

ENGINEER'S MAP, PLAN & REPORT
FOR
BIRCH HILL WATER DISTRICT
TOWN OF SOUTHEAST, NEW YORK

JUNE 23, 2014

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17 Home Service Area

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BIRCH HILL WATER DISTRICT

INTRODUCTION

The current system owner is Birch Hill Water Co., Inc., Birch Hill Road, Brewster, NY 10509 (David D. Bruen 845-279-4268). The Town of Southeast is contemplating acquisition of the water system at the behest of the current water company and customers. The system if acquired by the Town of Southeast will be constituted as the Birch Hill Water District. The proposed water district boundaries are shown on the attached drawing "Town of Southeast, New York, Birch Hill Water District," Nathan L. Jacobson & Associates, P.C., 1"=100 feet, dated May 2014.

HISTORY & EXISTING FACILITIES

Based on the October 1951 date of the "Map of Water Supply at Birch Hill Acres" prepared by F. J. Guss, Land Surveyor, the system was probably constructed in the early 1950s. The system serves 17 services with an estimated 50 people. There is a single well located on High View Terrace on a very small parcel owned by David Bruen. Particulars on the well are as follows:¹

Depth 200 feet

Flow 40 gpm

Water level 22 feet.

Submersible 1-1/2 horsepower pump set at 190 feet.

The well is located in a pit with access to a buried 2000 gallon hydropneumatic tank. This tank is a replacement that was installed 2007. The system is not chlorinated and is operating under a waiver of mandatory disinfection. The setback from the well to leaching systems is not known to us. However, a long record of coliform free operation is indicative of adequate setbacks.

Operating pressure range reported to have been set at the hydropneumatic tank is 55-75 psi. The approximate elevation at the valve pit is 430 feet. The high point in the water system is elevation 460 on High View Terrace. The computed static operating pressure at the high point is 42 to 62 psi. A 35 psi minimum pressure is required. The pressure is sufficient if the piping is adequately sized. To this writer, little is known about the piping on High View Terrace. The system low point is approximately elevation 340 on Birch Hill Road. High pressure at that location would be 113 psi.

In 2010 new polyethylene and copper piping was installed from the well pit to and along Birch Hill Road to serve 6 services by Lumar Plumbing & Heating. At this writing the age, size, and material of the remainder of distribution piping is unknown

¹ P.F. Beal & Sons, Inc. service records

WATER QUALITY INFORMATION

As mentioned above, the system is operating under a waiver from the mandatory disinfection requirements. The annual water quality reports indicate that no positive coliform test results were obtained in water sampling and the Health Department would not allow the system to operate with a waiver of mandatory disinfection if there was a history of positive coliform samples.

Sodium levels exceed guidance levels and require public notification for those on sodium restricted diets.

Based on the annual water quality report all sampling indicates that there has been no water quality violations in 2013. The only thing notable is that the 2011 copper sampling was 1.07 mg/l which is 82% of the maximum contaminant level. It bears watching. If the level increases moderately, chemical treatment would have to be added. Adding chemical treatment for corrosion control would be problematic in a well pit. Copper sampling is due again in 2014.

DEFICIENCIES & IMPROVEMENT RECOMMENDATIONS

Health Department Required Upgrades – The Putnam County Department of Health most recent inspection of the facility was September 10, 2013. The inspection noted that the facility was in compliance and well maintained. The Health Department did note that new regulations require that a manual transfer switch and generator plug. New regulations also require the installation of alarm dialer and set points must monitor low pressure, low temperature, and power failure. The estimated budget costs to add these features are as follows:

| | |
|-------------------------------------|----------------|
| Manual transfer switch | \$2,600 |
| Generator plug | \$400 |
| Portable generator (stored offsite) | \$2000 |
| Electrical conduit & wiring | \$1,800 |
| Alarm Dialer | \$3,200 |
| Pressure switch | \$650 |
| Temperature switch | \$150 |
| Miscellaneous & contingency | \$2,200 |
| Engineering | <u>\$2,200</u> |
| Total | \$15,200 |



