans for the closing of the East Northport site has already begun.

ISLIP

Over 95% of Islip's solid waste is disposed of in the Town's Hauppauge landfill. The Town also operates a recycling program, WRAP (With Recycling Alternatives are Possible), which receives approximately 5% of Islip's residential solid waste. The Town is engaged in initial steps toward the building of a 500 ton/day resource recovery plant.

The Hauppauge landfill has been a problem site, associated with odors, methane migration, leaching of toxics, and subsequent well contamination. Vinyl chloride detected in nearby vents caused the closing of a Hauppauge school in May of 1980. In December of 1981 the Suffolk County Department of Health Services conducted tests on groundwater quality and found that water from groundwater monitoring wells met groundwater quality standards, and that ambient air quality standards were also met at the site. Federal EPA tests conducted in June, 1981 also indicated no contamination or adverse environmental impact from the site.

There has been a methane migration problem around the Hauppauge site; the Town has installed a \$400,000 venting system which has mitigated it somewhat. Testing is now being conducted on more effective alternative systems. The area of the landfill which is currently in use is scheduled to close in February, 1982. A new portion of the site which is double-lined will be put into use at that time. The closed portion of the site will be capped, after the possibility of methane extraction at the site is explored.

The State Department of Environmental Conservation wants the Town to phase out its Blydenburgh road landfill in Hauppauge, and to reactivate its Sayville incinerator. The Town is resisting this suggestion, as it is using the Sayville facility to house its WRAP operations. The continued use of the Hauppauge site without the operation of the incinerator represents a violation of a consent order with the State, which has brought legal action against the town.

Islip's WRAP program began in 1980, with 34,000 homes involved. In July of 1981 the program expanded to include all 74,000 homes in the town. Residents participating in the program are required to sort their recyclables, clean bottles and jars, and

bag them for pick up on Wednesdays. Cooperation with the WRAP program varies in different parts of the Town, with greater participation from areas with higher income residents. The Town plans to do more education and outreach which will hopefully lead to increased participation after recycling facilities are expanded. Expansion is underway and is expected to be completed in May of this year.

The use of the entire Hauppauge landfill area will be phased out when the town has a working resource recovery plant. The WRAP program will stay in operation, and will hopefully by that time accomodate full participation by the residents of Islip.

NORTH HEMPSTEAD

One municipal landfill serves the residents of North Hempstead. The landfill is located in the Port Washington sand pits, along the west side of Hempstead Harbor. The 53 acre landfill presently being used is nearing capacity. The Town has initiated the administrative process for expanding its operation into the remaining 85 acre parcel. The hearing process, however, has been stalled since September awaiting the preparation of an acceptable DEIS.

The North Hempstead landfill has been a controversial operation since it opened. Over the past year, methane migration became a serious threat to local residents who live on the hill west of the landfill. High methane levels were found in several homes and a fire and an explosion were all attributed to a methane accumulation.

The Town of North Hempstead spent \$500,000 to install a methane control system. Steel and plastic ventilation pipes were placed around the perimeter of the site, and a gravel-filled trench was placed along the west boundary. The New York State Department of Environmental Conservation reviewed the North Hempstead landfill in August, 1981, as part of the State-Federal "Open Dump Survey" under the Resource Conservation and Recovery Act. As a result of that review, the site was classified as a "sanitary landfill," since no methane was detected beyond the perimeter of the site. Recently, the Nassau County Bureau of Air Quality Management detected methane in a shallow well west of the landfill at a level exceeding the 5% (lower explosive limit) standard. In addition to methane problems, vinyl chloride has been recorded in the vent bases coming out of the landfill.

The Port Washington Water District operates a public water supply well approximately 1800 feet from the landfill. The well has been closed twice due to suspected contamination (by 1,2 dichloropropane and vinyl chloride). However, in

both instances, the test results were never replicated. The well is presently on reserve status pending the results of a special analysis project to determine the name of an unknown substance.

The Town of North Hempstead is currently moving ahead with negotiations with the Power Authority of the State of N.Y. (PASNY) to build a solid waste fired energy plant in the vicinity of the landfill. In addition, the Town has opened negotiations with Getty Oil Co. to lease methane gas rights at the landfill.

The shredder-baler facility at the landfill is nearly complete. However, the Town and the builder of the shredder-baler are in court. At issue is the assumption of responsibility for the cost overrun of the facility.

OYSTER BAY

Oyster Bay disposes of its solid waste in the Old Bethpage landfill, a facility which has been designated by EPA as one of the 114 most dangerous disposal sites in the country. Use of the Old Bethpage site will be phased out when the town has an operating recycling plant, plans for which are now underway. Decisions are currently being made regarding the use of the Town's Old Syosset site in Jericho, which is no longer in use.

The inclusion of the Old Bethpage site on the EPA's list of most dangerous disposal sites means that the Town qualifies for Federal funds for cleanup under Superfund. In December of last year, however, the Town rejected the Federal money, choosing instead to conduct its own cleanup program. The Town was concerned about the stipulations attached to the money, though EPA officials have noted that such considerations have not caused any other eligible localities to reject the offer of Superfund monies.

Oyster Bay has a Town management plan which calls for Town resource recovery by 1985. In the meantime, the use of the Old Bethpage site continues. A Town groundwater management plan calls for the installation of deep monitoring wells to locate the plume of contamination which is likely to be emanating from the site. Tests at Old Bethpage have found unacceptable levels of benzene, vinyl chloride, chromium and other toxics, which may have been illegally dumped at the site years ago by Hooker Chemical Corporation and by Grumman Aerospace Corporation. The Town's program will also include lining a portion of the landfill and installing leachate treatment facilities. Town officials expect the site to be in operation until 1985.

The Town of Oyster Bay is now considering a plan for a new Long Island Rail Road station with a 3,700 space parking lot to be located over the closed Jericho landfill. The parking lot would be over a portion of the site which is not presently capped. Money has been allocated by the Town for the site's capping, as well as for methane venting at the site. The Town is investigating the possible sale of the methane, but anticipates that quantities produced by the landfill will be insufficient for commercial exploitation. Negotiations are now proceeding between the Long Island Rail Road and Town officials regarding the use of the site as a station; alternative plans are not currently being pursued.

The Town's long term outlook for the disposal of solid waste is towards the development of a garbage-to-energy plant. A plan for such a plant has been presented to the residents of Oyster Bay, though negotiations with the plant's expected builder are not complete. The plant being considered for construction is designed to burn up to 1,000 tons of garbage a day, and would not use the same technology as that used in the Hempstead Research Recovery plan.

RIVERHEAD

Riverhead operates one landfill into which all of the Town's solid waste has been buried since 1964. The site is expected to serve the Town's needs for another 4-5 years, and the Town has no concrete plans for an alternative disposal program after that time.

The Riverhead landfill is unlined. Water quality has been degraded in the vicinity of the site, but there has not been significant migration of the contamination plume. Some methane has been detected at the site, but to date methane migration has not been a major concern in Riverhead.

Officials of the Town have visited several facilities which might serve as model alternatives to the burial of solid waste. At this time, however, except for some dialogue with the Town of Southold concerning the possibility of a joint venture, Riverhead does not have a plan for a shift away from landfilling.

SHELTER ISLAND

The population of Shelter Island represents only 0.1% of Long Island's residents. The Town disposes of its solid waste at its landfill site, which is expected to serve Shelter Island's needs for an additional 30 years. To date the Town has experienced no significant contamination problems generated by the landfill.

The Town was involved in a solid waste disposal study with the four other east end towns, but it appears that cooperation among the towns in any solid waste disposal venture is unlikely.

SMITHTOWN

Solid waste is baled in Smithtown, and then landfilled in a double-lined site which has been in operation since 1979. Prior to that time, the Town used a rented site at King's Park. Smithtown was originally involved in the Multi-Town facility, but later withdrew. Recently the Town has received a proposal to rejoin the project.

The new site used by the Town is 86 acres, and is expected to be in use, along with the compacting facility, for 30-35 years. The King's Park landfill is still experiencing settlement of materials, and is not lined or capped. The site is covered with sand and overgrown with weeds. The Town does not currently have plans for capping the site.

If Smithtown rejoins the Multi-Town project or cooperates in any other regional effort, its landfill is likely to be used for disposal of ash, as it is a relatively new facility that has been designed using state of the art technology and materials.

SOUTHAMPTON

Southampton disposes of all of its solid waste in its North Sea Dump. The Town is now planning on excavating seven additional acres adjacent to the area which is currently used. The additional acreage is expected to be excavated by May of this year, and will be lined and equipped with a drainage system. The new dump area is being designed to accept refuse for the next five years.

A plume of contamination is flowing from the North Sea dump. This has caused the Town to extend the public water system to homes with private wells which were contaminated by the landfill leachate. Studies of the plume and of conditions at the North Sea site have led Town officials to believe that further contamination of private supply wells is unlikely.

The Town of Southampton is interested in solid waste recycling, and is exploring sources of funds for a resource recovery plant, as well as studying the possibility of cooperating with other towns in a resource recovery or garbage-to-energy venture.

SOUTHOLD

The Town of Southold's Cutchogue landfill, which is on the Environmental Protection Agency's open dump inventory list, receives all of the Town's solid waste for burial. The Town is in the preliminary stages of considering construction of a modular incinerator.

The Cutchogue landfill has generated methane and a leachate plume which flows northwesterly with the groundwater. A report by the Town's consultants which was released in January of this year reported that the plume has not migrated far from the landfill's borders. It added, however, that tests in the vicinity have detected several chemicals -- nitrates, phenols, manganese, selenium and chlordane -- at levels not exceeding allowable concentrations. If the Town does not agree to certain conditions for the upgrading of the Cutchogue site the landfill will have to be closed by Fall of 1984. These conditions center on the installation of a methane venting and monitoring system at the site, or the implementation of an alternative method of preventing methane from migrating off site.

