Town of North Castle, NY

Water System Capacity Study

Water District No. 4

November 2016

WATER SYSTEM CAPACITY STUDY

WATER DISTRICT NO. 4

TOWN OF NORTH CASTLE, NY

Prepared for

TOWN OF NORTH CASTLE, NY

Prepared by

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One Remington Park Drive
Cazenovia, NY 13035

November 2016

Project No. 11134206

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1. Executive Summary

The Town of North Castle Water District No. 4 does not have sufficient supply capacity to meet maximum day demand as required by the New York State Sanitary Code and is relying on existing storage capacity to meet that demand. The District has made a substantial effort to identify new water supplies and continues to evaluate ways to increase supply by developing new water sources as well as the potential to reduce demand through water conservation methods.

The existing storage capacity is adequate for the volume needed for fire flow up to 4,400 gallons per minute for a three-hour fire concurrent with a peak hour demand plus two hours of maximum day demand.

The system is provided with only one storage tank. Since the system lacks sufficient supply capacity to operate without the tank, the capability to maintain the tank is impaired.

This study evaluated water demand, supply, and storage capacity. The distribution system is not associated with frequent problem reports. It is of relatively new construction and was built in accordance with recent standards. Thus, evaluation of the distribution system was not included in the scope of this study.

2. Introduction

2.1 Background

The Town of North Castle Water District No. 4 (WD4) serves downtown Armonk, Business Park, and IBM. WD4 also supplies water to Water District 5 and 7 (WD5 and WD7). Water is currently supplied from two operating wellfields. An additional wellfield exists but is currently not in service. WD4, WD5, and WD7 are all served by one 1 million gallon (MG) storage tank.

2.2 Purpose of Study

The purpose of this study is to evaluate existing system demands and the capacity of existing supply and storage facilities, and to document the findings in a written report that may be utilized by the District for planning purposes.

2.3 Scope of Study

1. Collect and review data provided by the District:
   a. Water meter records (five years) of pumping (production) and customer meters (sales).
   b. Map(s) of the distribution system.
   c. Existing engineering and hydrogeology reports.
   d. Existing pump data including nameplate data, performance curves, and controls description.
   e. Storage tank data including volume, setpoints, inspection reports, and maintenance history.
   f. Existing Insurance Services Office (ISO) or Town fire flow testing reports.
   g. Records of problem and repair history.
   h. Water supply permits and agreements as applicable.
2. Determine existing average daily and maximum day demands.
3. Estimate future projections of average daily and maximum day demands based on potential development as projected by the Town.
4. Evaluate the adequacy of existing storage capacity to meet peak hour demand during a fire (needed fire flow provided by ISO or the Town).
5. Evaluate the existing system redundancy with respect to the *Recommended Standards for Water Works.*
6. Compare pumping records to metered sales and quantify unaccounted-for water.
7. Summarize the existing and potential supply capacity (well yield) based on existing engineering and hydrogeology reports to be provided by the Town of North Caste.
8. Evaluate the capacity of the system with respect to meeting existing and projected future demands. Evaluation of distribution piping capacity (level of service) will require system modeling and/or flow testing and is not included in this study.

9. Recommend alternatives to meet demands.

10. Prepare a written report summarizing the above data and evaluations.

2.4 Description of Existing Water System

WD4 presently serves 402 residential and commercial service connections, located predominantly in downtown Armonk. WD4 also supplies water to WD5 (118 service connections) and WD7 (29 service connections) including the Wampus and Crittendon schools.

The water is supplied by groundwater from a compilation of smaller systems that were originally developed for different needs. In 1960 and 1963, International Business Machines (IBM) developed a wellfield in the Wampus River aquifer to supply potable water to the IBM office facility. In 1988, the United States Environmental Protection Agency (USEPA) constructed two wells on School Street to provide potable water to residential and commercial properties located in downtown Armonk. This was done in response to contamination of local groundwater and individually owned wells from chlorinated solvents, which are believed to have originated from dry cleaning facilities that operated in the area. WD4 also includes two wells located at Whippoorwill Ridge which were installed by the developer to provide potable water for the District as a condition of approval for the subdivision. The wells at Whippoorwill Ridge are currently out of service.

