TOWN OF CATSKILL

Greene County, New York

WATER DISTRICT FORMATION STUDY

PROPOSED WATER DISTRICT NO. 3

DECEMBER 2003

Map, Plan and Report
DRAFT

J. Kenneth Fraser and Associates, PE, LS, LA, P.C.
22 High Street, Rensselaer, NY 12144
Tel: 518-463-4400 Fax: 518-432-6741

TABLE OF CONTENTS

Page

TABLE OF CONTENTS

Page

V. PROJECT IMPLEMENTATION

APPENDICES

Appendix A - Map of Proposed Water District No. 3 (Available at Town Clerk's Office)

Appendix B - Description of Proposed Water District No. 3 (Available at Town Clerk's Office)

Appendix C - Plan of Existing Facilities and
Recommended Water District Improvements (Available at Town Clerk's Office)

Appendix D - NYDWSRF Financial Information (Available at Town Clerk's Office)

Appendix E - Town of Catskill - Water Feasibility Study
Draft Preliminary Report (Available at Town Clerk's Office)

Appendix F - Preliminary Evaluation of Potential Water District No. 3
Extension To Serve Strawberry Lane Area

TOWN OF CATSKILL
WATER DISTRICT STUDY

I. INTRODUCTION

A. Purpose

The Town of Catskill retained Fraser and Associates to prepare a state-required map, plan and report to be used in the formation of a water district proposed for those areas of the Town presently served by public water from the Village of Catskill but not presently included in either of the Town's two existing water districts.

The Town desires to form the district to provide for better organization and operation of the water system in concert with the Village. A formal water district and agreement for water supply with the Village will also make the Town more attractive to economic development opportunities which will benefit both communities.

B. Scope

This report discusses the existing conditions under which the water system is currently operating including:

- current connected population,
- present water demands,
- physical layout of the water distribution system,
- general conditions of service (flow and pressure), and
- known problems or deficiencies.

The physical layout of the existing system is depicted on maps attached to the report.

For the formation of the water district to be known as "Water District No. 3 - Consolidated District", the Town Board has determined that the initial boundary will incorporate only those

properties presently served by public water that are not in an existing water district. Proposed improvements have been identified that address existing system deficiencies and support potential growth within the proposed district. The area of the proposed water district is shown on the map in Appendix A along with a suggested legal description of the district in Appendix B.

II. BACKGROUND AND EXISTING DISTRICTS

A. Village - Town System

The Village of Catskill Water System was originally constructed in 1880 and consisted of a pump station that supplied water from the Hudson River to a 4.0 million gallon open reservoir and about 16 miles of cast iron distribution mains. The river water was treated with chlorine for disinfection as it was withdrawn from the river.

The Hudson River supply was abandoned in 1930 and a new source of supply constructed on Potic Creek. This supply, as developed, consisted of a diversion dam, a reservoir of 200 million gallons and a water treatment plant providing both sedimentation and filtration of the raw water. The original capacity of the plant was 2.5 million gallons per day to serve a population of about 6,000 and meet an average day demand of 800,000 gallons per day (only the Village proper was served at this point in time). The plant is actually located in the Town of Coxsackie near the hamlet of Earlton in the Catskill foothills at about elevation 400.

The new supply was connected to the Village distribution system by a 16-inch, cement lined, cast iron water main about 9.5 miles in length. This main follows Potic Creek down to Leeds and then runs along the southerly side of NYS Route 23B, through the Town of Catskill to its connection with the Village distribution system.

These improvements to the Village system were to also include water service to the Hamlets of Leeds and Jefferson as the new transmission passed through them. Service to the Town residents along Route 23B from the Village's main became the first public water supply in the Town.

B. Water District No. 1 (West Leeds - South Cairo)

Water District No. 1 is one of two water districts that have been established by the Town.

Water District No. 1 was created in 1992 as a result of groundwater contamination in the

vicinity of the old industrial facility located along Route 23B and operated by the American Thermostat Company.

The United States Environmental Protection Agency funded a cleanup program in 1992 and constructed a two-mile long extension from the Village transmission main. This 10-inch diameter line begins near the intersection of Sandy Creek Road and Potic Mountain Road, crosses Catskill Creek just east of the Feddis Mobile Home Park and follows Route 23B westward to the Town line. Homes and two or three small businesses along Route 23B are served. Properties on the side streets of North Puffer Road, Pine Drive, Scotch Rock Road, Maple Lane, and Sunny Valley Road are also connected to the extension by individual services where they are in close proximity to Route 23B. As originally constructed, the main was to serve 44 properties impacted by the American Thermostat operations. This extension presently serves about 50 residences, two businesses and a small motel.

The main and service connections were constructed and eventually dedicated to the Village. The Town and Village entered into an agreement in March 1992 through which the Village would maintain the line and directly bill the Town residents at normal, outside-the-village rates.

C. Water District No. 2 (Post Avenue)

Water District No. 2 is a small district consisting of two Town streets (Post Avenue and Orchard Avenue) that abut the Village/Town municipal boundary. The district includes 18 properties, one of which is vacant, all of which are residential. The homes are served by 6-inch mains in the street which are fed from an 8-inch main in Broome Street in the Village. The district was formed in 2000.

III. NON-DISTRICT SERVICE AREAS

A. General

This section will describe the existing service areas in the Town that are not presently incorporated in a formal water district. These areas are the primary focus of this report. It is required by state law that any areas of a Town served by a municipal water system must be

part of a legally formed water district. This is required so that the system can be properly funded and operated, and improvements made when necessary, to protect the public health.

There are presently six non-district areas in the Town:

- Leeds,
- Jefferson Heights,
- Allen Avenue,
- Landon Avenue,
- Highland Avenue, and
- Carriage House Road.

These areas represent a wide range of land uses, population densities, and geographical size. Because some of the areas are very small and would not be able to finance any needed improvements, the Town Board has determined that it is in the best interests of the Town and the residents to form all areas into one district. The following sections will characterize each one in detail.