The modular incinerator under consideration by Southold is expected to generate electricity to be sold to LILCO. One possible builder has already submitted a Draft Environmental Impact Statement to the State DEC, and is awaiting the agency's reply. However, even if the necessary permits are approved, the Town has not made a firm commitment to the plan. The Town is also considering a cooperative agreement with Riverhead that would allow Riverhead to use excess incinerator capacity in all but the Summer months. Should Southold construct a modular incinerator it may well serve as a model facility for other towns with relatively small populations that are examining alternatives for waste disposal.

CONCLUSION

Even a brief survey of solid waste disposal facilities on Long Island reveals a long history of inadequate planning, designing and managing of landfill sites. Current understanding of the interaction between waste disposal practices and groundwater quality, along with state of the art materials and technology, enable new facilities to surpass old landfills in efficiency and safety. The presence of extended plumes of contaminated leachate in many towns, and the frequency of methane migration around many landfill sites, demonstrates the need to improve waste disposal practices. With this goal in mind, the Commission has drafted legislation, reprinted in the Legislation section of this report, which regulates the siting, construction, and operations of landfills on Long Island.

CONCLUSIONS AND RECOMMENDATIONS FOR SOLID WASTE DISPOSAL

- . The Commission finds and commends the fact that many of the towns on Long Island are in the process of moving away from the land burial of raw garbage and toward the development of recycling and/or resource recovery programs.

- . Shifts away from landfilling practices notwithstanding, problems identified in the Commission's Report of last year as associated with land burial of solid waste continue to be causes for serious concern. These include:
 - 1) methane generation and off-site migration;
 - 2) vinyl chloride gas generation;
 - 3) noxious odors;
 - 4) leachate generation
 - 5) major groundwater contamination with leachate plumes up to one mile long;
 - 6) pests and disease vectors;
 - 7) hazardous waste mixed with garbage; and
 - 8) location of many landfills, active and inactive, within the primary groundwater recharge areas.

- . The Commission takes this opportunity to re-state its recommendations of last year regarding landfills on Long Island, as follows:

The Commission finds that landfills must be managed, not only as to what they receive, but also as to where they are built.

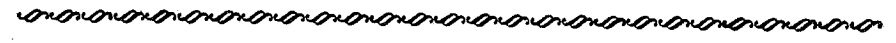
The Commission recommends that landfills of municipal or industrial waste be prohibited from the hydrogeologic zones I, II, and III as defined by the Long Island Comprehensive Waste Treatment Management Plan. All landfills presently operating within these zones should be properly vented, capped, and securely closed.

The Commission also recommends that all landfills outside zones I, II, or III which do not meet the highest standards of safety and construction be closed and that newer, environmentally secure landfills be built in their place. These will receive only those wastes that are the residues of such processes as incineration, resource recovery, or composting.



SECTION VI

PUBLIC EDUCATION



PUBLIC EDUCATION

The availability and the quality of water is easily taken for granted. Many Long Island residents have no awareness of where their clean water comes from and their used water goes to until a problem arises--a well is closed due to contamination, a cesspool collapses, household water takes on an unusual taste or odor--or one of many other problems with water supply, water quality or waste disposal comes to pass.

Problems force individuals to take note of the way water resources are used. But if awareness were developed early, problems might be avoided. Albeit unknowingly, the people of Long Island are, through their actions, endangering the groundwater supply. Individual area residents have the power to pollute, and, when informed and committed to action, also have the power to alleviate pollution problems. The fact that all Long Islanders live above their source of water is a simple yet crucial one; all Island residents should be aware of and responsive to that fact.

The Commission is engaged, on an ongoing basis, in efforts at increasing public awareness of the nature of Long Island's water resources and of the impact of individual action on water quality. Members of the Commission staff have met with and addressed community organizations such as Kiwanis International, St. Joseph's College, Lions Club International, the League of Women Voters, the Long Island Environmental Council, and several conferences.

Another format for the Commission's educational efforts has been a brochure introducing basic concepts regarding water resources and presenting ways individuals can help prevent water pollution and water shortages (see following pages). The brochure has been made available to the League of Women Voters, the Nassau Council of Girl Scouts and other organizations, as well as to Newsday.

Long Island's newspapers play a pivotal role in educating the public about a wide range of environmental issues. Over the past year, many Island publications have documented problems involving water quality and water supply. In an effort to provide basic information on Long Island's groundwater to Suffolk County residents, the Village Times of Setauket published a supplement on water. Commission staff provided assistance to the newspaper in preparing the supplement, and the Village Times provided the Commission with several hundred reprints of the supplement on water. Copies of the newspaper supplement were distributed by the Commission to community leaders

throughout Long Island. These included officers of civic associations and elected officials from the State to the village level.

Educational programs directed at homeowners and at local officials are important elements in efforts to curtail activities which are damaging to water resources. The best time for firmly establishing good environmental housekeeping practices, however, is when the habits of the "innocent polluter" are not yet developed. Accordingly, the Commission has been involved in the development of a water resources education program that will reach students from the primary grades through high school. It is hoped that this program will lay the foundation for the education of generations of Long Islanders who will understand, respect, and preserve the nature and value of their water supply.

WATER RESOURCES AND THE INNOCENT POLLUTER

Nassau and Suffolk Counties have only one source of drinking water--Long Island's groundwater. Because of the sandy, highly porous nature of Long Island's soil, rainwater and snowmelt percolate through the ground and into a natural underground water system, known as the aquifer system. It is from this system that all of our drinking water is drawn. It follows that any liquid or soluble material put on or into the ground might be carried with precipitation into the aquifer system, thereby contaminating our drinking water.

Our water supply is affected by all types of users. Long Island's agricultural and industrial communities, as well as its residents, draw on the aquifers, create water quality problems, and influence water quantity. Residential users are often "innocent polluters," sometimes causing groundwater contamination through use of common products which can damage the environment.

Changing habits in and around the home can make a difference.

- . Every time excess fertilizer is used, water quality is threatened by added nitrates.
- . Each time motor oil is drained onto driveways or streets, the oil gets into storm drains and from there into sumps which channel water back into our drinking supply.

Once it is in the ground, water is in constant motion, carrying soluble contaminants for significant distances. This means that pollution generated in one area of the Island can affect a wide area, so we need to understand that what each of us does can affect our neighbors.

Knowing where water comes from helps to illustrate the need to protect water resources, but it is not enough. We also need to know where water goes after it is used. People whose houses are connected to sewer systems must remember that water down the drain is water lost to the aquifer system. Those with cesspools do return used water to the groundwater system, but that water is not as pure as when it was removed.

Protecting water quality helps to prevent water shortages, because polluted water is water lost to us just as surely as if the wells had run dry. As more of our water supply becomes polluted and therefore dangerous to our environment and health, we are effectively reducing the limits of our clean water supply.

Of course, saving water means saving money as well. Water conservation means lower water bills. Protection and conservation of water helps to avoid water treatment plants, and transportation of water from distant sources. Saving water will save money now and in the future!

Water is a vital resource. It can no longer be taken for granted. The preservation and protection of our water means saving money, protecting the health and well-being of Long Island residents, and maintaining environmental quality. This can be done if we all commit ourselves to the simple measures listed below. If we join in both awareness and action, the result will be the protection and preservation of Long Island's water.

WHAT YOU CAN DO TO PREVENT WATER POLLUTION

DON'T...

* Use cesspool cleaners prohibited by law. Chemicals in these cleaners are damaging to the groundwater. 1 gallon of some of these cleaners can contaminate 22 million gallons of groundwater.

* Flush potential contaminants (e.g. turpentine, solvents, cleaning fluids) down the toilet.

* Over-fertilize lawns & shrubs
OR
Allow animal waste to go "unscopied"
(Both add nitrates to the groundwater)

* Use herbicides or pesticides unless absolutely necessary. These may contain synthetic organic compounds that can cause serious physical disorders.

* Drain used motor oil on the ground, into the street, or into storm drains. These chemicals will end up in our marine or groundwaters.

INSTEAD, TRY...

* Pumping out the sludge that accumulates in cesspools. Also, find out what chemicals are prohibited.

* Placing these contaminants in securely closed containers, putting them in the trash, and disposing along with solid waste.

* Fertilizing as little as possible. Cornell Cooperative Extension Service recommends.....

* Cleaning up after pets and disposing of pet wastes with other solid waste.

* Checking with the county health dept. to see if old herbicides or pesticides have ingredients now banned. IF SO, DON'T USE AT ALL! If not, use as little as possible, and never more than directed.

* Learn about natural techniques of weed and pest management, and consider giving up synthetic herbicides and pesticides.

* Funneling the oil into a container and bringing it to any service station. By law, service stations are required to accept used motor oil. (Oil can be reprocessed, so this will save oil as well as protecting water quality.)

DON'T...

* Allow faucets to drip. This wastes about 1 gal./hr.

* Use the dishwasher or washing machine unless full. These machines use 25-30 gallons of water per load.

* Run water for a long time while waiting for it to heat up.

* Water your lawn in the middle of the day. Much of this water will evaporate before it is absorbed by the ground.

* Run tap to get water cold enough to drink.

* Plant species of plants requiring frequent watering or intensive fertilizing.

Water saving appliances and devices can also help reduce usage. Many major appliances are now designed to minimize water usage. Smaller devices such as displacement bottles in toilet tanks, which reduce the amount of water used each time the toilet is flushed, shower flow restrictors and faucet aerators can save significant amounts of water at little cost and with little effort.

WHAT YOU CAN DO TO PREVENT WATER SHORTAGES

INSTEAD, TRY...

* Tightening the faucet after use, and putting on new washers.

* Making sure loads are sizable when machines are used (this saves energy as well.)

* Insulating hot water heater and pipes to keep water hot longer.

