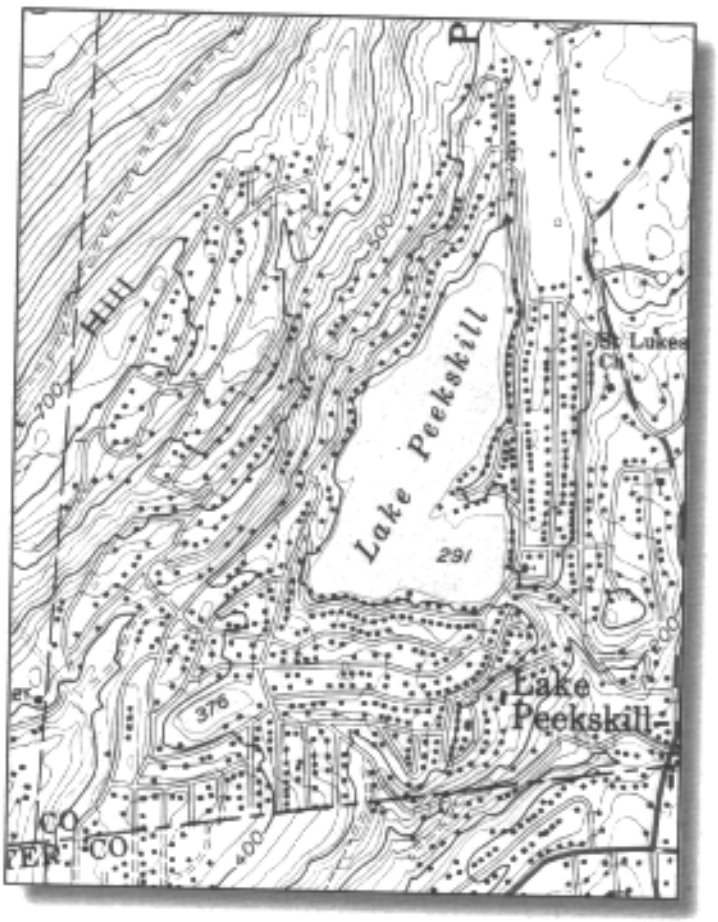
FINAL REPORT



Lake Peekskill Water Facility Plan

Town of Putnam Valley,
New York

January 2000

INSITE
ENGINEERING, SURVEYING &
LANDSCAPE ARCHITECTURE, P.C.

O'BRIEN & GERE
ENGINEERS, INC.

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Executive Summary

The Lake Peekskill community in the Town of Putnam Valley was conceived and marketed as a summer lake community in the 1920's. The on-site wells and seasonal water system that serve the individual lots were adequate for short periods of occupancy. Today, many of these summer cottages have been expanded and converted to year-round use, and many of the individual potable water wells and the seasonal water system are old and substandard and cannot handle the increased and constant demand of year-round occupation. As a result, the Lake Peekskill community has a history of well problems (as recorded by the Town and the Putnam County Department of Health). The following factors have contributed to the decline in the ability of the Lake Peekskill area to support itself through individual on-site wells.

- small lot size
- summer cottage conversions and expansions
- high population density
- shallow depth to ledge rock and groundwater that can lead to well water contamination from septic systems.
- steep slopes that can lead to septic system failures and well water contamination
- substandard subsurface sewage treatment system (SSTS) and well separation distances less than currently allowed
- age of existing facilities

Approximately 300 out of the 1100 homes in the Lake Peekskill community are connected to a seasonal water system that draws raw water from the Catskill Aqueduct. The system currently is not in compliance with the Surface Water Treatment Rule. This rule requires filtration of surface water used by water systems. The Catskill Aqueduct draws water from surface supplies in the Catskill Mountain region and is part of the New York City water supply system. The distribution system was constructed for seasonal use and most of the system's components are inadequately protected from freezing, and would not be suitable for year-round use.

The Town of Putnam Valley has selected the engineering consulting team of Insite/O'Brien & Gere to prepare a facility plan for a central water distribution system for the Lake Peekskill community. In general, the scope of work required the consultant to study the following:

1. Identify the potable water needs of the Lake Peekskill community.

2. Evaluate the feasibility and costs of providing a water treatment plant and a water distribution system with a service connection for every occupied parcel within the study area.

The study area for this facility plan is defined as the limits of the Lake Peekskill Improvement District (LPID). This area contains predominantly small residential dwellings served by individual wells and individual SSTSs. Other out-of-district users may potentially opt to connect to the proposed water distribution system.