B. Leeds Area

B.1 Existing Conditions

The Leeds Area is predominately rural and extends from the crossing by Route 23B of the Catskill Creek eastward to the interchange of Route 23 and Route 23B. Included in this area are several side streets including (from west to east)

- Green Lake Road,
- Church Street
- Weissel Avenue,
- Park Lane,
- Park Avenue, and
- Forest Hills Avenue.

This area is shown in detail on the map located in Appendix C. This area originally developed as part of the 1930 upgrade of the Village system and the construction of the 16-inch main in Route 23B.

This area is characterized by rolling terrain of moderate relief with a low elevation of about 140 where Route 23B crosses the Catskill Creek, to a high elevation of 310 at the north end of Forest Hills Avenue. Soils in the area are rated severely limited for on-lot wastewater disposal systems by the Greene County Soil Survey.

The area is zoned primarily General Commercial or Highway Commercial within 500 feet of Route 23B with the remaining area zoned Rural Residential/Agriculture or Moderate Density Residential. The land uses consist of a broad mix of residential, local business and tourist-related business. The area has several motels, restaurants and inns along Route 23B. Residences are distributed along the main road and concentrated on the side streets listed earlier. The current population for this area, based on the 2000 census, is estimated to be 370 people.

Current customer type and water demand in gallons per day (gpd) for this area are taken from the Village's Out-of-District Water Roll for 1st Quarter, 2003 and summarized in the following table.

Leeds Land Use/Water Demand

Type of Use	Units	GPD	Demand/Unit
Residential	150	7,000	113
Commercial	14	3,600	257
Lodging	4	7,900	1975
Restaurant	3	2,100	700

This area is principally served by the Village's 16-inch transmission main as it runs along Route 23B from Green Lake Road in the west to the interchange of Route 23 and 23B. A series of

static pressure measurements were taken at several fire hydrants at intersections along the route and the results are presented in the following table.

Leeds Pressure Tests		
Location	Elevation	Pressure, psi
Route 23B and Green Lake Road	171	84
Route 23B and Park Lane	180	75
Route 23B and Forest Hills Avenue	220	60

These measurements confirm that services along Route 23B experience very good flow and pressure.

The principal problem in this area is the service to the side streets. Gradual development of these streets with homes added by ones and twos has resulted in long, common service laterals of ¾-inch and 1-inch size, privately installed, serving from two to as many as ten homes.

The only street with a water line that would be acceptable by NYS DOH standards is Church Street with a 2000-foot, 6-inch ductile iron line. This main presently has three hydrants located at the beginning, middle and end. Because of the good pressure conditions in the transmission main, this line is capable of providing an adequate fire flow of 750 gpm at 20 psi residual pressure.

The existing facilities for this area are shown on the map in the Appendix C.

A second location of concern in this area is the point just east of the Thruway where the 16-inch main is at its highest elevation before starting a long run downhill to the Village. At elevation 260 the pressure in the main reportedly drops very close or below the minimum desirable

pressure of 35 psi.

B.2 Future Conditions/Recommended Improvements

B.2.1 Future Conditions

Future growth and development within the existing service area will be limited by the steep topography, shallow bedrock and poor soil conditions. Further limits are created by the Catskill Creek to the south and the Town boundary to the north. Projected increases in the population of the area are expected to match growth in the Town's overall average of 1.1 to 1.3 percent. This growth is expected to be fill-in growth as larger lots with one dwelling are subdivided into two lots or very minor subdivisions of less than five lots. The following table provides estimates of projected growth in the Leeds area.

Leeds Population Projections

Year	1980	1990	2000	2010	2020
Leeds	-	-	370	481	577
Town	6735	7275	7457	8332	9215

This residential growth will not create an undue demand on the existing system in this area, nor should the development of any possible commercial or other uses compatible with the present zoning.

B.2.2 Recommended Improvements

Recommended improvements for the Leeds area consist of the replacement of the long, small diameter service lines with adequately sized water distribution mains in the streets.

The NYSDOH has stated that their major concern with any substandard system in the

Town is adequate pressure and flow to meet public health requirements. The need to meet fire flow requirements would be a secondary consideration.

For Church Street a hydraulic analysis concluded that this line has sufficient capacity to meet future demands and provide required fire flows of 750 gpm at 20 psi minimum residual pressure.

For the streets with undersized lines, the recommended improvement is the installation of 6-inch lines.

An analysis of the proposed 6-inch mains for each of the side streets determined that an adequate fire flow of 750 gpm can be maintained with a minimum pressure in the system of 20 psi. The routes of the proposed mains are shown on the map in Appendix C.

The costs associated with these improvements are outlined in the following table.

Leeds Area Improvements				
Street	Size/Length in./ft.	Construction Cost	Engineering & Contingency	Total Cost
Weissel Avenue	6/450	$ 58,000	$17,000	$ 75,000
Park Avenue	6/1,000	$122,000	$37,000	$159,000
Park Lane	6/2,050	$248,000	$74,000	$322,000
Forest Hills Avenue	6/1,150	$139,000	$42,000	$181,000
Engineering and Contingency estimated at 30% of construction cost, some minor savings in engineering could be realized if all improvements are done at one time.				

C. Jefferson Heights Area

C.1 Existing Conditions

This area also began to develop with the construction of the transmission main but has grown in a more organized fashion. This area begins on the east side of the Route 23-23B interchange and extends eastward along Route 23B to the Village boundary. Included in this area are a number of side streets including:

- Ivy Terrace,
- Austin Acres,
- Brooks Lane,
- Country Estates,
- James Place and Locust Park,
- Wild Wing Park,

- Jefferson Avenue
- Sunrise Avenue, and
- Suburban Way (Snake Road).

This area is shown on the map located in Appendix C.

The area is less diverse topographically than Leeds and is relatively flat lying between elevation 150 and 160, with a gradual eastward slope until its easternmost edge slopes down dramatically into the Catskill Creek valley. Land to the south of Route 23B is flat and then abruptly drops steeply to meet the Catskill Creek coming in from the west. Land to the north of Route 23B is relatively flat until it drops off steeply into the Hans Vosen Kill valley.