* Running your sprinkler (or system) in the early morning, late afternoon or at night. Also, water slowly to make absorption more efficient.

* Keeping a bottle (or two) of water in the refrigerator.

* Landscaping with plants native to your area and plants that are especially hardy, or leaving land in its natural condition.

Water saving appliances and devices can also help reduce usage. Many major appliances are now designed to minimize water usage. Smaller devices such as displacement bottles in toilet tanks, which reduce the amount of water used each time the toilet is flushed, shower flow restrictors and faucet aerators can save significant amounts of water at little cost and with little effort.

ENCOURAGEMENT OF PUBLIC EDUCATION PROJECTS
RELATING TO LONG ISLAND'S WATER RESOURCES

In the course of carrying out its legislative mandate, the New York State Legislative Commission on Water Resource Needs for Long Island has recognized that the public has a generally incomplete understanding of the basic principles governing Long Island's groundwater system. The Commission is convinced that the long-term viability of any legislative initiative to protect Long Island's water resources will be largely dependent upon the active support of an educated populace on Long Island. Whenever possible, the Legislative Commission staff has, therefore, encouraged local educators to develop a specialized curriculum for the school children of Long Island. They have urged that such a curriculum be designed to provide the future citizens of the region with a solid background in basic water-related principles and issues.

Two of the leading educational institutions of the Long Island area, the Museum of Long Island Natural Sciences of the Department of Earth and Space Sciences at the State University of New York, at Stony Brook; and the Bureau of Cooperative Educational Services (B.O.C.E.S.) responded to the Legislative Commission's initiative regarding the need for a water resources curriculum. Procuring the funding to support their respective projects is not yet assured, but it seems possible that the Museum of Long Island Natural Sciences at the State University of New York at Stony Brook may soon initiate a major fund raising initiative for this purpose through private corporations and foundation sources. The Legislative Commission has agreed to provide technical advise and critical manuscript review services. A short description of the Museum's design for the curriculum project, is presented below. With the continuing expansion of environmental education, the surge of a Long Island regional spirit, and the growing concern over the purity of groundwater, the implementation of a curriculum on Long Island's water resources similar to this one becomes both timely and necessary.

PROPOSAL FOR A CURRICULUM ON
LONG ISLAND'S WATER RESOURCES

The purpose of this project is to encourage the development and implementation of curriculum materials to educate children in grades K-12, teachers, and ultimately the general public about Long Island's water resources. School children and teachers will be the initial target audience. From programs developed for these groups, the Museum of Long Island

Natural Sciences will later offer programs for the general public.

Programs will be developed for grade levels as follows: K-2, 3-5, 6-8 and 9-12. A foundation curriculum will be developed for each of the suggested grade groupings, portions which can be adapted for use by the suggested grade groupings, portions which can be adapted for use by the teacher in each grade level. Specific topics will be recommended for emphasis at each grade level at the elementary school level. The high school portion of the curriculum will be adapted for use in Earth Science and Long Island specific mini-courses.

For each grade level, curriculum materials will fall into four categories: classroom introduction, activities and experiments, field trips, and follow-up discussion. Sample posters, worksheets, pamphlets, site directions (where appropriate) and bibliographies will be included with each program packet. Suggestions for use of curriculum materials by Gifted and Talented and Special Education classes will be incorporated into the overall package.

In order to facilitate the introduction of a Water Resources program into the classroom, the Museum will undertake a study of state-mandated science and social studies curricula. Every effort will then be made to integrate a Water Resources Program into existing curriculum. For example, the third grade science curriculum includes pond study and the fourth grade social studies curriculum emphasizes local history. A study on local water resources, incorporated into both these areas, would enable teachers to integrate curriculum materials into existing curriculum requirements.

Sample curriculum topic headings are as follows:

Grades K-2: A Sample Introduction to Water

How do we use water?
How and why is water important to us?
Where does our water come from?
Introduction to the water cycle
How do soils differ?
What happens when you pollute?

Grades 3-5: Ponds and Rivers on Long Island

Biological and Physical Aspects
Introduction to the Geology of Long Island
Where are our local ponds, etc?
What's happening to them?
How did water affect the lives of the Indians?
Using maps to study Long Island terrain

Grades 6-8: Long Island's Aquifer

Historical Perspectives
 Chemicals in Soil and Water
 Long Island Geology: Reservoirs and Aquifers
 Critical Watershed Areas
 Current Problems, i.e., contamination

Grades 9-12: Natural Inventory Planning

In-depth on Pine Barrens and Geology as related to water
 Comparison of aquifers and ponds on Long Island
 History of groundwater problems on Long Island
 Sewage and saltwater intrusion
 Case Studies

In addition to the basic curriculum guides, a series of slide-tape programs will be developed so as to serve to enhance both the teacher's and student's understanding of the subject.

To introduce this curriculum to teachers on Long Island, a series of In-Service workshops will be held at a variety of locations in Nassau and Suffolk Counties. Four separate workshops will be planned, each directed to the specific grade groupings described above. These workshops will be presented on a regular basis throughout the second year of this two-year long project.

Workshops will consist of an introductory presentation, a discussion of curriculum objectives, sessions on activities and experiments, and field trips to specific sites.

Through a series of pre-scheduled meetings, school administrators will be informed of the availability of the curriculum. Workshops will be offered at no cost to participants. The Museum will recommend appropriate academic equivalency credit for all workshop participants.

In addition, curriculum materials will be distributed to all public and private schools in Nassau and Suffolk Counties:

<u>TYPE OF SCHOOL</u>	<u>NASSAU</u>	<u>SUFFOLK</u>	<u>BOTH</u>
Elementary	209	261	470
Junior High	80	67	147
Senior High	56	61	117
TOTALS	<u>345</u>	<u>389</u>	<u>734</u>

In each county there are over 200,000 children registered in public schools. To reach this vast audience of future voting citizenry, four curriculum packets should be incorporated into the libraries of each elementary school and two in each junior high school.

SECTION VII

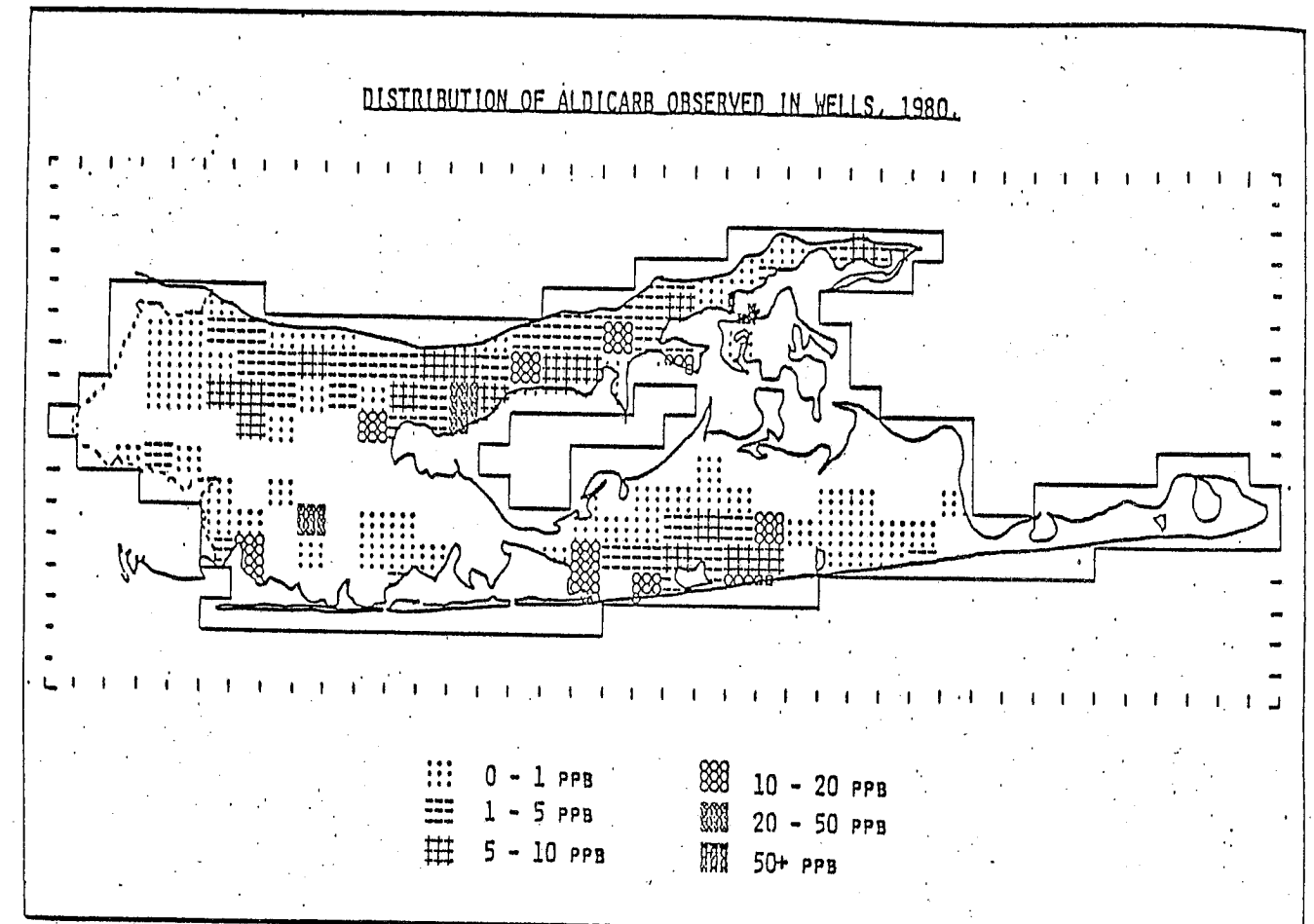
WATER CONTAMINATION AND SUPPLY PROBLEMS

water. This study will be used to design a monitoring system and determine locations of Aldicarb-free water.