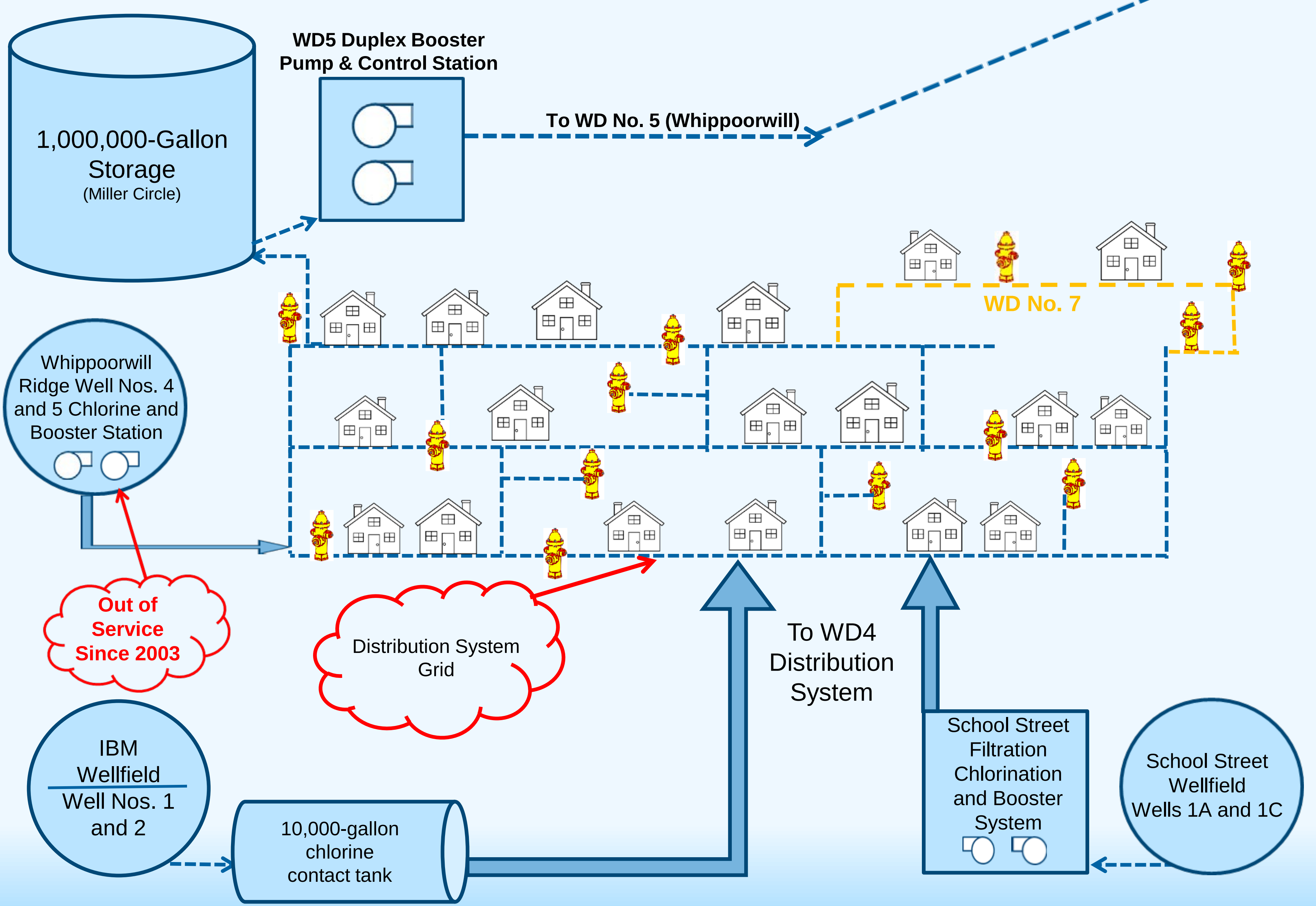
Table 1 presents a summary of key milestones in the development of the District.

Table 1 Historical Development of WD4

Date	Milestone
9/30/1991	WD4 start-up
5/7/1996	Whippoorwill Ridge start-up
7/20/1998	1 MG tank added to system
9/14/1998	IBM wells added to system
10/15/1998	Booster system added to School Street
2/2/2000	WD5 connected to WD4
6/1/2001	WD7 connected to WD4
6/1/2003	Whippoorwill Ridge wells shut down

These small water supply systems are currently operated and managed by the Town Water Department for the benefit of WD4. Additional detail pertaining to these water supplies is provided in Section 3 of this report. A schematic of WD4 is shown in Figure 1.

Figure 1 - Water District No. 4 Existing System



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3. Existing Water System Supplies

3.1 IBM Wells

There are two wells located on Town-owned property in Wampus Brook Park. The park and wells were formerly owned by IBM, and the wells provide most of the water supplied to the District. The IBM wellfield consists of two gravel-packed wells, currently identified as IBM Well Nos. 1 and 2. These wells were originally installed in 1960 and 1963, respectively. They are approximately 75 feet apart and are screened from about 105 to 120 feet below grade. The wells were initially rated to produce 250 gallons per minute (gpm) with the original 25 HP pumps.