Growth over the years in this area followed a fairly typical subdivision process. Water mains were installed by builders and dedicated to the Village. The area is zoned primarily Rural Residential/Agriculture and High Density Residential with a 500-foot wide strip along Route 23B from Jefferson Avenue to the Village/Town line designated as General Commercial. The area is predominantly residential with a number of intense institutional uses along Route 23B consisting of three senior care facilities. In addition there are a significant number of commercial and professional offices and two mobile home parks. Land use and water use for this area are summarized in the following table.

Jefferson Heights Lane Use/Water Demand			
Type	Units	GPD	Demand/Use Type
Residential	230	38,630	133
Commercial	25	4,700	187
Lodging	1	1,980	1,980
Institution	3	17,000	5,700

Similar to Leeds, this area is served by the Village's 16-inch transmission main running along Route 23B from the Route 23/23B interchange to the Town/Village boundary. Side streets and neighborhoods are served by a series of 4-inch, 6-inch and 8-inch cast iron or ductile iron

mains branching off the transmission main. These mains are shown on the map in Appendix C.

A pair of static pressure measurements were taken and one hydrant flow test was conducted for this area with results as shown in the following table.

Jefferson Heights - Pressure/Flow Tests			
Location	Elevation	Pressure, psi Static/Residual	Flow, gpm
Brooks Lane at Route 23 Overpass	185	69/15	250
Route 23B and Jefferson Avenue	175	75/NA	NA

This area has several locations where sub-standard facilities are cause for concern. These include:

- Brooks Lane (Route 23B to Locust Park)
- N. Jefferson Avenue (Route 23B to 17 N. Jefferson Avenue)
- Ivy Terrace

The hydrant test performed in Brooks Lane exhibited a pressure drop (69 static/15 residual) that was far greater than would normally be expected for the test flow rate of 250 gpm. The Village reports that this portion of the line is about 45 years old and is not cement lined. It is most likely that this line has become partially blocked by corrosion products and probably cannot provide a fire flow of 750 gpm without experiencing a drop in pressure below the NYSDOH minimum guideline of 20 psi. This very large pressure drop indicates that cleaning of the line is probably not feasible.

A significant portion of line in N. Jefferson Avenue is only 4-inch diameter and about 55 years old according to the Village. Although it is not known if this main has a cement lining for corrosion protection, at 4-inches it is simply too small to provide the 750 gpm fire flow for the homes.

Ivy Terrace is a short side street that has several homes on each side of the street served by two, ¾-inch services.

C.2 Future Conditions/Recommended Improvements

C.2.1 For the Jefferson Heights area, future growth and development will be limited by the poor soils, the Catskill Creek to the south, and the lack of large, available tracts of land. Significant growth could occur in the future if the golf course at the end of Brooks Lane were to be developed.

For this area, a modest growth in population is projected as shown in the following table.

Jefferson Heights Population Projections					
Year	1980	1990	2000	2010	2020
Jefferson Heights	-	-	1,105	1,215	1,335
Town	6735	7275	7457	8332	9215

This modest projection of growth is not expected to create any significant need for improvements.

C.2.2 Recommended Improvements

Recommended improvements for this area consist of replacement of existing lines that are sub-standard as discussed earlier. The proposed improvements are listed in the following table and are shown on the map in Appendix C.

Jefferson Heights Area Improvements				
Street	Size/Length in./ft.	Construction Cost	Engineering & Contingency	Total Cost
Brooks Lane	8/1,300	$156,000	$47,000	$203,000
N. Jefferson Ave.	8/880	$104,000	$36,000	$135,000

Ivy Terrace	6/450	$ 57,000	$17,000	$ 74,000
Engineering and Contingency estimated at 30% of construction cost, some minor savings in engineering could be realized if all improvements are done at one time.				

It is further recommended that a comprehensive program of pressure/flow testing be initiated in the Jefferson Heights area to determine if other lines, that appear to be adequately sized, are corroded and in need of cleaning or replacement.

D. Allen Street Area

D.1 Existing Conditions

The Allen Street Area is a long narrow area that consists of several residential streets located just to the east of NYS Route 9W. The area is bisected into a north portion and a south portion by Route 23. The south portion consists of Allen Street running northward from a low elevation of 60 by the Hans Vosen Kill at the interchange of Route 23B and 9W to a dead end at the south edge of Route 23 at elevation 90. The street is very irregular and winds around rock/out-croppings and small streams. Single family homes line the west side of the street. The area is zoned Highway Commercial, since it abuts the east side of NYS Route 9W,

The north portion consists of three residential streets located within the limits of the Route 23 on/off ramp. These streets are:

- Upper End of Allen Street
- 10th Street, and
- Second Street.

Central Hudson Gas and Electric Corp. maintains a large industrial facility in this area at the north end of Allen Street. This area is shown on the map in Appendix C.

Land use and water use for this area are summarized in the following table.

Allen Street Land Use/Water Demand			
Type of Use	Number	GPD	Demand/Unit
Residential	31	4,650	150
Industrial	1	888	888

This area is served by a single, 1500 foot, 8-inch ductile iron main in Allen Street from the lower end of the portion south of NYS Route 23. The line reduces at this point to 6-inch ductile iron and continues under Route 23 and up Allen Street and then up Second Street about 1,200 feet to the Central Hudson Gas and Electric facility at the north end of the area. A short, 6-inch ductile iron line branches off to serve 10th Street.

A pair of pressure measurements were taken on the main in this area at different times. These are summarized in the table below.

Allen Street - Pressure/Flow Tests			
Location	Elevation	Pressure, psi	Flow, gpm
N. end of Allen St.	128	55	N/A
Hudson Gas & Elec.	146	55/10	500

From the pressure test it can be seen that pressure and flow are just adequate for the homes at the upper end of Allen Street. A flow of 750 gpm would be preferred but 500 gpm is acceptable for a small, isolated neighborhood of single story homes. The pressure drop measured (55 psi static/10 psi residual) at a flow of 500 gpm indicates that very little additional flow is available at this location (possibly 560 gpm) before the residual pressure approaches 0 psi and an undesirable vacuum condition is created in the immediate vicinity. Required fire flows for industrial facilities range, depending on numerous factors (height of building and type of construction, building contents, presence of sprinklers, as well as others), from 1,000 to 3,000 gpm. As the test data indicate, even the lower fire flow is not attainable. Replacement of the 1,200 feet of 6-

inch main would only increase the available flow to 750 gpm.