Suffolk County has also embarked on The North Fork Study to develop a plan for alternate water supplies for the residents of Riverhead and Southold Towns. The need for this study has been heightened by results of a Cornell University Center For Environmental Research Study entitled, "Monitoring for Groundwater Management: Basic Issues and Questions."

In late 1979, extensive contamination of groundwater in eastern Suffolk County was confirmed by groundwater monitoring. It was subsequently found that apart from possible biodegradation of the chemical in the soil-groundwater system, the major factor governing Aldicarb's distribution is transit time through the soil to the water table. Accordingly, the monitoring strategy to be adopted should explicitly consider cause and effect relationships as determined by transit times, pathways of migration and process of attenuation. (See figures 1, 2, 3). "Status Report on Aldicarb Contamination of Groundwater" as of September 1981, cites other needs for The North Fork Study. The North Fork Study was initiated as a response to Aldicarb test results, saltwater problems, and nitrate contamination from fertilizers. It will look at the feasibility of other alternatives such as: extension of public water to the area, brackish water treatment, treatment at the well head, creation of small water districts, creation of private well treatment districts, and other appropriate solutions. Methods of implementing, financing, and institutionalizing the alternatives will also be covered. The study, to be conducted by ERM Northeast, will begin in early 1982, and is expected to take about nine months to complete.

FIGURE 1



Courtesy of:
Cornell University Center for Environmental Research

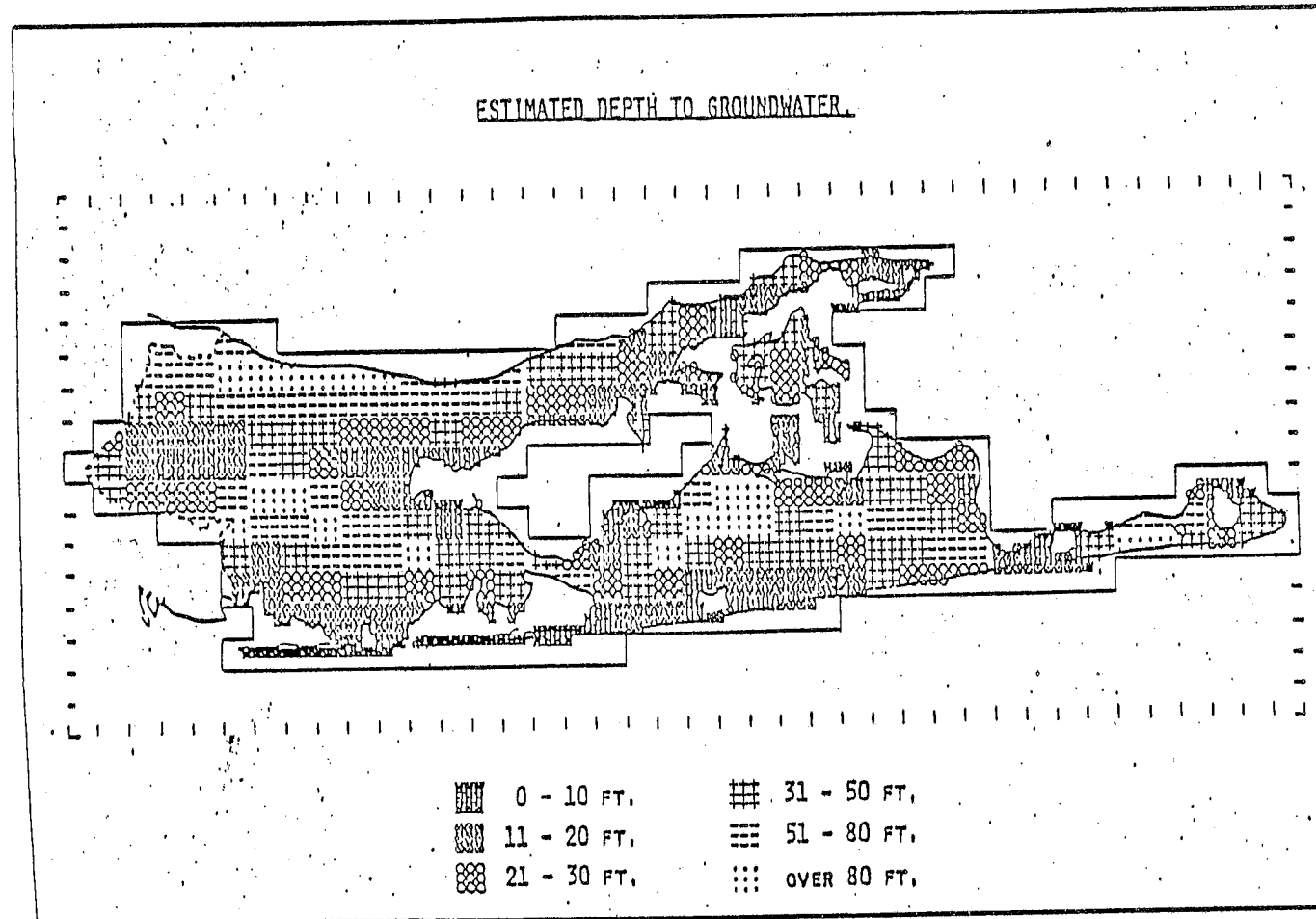
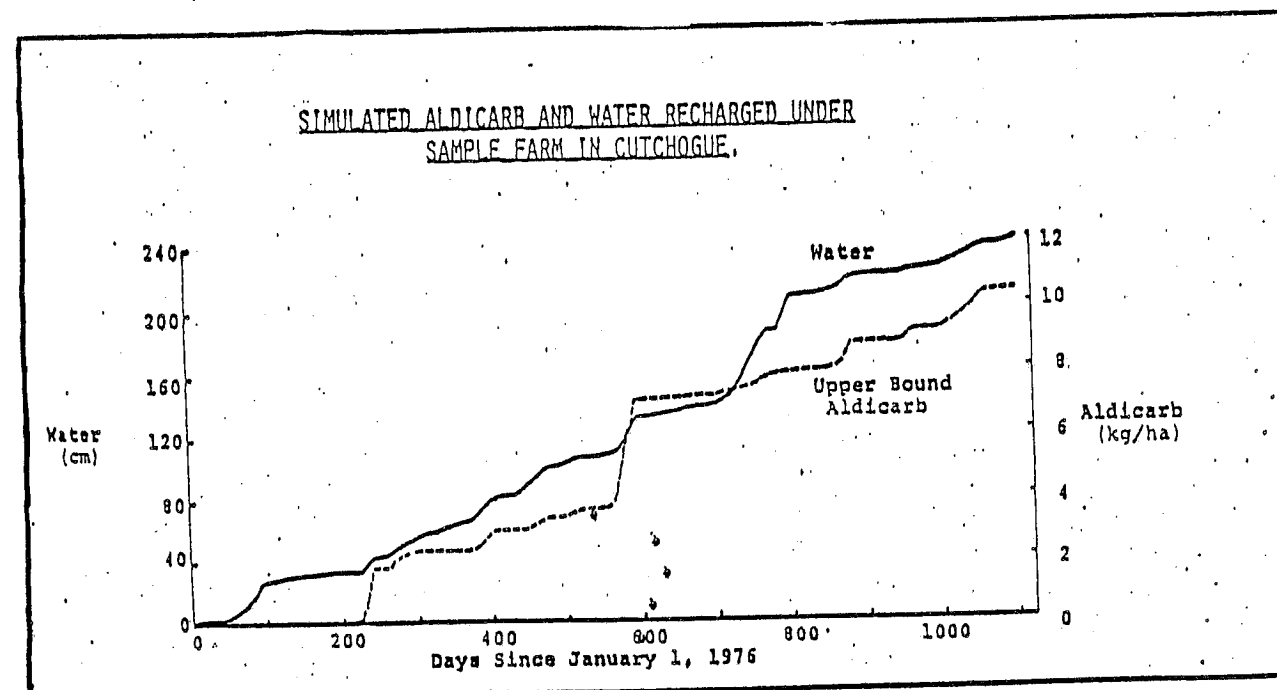


FIGURE 3



Courtesy of:
Cornell University Center for Environmental Research

CROSS CONNECTION CONTROL PROGRAM

Water Supply on Long Island

The degradation of groundwater quality and the overdrafting that affects groundwater quantity are dramatic issues that receive great attention in discussions about Long Island's water problems. However, they are only part of the story, and should not overshadow the importance of the manner in which water is treated, protected, and distributed by water suppliers. Among the many features that makes Long Island's water story unusual is the large number of suppliers who provide water to the Island's 3 million residents, all of whom are dependent on one groundwater reservoir. Nassau County has 51 different water suppliers while Suffolk County has over one hundred. Such a system, with so many suppliers serving so many people, all relying on one source of water, exists nowhere else in the Country.

The process of maintaining a product of uniform quality under such circumstances is complex, time consuming, and expensive. Efforts by water suppliers to protect the resource are regulated partially by the Department of Environmental Conservation and partially by the State and County Departments of Health. Standards for water delivery practices are set in the State Sanitary Code. Because of the large number of water purveyors on Long Island, most enforcement has relied on self-monitoring and reporting by the water supply community to meet State and local requirements.

CROSS-CONNECTION CONTROLS

One technique for the protection of water in public water systems is the use of cross-connection controls, which protect against the backsiphoning * of contaminated or polluted water from a plumbing fixture or other customer source(s) into a public water supply system main. Conditions under which backsiphoning can occur are not common, but are of major concern since the backsiphoning of contaminated water can result in a serious public health problem.