In 2000 (Well No. 2) and 2001 (Well No. 1), the 25 HP pumps were removed and a video inspection of each well was conducted. Although the well screens showed evidence of biofouling, the video records did not indicate that the structural integrity of the screens would lead to collapse. At that time, eight-hour step pumping tests were conducted to determine the potential yield. The results indicated a long-term safe yield of 350 gpm for Well No. 1 and 400 gpm for Well No. 2. The video log for Well No. 1 indicated the redeveloped well screen was clean of visible biogrowth; however, very little gravel pack was observed between the slot openings. This is indicative of poor gravel pack due to installation or degradation over time.

3.1.1 IBM Well No. 1

IBM Well No. 1 (also known as South Well) was constructed with an 18-inch outer diameter casing and a 14.5-inch diameter, 110-slot Everdur bronze Johnson well screen set from 105 to 115 feet below grade and a No. 125 slot screen from 115 to 120 feet below grade. The annular space around the well screen is a gravel pack of about 2.5 inches to 1/8-1/4 Cape May gravel.

The initial testing of this well in 1960 demonstrated a yield of 300 gpm. It was equipped with a 25 HP shaft turbine pump rated at 250 gpm. In 2001, the well was redeveloped using mechanical and chemical methods. During the 2001 rehabilitation, a step pumping test indicated a yield of 350 gpm. The 25 HP pump was replaced with a 40 HP Peerless lineshaft turbine pump.

IBM Well No. 1 was again redeveloped in 2011 using mechanical and chemical techniques. The well screen was identified as having a high degree of biofouling. During this rehabilitation, the well was relined and a new screen was installed (90-slot stainless steel from 98 to 103 feet below grade). The annular space between the original screen, which remained in place, and the new screen was filled with Cape May No. 4 gravel pack. A 1.4-foot, 12-inch x 18-inch packer was installed on top of the riser to provide a seal against the inside of the 18-inch casing. New parts were installed below the existing 40 HP Peerless lineshaft turbine pump. Following the redevelopment, pumping tests were conducted which indicated that IBM Well No. 1 can be pumped at a safe, long-term yield of 350 gpm.

3.1.2 IBM Well No. 2

IBM Well No. 2 (also known as the North Well) was installed in 1963 and constructed with an 18-inch outer diameter casing and a 14.5-inch diameter, 110-slot Everdur bronze Johnson well screen set from 107 to 122 feet below grade. The annular space between the casing and the screen is a gravel pack of about 2.5 inches of 1/8-1/4-inch Cape May gravel.

In 2010, the well was relined with a 12-inch diameter, 90-slot stainless steel high flow Johnson screen. The new screen extends 18 feet from the bottom of the existing well with 7 feet of 12-inch diameter stainless steel tight wind wire wrap screen riser above the high flow 90-slot screen. The annular space between the older and newer screen was filled with Cape May No. 4 gravel. A 12-inch x 18-inch packer was installed on top of the riser to provide a seal against the inside of the 18-inch casing.

In 2016, the well was again rehabilitated by chemical and mechanical methods. A new 50 HP pump was installed as well as a new depth gauging system.

Initial testing of this well in 1963 demonstrated it was capable of yielding 300 gpm. An eight-hour step test in 2000 indicated the maximum long-term safe yield was 400 gpm. Following rehabilitation in 2010, pumping test data indicated the well was capable of yielding 400 gpm for an extended period of time. Subsequent to the 2016 redevelopment activities, pumping tests indicated the specific capacity achieved was about 360 gpm, which is 10 percent less than that documented following the previous redevelopment in 2010.

The IBM wells cannot be operated simultaneously. This limits the production rate to 350 gpm with the largest well out of service. The wells are located in close proximity to each other such that the cone of depression resulting from groundwater drawdown for one well interferes with the other, creating a condition where the wells “compete” with each other for capacity. The IBM well system is equipped with a chlorination system and a buried 10,000-gallon baffled contact tank that was installed in 2013 as a requirement of the Health Department. The 10,000-gallon chlorine contact tank provides sufficient contact time only when one pump operates. There are engineered controls, including a pump interlock and a flow restricting orifice plate, that function to maintain sufficient contact time. Further, the existing electrical service provides sufficient capacity to operate either the 40 HP or 50 HP well pump, but not both at the same time.

In 2015, the District began adding polyorthophosphate as a sequestering agent for iron and manganese. This has been effective in mitigating concerns associated with iron and manganese.

