

**REGIONAL GROUND-WATER STUDY
TOWN OF TUXEDO
ORANGE COUNTY, NEW YORK**

Prepared For

Orange County Water Authority

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Groundwater Inventory Map ("GIM")

**REGIONAL GROUND-WATER STUDY
TOWN OF TUXEDO
ORANGE COUNTY, NEW YORK**

INTRODUCTION

There is only one municipal water system in the Town of Tuxedo. The system is owned and operated by the Village of Tuxedo Park. A discussion of this water supply follows.

EXISTING WATER SUPPLY SYSTEMS

Village of Tuxedo Park Water Supply

The Village of Tuxedo Park water supply is a surface water supply system. Water is taken from Tuxedo Lake. According to Orange County Health Department records, Tuxedo Lake is 290 acres in area, has a capacity of 400,000,000 gallons, and a water elevation of 557-feet above Mean Sea Level (Orange County 1993).

Water Supply in Service

The source of water supply for the Village of Tuxedo Park is Tuxedo Lake. Tuxedo Lake has a safe yield of 1.4 mgd. The safe yield is a function of net inflow and reservoir capacity and is the quantity of water, in mgd, which is available from the reservoir throughout its lifetime with certain reliability without incurring a deficiency. The treatment plant capacity depends on the water demand in the service area. The Village of Tuxedo Park has a treatment plant capacity of 0.65 mgd.

Three low lift pumps (7.5 Hp) are provided at the intake pump station. Potassium permanganate is added at the pump station to control taste and odor. An 8-inch line conveys water from the low lift station to the treatment facility. The treatment facility consists of a flocculation tank, two updraft dual media filters, and a clear well.

Information obtained from the Orange County Health Department indicates that both lime and alum are added before the water enters the 12-foot diameter flocculation tank. Chlorine is added in the flocculation tank.

The two dual media filters have a total area of 190 square feet. Each filter has a 7,500 gallon storage tank for backwash. The finished water is chlorinated and stored in a 12,000 gallon clear well. Three high lift pumps, 350 gallons per minute (gpm) each, deliver

treated water to the distribution system and water storage system in the village.

Water is supplied from the treatment facility to the Village of Tuxedo Park, the Hamlet of Tuxedo, and the East Village development. The treatment facility normally runs during the day and is shut down at night.

Water Supply Not in Service

There are no municipal water supplies not in service in the Town of Tuxedo.

Community Water Supply Systems

Water Supply in Service

The following are community water supply systems in service in the Town of Tuxedo.

Indian Reservoir

This is a treated surface water supply. Conversation with Edwin Sims of the Orange County Health Department indicated that it serves about 2,000 people and supplies water to CintiChem, International Paper, the Sterling Forest building, and two developments. Daily production is 119,500 gallons. Safe yield is estimated at 1.27 mgd (LMS, 1990). The filtration plant capacity is 0.60 mgd.

Maple Brook Development

This is a community water supply. There is one bedrock well 260-feet deep which serves a population of 184 persons (Groundwater Inventory Map ["GIM"], Well TX-1). The well yield is 39 gpm (Water Resources Commission, 1961). Average daily demand is 8,500 gallons. The well was drilled in 1961 and is noted on Table 1. There is a standpipe with 200,000 gallons capacity serving this subdivision.

New York University Housing

This community water supply system supplies water to a population of approximately 120. According to Orange County Health Department records, the daily consumption is estimated at 4,000 gallons. There is one well 255-feet deep, with a yield of approximately 30 gpm. Because of its very low yield, this well is not noted on Table 1 (Orange County, 1993).

Tuxedo Heights Condo Association

The community water supply for Tuxedo Heights Condo Association serves a population of 300. The system has one well, drilled in 1970, 600-feet deep

TX-2

with 6-inch casing. Because of its low yield, this well is not noted on Table 1. Average daily demand is 10,000 gallons. The well yield is not known (Orange County, 1993).

Water Supply Not in Service

Bramertown Well

This well is located in the Sterling Forest area and yields approximately 100 gpm. The well is 8-inch diameter and 36-feet deep in sand and gravel aquifer. The well is noted in Table 1 and is shown on GIM, TX-2. According to Edwin Sims, this well is not in service (Sims, 1993).

Indian Reservoir Wells

There are two high yield wells drilled near Indian Reservoir. These wells are referred to as IKR #2 and IKR #3 in the LMS Report (LMS, 1990). They produce 75 and 89 gpm, respectively. Both these wells are bedrock wells. These wells are shown on GIM, Well TX-3 and Well TX-4. These two wells were drilled in 1955 and are not in service, according to Edwin Sims (Sims, 1993).