Recognizing that the public must be protected from this type of hazard, in 1977 the NYS Public Health Council amended Part 5 of the Sanitary Code to include, among other items, a section (5-1.31) on cross-connection controls, devices installed in water supply lines to prevent backsiphoning. This section stipulates that water suppliers are responsible for determining which of their customer facilities constitute significant hazards to the public supply system by the nature of their operations and by the materials they use or produce. The water supplier is

* backsiphoning: the reverse flow of water from a customer's water line into the main water distribution system.

further required to protect the system by installing (or having the customer install) acceptable cross-connection control devices to protect against backsiphoning. Additionally, Section 5-1.31 enjoins water suppliers to:

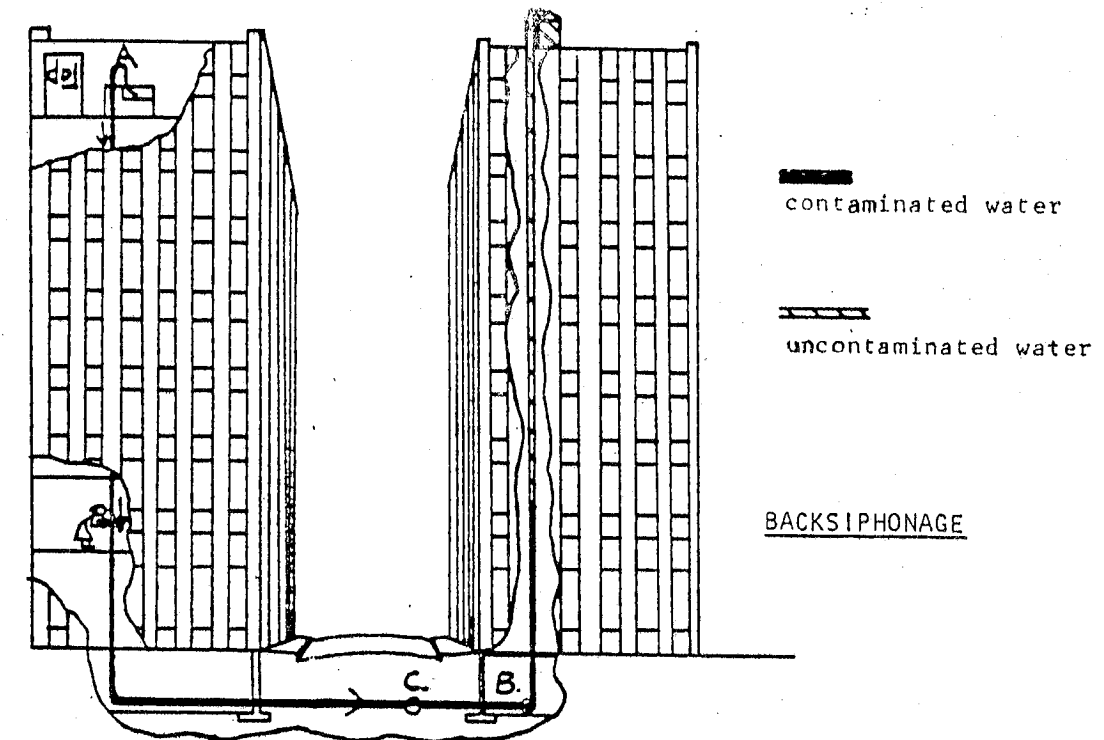
- a) obtain approval from the Health Department on all device installations;
- b) assure annual inspection and testing of all devices; and
- c) maintain appropriate records of all inspections and tests of all devices.

To help water suppliers to better understand their obligations to the 1977 Code amendments, NYS Department of Health published a Cross-Connection Control Guide in January, 1981. The guide details managerial concepts, responsibilities, technical considerations, installation procedures, acceptable and unacceptable control devices, plans and specifications for approved devices, testing and maintenance procedures, and references for the cross-connection control program. Neither the 1981 State Guide nor the 1981 amendments to the Sanitary Code make any significant changes to the 1977 cross-connection control regulations, they merely amplify and clarify the regulations and set standards for operators and testers. The following policy considerations are clearly stated in the State Guide:

- a) hazardous cross-connections must be promptly eliminated;
- b) cross-connection control is the responsibility of the supplier and of the customer;
- c) an acceptable backflow prevention device must be installed in every service line to a facility where a potential hazard exists; and
- d) the degree of protection shall be commensurate with the degree of hazard whether immediate or potential.

Potentially hazardous facilities include hospitals, clinics, laboratories, mortuaries, food processing plants, sewage treatment plants and pumping stations, petroleum product processors, chemical processors, laundries, dry cleaners, exterminators, and buildings that use chemical conditioners in their boilers or cooling systems or internal firefighting systems. These types of facilities present hazards because they use or produce potential contaminants. Backsiphoning leading to a health hazard can occur where pressure differentials cause the introduction of water from inside a customer's facility into main water distribution lines. (See figure 1) In this way, contaminated water could then be distributed to other customer facilities served by those water mains.

Figure 4



Example: A hose is submerged in a laboratory sink at A. Both buildings are connected to the same public water supply system, C. This main often lacks adequate pressure. The building on the right has installed a booster pump in the basement at B, in order to alleviate low pressures. The booster pump could deplete the water in main C, thereby subjecting the customer's water system to a pressure less than atmospheric thus causing a reversal of flow from the laboratory in the opposite building.

Reprinted from Cross-Connection Control Manual, New York State Department of Health, January, 1981.

The January, 1981 guide includes an implementation timetable that details the steps to be taken by suppliers in each of three successive years to bring their systems into full conformity with the cross-connection control regulations. There is little evidence to date that all suppliers are following this timetable. On August 11, 1980, the Nassau County Department of Health requested information from all county water suppliers on the extent of their present and proposed compliance with Section 5-1.31 of the Sanitary Code. Details were requested on the following:

- a) all protective devices existing in each system;
- b) all locations that need, but lack, devices, and plans for device installation;
- c) plans for inspecting and testing of devices annually, if inspection and testing is not already underway (NYS Department of Health expects to publish an approved tester certification program and curriculum this Spring);
- d) plans for obtaining approval for all new devices;
- e) plans for periodic inspection of nonresidential customers to determine whether future protective devices need to be installed; and
- f) cross-connection control rules and regulation incorporation into the general regulations of the water systems.

To date, the Nassau County Department of Health has not received full and adequate responses to its survey. The results, therefore, are not yet available.

Violations of Cross-Connection Control Regulations

Documentation exists in the case of at least one water supplier in Suffolk (Dix Hills) and one in Nassau (Citizens of Great Neck) that indicates long term non-compliance with Section 5-1.31 of the Code. In the Dix Hills case, the supplier, in making application to the Suffolk County Department of Health Services for chlorination waiver it has received since 1973, has stipulated annually that the system is in full compliance with all cross-connection control regulations. However, a letter from a former water company employee to the State Attorney General indicates detailed and widespread violations of the Sanitary Code. An exchange of correspondence between the Attorney General's office and NYS Department of Health has initiated an investigation of the situation.

In the case of Citizen's Water Supply Company, the privately owned supplier has, since 1979, corresponded with the Nassau

Health Department and received requests from the Department regarding information on the company's cross-connection control program. The records furnished in response to Health Department requests do not seem to support the company's contention that inspections and tests have been made on a yearly basis. As recently as January, 1982, the Nassau Health Department again requested that the water supplier correct all violations.

In general, the State's cross-connection control program has been slow to be implemented and enforced. It is hoped that this situation will improve following the publication of an approved certification program for control device testers which is due soon from the State Department of Health. Additionally, Nassau and Suffolk Counties are planning a seminar for water suppliers on cross-connection controls within the next few months. Growing public attention to the need for an active program has also helped to end the confusion and spotty compliance with this Sanitary Code requirement.



SECTION VIII

EXECUTIVE SUMMARY:
JOINT HEARING ON THE STATE'S
ORGANIZATION TO DEAL WITH WATER RESOURCES



EXECUTIVE SUMMARY OF JOINT PUBLIC HEARING

On January 11, 1982, the New York State Legislative Commission on Water Resource Needs of Long Island, in conjunction with the New York State Legislative Commission on Economy and Efficiency in Government, sponsored a hearing to solicit testimony regarding the suitability of the present organization of the New York State Government to deal with the protection, management, utilization, and transportation of water resources; to examine the present roles of various governmental and extra-governmental entities in these matters; and to consider ways of increasing efficiency and cost effectiveness in the State's management and protection of water resources.

Below is a summary of testimony received at the joint hearing.

State Senator Caesar Trunzo and Assemblywoman May Newburger, co-chairpersons of the New York State Legislative Commission on Water Resource Needs of Long Island, made introductory remarks at the hearing. Senator Trunzo noted that "the topic of the hearing is extremely important, for with the exception of air, water is the most essential commodity we use. Therefore if, through more sound organizational design, we can better attack problems of infrastructure deterioration, groundwater contamination, and water resource management, then we have a distinct advantage at solving them. The Senator added "if we cannot however, then we and our children will bear the brunt of our ineffectiveness."

Assemblywoman May Newburger highlighted in her testimony the need for reorganization to achieve regional management of water resources. The Assemblywoman noted with favor that the proposed State Water Finance Authority addresses that need, which is especially acute on Long Island. "In the absence of a regional policy that guides prudent water utilization based on the specific qualities of the Long Island aquifer system or that promotes conservation and aquifer protection," Newburger explained, "water suppliers are left to manage and solve their water problems within the boundaries of their individual water districts. Such a system does not effectively manage the aquifer in the best interest of all its parts. Furthermore, our balkanized system makes it much harder to focus and implement the necessary protective measures that can prevent further deterioration of water quality."

Assemblyman Maurice Hinchey stressed in his testimony his belief that the present State administrative framework is somewhat inadequate in resolving problems in the field of water resource management. He believes that due to overlapping and fragmentary jurisdictions, many confusing and contradictory regulations have been developed, and that "the effects of one agency often tend to cancel out the efforts of

another." In addition, the Assemblyman mentioned the existence of unintended gaps between state agencies that hamper their effectiveness.