3.2 School Street Wells

There are two wells located on Town-owned property on School Street, installed in 1988 by the USEPA in response to contamination identified in residential and commercial wells located in downtown Armonk. The source of the contamination is believed to be from dry cleaning facilities and gas stations that operated in the area.

The School Street wells are equipped with four greensand filters and two activated carbon adsorption columns. This equipment was installed when the wells were constructed to mitigate potential contamination from the USEPA clean-up site in downtown Armonk. The sand filter and the carbon system are currently maintained in service. The capacity of the treatment system limits production to 100 gpm.

The School Street well system is also equipped with two 30,000-gallon hydropneumatic tanks. The tanks, which are pressurized by an air compressor, were installed as part of the original well system to regulate system pressure and provide storage. They are no longer needed to maintain system pressures since the 1 MG water storage tank is now connected to the system. However, the hydropneumatic tanks remain necessary to provide sufficient backpressure on the well pumps and serve as a reservoir for booster pumps located downstream and for backwash water to maintain the filtration systems. Well WD4-1 (also known as Well 1A) is a bedrock well that had an original reported yield of 120 gpm. In 1988, a pump test identified a sustained yield of 100 gpm.

Well WD4-2 (also known as Well 1C) is a sand and gravel well located approximately 20 feet from Well 1A. It is screened in sand and gravel from approximately 46 to 64 feet below grade. The well screen is 10 inches in diameter with a 0.25-inch slot size and is surrounded by 3 inches of 0.25-inch Morie gravel pack. A 72-hour pumping test was performed in 1988 and a sustained pumping rate of 135 gpm was identified. In recent years, a decrease in well yield has been observed.

In 2015, WD4-2 was redeveloped. Prior to rehabilitation activities, the well was sampled and tested for the presence of nuisance bacteria. Iron and sulfate reducing anaerobic bacteria were identified as present in the well, suggesting that biofouling may have played a role in the decline in yield. Well WD4-2 was rehabilitated utilizing mechanical surging and chemical treatments with acid, polymer dispersant, and sodium hypochlorite. A new 7.5 HP pump was installed at 49 feet from the top of the well. New level monitoring equipment was also installed.

Following redevelopment of the well, a step drawdown test was conducted. The specific capacity was determine to be 4.52 gpm/ft after 30 minutes of pumping at 137 gpm. This is about 90 percent of the specific capacity determined in the 1988 pumping test, which was 5.06 gpm/ft after 30 minutes of pumping at 135 gpm. This was the first redevelopment effort for the well.

3.3 Whippoorwill Ridge Wells

Two bedrock wells, WD4-4 and WD4-5, are located at the Whippoorwill Ridge subdivision. Both wells were drilled in 1988. Their initial yields were 37 and 65 gpm, respectively. In 2014, efforts were made toward rehabilitation of WD4-5, including “fracking” the well and replacement of the pump. There was no improvement to the yield of the well, which is currently about 40 gpm

WD4-4 and WD4-5 are currently out of service due to concerns related to iron and manganese in the water. The District is currently evaluating the implementation of chemical addition to mitigate iron and manganese and return the wells to active production.

A summary of the existing water supply wells for WD4 is shown in Table 2.

Table 2 Existing Water Supply Wells for WD4

Well	Current Status (In or Out of Service)	Most Recent Redevelop-ment	Original Yield	Recent Yield and Year Tested	Current Yield Based on Pumping Records	Well Type
IBM No. 1	In	2011	350 gpm	350 gpm, 2011	340 gpm	Overburden
IBM No. 2	In	2016	400 gpm	400 gpm, 2016	360 gpm	Overburden
WD4-1	In	Not redeveloped	120 gpm	100 gpm, 1988	--	Bedrock
WD4-2	In	2015	135 gpm	135 gpm, 2015	--	Overburden
WD4-4	Out	Not redeveloped	37 gpm	Out of service	Out of service	Bedrock
WD4-5	Out	2014	65 gpm	40 gpm, 2014	Out of service	Bedrock

3.4 Existing Water Storage

WD4 is equipped with a 1 MG steel ground storage tank located in the Whippoorwill Hills residential subdivision. The tank was constructed in 1998. It is 81 feet in diameter and 28 feet high. The tank is equipped with cathodic protection to mitigate corrosion. Level sensing instrumentation in the tank communicates with the well pumping stations. When the water level in the tank reaches 23.0 feet, a start signal is sent to the pumps. The pumps will run until a stop signal is sent when the water level reaches 25.5 feet.