Confined Space entry to pit – The pit which contains the well, hydropneumatic tank, sampling taps, and motor starter is a below grade pit with access through a hatchway and wooden ships ladder. OSHA regulations dictate very specific safety procedures for entry into a confined space such as this pit. The OSHA regulations require the use of equipment and multiple personnel to safely effect entry and operations in a confined space. The problem is that given this configuration to safely conduct routine operations will require significant resources and costs for regular visits, inspections, and

sampling. A suggested mitigation to this problem is to use electrical transmitted information/controls to a panel mounted above grade along with frost proof sampling station so that most routine inspection functions can be accommodated without need to enter the pit. If Estimated costs for confined space entry mitigation are as follows:

| | |
|--|----------------|
| Aluminum NEMA 3 free standing enclosure with heater and ventilator | \$4,100 |
| Frost proof sampling station (outside panel) | \$3,400 |
| Pressure transducer | \$2,500 |
| Pressure indicator | \$2,500 |
| Level transmitter for hydropneumatic tank | \$2,500 |
| Level indicator for hydropneumatic tank | \$2,500 |
| New motor starter for well pump | \$1,380 |
| New electrical distribution Panel | \$940 |
| Conduit & Wire | \$1,300 |
| Air line for addition of air to the hydropneumatic tank from above | \$240 |
| Miscellaneous & contingency | \$5,360 |
| Engineering | <u>\$5,360</u> |
| Total | \$32,100 |

Pitless adapter for well – Well heads which terminate in pits are subject to contamination if the pit should flood due to a broken pipe or high groundwater. In the past it was fairly common practice to terminate well heads in pits below the frost line, but seals typically deteriorate after a few years and will allow contaminated water to enter the well source. Pitless adapters were introduced to the market and since the 1970s it has been common practice to use pitless adapters for well heads. The current Health Department regulations call for well heads to terminate a minimum of 18” above finished grade. The Birch Hill Water Company is operating under a waiver from the Health Department for chlorination. Should the well source show contamination, the Health Department would undoubtedly order the well supply to be chlorinated. This would be a tremendous hit financially, not so much because of the chlorination, but because an aboveground building would be necessary to house the facilities. There is

really very little space or property to do that without acquiring some additional property. Thus we seriously recommend the preventative measure of installing a well casing extension up through the metal cover plate above the well and installing a pitless adapter coupling in the pit for connection of the discharge piping within the pit below frost level. The estimated cost for this modification would be as follows:

| | |
|-------------------------------|--------------|
| Well Casing extension | \$1,200 |
| Pitless adapter coupling | \$650 |
| Well cap, vented | \$150 |
| Electrical conduit & wiring | \$270 |
| Flashing of cover penetration | \$750 |
| Piping connection in pit | \$360 |
| Miscellaneous & contingency | \$860 |
| Engineering | <u>\$860</u> |
| Total | \$5,100 |

Service shutoffs – It is known that a number of houses do not have service shut offs. The houses on Birch Hill Road had shut offs installed in 2010. We suggest budgeting for 4 service valve installations on High View Terrace

| | |
|-------------------------------------|----------------|
| Four service shut off installations | \$12,000 |
| Miscellaneous and contingency | \$3,000 |
| Engineering | <u>\$3,000</u> |
| Total | \$18,000 |

Metering - There is currently no water metering for either the source well or individual services. Individual service meters help provide a conservation ethic to the individual customers if they know that there is a cost factor to leaking fixtures and free flowing use of water. Source well metering allows operations to know what actual pumpage is and provides a red flag when a leak develops. Combined individual and source metering allows for water audits and the quantification of the amount of unaccounted for water. The estimated cost for water meter installations are as follows:

| | |
|--|----------------|
| 2" meter for well with remote reader. | \$900 |
| 5/8" X 3/4" meter for 17 services with remote reader | \$6000 |
| Pressure reducing valves for four services | \$900 |
| Miscellaneous & contingency | \$1,400 |
| Engineering | <u>\$1,400</u> |
| Total | \$8,400 |

Estimated total for all improvement recommendations

\$76,800

The expenses outlined above may be delayed or deferred with the exception of the \$13,200 item for alarm dialer and electrical power transfer switch which have been ordered by the Putnam County Department of Health as the result of recent County regulations. All other items should be considered as part of a longer term improvement program.