The main focus of Assemblyman Hinchey's testimony was the importance of developing programs that are preventive rather than remedial in nature. As an example, he cited the need for categorizing groundwater watersheds and prioritizing their relative importance within the context of a clean land program for New York State. Such a program might follow the model of the proposed Schenectady County program, or the statewide approach that has been implemented in Connecticut. (Both of these programs are described elsewhere in this Report).

Testifying for the Public Service Commission, Robert Mulligan detailed the various responsibilities of the Public Service Commission concerning water resource utilization, and its interaction with other state agencies. Mr. Mulligan, Director of the Public Service Commission's Water Division, explained the proposed State Water Finance Authority, which the Public Service Commission supports, and described how the Authority will be able to reverse the declining condition of New York State's water distribution and collection systems. Mr. Mulligan believes the current regulatory scheme for the management of water is adequate, and sees no need for any major changes or additions. Addressing the question of jurisdiction of state agencies, he said that "each of the three major agencies has significant expertise in the area of its responsibilities and it would be extremely difficult to duplicate that expertise within one state agency."

Dr. Leo Hetling of the State Department of Health also testified as to the suitability of the present state organization to manage water resources, explaining that "we tend to meet any new situation by reorganizing, and a wonderful method it can be for creating the illusion of progress, while producing confusion, inefficiency, and demoralization". Dr. Hetling noted that the problems most often faced are not organizational, but rather are related to lack of foresight, policy, direction, leadership, and/or resources. The interaction of the Department of Health with local levels of government utilizing city and county health departments was described by Dr. Hetling as being perhaps greater than any other state agency's degree of interaction in carrying out many of the day-to-day activities of regulating and monitoring water supplies.

With respect to water resource planning, Dr. Hetling indicated a need for statewide planning (e.g. drought management), but noted that because the State varies greatly from region to region in terms of its geological, hydrological, and demographic characteristics, local and regional management efforts are appropriate and necessary as well.

Department of Environmental Conservation Commissioner Robert F. Flacke spoke at the hearing and described the responsibilities of the Department of Environmental Conservation and how it

relates to other state agencies. Commissioner Flacke voiced his support for some expansion of the agency's involvement in water resource issues, as well as for the development of new programs.

The Commissioner's testimony emphasized the need for three new water programs. They are the proposed State Water Finance Authority; a system for water allocation; and the Water Resources Management Program to be jointly administered by the Department of Environmental Conservation and the Department of Health. The Authority would assist in financing the construction and improvement of sewer and water facilities. The water allocation system would provide the basis for more effective utilization of our water resources, and would have four components. First, it would provide for a determination of the availability of water; second, it would assure and allocate water within the existing constraints; third, it would provide for contingency plans to mitigate losses when a severe drought occurs; lastly, it would determine methods of increasing supply and decreasing demands. The Water Resources Management Program is designed to address the following major water resource management needs in the state: urban water supply systems; infrastructure problems; water conservation; groundwater management needs; and water supply shortages. In his closing remarks the Commissioner expressed his belief that the state's organizational framework is adequate and that with the initiation of the programs outlined above, the Department of Environmental Conservation's coverage and responsibility in the water resource management field will be thorough and effective.

After reviewing the testimony received at the joint hearing of January 11, 1982, the New York State Legislative Commission on Water Resource Needs of Long Island puts forth the following findings and recommendations:

The proposed State Water Finance Authority-- The Commission finds: 1) that water collection and distribution systems in New York State are becoming obsolescent and in need of repair; 2) that the proposed Authority would provide an essential funding mechanism to aid communities whose infrastructure is in need of renovation, while enabling localities to avoid the debt structuring limitation of Article 8, Section 2 of the State Constitution; and 3) that the Authority could additionally assure steps toward regional planning and management of the State's water resources. The Commission recommends the establishment of a State Water Finance Authority which will provide a system for regional planning, protection, and management of the state's water resources and facilitate needed infrastructural improvements and renovations.

The State's Administrative Framework-- The Commission finds: 1) that legislative mandates have directed several State agencies to deal with water resource issues, yet there is evidence of overlapping jurisdictions and of areas addressed by no State agency or body; and 2) that with the implementation of newly developed programs being established by the Department of Environmental Conservation it is hoped that the State will make significant progress in the area of long-range water resource planning. The Commission recommends that the New York State Department of Environmental Conservation and the Department of Health receive the budgetary and professional resources required for the implementation of projects and achievement of goals, and that there be an increased effort at communication and coordination amongst all State entities involved in water resource planning and management.

Informational Needs-- The Commission finds: 1) that a retrievable data system established on a regional or statewide basis would greatly facilitate planning efforts, reduce the amount of time needed for implementation of programs stemming from this common data base, and would make existing programs more efficient and consistent; and 2) that such a system would ideally enable regional systems to be linked within a statewide network. The Commission recommends the implementation of a common retrievable data system for all involved governmental and non-governmental water resource management, protection, and utilization entities.

Establishment of a Critical Groundwater Watershed Acquisition Program-- The Commission finds: 1) that much of New York State's groundwater resources are being irrevocably contaminated due to a variety of land use activities on the land surface; and 2) that such contamination may persist in the groundwater reservoir for tens or hundreds of years; and 3) that acquisition and preservation of important groundwater watersheds areas is the most cost effective way of insuring clean, potable water for future consumption. The Commission recommends the establishment of a program to catalog, prioritize, acquire, and manage critical groundwater watershed areas in New York State.

The Commission would like to thank all those who attended the hearing and submitted testimony, and those who mailed in written comments. The Commission gratefully acknowledges the assistance and cooperation of the Commission on Economy and Efficiency in Government.

SECTION IX

DRAFT LEGISLATION

INTRODUCTION TO LANDFILL LEGISLATION

Concomitant with the increase in understanding of the vulnerability of Long Island's groundwater reservoir to contamination has been a comprehensive identification of activities that have caused groundwater degradation.

The numerous sanitary landfills on Long Island present a serious threat to groundwater quality. The leachate plumes generated from many landfill facilities are derived from a combination of the various materials and chemicals of which household refuse is comprised--pesticides, waste motor oil, plastics, solvents, degreasers--and the products of their degradation. Since all these materials, along with countless others, are dumped at common sites, the leachate generated is a concentrated collection of toxic substances.

Recognition of regional variations in hydrogeology is essential in the siting of waste disposal facilities. The Federally funded Long Island Comprehensive Waste Treatment Management Plan, the "208 Study" of 1978, delineates eight distinct hydrogeologic zones on Long Island. Zones I, II, and III are characterized as deep flow recharge areas--regions where rainwater and snowmelt move vertically into the deeper aquifers. These crucially important zones are found in the middle of the Island. The recharge that occurs at the deep flow recharge areas replenishes the deepest parts of the aquifer, precisely the same segments that are the primary drinking water sources for most Long Islanders. The five other zones, known as shallow flow systems, are areas near the coast where groundwater moves horizontally, discharging into the many bays and harbors that fringe Long Island.

In recognition of the toxic nature of landfill leachate and the hydrological and water supply importance of the deep flow recharge areas, the Commission on Water Resource Needs of Long Island has drafted legislation to prevent the siting of any new landfills in Hydrogeologic Zones I, II, and III. Furthermore, all landfills in Zone III will be required to be closed once they reach capacity as described in their current operating permits; and all landfills outside of the deep flow recharge areas that do not or cannot conform with the provisions in the bill must be phased out. In their place will be landfills which conform to additional construction, operational, and disposal requirements as outlined in the legislation.

In response to comments received on the draft legislation, the Commission has amended the bill to address the disposal of untreated refuse due to scheduled or unscheduled downtime of resource recovery plants or incinerators. The details of this provision can be found in the legislation.

STATE OF NEW YORK

S. 5786--B

A. 8311--B

1981-1982 Regular Sessions

SENATE--ASSEMBLY

April 28, 1981

IN SENATE—Introduced by Sens. TRUNZO, BERMAN, DUNNE, LACK, LAVALLE, LEVY—read twice and ordered printed, and when printed to be committed to the Committee on Conservation and Recreation—committee discharged, bill amended, ordered reprinted as amended and recommitted to said committee—recommitted to Committee on Conservation and Recreation in accordance with Senate Rule 6, sec. 8—committee discharged, bill amended, ordered reprinted as amended and recommitted to said committee

IN ASSEMBLY—Introduced by M. of A. NEWBURGER, YEVOLI, HINCHEY, PILLIT-TERE, GRANNIS—Multi-Sponsored by—M. of A. BIANCHI, BRANCA, ENGEL, FELDMAN, FINNERAN, HARENBERG, HEVESI, HOCHBRUECKNER, JACOBS, KOPPELL, MURTAUGH, ORAZIO, REILLY, SEMINERIO, SIEGEL—read once and referred to the Committee on Environmental Conservation—reported and referred to the Committee on Rules—Rules Committee discharged, bill amended, ordered reprinted as amended and recommitted to the Committee on Rules—recommitted to the Committee on Environmental Conservation in accordance with Assembly Rule 3, sec. 2—committee discharged, bill amended, ordered reprinted as amended and recommitted to said committee

AN ACT to amend the environmental conservation law, in relation to land burial and disposal of solid waste in the counties of Nassau and Suffolk

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

1 Section 1. Legislative findings. The legislature hereby finds that the
2 land burial and disposal of domestic, municipal and industrial solid
3 waste poses a significant threat to the quality of groundwater and
4 therefore the quality of drinking water in the counties of Nassau and
5 Suffolk which are solely dependent on groundwater for all the water sup-

EXPLANATION—Matter in *italics* (underscored) is new; matter in brackets
[] is old law to be omitted.