The tank was inspected 2012 and a remotely operated underwater vehicle was utilized to record a video of the tank interior. The tank was judged to be in good overall condition and OSHA compliant. Some recommendations for cleaning and general maintenance were made at that time.

3.5 System Control

Control of the system is based on the level in the 1 MG storage tank which is communicated to the wellfields by radio telemetry. When the level drops to the “pump on” setpoint of 23.0 feet of water depth, one of the IBM well pumps is activated. The pump will run until the tank level reaches the “pump off” setpoint of 25.0 feet.

The School Street well pumps are controlled by a level signal from the two 30,000-gallon hydropneumatic tanks at the wellfield. The School Street booster pumps are controlled by the level in the 1 MG tanks.

4. Water Demands

Demand data can be derived from records of metered sales to customers or from records of production. Typically, production may be anticipated to exceed metered sales. The difference is referred to as “unaccounted-for” water.

4.1 Water Pumping Records

In recent years, the water supply for WD4 has been from groundwater supplied from four wells at two locations. Pumping is metered and data is recorded. Thus, the maximum day production may be identified directly from the data. Since the data indicates an increasing demand over the period 2011-2015, pumping records for 2015 were evaluated to identify average daily demands to be representative of current conditions.

Maximum day demand is estimated based on the maximum pumping (production) rate plus the change in storage. For WD4, when the maximum day occurred, the pumps ran continuously and produced 648,000 gpd. The storage tank was observed to drop to a level of 15 feet. It is estimated that 8 feet of storage (308,000 gallons) was utilized in addition to the water produced. On this basis, the maximum day demand can be estimated to be 960,000 gallons.

The peak hour demand is estimated by applying a peaking factor of 2x to the maximum day demand data. The value of the peaking factor is based on the experience of the engineer. Demand based on well pumping data is presented in Table 3. Estimated values are rounded.

Table 3 Demands Based on Pumping Records, 2015

Average Daily Demand	Estimated Maximum Day Demand	Estimated Peak Hour Demand
381,111 gpd	960,000 gpd	1,900,000 gpd (80,000 gph)

4.2 Water Sales Records

Water is metered at the point of service. Since consumer meters are read on a quarterly basis, demand characterizations based on shorter durations (i.e., peak hour, maximum day, maximum month) must be estimated. Meter data for the period 2011–2015 is summarized in Table 4.

Table 4 Demand Based on Metered Sales, 2011-2015

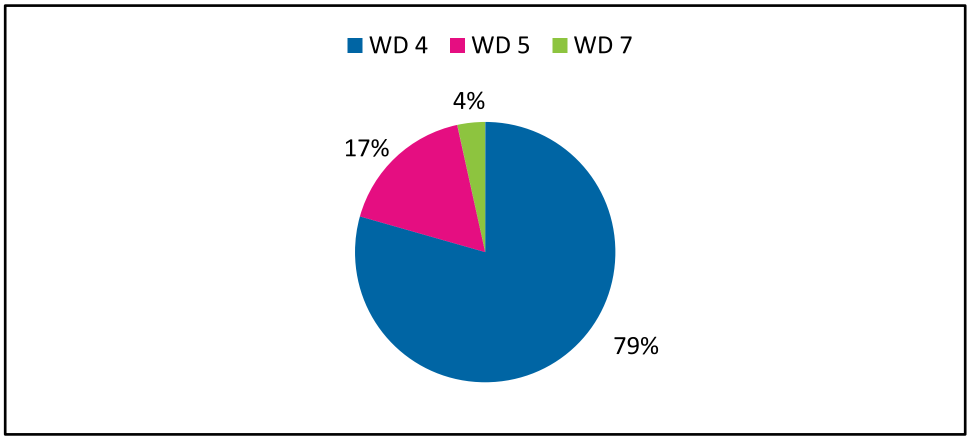
Customer	Average Daily Demand	
	2011-2015 (gpd)	2015 (gpd)
WD4	300,689	347,518 (1)
WD5	64,860	72,907
WD7	13,048	12,598
TOTAL	**378,597**	**433,023** (1)

(1) Includes IBM facility average daily demand of 101,709 gpd.

The IBM facility is the largest single customer in WD4, with an average daily demand of 101,709 gpd (2015).

Figure 2 presents a graphic representation of the distribution of metered sales demand by District.