FULL PUMP HOUSE REPLACEMENT SCENARIO

A worst case scenario could be precipitated if the following were to occur:

- Coliform was detected in routine sampling and the Health Department rescinds the disinfection waiver.
- Copper contaminant level rises to above the maximum contaminant level.

These events would require chemical treatment of the supply and would require construction of a treatment facility. A treatment facility would require an above grade building to house chemical feeders and product storage. Given the small property (14'X23') owned at the existing well site, the most pragmatic solution would be to build a new facility on a vacant property at the end of High View Terrace. The vacant property is owned by Putnam County and hopefully should be available to the Water District.

A new treatment facility will need to be built to current standards for water supply facilities. Those facilities would need to include:

- atmospheric storage tank with 24 hour demand storage and chlorine contact time (5000 gallon)
- Level controls to actuate the well pump
- Duplex booster pumps with variable speed constant pressure control
- Hypochlorinator with metering pump and mix day tank.
- Corrosion control by pH adjustment (Metering pump and mix day tank)
- Sample taps
- Well line from existing well to treatment facility
- Distribution line from treatment facility to approximate location of existing well.
- Flow metering
- Electrical service with transfer switch and generator.
- Alarm monitoring and alarm dialer
- Heated building with grade level entrance suitable for treatment chemical delivery
- Secondary containment for chemical storage and day tanks
- Chlorine residual analyzer
- Drain piping for floor drain and sample water to a dry well

- Ventilation

Estimated costs for a new pump station and treatment facility are as follows:

| | |
|--|-----------------|
| Atmospheric storage tank. | \$34,500 |
| Level sensor for well pump control | \$10,400 |
| Duplex booster pumps with VFD control | \$34,500 |
| Small hydropneumatic tank | \$1,500 |
| Hypochlorinator with flow meter control | \$3,500 |
| Corrosion control chemical feed system with flow meter control | \$3,500 |
| Pump station water piping | \$14,200 |
| Automatic transfer switch and generator (permanent) | \$20,500 |
| Electrical | \$25,000 |
| Alarm monitoring & dialer | \$3,200 |
| Sitework | \$24,500 |
| Building envelope | \$51,800 |
| Secondary containment pallets | \$4,500 |
| Chlorine residual analyzer | \$9,000 |
| pH analyzer | \$1,250 |
| Floor drain, sample sink, piping | \$4,400 |
| Drywell for sampling, analyzer | \$2,000 |
| Ventilation fan, louvers | \$2,300 |
| Distribution & well connection pipe | \$75,000 |
| Miscellaneous & contingency | \$81,400 |
| Engineering | <u>\$81,400</u> |
| Total | \$488,400 |

BIRCH HILL WATER DISTRICT

ADDENDUM

7 ADDITIONAL SERVICES - TOTAL 24 SERVICES

INTRODUCTON

Directly adjacent to Birch Hill Water Company's service area on High View Terrace, there is another water system which serves 7 service connections. Very little is known to this writer about the origin and history of this water system. The Putnam County Department of Health was unaware of this water system. The system has not been monitored for water quality. The system consists of a single well and 3 hydropneumatic tanks with a distribution system of unknown make up. The well is reputed to have a 7 gpm yield. The well and hydropneumatic tanks are located in a pit in front of #27 High View Terrace. It is unknown if the well is located outside standard setback requirements from septic systems. From the appearance of the aerial photograph, the well location is uncertain to meet set back requirements.