The planning period selected for this facility plan is 20 years. The projected planning year average daily flow for LPID is 0.47 mgd. The design flow for the adjacent Putnam Valley Sewer District No. 2 (PVSD#2) is 0.06 mgd. Assuming PVSD#2 will be connected to the proposed water system and allocating an additional flow of 0.07 mgd for other potential users, brings the future average daily flow to 0.60 mgd. The maximum day flow of 1.5 mgd was calculated using a peaking factor of 2.5.

Fire flow requirements were determined by referencing the American Water Works Association (AWWA), *Manual 31: Distribution System Requirements for Fire Protection*. Using the Insurance Services Office (ISO) method, a minimum fire flow of 750 gpm was determined to be appropriate. This flow would need to be maintained for a period of two hours.

The three water supply sources in the region that could be made available for the Lake Peekskill Community are noted below.

- Catskill Aqueduct
- Croton System/Amawalk Reservoir
- Peekskill Hollow Creek/Wiccoppee Reservoirs

The Catskill Aqueduct and Amawalk reservoirs are owned and controlled by New York City. The City of Peekskill Water Board owns and operates the Wiccoppee Reservoirs (located in Putnam Valley). The filtration plants listed below currently filter these available source waters.

- Montrose Improvement District (MID), Locust Avenue/Route 6 Catskill Aqueduct plant
- Westchester County Water District #2, Amawalk plant
- City of Peekskill plant

Note, the Northern Westchester Joint Water Works (NWJWW) will be taking over the operation of the MID Locust Avenue/Route 6 Catskill Aqueduct plant and the Westchester County Water District #2, Amawalk plant. The NWJWW is a recently formed water works consisting of the Montrose Improvement District (located in the Town of Cortlandt), Town

of Cortlandt, and Town of Yorktown. The NWJWW is to own and operate the water filtration plants, aqueduct connections, and transmission mains.

The Lake Peekskill Improvement District has the following options for connecting to the three available water sources.

Source	Connection Option
NYC Catskill Aqueduct Raw Water	Direct connection to aqueduct with existing tap, refurbished raw water pump station, and construction of a new water treatment plant
Peekskill Hollow Creek Raw Water	Direct connection to Peekskill Hollow Creek with new raw water pumping station and construction of a water treatment plant
Peekskill Hollow Creek Treated Water	Connection to Cortlandt Consolidated Water District distribution system which is supplied filtered water from the City of Peekskill (water filtration plant at Campfields Holding Reservoir)
NYC Catskill Aqueduct Treated Water	Connection to Cortlandt Consolidated Water District distribution system which is supplied filtered water from NWJWW (Locust Avenue/ Route 6 water filtration plant)
NYC Croton System/Amawalk Reservoir Treated Water*	Connection to either Cortlandt Consolidated Water District or Yorktown Water Storage District distribution systems which are supplied filtered water from NWJWW (Amawalk water filtration plant)

*Note: It is unlikely this source has extra available capacity

For this facility plan the following two alternative options were studied:

- Maintain an independent primary source of supply off Lake Peekskill's current connection to the Catskill Aqueduct and provide a new water treatment plant. Establish emergency interconnections to the Cortlandt Consolidated Water District distribution systems as a secondary source of supply.
- Establish connections with the Cortlandt Consolidated Water District to provide both primary and secondary sources of supply.

These two supply alternatives were chosen due to the proximity of the Catskill Aqueduct and the Cortlandt Consolidated Water District distribution system to the Lake Peekskill community.

The Safe Drinking Water Act (SDWA) and its amendments encompass the federal regulations governing drinking water systems. The SDWA was originally passed in 1974, and has been amended or reauthorized a number of times since then, with major amendments and/or reauthorizations in 1986 and 1996.

Two sources of water quality information were used to evaluate compliance with current and future regulations. Data was obtained from the Montrose Improvement District from their connection to the Catskill Aqueduct. Data was also obtained from the NYCDEP Bureau of Water Quality Supply and Protection, in particular the *Technical Memorandum* for *Task 2.1.1 Water Quality and New York City Water Quality Data*. The above information is contained in Appendix A.

A review of Federal and State regulations with respect to drinking water was conducted and the following is a summary of the regulatory impacts to Lake Peekskill:

Disinfectants/Disinfection By-Products Rule (Stage 1&2)
It is anticipated that the Lake Peekskill facility can most likely meet the Stage 1 requirements. Given the historically low raw water total organic carbon (TOC), the facility will probably be exempt from the enhanced coagulation requirements. It is possible, however, that the facility may have difficulty meeting the Stage 2 requirements using free chlorination if the rule is applied to small systems at the proposed levels. Bench-scale testing would be required to confirm this. To facilitate compliance with the proposed Stage 2 levels, provisions should also be made for the future practice of chloramination (chlorine and ammonia).