D.2 Future Conditions/Recommended Improvements

D.2.1 Future Conditions

Future conditions in this area will see little growth due to steep slopes, shallow bedrock and the NYS Route 23 ramps. Existing homes and businesses in or adjacent to the area along NYS Route 9W were present before the reconstruction of Route 23. Some minor commercial growth along Route 9W may occur but will not create any significant demand.

D.2.2 Recommended Improvements

No specific improvements are recommended for this area.

Hydraulic analysis of the existing line demonstrated that the line has experienced some corrosion that has increased the roughness of the interior pipe walls resulting in a greater pressure drop. This line appears to be a suitable candidate for cleaning by"pigging". "Pigging" is a maintenance procedure in which foam swabs (pigs), with an exterior wrapped in abrasives, are forced through the line by water pressure to scrape and clean it. Consideration should be given to implementing this technique during one of the biannual flushing programs. Since it is reported that the 6-inch portion of the line is ductile iron, and therefore cement lined, the lower 8-inch portion is the most likely source of pressure loss. Additional flow tests would confirm this. A significant increase in flow rate could be obtained for a reasonable cost.

E. Landon Avenue Area

E.1 Existing Conditions

The Landon Avenue Area is a single, dead end, street extending almost 0.9 miles directly south from the Village boundary. The street runs along a ridge of open land at

an average elevation of 120 with the south end less than twenty feet lower in elevation. The surrounding area is former farmland with moderate slopes that gradually steepen and drop off to the west towards Mineral Spring Brook and to the east towards Burget Creek. This area is shown on the map in Appendix C.

Growth and development has occurred in a very piecemeal fashion with gradual extensions of the street to serve homes constructed along its length. Located at the north end of the street about 1200 feet south of the Village is a large resort complex that places significant daily and seasonal demands on the water system. The remainder of the area consists of three apartment buildings and 21 homes. The population for this area is estimated to be 83 people.

The area is zoned Rural Residential/Agriculture (RA). There is significant potential for additional homes or minor subdivisions constructed on short cul-de-sac streets or circular drives off Landon Avenue. Land use and water demand are summarized in the following table.

Landon Avenue Land Use/Water Demand			
Type of Use	Units	GPD	GPD/Unit
Residential	21	3,345	159
Recreational	1	5,945	5,945

This area is served by a series of privately constructed lines. The resort is served by a 6-inch ductile iron line that connects to the Village system at the corner of Landon Avenue and Bogardus Avenue.

The apartments and single family homes are served by a separate 2-inch line that also connects to the Village's system at Landon Avenue and Bogardus Avenues and extends the entire length of Landon Avenue. It is reported that a middle portion of this small main is only 1 ½-inch, but its actual length is not known. The specific manner in which all 21 homes and 3 apartments are served by this line is not well documented.

A static pressure test was taken for this area on the hydrant located at Landon Avenue and Bogardus Avenue. No flow test was taken because the existing lines that supply this intersection are 4-inch and 6-inch. The 4-inch line is scheduled to be replaced with an 8-inch line in 2003. The Village furnished flow test data taken in 1995 for the nearby intersection of Bogardus Avenue and Broome Avenue that is representative of the probable flow that will be available at the Landon/Bogardus intersection once the improvements are made. The data are summarized in the following table.

Landon Avenue - Pressure/Flow Tests			
Location	Elevation	Pressure, psi Static/Residual	Flow, gpm
Landon - Bogardus	125	60/ -NA	NA
Bogardus - Broome	119	70/40	750

E.2 Future Conditions/Recommended Improvements

E.2.1 Future Conditions

As indicated above, the Landon Avenue extended area has strong potential for future growth. Several of the parcels, as shown on the map in Appendix C are large enough to support minor subdivisions.

Past growth has been limited by the poor soils, and both on-lot wastewater disposal systems and wells which exhibit very marginal performance. Since technical solutions exist to address the wastewater disposal issue, the more critical restriction is the lack of adequate water supply volume and pressure.

Projected growth for this area if no improvements are made will be negligible. The existing system of small diameter service lines cannot support any further connections, nor should any be permitted.

Projected growth for this area, if the proposed improvement is constructed, is shown in the following table.

Landon Avenue Population Projections					
Year	1980	1990	2000	2010	2020
Landon Avenue	-	-	83	100	115
Town	6735	7275	7457	8332	9215

E.2.2 Recommended Improvements

The recommended improvement for the Landon Avenue extended area is an 8-inch main, beginning at the Village line and extending the entire length of the existing road. From a hydraulic analysis of this proposed line it was determined that a fire flow of 750 gpm could be maintained at the end of the street with a 20 psi residual at the Village line. A similar analysis for a 6-inch line demonstrated that a 6-inch line could not maintain sufficient fire flow at the south end of the street without excessive pressure drop. The hydraulic analysis assumes that improvements proposed by the Village in 2003, for Landon Avenue and Bogardus Avenue are completed.

The following table presents the probable cost for constructing this improvement.

Landon Avenue Improvements				
Street	Size/Length in./ft.	Construction Cost	Engineering & Contingency	Total Cost
Landon Avenue	8/4,800	$600,000	$180,000	$780,000
Engineering and Contingency estimated at 30% of construction cost, some minor savings in engineering could be realized if all improvements are done at one time.				

It should be kept in mind that this installation of this very long, dead-end main will have at least one negative aspect. It is well documented that such mains can experience water quality problems from time to time. During periods of normal domestic demand, the flow of water in the main is slow and the water can become "stale" or lose its "freshness" because the water does move along the main and into the house quickly enough.