Figure 2 Metered Sales, 2011-2015



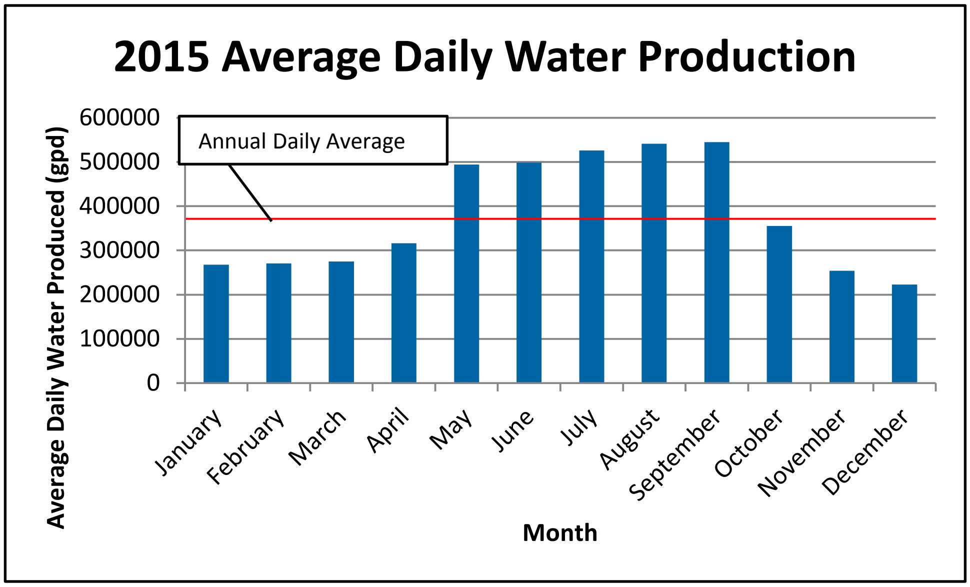
4.3 Unaccounted-For Water

The data for metered sales was compared to the data for water production. No unaccounted-for water issues were identified for the distribution system. This is consistent with the understanding that the distribution system piping is in good condition.

4.4 Seasonal Variation in Demand

Figure 3 presents the volume of water produced per month for 2015. As shown, the WD4 water demand data demonstrates a seasonal variability. The significant increased demand during the period May through September is most likely due to water being utilized for irrigation and swimming pools.