Surface Water and Enhanced Surface Water Treatment Rules
The Surface Water Treatment Rule will apply to the proposed Lake Peekskill facility until the Long Term 1 Enhanced Surface Water Treatment Rule (LT1 ESWTR) is promulgated. The requirements for disinfection, 3-log removal/ inactivation of *Giardia* cysts and 4-log removal/inactivation of viruses, will also need to be met. Additional or more stringent requirements may be imposed by the implementation of the LT1 ESWTR. Since microfiltration/ ultrafiltration has been selected to treat the water, it is anticipated that existing and future *Giardia* cyst and *Cryptosporidium* oocyst removal requirements would be met. However, enough disinfection will still need to be provided to inactivate viruses, which are not completely removed by microfiltration/ ultrafiltration. In addition, the New York State Department of Health is not allowing more than 2-log removal credit for microfiltration. Therefore a chlorine contact tank that provides at least one log inactivation is still required, as is a disinfectant residual in the distribution system.

Filter Backwash Recycling Rate
The regulation will apply to all public water systems, regardless of size. USEPA is currently gathering data in support of this future regulation. It is not proposed to recycle backwash water from the Lake Peekskill water treatment plant.

Total Coliform Rule
The maximum contaminant level (MCL) for total coliforms specified by the Total Coliform Rule can be met by meeting the Surface Water Treatment Rule requirements for a continuous disinfectant residual in the distribution system as discussed in Section III.1.b. Therefore, it is anticipated that compliance with this rule will be achieved with proper disinfection practices.

Lead and Copper Rule
Currently, other water systems in the area, utilizing Catskill Aqueduct water, use caustic soda and orthophosphate for corrosion control due to the somewhat corrosive nature of the Catskill Aqueduct water. To comply with the requirements of the rule, it is likely that the Lake Peekskill facility would need to use the same chemicals for corrosion control. By using these chemicals, the facility would also need to monitor and test the finished water for the presence of these chemicals.

Volatile Organic Chemicals (VOCs)
On the basis of historical data, it is not anticipated that VOCs will have an impact on the Lake Peekskill facility.

Synthetic and Inorganic Chemicals
It is not anticipated that the Phase II and Phase V synthetic organic and inorganic regulations will have an impact on the Lake Peekskill facility.

Arsenic
It is not anticipated that the new arsenic regulations will have an impact on the Lake Peekskill facility.

Sulfate
It is not anticipated that the sulfate regulations will have an impact on the Lake Peekskill Facility.

Fluoride
Since the water system currently does not fluoridate, the fluoride regulations are not anticipated to have an impact on the Lake Peekskill facility.

Radionuclides
It is not anticipated that the radionuclide regulations will have an impact on the Lake Peekskill facility.

Secondary Maximum Contaminant Levels (SMCLs)
Based on the experiences of nearby municipalities utilizing this source water, it is not anticipated that the SMCLs related to taste and odor will have an impact on the Lake Peekskill facility. Data has indicated that there may be occasional exceedances of the iron and manganese SMCLs, which may require either removal or sequestration. The relatively low levels of iron and manganese which normally appear to be in the water (typically less than 0.19 mg/l and 0.18 mg/l, respectively) do not require treatment. The rare elevated

levels of iron (1.2 mg/l) seem to be connected to unusual rainfall events that have also resulted in elevated turbidity levels. This historical elevated iron level can be treated through the use of sequestering agents including some phosphate blends, which may also be useful for corrosion control. Further study during design would be required to confirm the appropriate selection of phosphate.

Operator Certification
Depending upon the State of New York's operator certification program, it is anticipated that the Lake Peekskill facility would need to have certified operators.

Source Water Supplies
Based on the reviews of the Federal and State requirements for drinking water and quality of the Catskill Aqueduct water, it was decided to select membrane technology as the treatment method to be utilized for the Lake Peekskill water treatment plant (WTP). Regulations are headed towards tighter control on *Giardia* cyst and *Cryptosporidium* oocyst removals. Membrane technology (microfiltration or ultrafiltration), offers removal levels that would exceed current and future removal requirements for these organisms. Disinfection, typically with chlorine, is still a requirement for bacteria and virus destruction, and also maintains a residual chlorine level in the distribution system.