F. Highland Avenue Area

F.1 Existing Conditions

The Highland Avenue area consists of two streets located along the southwest Town/Village boundary. The streets are Highland Avenue and the eastern end of Cauterskill Avenue. The municipal boundary line divides Highland Avenue with properties on the west side in the Town and those on the east side in the Village.
Land to the west of Highland Avenue rises steeply to elevation 260 and then drops off steeply. Land to the north also drops off steeply. The elevation for the two streets varies from 155 to 210. Soils in the area are rated severely limited for on-lot wastewater disposal systems. This area is shown on the map in Appendix C.

The area is presently zoned General Commercial but consists of one business, six single family dwellings and eight multi-family dwellings. The estimated population for this area, based on 2000 census data, is 78 people. These land uses and water usage for this area are summarized in the following table.

Highland Avenue Land Use/Water Demand			
Type of Use	Number	GPD	GPD/Unit
Residential	38	3,969	104
Commercial	1	33	33

This area is served by an 8-inch main that loops through an easement from Cauterskill Avenue at the Village line to No. 20 Highland Avenue, runs south in Highland Avenue to NYS Route

23A, and then back eastward in Route 23A to reconnect to the Village system. The existing mains are shown on the map in Appendix C.

One home at the north end of Highland Avenue and three homes on Cauterskill Avenue are connected to the main by long (300-400 feet) ¾-inch service lines.

The Village reports that poor service pressure conditions occur from time to time at those homes located at the high point (elevation 210) in Highland Avenue.

F.2 Future Conditions/Recommended Improvements

F.2.1 Future Conditions

There is almost no growth potential for this area due to steep topography, poor soils and existing land uses (small, occupied lots). For this reason, no meaningful population projections could be prepared.

F.2.2 Recommended Improvements

The poor pressure conditions for this area are caused by the location and high elevation relative to the rest of the system. Higher elevations reduce the available service pressure by 1.0 psi for each 2.3-foot increase in elevation.

Compounding the pressure problems are due to the location of this area at the far end of the system from the 16-inch supply line coming into the Village in Route 23B. As water usage in the system increases the available pressure decreases because all the flow into the system comes in at this one point.

The closure of the Hamburg Reservoir off NYS Route 385 eliminated a secondary source of supply that helped the system meet high demands and maintain better system pressures. It also eliminated a back-up source of water should a main break in Route 23B or problem at the water plant cause a temporary loss of the main supply. The pressure problems for this area cannot be addressed by an improvement, such as a larger main, in this area. The cause is system wide as discussed in the previous paragraph. There are no recommended improvements for this area.

Although beyond the scope of this report, there does appear to be a suitable site for an water storage tank on high ground just west of Highland Avenue. It appears from the topography that land to the west of Highland Avenue is sufficiently high, at elevation 250, to permit construction for a reservoir as opposed to a more expensive elevated tank. A tank in this area would do much to improve the flow and pressure in this portion of the system. During the day, the water would flow out of the tank to meet demand and

pressure; during the night when demand is low the tank would refill. Storage like this, on the system would also allow the water plant to run more efficiently by leveling out the peak demands.

G. Carriage House Road

G.1 Existing Conditions

The Carriage House Road area is a very small cluster of three homes and a small motel on either side of NYS Route 385 immediately adjacent to the Village boundary. This area is part of a ridge of land at about elevation 190 formed by the Hudson River immediately to the east and the Catskill Creek to the west. This ridge is the highest area within the Village. Within this area is the Village's old Hamburg Storage Reservoir, located at about elevation 250, which is no longer in use because its open surface allowed contamination of the treated water that used to be stored there. This area is shown on the map in Appendix C.

This area consists of steeply sloping ground to the west and is fully developed with homes lining both sides of Route 385. The area is zoned Moderate Density Residential on the east side of Route 385 and High Density Residential on the west side.

No meaningful population or water usage data could be developed for this small area.

The four parcels are served by a private 4-inch cast iron main, about 40 years old, that branches off the 10-inch main by the old Hamburg Reservoir and crosses over private property to Carriage House Road. There is no documentation as to how the four properties are connected to the main. There is no fire protection for these properties as the nearest fire hydrant is inside the Village, on the other side of the busy Route 385/Route 23 intersection about 900 feet away.

G 2. Future Conditions/Recommended Improvements

For this small area, no future conditions or recommended improvements are projected. The area has no available land that could be developed.

H. Summary of Areas

H.1 General

As noted in Section I, the Town Board intends to combine all of the service areas into one water district. This section summarizes the data presented under Future Conditions/Recommended Improvements for each of the areas so that an understanding of the total district needs can be reached. The adequacy of the existing Village water supply is discussed and basic specifications for the proposed improvements are listed.

H.2 Summary of Growth and Water Demand

The following table presents the total population growth and water demand in GPD projected for the areas.

Area Summary of Population and Water Demand

Area	2000		2010		2020	
	Population	Demand	Population	Demand	Population	Demand
Leeds	370	21,000	481	36,000	577	43,300
Jefferson Heights	1,015	62,300	1,215	79,000	1,335	87,000
Allen Street	75	5,500	75	5,500	75	5,500
Landon Avenue	83	9,300	100	12,000	115	13,800
Highland Avenue	78	4,000	78	4,000	78	4,000
Carriage House Rd.	12	900	12	900	12	900

TOTALS	1,621	102,100	1,949	136,500	2,180	153,600

Water demand is based on the Village's water records and per capita water consumption estimated from existing demand, and where appropriate, an increase in demand due to improvement in supply and pressure.

The maximum day demand is based on analysis prepared for the Village for their water treatment plant upgrade and is estimated to be 246,000 gallons per day. The peak hour demand is estimated to be 370,000 gallons per day. Total annual consumption for the proposed district would be about 37,230,000 gallons at present and 56,210,000 gallons in the future.

H.3 Summary of Capital Costs

The following table summarizes the probable cost of the recommended improvements for the total district. This total cost of $1,929,000 will be used in the next section to examine how different methods for financing will affect the user costs for individual homeowners.