Route 17 Shopping Center

The LMS Report (LMS, 1990) indicates the existence of a high yielding well at the Route 17 Shopping Center. This well is in sand and gravel aquifer. The well yield is reported to be 100 gpm (LMS, 1990). The Route 17 Shopping Center well was drilled in 1968 and is not in use at present (Sims, 1993). This well is noted in Table 1, and is shown on the GIM, Well TX-5.

PROPOSED COMMUNITY WATER SUPPLY SYSTEMS

Sterling Forest Corporation

The Sterling Forest Corporation is presently proposing major planned developments, with mixed use in the Town of Tuxedo and adjacent towns. If this materializes, the population of the town will increase rapidly.

Sterling Forest is located in the Towns of Tuxedo, Monroe, and Warwick. Studies conducted by Lawler, Matusky & Skelly Engineers (LMS) indicated that both surface and ground-water supplies could be developed for the Sterling Forest community (LMS, 1990).

Safe yields of 3.28 mgd from Sterling Lake, 1.59 mgd from Blue Lake, and 1.27 mgd from Indian Reservoir were estimated by LMS. The LMS study also provided information on ground-water wells within Sterling Forest.

The Sterling Forest Corporation is in the process of preparing a DEIS for this project. Further information on this project, especially in relation to providing an adequate water supply for the proposals, will become available when the environmental considerations are completed.

WATER SUPPLY DEMAND

Village of Tuxedo Park

The Village of Tuxedo Park is supplied by a surface water source (Tuxedo Lake) which has a safe yield of 1.4 mgd. The filtration plant has a capacity of 0.65 mgd, which is the present limit to the yield of this water supply system.

Average water supply demand for the Village of Tuxedo Park and the additional service areas for the last 12 months was 0.368 mgd.

To calculate the future demand, we have utilized the population figures provided in the Orange County Comprehensive Sewerage Study. The village population is estimated to increase from 1,000 in 1990 to 1,100 in 2000 and 1,200 in 2010 and 2020 (Hazen & Sawyer, 1991). We have assumed that the population of the service area in the town will also increase proportionally.

The projected average demand for the village water supply in the year 2020 is therefore calculated to be 0.442 mgd. Based on this estimate, the water supply system for the Village of Tuxedo Park will have a surplus of 0.208 mgd in the year 2020.

If the Sterling Forest Corporation's plans for major planned developments materialize, the population of the Town of Tuxedo will increase rapidly. However, the proposed planned development will develop the required water supply sources to meet the anticipated demand.

INVENTORY OF GROUND WATER CONTAMINATION PROBLEMS

Existing Ground Water Contamination Problems

Eustance & Horowitz reviewed existing ground water contamination sites including New York State

Department of Environmental Conservation inactive hazardous waste sites, solid waste facilities, active spills, and RCRA notifiers list. The information was gathered from Freedom of Information Law (FOIL) request by LMS. The following inactive hazardous waste sites exist in the Town of Tuxedo.

Tuxedo Waste Disposal Site

The Tuxedo Waste Disposal site is located off Route 17, east of the Village of Tuxedo Park. The New York State Department of Environmental Conservation registry number for this site is 336035. The location is latitude 41°-12'-35.9", longitude 74°-11'-02.0" and is shown on GIM

Harriman State Park West

This site is located northeast of the Village of Tuxedo Park in the western part of Palisades Interstate Park, Harriman section. The New York State Department of Environmental Conservation registry number for this site is 336026. The location is longitude 41°-13'-10.9" and longitude 74°-10'-58.0" and is shown on GIM.

Potential Ground Water Contamination Problems

Information about potential ground-water contamination sites was obtained from:

- ! FOIL request to NYSDEC (LMS, 1993); and
- ! Land use data from the Orange County, New York Real Property Tax Assessment data base (Space Track, 1993).

The following is a summary of potential inactive hazardous waste sites and solid waste facilities in the Town of Tuxedo, resulting from the FOIL request.

C&D Landfill - Barone/Sacco

This C&D landfill is located off New York State Route 17. The landfill has been closed.

C&D Landfill - Georgia Tech

The C&D landfill - Georgia Tech is located off New York State Route 17 and is just south of C&D Landfill - Barone/Sacco.

Recycling Facility - CintiChem/Union Carbide

The recycling facility is located off Long Meadow Road near Indian Reservoir.

Village Sewage Treatment Facility

The Village sewage treatment facility is located off Wee Wah Road in the Village of Tuxedo Park.