For potable water obtained from outside districts, those districts are responsible for supplying potable water that meets Federal and State requirements.

Membranes for drinking water applications are generally made from ceramics or polymers. The membranes typically come in tubular or hollow fiber configuration. There are many manufacturers of membrane systems for drinking water applications.

The selection of a membrane system usually requires pilot testing of several different manufacturer's systems on the source water. The goal of pilot testing is to obtain quality and performance data that can be utilized by the engineer and manufacturers to determine the most applicable system in consideration of treatment quality, system performance and site specific issues and costs.

Membrane systems are modular, generally skid mounted systems, and almost always housed in a building. The membrane modules need to be periodically replaced, and typically have a 5 to 10 year operating life. The membranes also require backwashing or "back pulsing" to control fouling of the membrane surface and to maintain water flow or "flux rate". This is done automatically and is computer controlled. Some systems backwash with air and some backpulse with permeate alone. Other systems backwash with permeate mixed with bleach, or (filtered water) with bleach and

caustic. The membranes also need to be cleaned, generally monthly, to remove contaminants, such as organic matter and crystallized salts, that foul the membrane surface. Typically citric acid, caustics and bleach are chemicals used to clean the membranes of inorganic and organic foulants. The exact cleaning regime varies somewhat between manufacturer's systems and source water characteristics. Backwashing/back pulsing, as well as chemical cleaning requirements, are usually determined during pilot testing. For this facility plan, the systems from three manufacturers (Koch, Memcor, and Zenon) were considered. The complete membrane treatment plant would incorporate the following additional components:

- feed pump station for membrane water filtration system
- chlorine contact tanks and clearwell
- laboratory
- chemical feed systems
- underground tank for temporary residual storage
- distribution pumps

The proposed water treatment plant would require about one acre of land. A possible site for the site was considered in the vicinity of Mimosa Street and the Catskill Aqueduct. The proposed site for the new facility contains no federally mapped wetlands or wetlands listed in the New York State Wetlands Inventory. There are homes near the proposed site and special considerations such as architecture and landscaping have been included in the proposed budgets to allow sufficient attention to these issues during design.

Shown below are the capital and O&M treatment costs of the Lake Peekskill water supply options.

Treatment Costs

	Connection to the Cortlandt Consolidated Water District	New Water Treatment Plant
Capital Cost	$0	$5,790,000
Annual O&M Cost	$0	$332,800

Distribution System

The distribution network for Lake Peekskill would be divided into three (new water treatment plant option) or four (connection to Cortlandt option) separate pressure zones. Water will be pumped to the upper pressure zone from either the clearwell of a new water treatment plant, or from a booster pump station off the Cortlandt system. Water to the lower pressure zones will flow by gravity from the clearwell of a new water treatment plant, or from the direct connection to the Cortlandt system. A storage tank will be provided for the upper pressure zones and a second storage tank for the lower pressure zones. During times of peak demand or fire flow, the upper pressure zones will draw water from a storage tank to be located at a ground

elevation of about 740 near Ridgecrest Road. The lower pressure zones will draw water off a storage tank that will be located in the vicinity of the new water treatment plant or connection to Cortlandt. To prevent a shortage of water to the lower pressure zones, in the event of unusual circumstances. the distribution system will be equipped with pressure reducing valves at different locations. These pressure reducing valves will automatically release water from the upper pressure zones into the lower pressure zones whenever the pressure in the lower pressure zones drops below preset levels. This would allow for the storage in the upper pressure zone tank to be utilized by lower pressure zone users.

Two storage tanks are proposed , each providing 345,000 gallons of storage. The combined storage of 690,000 gallons meets the requirements to provide a storage volume equal to the average day demand (600,000 gallons) plus fire protection demand (90,000 gallons). The storage tank for the upper pressure zone would be located on the high point (elevation 740 feet) adjacent to Ridgecrest Road. The second storage tank for the lower pressure zones is planned to be located near the proposed water treatment plant or the connection to Cortlandt. Both supply options studied in this facility plan would require the same storage, assuming the Cortlandt Consolidated Water District could supply up to the maximum day demand.