SUMMARY OF CAPITAL COSTS

Area	Construction Cost (1)	Engineering & Contingency	Total Cost
Leeds			
Weissel Avenue	$ 58,000	$ 17,000	$ 75,000
Park Avenue	$ 122,000	$ 37,000	$ 159,000
Park Lane	$ 248,000	$ 74,000	$ 322,000
Forest Hills Avenue	$ 139,000	$ 42,000	$ 181,000
Sub-Total	$ 567,000	$ 170,000	$ 737,000
Jefferson Heights			
Brooks Lane	$ 156,000	$ 47,000	$ 203,000
N. Jefferson Avenue	$ 104,000	$ 31,000	$ 135,000
Ivy Terrace	$ 57,000	$ 17,000	$ 74,000
Sub-Total	$ 317,000	$ 95,000	$ 412,000
Allen Avenue	0	0	0
Landon Avenue	$ 600,000	$ 180,000	$ 780,000

Highland Avenue	0	0	0
Carriage House Road	0	0	0
Total District	$1,484,000	$ 445,000	$1,929,000

(1) Does not include changes or replacements of house service laterals on private property and assumes that water main replacements will be considered a Type II SEQR action.

H.4 Village Water Supply

The Village water supply consists of the 200-million gallon Potuck Reservoir, a treatment plant rated at 2.0 mgd and a 200,000 gallon clear well.

Current water consumption averages about 1.0 mgd (including water for back washing) with a maximum day demand of 1.3 mgd. The plant has adequate capacity to meet present and future demands for the existing service area.

The Village had a safe yield study prepared in 2001. The accepted conclusion of this study was that the Potuck Reservoir had a safe yield of 1.3 mgd.

The one current weakness in the system is the lack of treated water storage. The closure of the open-top Hamburg Reservoir reduced the reliability of the system. The DOH guideline for storage is to provide sufficient storage volume to meet average day demand for 24 hours plus an appropriate fire demand.

H.5 Basic Outline of Specifications for Improvements

Water mains and appurtenances, including a service connection to the property line to be served, will be installed in the streets as described and as shown on the plan in Appendix A. All construction work will be performed meeting the following brief specifications:

- The system will be constructed of cement-lined ductile iron pipe conforming to current AWWA specifications. It should be noted that the Village prefers to use high-density polyethylene pipe for its water mains and services.

- All hydrants will have a valve opening not less than five inches in size, installed at the end of a 6-inch, ductile iron, valved branch.

- Valves will be resilient wedge in conformance with AWWA specifications.

- Mains will, in general, be installed at a depth of not less than 5 feet from surface to centerline of pipe, and will be tested and sterilized in accordance with AWWA specifications.

- All work will be performed in accordance with currently accepted construction methods.

IV. FINANCING AND USER COSTS

A. General

This section discusses the various methods of financing the district improvements and presents user costs that reflect the various rules and requirements of each method.

The user cost is the annual payment that a typical, average home would have to make to finance the recommended improvements and operate the system. The cost consists of two components, a water tax and a water bill. The water tax provides revenue for payment of annual debt service needed to amortize the monies borrowed to construct the improvements, and is based on assessed values of the properties served by the water system. The water bill provides revenue for the operation and maintenance of the water system. It is based on the quantity of water actually consumed, as measured by a water meter. The two costs together make up the annual user cost as will be discussed in the following paragraphs.

The State Comptroller's Office (SCO) annually establishes a statewide guideline for the maximum affordable user cost above which the Comptroller's Office must review the district formation and give approval. For 2004, the CSO has set this figure at $621.00 per year.

B. Level Debt Service Municipal Bonds

B.1 Water Tax

The first, and most common, method of financing most municipal improvements is level debt service using general obligation serial bonds. The advantage of this method of financing is convenience. A municipality can obtain this type of financing at any time of

its choosing making it suitable for projects that might be very time sensitive. As the name implies the annual payments do not vary over the life of the bond.

For this type of financing, a term of 20 years and an interest rate of 6.0 percent is quite typical.

The table in the appendix shows the annual payment necessary for each area as well as the total district, to amortize the debt with this type of financing.

The revenue to pay the annual debt service is typically generated through the use of an ad valorem tax. The tax is only assessed against those properties that are included in the water district and therefore receive a benefit from the water system. As noted in Section I, the properties that are to be included in the water district are those that are presently served by the water system but are not in an existing water district.

The following proposed table shows the current total assessed value (AV) for the district, as well as the AV attributed just to the homes in the district. Based on the number of homes from the Town's property tax roll and the residential AV, the average AV for a home in the district is calculated and presented. The tax rate in dollars per $1000 of AV, is computed and shown in the table, by dividing the annual debt service required by the total AV. Knowing the average AV for a typical home and the tax rate allows the annual tax for a typical, individual home to be calculated. The average annual tax per home, for this financing method, as shown on the table is $205.32.

It should be kept in mind that:

- depending on the finance method chosen and manner in which the debt repayment schedule is structured, annual debt service may vary which will make the annual tax rate vary,

- these estimates of AV, tax rate, and annual tax are only valid for the first year of operation of the newly formed water district, assessed values will change in

subsequent years creating a different average value and tax rate, and higher or lower tax bill;

- the estimated tax shown represents an average home (calculated mathematically) and any actual home with a higher or lower assessment will have a correspondingly higher or lower tax.

- commercial, industrial and other properties will be taxed based on the same rate but will receive a higher or lower tax bill based on the value of their assessment.

B.2 Water Bill

The water bill as previously discussed provides revenue for the daily operation and maintenance of the system. It is based on the water measured by the water meter at the customer's service connection. The billing rate is set, based on the cost to produce and distribute treated water, so that sufficient income is generated for operational expenses and leave a little left over to be set aside for emergencies.

To compute the water bill portion of the user cost, an estimate of the average water consumption, by the typical home, is prepared and is multiplied by the appropriate billing rate. The long-term water consumption record for the Village and Town was analyzed and a consumption rate of 75 gallons per capita was determined. Using the census data of 2.42 persons per home results in an average home consumption of 181.5 gallons per day. This figure is considered representative and conservative because the review of water billing records for the first quarter of 2003 determined that most homes in the area average a daily consumption of between 104 and 159 gallons per day. It is also expected that usage will increase once the improvements are installed because of higher service pressures. Using a figure of 180 gallons per day, the average home would require about 65,700 gallons per year.