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1 ply needs of the two counties. Scientific evidence and analysis has
2 identified the incapacity of land burial and disposal to isolate leach-
3 ing chemicals and gases from the surrounding environment over the long
4 term. In order to prevent the pollution of such water resources in these
5 geographical areas, it is necessary to control the siting of landfill
6 operations in certain areas in Nassau and Suffolk counties. Such control
7 will remove the potential for deep infiltration of contamination into
8 the deepest portions of the aquifer system within this area.

9 § 2. The environmental conservation law is amended by adding a new
10 section 27-0704 to read as follows:

11 § 27-0704. Land burial and disposal in the counties of Nassau and Suf-
12 folk; special provisions.

13 1. As used in this section, a "deep flow recharge area" shall mean
14 sensitive recharge areas within the counties of Nassau and Suffolk
15 within the boundaries of hydrogeologic zones I, II and III as defined in
16 the Long Island Comprehensive Waste Treatment Management Plan prepared
17 by the Long Island Regional Planning Commission as called for under sec-
18 tion two hundred eight of the Federal Water Pollution Control Act, such
19 boundaries hereby adopted as part of this section. Such plan shall be
20 kept on file in the office of the commissioner. The commissioner may
21 amend such boundaries upon the finding of new information or change in
22 circumstances.

23 2. On or after the effective date of this section, no person shall
24 commence operation, including site preparation, of a new solid waste
25 management facility which includes land burial and disposal which is
26 located in a deep flow recharge area.

27 3. All landfill operations presently permitted within deep flow
28 recharge areas shall be closed when they meet the limits of their pre-
29 sent field plans as granted under their current operating permits. No
30 such landfills shall be expanded or extended. Such landfills shall be
31 safely and securely closed in such a manner as to minimize the penetra-
32 tion of precipitation into the landfill and the leaching of fluids from
33 the landfill and shall be restored to a natural condition that is compa-
34 tible with and enhancing to the surrounding landscape.

35 4. On or after the effective date of this section, no person shall
36 commence operation, including site preparation, of a new solid waste
37 management facility which includes land burial and disposal which is
38 located in the counties of Nassau and Suffolk outside of deep flow
39 recharge areas unless:

40 a. The commissioner has made an affirmative determination that such
41 facility will not pose a threat to groundwater quality; and

42 b. The owner or operator of such facility shall post a bond securing
43 the cost of treatment compensation, or the development of alternative
44 water sources should such facility become a source of groundwater, sur-
45 face water, or air pollution. The size of the bond, the financial sta-
46 bility of the bonding company, and the terms of posting shall be deter-
47 mined by the commissioner. Financial surety in the form of a bond shall
48 also be arranged to ensure the proper operation and maintenance of
49 leachate and other collection and treatment systems after a landfill is
50 closed for a period of time to be determined by the commissioner; and

51 c. The facility is underlain and enclosed by at least two feet of a
52 continuous layer of clay with a hydraulic conductivity not to exceed 10
53 to the minus 7 centimeters per second; and

54 d. The facility is designed and operated to minimize the production of
55 methane gas, or other gases which could pose a danger or nuisance and to

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1 minimize the introduction of such gases into groundwater, surface waters
 2 or the air; and
 3 e. The facility is prohibited from accepting industrial, commercial,
 4 or institutional solid or liquid waste that is either toxic or hazardous
 5 in nature as defined pursuant to section 27-0903 of this article; and
 6 f. The facility is prohibited from accepting waste which is not resi-
 7 due resulting from incineration, resource recovery, or composting; and
 8 g. The facility is not located in a freshwater wetland, tidal wetland,
 9 or floodplain as identified by the department.
 10 5. The commissioner shall provide for the phasing out within seven
 11 years of each existing landfill in the counties of Nassau and Suffolk
 12 outside of deep flow recharge areas unless:
 13 a. The owner or operator posts a bond securing the cost of treatment
 14 compensation, or the development of alternative water sources should the
 15 landfill become a source of groundwater, surface water, or air
 16 pollution. The size of the bond, the financial stability of the bonding
 17 company, and the terms of posting shall be determined by the
 18 commissioner. Financial surety in the form of a bond shall also be ar-
 19 ranged to ensure the proper operation and maintenance of leachate and
 20 other collection and treatment systems after a landfill is closed for a
 21 period of time to be determined by the commissioner; and
 22 b. The landfill is underlain and enclosed by at least two feet of a
 23 continuous layer of clay with a hydraulic conductivity not to exceed 10
 24 to the minus 7 centimeters per second; and
 25 c. The landfill is designed and operated to minimize the production of
 26 methane gas, or other gases which could pose a danger or nuisance and to
 27 minimize the introduction of such gases into groundwater, surface waters
 28 or the air; and
 29 d. The landfill does not accept industrial, commercial, or institu-
 30 tional solid or liquid waste that is either toxic or hazardous in nature
 31 as defined pursuant to section 27-0903 of this article; and
 32 e. The landfill does not accept waste which is not residue resulting
 33 from incineration, resource recovery, or composting; and
 34 f. The landfill is not located in a freshwater wetland, tidal wetland,
 35 or floodplain as identified by the department.
 36 6. Notwithstanding the other provisions of this section, the commis-
 37 sioner may allow, by permit, the disposal of clean fill material in the
 38 counties of Nassau and Suffolk. Clean fill shall consist of concrete,
 39 steel, wood, sand, dirt, soil, glass or other appropriate material which
 40 is inert. Such material shall not be contaminated with hazardous wastes
 41 as defined under any provision of this article.
 42 § 3. This act shall take effect on the thirtieth day next succeeding
 43 the date on which it shall have become a law.

Amended to add §4h

h. The facility is required to designate a special area within the
 lined site to receive by-pass waste which hereafter will be
 defined as solid waste which is not treated by incineration,
 resource recovery, or composting and which is generated during
 a scheduled or unscheduled down time of the treatment facility.
 The special disposal area will be located and constructed so as
 to segregate by-pass waste and minimize its effect on residents
 of the surrounding areas. By-pass waste may only be deposited
 in the special area and the amount of the by-pass waste to be
 deposited may not exceed five days of the rated volume capacity
 of the facility within any ninety day period, during the life of
 the facility.

INTRODUCTION TO SOLE SOURCE PROTECTION BILL

The Sole Source Aquifer Protection bill reprinted below is the companion legislation to section 1426, an amendment to the Federal Safe Drinking Water Act which expands the sole source aquifer program established under the Act. The Federal bill will broaden the jurisdiction of the sole source program to provide for the planning for and management of special protection areas within designated sole source areas. The amendment, which was drafted by Commission staff with the help of experts in the field of water resources, has been introduced in both the Senate and the House and will be considered at hearings late in March, 1982.

The draft legislation reprinted below, in conjunction with the Federal bill, will establish a program for the management and protection of critical watersheds within designated sole source areas. For areas such as the Pine Barrens of Suffolk County and the critical watersheds in northern Nassau, the program may well provide an ideal opportunity for efforts to preserve environmental quality within the context of a comprehensive management plan which will consider economic growth and development as well as the protection of natural resources.

SOLE SOURCE AQUIFER PROTECTION BILL

- a. Statement of Policy: The State of New York, in recognition of the significant role groundwater plays as a primary drinking water source for over 6 million state residents, should provide funds for the preparation and implementation of groundwater watershed protection plans, to maintain existing water quality in critical groundwater recharge watershed areas within federally designated Sole Source Aquifer areas.
- b. Findings: The Legislature finds that:
1. the scientific evidence of groundwater contamination is mounting;
 2. such contamination, once it occurs, is often irreversible;
 3. within any area subject to sole source aquifer designation, some recharge watershed areas, hereinafter referred to as special protection areas, are particularly critical for the maintenance of large volumes of high quality groundwater for long periods of time, because of their particular rates of recharge and hydrogeological conditions;
 4. in the face of mounting cases of groundwater contamination by toxic organic compounds, nutrients, salts and other pollutants, the state needs a program for designating and protecting critical groundwater recharge watershed areas;
 5. it is desirable to maintain natural vegetative and hydrogeologic conditions for their role in critical groundwater recharge watershed areas;
 6. prevention of the contamination of high quality groundwater and the protection of critical recharge watershed areas costs substantially less than measures to mitigate harm following contamination; and
 7. there is a demonstrated need to protect, preserve and enhance the land and water resources of special protection areas through a new program

which combines the capabilities and resources of the local, State and Federal governments and the private sector.

- c. Purposes. The purposes of this Act are:
1. to establish procedures for the designation of special protection area(s) within designated sole source areas;
 2. to acknowledge the variations in hydrogeology, water quality, and land uses within designated areas, and the existence of certain areas which are of critical importance in maintaining water quality in the designated sole source area;
 3. to assure that such critical areas within designated sole source areas are protected and managed in such a way as to maintain or improve existing water quality;
 4. to establish procedures for the development and implementation of a site-specific comprehensive management plan for each designated special protection area; and
 5. to establish guidelines for federal-state cooperation in the planning, funding and implementation required to carry out the purposes of this act, as follows:
- d. Petition for Delineation of Special Protection Area.
1. Any local unit of government or any person may petition the Governor to designate a special protection area within a Federally designated sole source aquifer as defined in Public Law 95-190.
 2. The petition shall propose boundaries for said area, and further shall address the following criteria;
 - (A) whether the special protection area is a recharge zone for significant volumes of groundwater with water supply potential;
 - (B) whether the special protection area is largely undeveloped with large contiguous

tracts of natural vegetation, or natural geological conditions;

- (C) whether the groundwater which is recharged through the special protection area is of high quality;
- (D) whether the hydrogeologic conditions are such that development could lead to degradation of water quality;
- (E) whether portions of the groundwater within the sole source area are already contaminated with toxic organics, nutrients, salts or other pollutants so as to warrant special protection for areas which recharge high quality groundwater;
- (F) whether maintenance of existing high quality in the groundwater recharged through the special protection area would have significant economic, social and ecological, recreational and/or aesthetic benefits for the sole source area; and
- (G) whether, on the other hand, degradation of such groundwater would have significant economic, social, ecological, recreational and aesthetic costs for the area.

e. Governor's Approval.