PF Beal did not drill the well but has worked on it. The pump is at 190' and pumps 7 GPM. It has a 3/4 HP pump with 230V power supply and has 3 - 86 gallon Well-Xtrol tanks.

The operating pressure range is unknown to us. The high point in the water system is approximately elevation 470 at #36 High View Terrace.

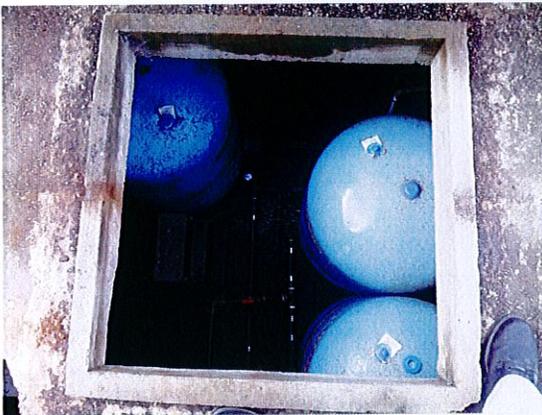
WATER QUALITY INFORMATION

If this water system which we will refer to as Birch Hill West is to become part of Birch Hill Water District, the first order of business will need to be sampling and laboratory analyses to identify any water quality issues and to conduct a sanitary survey of sources of pollution and setbacks. It appears from the dwelling spacing there could be a problem with the 100 foot separation to a leaching system. If the water supply source does not meet water quality standards this system will not be able to continue with the existing well supply and it will have to be replaced with other water supply source. A full set of sampling including coliform, inorganic chemicals, organic chemical, lead & copper and secondary contaminants in compliance with the Safe Drinking Water Requirements will cost approximately \$3000. A sanitary survey will add another \$1500 to the cost. If water quality is not acceptable this would trigger the need for a new water supply source. Drilling a new well can be expected to have a budget cost of \$40,000 and if treatment is required, could require construction of a pump station as described in the main body of this report. The vacant Putnam County property at the end High View Terrace would appear to be large enough to drill a well with the required setback distances.

DEFICIENCIES & IMPROVEMENT RECOMMENDATIONS

Health Department Required Upgrades – As with the main Birch Hill Water system the Health Department new regulations require that a manual transfer switch and generator plug. New regulations also require the installation of alarm dialer and set points must monitor low pressure, low temperature, and power failure. The estimated budget costs to add these features are as follows:

| | |
|-------------------------------------|----------------|
| Manual transfer switch | \$2,200 |
| Generator plug | \$400 |
| Portable generator (stored offsite) | \$1500 |
| Electrical conduit & wiring | \$1,800 |
| Alarm Dialer | \$3,200 |
| Pressure switch | \$650 |
| Temperature switch | \$150 |
| Miscellaneous & contingency | \$2,200 |
| Engineering | <u>\$2,200</u> |
| Total | \$14,300 |



Confined Space entry to pit – The pit which contains the well, hydropneumatic tanks, electrical distribution, and motor starter is a below grade pit with access through a hatchway and wooden step ladder. OSHA regulations dictate very specific safety procedures for entry into a confined space such as this pit. The OSHA regulations require the use of equipment and multiple personnel to safely effect entry and operations in a confined space. The problem is that given this configuration to safely conduct routine operations will require significant resources and costs for regular visits, inspections, and

sampling. A suggested mitigation to this problem is to use electrical transmitted information/controls to a panel mounted above grade along with frost proof sampling station so that most routine inspection functions can be accommodated without need to enter the pit. Estimated costs for confined space entry mitigation are as follows:

| | |
|--|----------------|
| Aluminum NEMA 3 free standing enclosure with heater and ventilator | \$4,100 |
| Frost proof sampling station (outside panel) | \$3,400 |
| Pressure transducer | \$2,500 |
| Pressure indicator | \$2,500 |
| New motor starter for well pump | \$1,380 |
| New electrical distribution Panel | \$940 |
| Conduit & Wire | \$1,300 |
| Miscellaneous & contingency | \$4,040 |
| Engineering | <u>\$4,040</u> |
| Total | \$24,200 |