Town of Tuxedo Highway Refuse Disposal Site

This site is located off Warwick Brook Road.

Town of Tuxedo Salt Storage

The Town of Tuxedo stores its salt in a Town shed located off Warwick Brook Road, near Route 17. The floor of the shed is unpaved.

Village of Tuxedo Park Salt Storage

The Village of Tuxedo Park's salt storage is located in an open area, east of Wee Wah Road, around the Wee Wah Lake. There are plans to move the Village salt storage into the public works garage.

Each property in Orange County has a land use code number. Properties with land use code numbers associated with potential contamination of ground water were identified through analysis of the Real Property Tax Assessment data base by Space Track, Inc. The types of land uses in the potential contamination category include:

- ! industrial facilities;
- ! gas stations;
- ! dry cleaners, and
- ! auto repair facilities.

Where possible, approximate locations of these sites are shown as triangles on the GIM.

Petroleum Bulk Storage Facilities

The FOIL request from the New York State Department of Environmental Conservation provided an inventory of the petroleum bulk storage facilities and active spills. These are presented on Table 5.

The above sites are listed as potential ground-water contamination sites. Further investigation would be required to determine if contamination exists at the respective locations.

TABLE 1

TOWN OF TUXEDO
Summary of Available Well Data

Well ----- Water District	Tax Map Municipality ----- Section ----- Block ----- Lot	Map Location ----- I.D. #	Well Status -----	Reported Yield (gpm) Original ----- Present	Depth of Well (feet)	Well Diamete r (inches)	Length of Casing (inches)	Well Screen Length (feet) ----- Setting Interval (feet)	Aquifer	Date Drilled	Comments
Maple Brook ----- (T) Tuxedo	Tuxedo N/A	Tuxedo ----- TX-1	In Service ----- Active	39 ----- 39	260	6	42	N/A	Bedrock mgu	1961	
Bramertown ----- (T) Tuxedo	Tuxedo N/A	Tuxedo ----- TX-2	Inactive ----- Not Equipped	100 ----- 100	36	8	N/A	N/A	Sand and Gravel	1961	
IKR #2 ----- (T) Tuxedo	Tuxedo N/A	Tuxedo ----- TX-3	Inactive ----- Not Equipped	75 ----- 75	125	8	20±	N/A	Bedrock mgu	1955	Near Indian Reservoir
IKR #3 ----- (T) Tuxedo	Tuxedo N/A	Tuxedo ----- TX-4	Inactive ----- Not Equipped	89 ----- 89	111	8	20±	N/A	Bedrock mgu	1955	Near Indian Reservoir
Route 17 Shopping Center ----- (T) Tuxedo	Tuxedo N/A	Tuxedo ----- TX-5	Inactive ----- Not Equipped	100 ----- 100	41	8±	N/A	N/A	Sand and Gravel	1968	

gpm - Gallons per minute.

N/A - Not available.

Well Status: In service - active; In service - stand by; Inactive - equipped; Inactive - not equipped; Abandoned

NOTE: Information on the wells obtained from LMS Report (LMS, 1990).

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TABLE 1

TOWN OF TUXEDO
Summary of Available Well Data

Well ----- Water District	Tax Map Municipality ----- Section ----- Block ----- Lot	Map Location ----- I.D. #	Well Status	Reported Yield (gpm) Original ----- Present	Depth of Well (feet)	Well Diamete r (inches)	Length of Casing (inches)	Well Screen Length (feet) ----- Setting Interval (feet)	Aquifer	Date Drilled	Comments
Maple Brook ----- (T) Tuxedo	Tuxedo N/A	Tuxedo ----- TX-1	In Service ----- Active	39 ----- 39	260	6	42	N/A	Bedrock mgu	1961	
Bramertown ----- (T) Tuxedo	Tuxedo N/A	Tuxedo ----- TX-2	Inactive ----- Not Equipped	100 ----- 100	36	8	N/A	N/A	Sand and Gravel	1961	
IKR #2 ----- (T) Tuxedo	Tuxedo N/A	Tuxedo ----- TX-3	Inactive ----- Not Equipped	75 ----- 75	125	8	20±	N/A	Bedrock mgu	1955	Near Indian Reservoir
IKR #3 ----- (T) Tuxedo	Tuxedo N/A	Tuxedo ----- TX-4	Inactive ----- Not Equipped	89 ----- 89	111	8	20±	N/A	Bedrock mgu	1955	Near Indian Reservoir
Route 17 Shopping Center ----- (T) Tuxedo	Tuxedo N/A	Tuxedo ----- TX-5	Inactive ----- Not Equipped	100 ----- 100	41	8±	N/A	N/A	Sand and Gravel	1968	

gpm - Gallons per minute.
N/A - Not available.