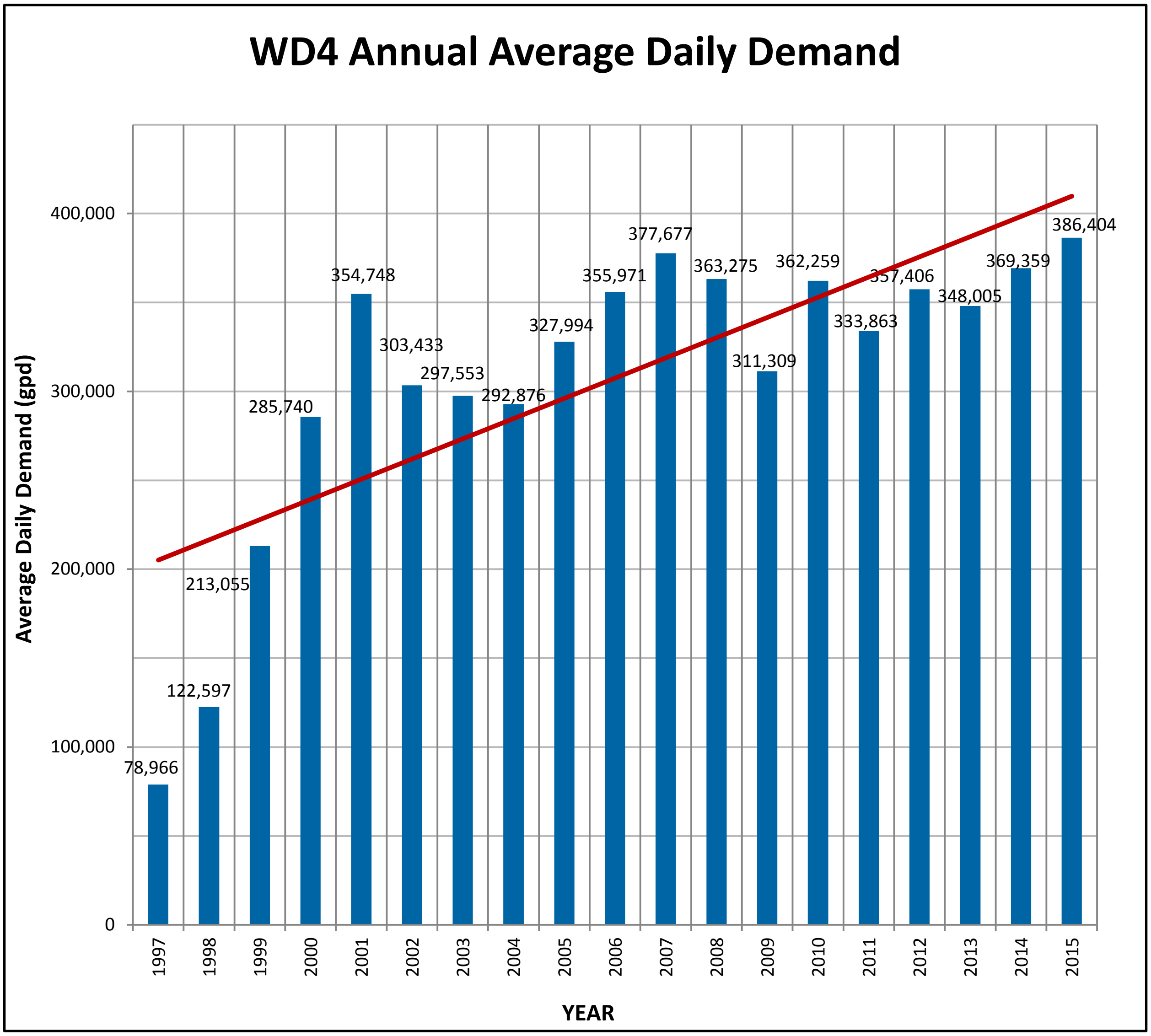
Figure 3 2015 Monthly Water Production



4.5 Future Demands

As indicated in Figure 4, water demand in WD4 has been on an increasing trend. Current and future requests for development should be carefully considered with respect to the associated water demand.

Figure 4 WD4 Average Daily Pumping Data, 1997-2015



5. Water System Capacity Evaluation

Based on the current capacity of the wells in service and the limitations on well pumping described in Section 3, the water production capacity of the existing system is estimated to be 450 gpm, or about 648,000 gpd. As discussed in Section 4, production and storage records indicate the maximum day demand has been 960,000 gpd.

The NYS Sanitary Code requires that “the total developed groundwater source capacity, unless otherwise specified by the reviewing authority, shall equal or exceed the design maximum day demand with the largest producing well out of service” (*Recommended Standards for Water Works,* Article 3.2.1.1). Based on this standard, WD4 has a production capacity deficit of about 312,000 gpd and does not currently conform to the standard.

The District has made substantial efforts toward locating additional water supplies. Some of this effort is documented in a memo from the Town’s hydrogeologic consultant, Leggette, Brashears & Graham, Inc. (Appendix A).

5.1 Water Storage

Storage facilities should have sufficient capacity to meet domestic demands, and fire flow demands where fire protection is provided (*Recommended Standards for Water Works*, Article 7.0.1). Also, fire flow requirements established by the ISO should be satisfied where fire protection is provided.

The adequacy of storage was evaluated by considering the conservative case of the need for fire flow during a peak hour demand period. ISO testing was conducted for WD4; however, needed fire flow recommendations were not provided. The fire flow demand was based on ISO recommendations for typical residential fire protection and considered a 2-hour event with 1,500 gpm fire flow plus 1 hour at peak hour demand plus 1 hour at maximum day demand.

The storage capacity evaluation is summarized in Table 5.

Table 5 Evaluation of Required Storage

Parameter	Estimated Water Volume (gallons)
Fire flow (1,500 gpm for 2 hours)	180,000
Peak hour water demand (1 hour)	80,000
Maximum day water demand (1 hour)	40,000
Sum of Demand For 2-Hour Fire Scenario	**300,000**
Pumping supply (2 hours)(1)	-54,000 (supply)
Storage required	246,000

(1)With the largest well out of service

The existing water storage tank has a capacity of approximately 38,500 gallons per vertical foot. Thus, the 246,000 gallons of storage utilized during the fire scenario is accommodated by about 6.4 vertical feet of storage in the tank. If the tank is at the “pump-on” setpoint of 23.0 feet at the beginning of the fire event, then the tank level may be anticipated to reach a level of about 16.6 feet by the end of the event.

While the tank water level was at 24.1 feet, system pressure was observed to be 36 psi at a hydrant on Raven Court, which is representative of static pressure for customers at the highest elevations in the distribution system that are not served by booster pumping. Based on this observation, system static pressure may be anticipated to be above 32 psi when the tank level is at 16.6 feet. Since this is above the minimum acceptable pressure of 20 psi, it is judged that the existing storage volume is adequate for the residential 1,500 gpm fire flow scenario described above.