The following is a summary of the components that would make up the distribution system for the option of connecting to the Cortlandt Consolidated Water District:

- 6,8,12, inch PVC – Class 200, DR 14 piping
- pressure reducing valves
- isolation/divide valves
- fire hydrants
- service connections
- service metering
- master metering
- storage tanks
- booster pump station

The following is a summary of the components that would make up the distribution system for the new water treatment plant option:

- 6.8,12, inch PVC – Class 200, DR 14 piping
- pressure reducing valves
- isolation/divide valves
- fire hydrants
- service connections
- service metering
- master metering
- storage tanks

- raw water feed pump station
- distribution pumps

Shown below, for each option, are the capital and O&M costs:

Distribution Costs

	Connection to the Cortlandt Consolidated Water District	New Water Treatment Plant
Capital Cost	$19,081,000	$18,635,000
Annual O&M Cost	$181,400	$85,100

The total (treatment and distribution) project capital and O&M costs are listed below:

Treatment and Distribution Costs

	Connection to the Cortlandt Consolidated Water District	New Water Treatment Plant
Capital Cost	$19,081,000	$24,425,000
Annual O&M Cost	$181,400	$417,900

Funding

There are several funding sources available to the Town of Putnam Valley; they are: New York State Drinking Water State Revolving Loan Fund (DWSRF), Rural Utilities Service, and New York State Clean Water/Clean Air Bond Act (Bond Act). There exists opportunities to obtain low to zero interest loans and grants. The Town of Putnam Valley has previously filed for SRF loans and is currently on the New York State Environmental Facilities Corporation (NYSEFC) Intended Use Plan for SRF loans. The next step in determining funding amounts and types (loans/grants) is the submission of this facility plan. Applications to the Rural Utilities Service and New York State for Bond Act funding should be undertaken.

User Fees

User fees can be implemented to pay for debt service and operational costs for implemented facilities. Estimated user fees were computed by taking the annual cost to repay a SRF (State Revolving Fund) loan, (used to cover the capital cost at 0 % interest over a 20 year period), and dividing this amount by the estimated number of future users. Added to this is the total annual O&M costs divided by the future number of users. The user fee computations are only estimates, and for this facility plan, funding has been initially assumed at 0% interest and no grants. Future funding evaluations will need to continue. Obtaining grants could reduce the user fees computed

in this facility plan. The cost of purchasing water must also be accounted for in the user fee calculations. The total future estimated average daily water demand for the Lake Peekskill community is approximately 469,000 gpd. For the new water treatment plant option, the cost of purchasing raw Catskill water from New York City is $343.58 per million gallons; or approximately $58,815 per year. For purchasing treated water, in lieu of a constructing a new water treatment plant, the cost of water is about $1,225,685 per year ($7.16/1000 gallons) based on out of district rates from the Cortlandt Consolidated Water District.

Shown below are the sum of annual O&M and annual SRF loan repayment costs, the annual cost of water, and the estimated annual user fee for each option:

User Fees

	Connection to the Cortlandt Consolidated Water District	New Water Treatment Plant
SRF annual payment + annual O&M cost	$1,135,450	$1,639,150
Cost of Water	$1,225,684	$58,815
Estimated Annual User Fee	$1,713	$1,232

Funding and approvals associated with a water project will require fulfillment of a mandated environmental review. The environmental assessment for the project is included with this facility plan in Appendix C.

It is evident that the new treatment plant option provides the lower cost to the users in the Lake Peekskill community. The ultimate cost to the users, and the project itself, is also dependent on the types and availability of funding from available sources. Success in obtaining funding, such as grants, will lower the user fees shown above. Therefore, it is recommended that a dual track approach be undertaken by the Town. The Town should determine if the connection to the Cortlandt Consolidated Water District is politically feasible by lobbying appropriate officials in Westchester County. The Town should also determine the levels of available funding by submitting this Facility Plan to the New York Environmental Facilities Corporation, submitting an eligibility determination application to the Rural Utilities Service, submitting a New York State Clean Water/Clean Air Bond Act Application for state assistance payments, and lobbying State and Federal officials.

The New York State Environmental Facilities Corporation (NYSEFC) administers the State Revolving Loan Fund Program. Funding levels to communities are based partly on a community's ability to pay for the service. This ability to pay is called a Target Service Charge (TSC) and is compared

to the Projected Service Charge (PSC) of the planned project. The TSC is computed based on a percentage of median household income, which about $42,000 for Lake Peekskill. According to published information from the NYSEFC, the TSC for Lake Peekskill would be $735. The PSC for the water project is $1,232. Therefore, obtaining of grants and zero/low interest loans from various funding agencies would be needed to lower the PSC to the TSC.

It may make economic sense, with respect to reducing the overall Projected Service Charge, to plan a water plant that could serve Continental Village as well. A larger water plant could reduce the cost per gallon to treat the water, thereby reducing the service charge. Continental Village's water supply from the Catskill Aqueduct is also not filtered and they will eventually need to provide treatment or seek another filtered source.