The water billing rate is set by the Village for service outside the Village at $5.00 per unit (one unit = 750 gallons). At this rate, the annual bill for water for the average home can

be estimated to be $438 per year. This annual cost is shown in the table. Obviously for a home or property that uses more or less water, the water bill will vary.

B.3 User Cost

The user cost for the average home, for this method of financing, is the sum of the debt service and the user cost. For this method of financing, the annual user cost for the average single family home, shown in the table is $643.32. This value s above the SCO guideline number for affordable user vost for new districts.

DEBT SERVICE AND USER COST FOR PROJECT COST OF $1,929,000								
LEVEL DEBT SERVICE FINANCING WITH MUNICIPAL BOND								
Debt Service $	Total AV $	Homes AV $	No. of Homes	Average Home AV	Tax Rate $/$1000 AV	Water Tax Per Home	Annual Water Bill	Annual User Cost
$168,170	74,207,700	$36,813,600	407	$90,451	$2.27	$205.32	$438.00	$643.32

C. Low-Interest State Revolving Fund Loan

C.1 Water Tax

The New York Drinking Water State Revolving Fund (NYDWSRF) makes low interest loans to municipalities for water system improvements. This is a self-supporting fund, as the money is paid back from one community it is loaned out to another. The low-interest rate is one-third percent below the municipal bond market rate at the time the loan closes. The state is able to offer the reduced rate by pooling the loans, to several communities, into a large package that attracts a better rate from the municipal bond market.

The drawback to these loans is that they are offered only twice per year on a regular schedule so a community must schedule its project to conform to the NYDWSRF semi-annual loan closings. A bigger hurdle to a community wishing to avail themselves of this funding is the fact that there are more projects than there are funds so the loans are awarded on a competitive basis. Projects are submitted to the NYDWSRF, reviewed, and assigned a score based on the types of problems the project is designed to address. Semi-annually the NYDWSRF selects the highest scoring projects for funding with the monies that are available for that year. The fund was created to primarily address water quality deficiencies created by the more stringent water treatment regulations enacted by the EPA for turbidity and organic compounds.

Unfortunately, projects of the type being considered here do not receive high scores and often must wait a significant number of years to receive funds. The NYDWSRF is currently making these 20-year loans at about 2.5 percent. To be a little conservative, a figure of 3.0 percent has been used to show the costs associated with this financing.

The debt service for this financing method is $129,667 and is shown in the table following this discussion. The discussion of the average assessed value, presented in IV.B.1 for standard municipal financing is also applicable here and will not be repeated. The water tax for this option is $158.29 per year.

C.2 Water Bill

The development of the water bill under this financing option follows the same methodology presented in IV. B.2 and thus will not be repeated here. The water bill, as shown in the table, for the average home in the district is $438.00 per year.

C.3 User Cost

The user cost discussion presented in IV. B.3 contains the same elements for consideration. As presented in the table, the average home user cost for this method of financing is $596.29 per year.

DEBT SERVICE AND USER COST FOR PROJECT COST OF $1,929,000								
LEVEL DEBT SERVICE FINANCING WITH LOW-INTEREST SRF LOAN								
Debt Service $	Total AV $	Homes AV $	No. of Homes	Average Home AV	Tax Rate $/$1000 AV	Water Tax Per Home	Annual Water Bill	Annual User Cost
$129,667	74,207,700	$36,813,600	407	$90,451	$1.75	$158.29	$438.00	$596.29

D. Low-Interest NYDWSRF Hardship Loan

D.1 Water Tax

Along with their basic loan program, the NYDWSRF has a program that uses a portion of the appropriated monies to fund projects that will require such a high debt service that their associated user cost will impose a hardship on the homeowners. If a project is determined to be a hardship, the standard NYDWSRF loan term of 20-years and interest rate is adjusted until the user charge meets the NYDWSRF guidelines for affordability. For this analysis a 30-year term and 3 percent interest rate will be fairly representative.

The NYDWSRF has rules and guidelines for calculating what the maximum acceptable user cost is. The NYDWSRF maximum user charge should not be confused with the SCO maximum user charge, they are not the same. The NYDWSRF user charge is based on census data for the median household income or an actual income survey of the homes in the proposed district. The SCO guideline is based on state wide data.

One of the rules the NYDWSRF uses is to calculate the debt service using the 50 percent rule of the NYS finance law. This rule allows a community to schedule how the loan amount is repaid. The law's requirement is that the amount of principal paid on the loan in any year must not be more than 50 percent greater than the lowest amount of principal paid in any year of the loan. The interest each year is paid on the outstanding balance of the loan. The advantage to this financing method is the flexibility it permits. A community can organize the repayment schedule around other debt service needs or to keep the annual payments low for the first few years. The disadvantage is that principal

is not paid off as quickly and interest costs are more. The following table outlines the costs for this type of financing. The calculation of the water tax follows the same methods outlined in IV.B.1. With financing following the 50 percent rule the annual water tax for the average home, is $132.96.

D.2 Water Bill

The water bill for this method remains the same as for the other financing options at $438.00 per year for the average home.

D.3 User Cost

The user cost, under this financing method, is calculated as with the other methods by adding the water tax component and the water bill component to get the user charge for the average home. For this finance option the annual user charge varies from $487.24 to $570.96, as shown in the table. This user charge would be compared to the maximum allowable user charge calculated by the NYDWSRF formula based on the median household income to determine the Town's eligibility for hardship funding.

DEBT SERVICE AND USER COST FOR PROJECT COST OF $1,929,000								
LEVEL DEBT SERVICE FINANCING WITH LOW-INTEREST HARDSHIP								
Debt Service $	Total AV $	Homes AV $	No. of Homes	Average Home AV	Tax Rate $/$1000 AV	Water Tax Per Home	Annual Water Bill	Annual User Cost
$109,310	74,207,700	$36,813,600	407	$90,451	$1.47	$132.96	$438.00	$570.96

E. Financing with NYDWSRF Interest-Free Hardship Loan

E. 1 Water Tax

In extreme hardship cases, the user charge is so onerous that the NYDWSRF reduces

the interest on the loan to 0 percent. In this case the debt service is easily calculated by dividing the principal amount by the term of the loan. For this discussion, the most favorable terms available (30 years at 0 percent) will be used to present the best case. As presented in the table, the debt service for this method of financing is $64,300.