A similar approach may be utilized to estimate the maximum available fire flow. If the entire usable storage of the tank is demanded and the tank level falls to 0 feet, it is estimated that system static pressure will remain above the minimum required value of 20 psi for customers at the highest elevations in the distribution system. If the storage volume of the tank below level 23.0 feet is available at the beginning of a 3-hour fire flow event, the maximum fire flow available would be approximately 4,400 gpm. In this scenario, system pressures may remain acceptable; however, there would be no stored water available at the end of the event. This would be problematic if instantaneous demands exceed production.

Although storage and supply capacity for this fire flow is available, an evaluation of the distribution system (not part of this study) would be required to verify that this fire flow could be delivered to specific locations within the system.

6. Summary of Conclusions and Recommendations

1. Based on recent demand data, the requirements of the NYS Sanitary Code, and the *Recommended Standards for Water Works*, WD4 has an existing production capacity deficit of about 0.31 mgd (220 gpm).

   – **Recommendation:** The District should continue to explore and evaluate potential additional water supplies and consider ways to reduce demand. An additional production capacity of 440 gpm or more is recommended to meet standards and to avoid operating the wells for more than 18 hours per day under existing demand conditions. However, the District should seek more than 440 gpm of additional supply capacity to meet demands associated with population growth, future development, or changes in use of properties that increase water demand (for example, the conversion of a warehouse space to an athletic facility). Such additional demands would increase the required water production.

2. The existing storage facility can provide storage capacity for 4,400 gpm of fire flow for three hours concurrent with the 2015 estimated peak hour demand. However, there is no feasible means to paint the steel storage tank without taking it out of service and draining it. The District has made substantial efforts toward identifying potential locations for a second water storage tank that would support system operation and allow the existing tank to be taken out of service for maintenance. However, no location has been finalized.

   – **Recommendation**: The District should continue efforts to locate and construct a new tank which will serve as a backup to the existing storage and support maintenance of the existing tank.

Appendix A – Hydrogeologic Memorandum

LEGGETTE, BRASHEARS & GRAHAM, INC.

4 RESEARCH DRIVE, SUITE 301
SHELTON, CT 06484
PHONE (203) 929-8555 • FAX (203) 926-9140
www.lbgweb.com

MEMORANDUM

TO: Sal Misiti
FROM: Karen Destefanis

DATE: December 5, 2014

SUBJECT: Summary of Water Source Investigations – Water District No. 4

As we recently discussed, I am providing you with a brief summary of the hydrogeologic investigations/reviews Leggette, Brashears & Graham, Inc. (LBG) has conducted with respect to Water District No. 4. These investigations are presented below.

January – February 2010 – Well Rehabilitation/Screen Replacement of IBM Well 2 (North Well)

March – April 2011 – Well Rehabilitation/Screen Replacement of IBM Well 1 (South Well)

December 2011 – January 2012 – Boring/Test Well Installation

- Drilled five borings at the IBM property and Sewer property (at locations behind the ball fields and tennis courts)
- Conducted yield and water quality testing
- Potential water quality issues (MTBE)

June 2012 – Paper study of the McCue Property, located at 2 Cox Avenue

- Property underlain by low-yielding till in overburden and gneiss bedrock
- The majority of the site contains a large wetland feature (Town regulated)
- Historic cemetery located within 200 feet of potential well site
- The entire property is located within the Federal Emergency Management Agency (FEMA) 100-year flood.
- No potential location on the property where there is 100 feet of ownership from the wellhead without being in the wetland or Smith Creek
- Potential drilling locations limited because of cemetery, wetlands and private residences within 200 feet.
- Additional land clearing work would be necessary to access a drill rig on site because of heavily wooded conditions and steep slopes

June 2012 – 99 Business Park Drive

- Existing well located within 10-20 feet of two impoundments that would need to be abandoned. Another large impoundment located within 200 feet identified.
- Requires 100 feet of ownership around well and 200 feet of control. Active parking lot with surface runoff.
- Well completion unknown.

May 2013 – Old Rt 22 Property
Paper study of property located across from IBM entrance
No appreciable overburden material available
Bedrock mapped as low-yielding gneiss

June 2013 – Old Mount Kisco Road
Paper study of property
Site underlain by low-yielding till (overburden) and schist (bedrock)
Need to have 100 feet of ownership which would be difficult, locate well in Town-regulated wetland
Residential homes in the 200 foot setback

September – October 3013 – 125 Business Park Drive
Test existing 6-inch diameter well
Bedrock well completed in high-yielding Inwood Marble
Demonstrated a constant yield of 90 gpm
Low concentration of MTBE detected
100 foot ownership requirements with 200 feet of sanitary control

August 2014 – Sewer District property
Preliminary paper study to determine feasibility of installing bedrock well on Town property

www.ghd.com