Well Status: In service - active; In service - stand by; Inactive - equipped; Inactive - not equipped; Abandoned

NOTE: Information on the wells obtained from LMS Report (LMS, 1990).

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TABLE 2
VILLAGE OF TUXEDO PARK

Summary of Well Yield Capacities

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Well ----- Water District	WSA No. ----- Permitted Yield (gpm)	Average Yield Capacity (gpm) ----- (gpd)	Maximum Yield Capacity (gpm) ----- (gpd)	Comments
-----	-----	-----	-----	Surface Water Supply
TOTALS	(Total Permitted Yield)	(Total Yield Capacity)	(Total Maximum Yield Capacity)	

gpm - Gallons per minute.
gpd - Gallons per day.

WSA No. - Water Supply Application Number.

COMMENTS:

**TABLE 3
VILLAGE OF TUXEDO PARK**

Summary of Water-Supply Source
Existing Source

	Surface Water (mgd)	Ground Water (mgd)
Current Average Daily Water Demand	0.368	0.0
Current Maximum Daily Water Demand	0.526	0.0
Maximum Yield Capacity	0.650	0.0
Average Yield Capacity	0.368	0.0
Proposed Sources (Average Day)		
TOTAL MAXIMUM YIELD CAPACITY (MGD) = 0.650		
----- CURRENT MAXIMUM DAILY USE (MGD) = 0.526		

mgd - Million gallons per day.
* Combine surface water and ground-water sources.

COMMENTS:

- ! Maximum yield capacity is limited to treatment capacity of up to 0.650 mgd.
- ! Current maximum daily water demand is the average of three summer months.

TABLE 4
VILLAGE OF TUXEDO PARK

Projected Water Demand
1993 - 2020
(mgd)

Water District	Current Maximum Yield Capacity (mgd)	Current and Proposed* Maximum Yield Capacity (mgd)	1993 Projected Water Demand ----- Water-Supply Adequacy	2000 Projected Water Demand ----- Water-Supply Adequacy	2010 Projected Water Demand ----- Water-Supply Adequacy	2020 Projected Water Demand ----- Water-Supply Adequacy
(V) Tuxedo Park	0.65	0.65	0.368 ----- +0.282**	0.405 ----- +0.245**	0.442 ----- +0.208**	0.442 ----- +0.208**
TOTAL	0.65	0.65	0.368 ----- +0.282**	0.405 ----- +0.245**	0.442 ----- +0.208**	0.442 ----- +0.208**

mgd - Million gallons per day.

* Combined yield capacity of both current and proposed water supply(s).

**Calculated by current maximum yield capacity minus projected water demands.

+ Surplus water supply, mgd.

- Water supply deficiency (mgd).

COMMENTS:

! Data indicates that with current maximum yield capacities, the Village will likely meet projected water demand.

! Maximum yield capacity is limited to treatment capacity.

TABLE 5

TOWN OF TUXEDO

 Petroleum Bulk Storage Facilities

FACILITY NAME	LOCATION	MUNICIPALITY
3D Associates	Route 17	Southfields
New York Telephone	State Highway 17	Southfields
IBM Corporation	Long Meadow Road	Sterling Forest
Wehran Engineering Corporation	Routes 210 and 17A	Sterling Forest/Tuxedo
Beverly J. Properties, Inc., Gulf #120770	U.S. Route 17 Southbound	Tuxedo
CintiChem, Inc.	Long Meadow Road	Tuxedo
Lanza Labs	Long Meadow Road	Tuxedo
Lemsip	Long Meadow Road	Tuxedo
SOS Fuels	East Village Road	Tuxedo
South County Water Corporation	Sterling Lake Road	Tuxedo
Sterling Forest Conference Center	Long Meadow Road	Tuxedo
Sterling Forest Corporation	RR 1 - Sterling Lake Road	Tuxedo
Sterling Forest Ski Center	Box 608	Tuxedo
Tuxedo Park School	Camp Comford Road	Tuxedo
Tuxedo Union Free School District	Route 17	Tuxedo
University Valley Apartments	RD1 - Warwick Brook Road	Tuxedo

TX-10

International Paper Company	Long Meadow Road	Tuxedo Park
Jose Luis de Rivera	Cliff Road	Tuxedo Park
Town of Tuxedo Police Department	Route 17	Tuxedo Park

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