1. Within 180 days upon receipt of such petition, the Governor shall evaluate the petition, consider the criteria set out in subsection (d)(2), and pursuant to such criteria, may approve or disapprove the petition. Such approval shall:
 - (A) establish the boundaries of the special protection area;
 - (B) designate or establish a planning entity to develop a comprehensive management plan, hereafter to be known as the Plan, for the area with adequate representation by local units of government to assure their participation in the planning process;

- (C) establish one or more advisory committees, including representation from state and local units of government, and citizens' groups, hold hearings, issue a draft plan and take other appropriate steps to assure and encourage public participation; and
 - (D) establish procedures for review, approval and adoption of the management plan and offer assistance to local units of government and other pertinent governmental agencies with legal responsibilities for implementation of said plan.
2. If the Governor disapproves the petition, he/she must notify the petitioner in writing within 30 days of the disapproval, the reasons for the disapproval and allow the petitioner to resubmit the petition based upon such reasons. Any resubmission would reinitiate the review process.
- f. Environmental Protection Agency Approval. Upon approval described in subsection (E), the Governor shall, within 30 days, submit to the Administrator of the United States Environmental Protection Agency, hereafter referred to as the Administrator, his/her delineation of a special protection area and designation of a planning entity. The Governor is empowered to respond to the decision rendered by the Administrator as follows:
1. Should the Governor receive notification of disapproval by the Administrator, the Governor shall resubmit within 90 days a request that addresses the reasons for disapproval cited by the Administrator.
 2. Upon approval of the request for designation by the Administrator, the State through the Governor, is authorized to receive from the Federal government in a 50 percent matching basis funds to cover the cost incurred in preparing the petition and developing the Plan. The designated planning entity through the Governor shall be eligible for such planning funds for a period not to exceed two years.
- g. Moratorium: Upon designation of a special protection area by both the Governor and the Administrator, the affected County may declare a moratorium on any activities including but not limited to construction or subdivision for the purpose of protecting the water supply

potential of any or all of the special protection area.

- h. Comprehensive Management Plan: The designated planning entity shall prepare the Comprehensive Management Plan for the special protection area. The Plan shall be designed to ensure the non-degradation of the high quality of groundwater recharged within the special protection area. Such plan shall include but not be limited to:
1. a determination of the quality of the existing groundwater recharged through said special protection area, the natural recharge capabilities of the special protection area watershed and the dependence of any natural ecosystems in the special protection area on the water quality and natural recharge capabilities of said area;
 2. an identification of all existing and potential point and non-point sources of groundwater degradation;
 3. development, for any special protection area so designated, of qualitative and quantitative groundwater quality standards designed to maintain indefinitely, existing groundwater quality conditions where those conditions reflect water of a quality better than Environmental Protection Agency drinking water standards or applicable state regulations, and to restore such quality where it presently does not meet such regulations;
 4. a map showing the detailed boundary of the special protection area;
 5. a resource assessment which determines the amount and type of human development and activity which the ecosystem can sustain while still maintaining existing ground and surface water quality and protecting unique ecological features;
 6. the identification and proposal of limits on federal, state and local government, financially assisted activities and projects which, directly or indirectly, may contribute, in any way whatsoever, to any degradation of such groundwater or any loss of natural surface and subsurface infiltration or purification capability of the special protection area watershed;
 7. development of a comprehensive statement of land use management as it pertains to the maintenance and enhancement of groundwater quality and quantity;

8. proposal and establishment of limits on land uses in the special protection area which might have an adverse impact on water quality and/or recharge capabilities;
 9. consideration and proposal of specific techniques, including, but not limited to: clustering; large lot zoning; purchase, exchange or donation of conservation easements or development rights; and other innovative measures sufficient to achieve the objectives of this section;
 10. consideration of the establishment of a state institution to facilitate and assist in the funding of a transfer of development credit system;
 11. designation of specific areas within special protection areas suitable and appropriate for public acquisition; and
 12. a program for State and local governmental implementation of the comprehensive management plan described in this subsection in a manner that will insure the continued, uniform, consistent protection of this area in accord with the purposes of this section.
- i. The Approval Process. During the development of the Comprehensive Management plan, the planning entity shall:
1. consult with appropriate officials of any municipality or State or Federal agency which has jurisdiction over lands and waters within the area;
 2. transmit any draft and final plan to all units of local government for review and comment;
 3. consult with the officials of any local government which has jurisdiction over lands and waters within areas delineated in accordance with subsection (h) (4);
 4. consult with interested professional, scientific and citizens' organizations;
 5. consult with a citizens' advisory committee which may be established by the Governor or the planning entity; and

6. conduct public hearings at places within the area, and at such other places as may be appropriate, for the purpose of providing interested persons and units of local government with an opportunity to express their views with respect to matters covered by the management plan.
- j. Approval by the Governor: Upon completion of the processes described in subsections (h) and (i), the planning entity shall submit the Plan to the Governor for review. The Governor shall approve or disapprove the Plan within 90 days of its receipt. In his/her review of the Plan, the Governor shall consider whether:
1. the Plan will achieve the stated water quality objectives of the Plan and this Section and protect the ecological values of the special protection area which are significant for maintenance of water quality;
 2. the plan requires the exercise of land use and zoning responsibilities to the greatest extent practicable to regulate the use of land and water resources in a manner consistent with the purposes of this section;
 3. the planning entity has afforded adequate opportunity, including public hearings, for public and governmental involvement in the preparation and review of the plan, and whether such review and comment thereon were considered in the plan or revision as presented to him/her;
 4. he/she has received adequate assurances from appropriate State and local officials that the recommended implementation program identified in the plan will be initiated within a reasonable time after the date of approval of the plan and such program will insure effective implementation of the State and local aspects of the plan;
 5. he/she should designate or establish a management entity with the power and authority to assure implementation of the plan; and
 6. the legal authorities at the state level, including statutory provision for a land credit exchange institution, are provided.

- k. Environmental Protection Agency Approval: The Governor shall submit the plan, as required pursuant to subsection (J) to the Administrator for review and approval. If approval is not given, the Governor will have 90 days to resubmit a modified plan.
- l. Upon approval of the plan, the State acting through the Governor, shall enter into a cooperative agreement to share on a 50 percent matching basis the cost of implementation of the plan including but not limited to land acquisition, capitalization of a land credit exchange institution, and acquisition of land development rights.
- m. Land Acquisition: Land acquired by the State under this Act may reside in State ownership and is subject to assessment as watershed land. The State, at the discretion of the Governor, may transfer title to said land to the appropriate county under the condition that it be dedicated as parkland or forest preserve whose uses are consistent and compatible with the watershed purposes of the land. Certain rights also acquired under this Act are also transferable to the appropriate county.
- n. Authorization: There are authorized to be appropriated:
 1. Funds to carry out subsections (D), (H) and (I), \$350,000; and
 2. Funds: to carry out the plan pursuant to subsection 1. to be not more than \$15,000,000, and to be matched on a 75-25 percent basis with the involved county or counties.

Definitions: For the purposes of this Act:

1. The term "Plan" means the Comprehensive Management Plan developed pursuant to subsections (E), (I), and (B).
2. The term "land credit exchange institution" is any institution established to facilitate the exchange, transfer, acquisition, and donation of development rights, conservation easements, or other partial interests in land.
3. The term "recharge" means the downward movement of water to the water table through the soil over-

lying an aquifer.

4. The term "watershed" means an area where water drains into a specific basin or reservoir, or, for groundwater, a region where water is abundantly recharged to the subsurface groundwater reservoir.
5. The term "special protection area" means a recharge watershed area within a designated sole source area which is particularly critical for the maintenance of large volumes of high quality groundwater for long periods of time.

UPCOMING LEGISLATION

The Commission is currently drafting two bills which address different aspects of the water resources picture. One focuses on the need for consumers to be informed about their water supply; the other is a statewide critical watershed protection bill.

The education bill will establish a system whereby customers of a water supply company will be supplied, on a regular basis, information about activities of the supply company and the quality of water supplied which may affect the service provided. This bill will be drafted following Commission dialogue with water suppliers.

Another Commission effort is in the area of critical watershed protection. As described in the critical watershed protection section of this Report, a statewide watershed protection program already exists in New York in the form of the New York State Department of Health's rules and regulations program. The Commission believes that the program should be strengthened and broadened to include the promulgation and enforcement of a set of rules and regulations which will be in effect for critical watershed areas. This legislation will be drafted shortly by the Commission.

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CLOSING STATEMENT OF THE CHAIRPERSONS

For the past two years, we have been privileged to serve as Co-Chairpersons of the New York State Legislative Commission on Water Resource Needs of Long Island. As such, we have served not only the needs of our constituents, but the two and one half million residents who live in Nassau and Suffolk Counties.

At the time we accepted our respective co-chair positions, we did so in recognition that the despoilation of our only source of potable water was the most serious problem threatening the future development and well-being of the Counties of Nassau and Suffolk. Now, two years later, as the quality of the Island's groundwater resources continues to decline, this complex problem has taken on added significance.

As evidenced in this Report, and the work of other involved agencies, programs are being developed to insure a continued supply of clean water. Progress is being made. However, if we are to see that this necessary objective reaches fruition, continued support of the Commission's endeavors must be provided.

Special thanks must be made to the staff of the Commission. It is due to their dedication and tireless efforts that this Report was made possible. To them we extend our appreciation.

Sincerely,

May W. Newburger
Co-Chairwoman

Caesar Trunzo
Co-Chairman

March 31, 1982