The determination of the average home AV and tax rate remains the same as discussed under IV. B.1. For this financing method, the annual water tax for an average home is $78.69. This is the lowest water tax figure of any of the four financing options and reflects the lower debt service required by the interest-free loan and 30-year term.

E.2 Water Bill

The water bill remains unchanged for this option at $438.00 per year for the average home in the district.

E.3 User Cost

The user cost shown in the table for this option and is $516.69 and is computed in the same manner as discussed above.

DEBT SERVICE AND USER COST FOR PROJECT COST OF $1,929,000								
FINANCING WITH 30-YEAR, 0% INTEREST SRF HARDSHIP LOAN								
Debt Service $	Total AV $	Homes AV $	No. of Homes	Average Home AV	Tax Rate $/$1000 AV	Water Tax Per Home	Annual Water Bill	Annual User Cost
$164,300	74,207,700	$36,813,600	407	$90,451	$0.87	$78.69	$438.00	$516.69

V. PROJECT IMPLEMENTATION

The Town of Catskill has held discussions with the Village of Catskill and has determined that it is necessary to create a water district to serve those areas of Town not already in a legal

district. The scope of the proposed water district has been determined, and this :map, plan and report: is submitted to provide the basis for legally forming "Water District No. 3 - Consolidated District". The following procedures will be required for progressing this project:

1. The Town Board must review the map, plan and report, and determine a course of action;

2. The Town Board and Village must develop an agreement as to ownership of the portions of the system in the Town and negotiate a contract for operation and maintenance;

3. Acceptance and filing of the map, plan and report and the scheduling of a public hearing in accordance with the appropriate requirements of the Town Law. The procedure can be initiated by the filing of a petition (Article 12) by property owners within the proposed district limits, representing at least one half of the total assessed value of property within the district area;

   This procedure can also be conducted under that provision of the Town Law (Article 12A) which would make approval of the extension subject to a 30-day Permissive Referendum, during which time if no petition demanding an actual vote is received, the project would be approved by the Town Board in the manner prescribed by the Law. The Permissive Referendum method is recommended for this district formation.;

4. Town Board action approving or disapproving the proposed district subsequent to the Public Hearing;

5. Upon affirmative Town Board action, the submission of an application for approval of the district to the New York State Department of Environmental Conservation (Water Resources). The approval of the project by the State Department of Audit and Control will not be required.

We trust that this report will provide adequate details for your consideration at this time. We would be pleased to furnish any additional information which you may require or to discuss these matters with you in more detail at any time.

DEBT SERVICE AND USER COSTS							
AREA							
	Leeds	Jefferson Heights	Allen Avenue	Landon Avenue	Highland Avenue	Carriage House	District Total
Capital Cost	$ 737,000	$ 412,000	0	$ 780,000	0	0	$ 1,929,000
(1) Debt Service (30 yr/6%)	$ 53,543	$ 29,932	0	$ 56,667	0	0	$ 140,142
(2) Debt Service (30 yr/3%)	$ 37,602	$ 21,020	0	$ 39,796	0	0	$ 98,418
(3) Debt Service (30 yr/3%)	$ 41,763	$ 23,347	0	$ 44,200	0	0	$ 109,310
(4) Debt Service (30 yr/0%)	$ 24,567	$ 13,733	0	$ 26,000	0	0	$ 64,300
Assessed Value (AV)							
Total AV	$ 12,103,018	$ 48,016,605	$6,714,677	$5,492,100	$1,288,100	$ 593,200	$74,207,700
Residential AV	$ 7,337,500	$ 25,222,800	$1,486,800	$1,849,800	$ 658,500	$258,200	$36,813,600
Homes	101	251	28	18	6	3	$ 407
Avg. Residential AV	$ 72,649	$ 100,489	$ 53,100	$ 102,767	$ 109,750	$ 86,067	$ 90,451
Ad Valorem Tax $/$1000							
(1) Tax Rate (30 yr/6%)	$ 4.42	$ 0.62	0	$ 10.32	0	0	$ 1.89
(2) Tax Rate (30 yr/3%)	$ 3.11	$ 0.44	0	$ 7.25	0	0	$ 1.33
(3) Tax Rate (30 yr/3%)	3.45	$ 0.49	0	$ 8.05	0	0	$ 1.47
(4) Tax Rate (30 yr/0%)	$ 2.03	$ 0.29	0	$ 4.73	0	0	$ 0.87
(1) Avg. Annual Tax/Home	$ 321.11	$ 62.30	0	$ 1,060.55	0	0	$ 171.92
(2) Avg. Annual Tax/Home	$ 225.93	$ 44.22	0	$ 745.06	0	0	$ 120.30
(3) Avg. Annual Tax/Home	$ 250.64	$ 49.24	0	$ 808.94	0	0	$ 132.96
(4) Avg. Annual Tax/Home	$ 147.48	$ 29.14	0	$ 475.31	0	0	$ 78.69
(5) Avg. Annual Water Bill	$ 438.00	$ 438.00	0	$ 438.00	0	0	$ 438.00
(1) Avg. Annual User Cost	$ 759.11	$ 500.30	0	$ 1,498.55	0	0	$ 609.42
(2) Avg. Annual User Cost	$ 663.93	$ 482.22	0	$ 1,183.06	0	0	$ 558.30
(3) Avg. Annual User Cost	$ 688.64	$ 487.24	0	$ 1,246.94	0	0	$ 570.96
(4) Avg. Annual User Cost	$ 585.48	$ 467.14	0	$ 913.31	0	0	$ 516.69

(1) Level debt service financing w/ typical municipal bond.

(2) Level debt service financing w/ low-interest SRF loan.
(3) 50% rule financing w/ low-interest SRF loan 1st year only.
(4) Level debt service financing w/ 0%-interest SRF hardship loan.
(5) Based on 75 gpcd and 2.42 persons per home.