Pitless adapter for well – Well heads which terminate in pits are subject to contamination if the pit should flood due to a broken pipe or high groundwater. In the past it was fairly common practice to terminate well heads in pits below the frost line, but seals typically deteriorate after a few years and will allow contaminated water to enter the well source. Pitless adapters were introduced to the market and since the 1970s it has been common practice to use pitless adapters for well heads. The current Health Department regulations call for well heads to terminate a minimum of 18” above finished grade. Raising the well head at this location has some real difficulties unless the well is combined with the source of the Birch Hill Water District so the hydropneumatic tanks could be eliminated from Birch Hill West. This combination would require that the distribution systems be strongly interconnected and telemetry to turn on the current Birch Hill West well pump provided. Of The estimated cost for this modification would be as follows:

| | |
|-------------------------------------|---------------|
| Well Casing extension | \$1,200 |
| Pitless adapter coupling | \$650 |
| Well cap, vented | \$150 |
| Electrical conduit & wiring | \$300 |
| Demolition and filling of pit | \$1500 |
| Distribution system interconnection | \$20,000 |
| Telemetry equipment | \$6,000 |
| Miscellaneous & contingency | \$7400 |
| Engineering | <u>\$7400</u> |
| Total | \$44,600 |

A caveat is that if water quality is inadequate for a public water system, all these items are moot at the existing well, although they would remain applicable to a new well.

Metering - There is currently no water metering for either the source well or individual services. Individual service meters help provide a conservation ethic to the individual customers if they know that there is a cost factor to leaking fixtures and free flowing use of water. Source well metering allows operations to know what actual pumpage is and provides a red flag when a leak develops. Combined individual and source metering allows for water audits and the quantification of the amount of unaccounted for water. The estimated cost for water meter installations are as follows:

| | |
|---|--------------|
| 3/4” meter for well with remote reader. | \$400 |
| 5/8” X 3/4” meter for 7 services with remote reader | \$2,500 |
| Miscellaneous & contingency | \$750 |
| Engineering | <u>\$750</u> |
| Total | \$4,400 |

Estimated total for all improvement recommendations

\$87,500

The expenses outlined above may be delayed or deferred with the exception of the \$14,300 item for alarm dialer and electrical power transfer switch and \$3000 for water sampling which are all Putnam County Department of Health requirements. All other items should be considered as part of a longer term improvement program.

FULL PUMP HOUSE REPLACEMENT SCENARIO

If major issues in reliability and water quality create an untenable use of the water facilities in their current form it is possible to construct a treatment facility in concert with the 17 service Birch Hill Water District. Combining with the larger water district would not require a proportionally more expensive facility as there would be an economy of scale, the ability to spread the cost over more users, and not a too much additional capital cost to serve an additional 7 services.

Again as with the 17 users District, the most pragmatic solution would be to build a new facility on a vacant property at the end of High View Terrace. The vacant property is owned by Putnam County and hopefully should be available to the Water District.

A new treatment facility will need to be built to current standards for water supply facilities. Those facilities would need to include:

- atmospheric storage tank with 24 hour demand storage and chlorine contact time (7500 gallon)
- Level controls to actuate the well pump
- Duplex booster pumps with variable speed constant pressure control
- Hypochlorinator with metering pump and mix day tank.
- Corrosion control by pH adjustment (Metering pump and mix day tank)
- Sample taps
- Well line from existing well to treatment facility
- Distribution line from treatment facility to approximate location of existing well.
- Flow metering
- Electrical service with transfer switch and generator.
- Alarm monitoring and alarm dialer
- Heated building with grade level entrance suitable for treatment chemical delivery
- Secondary containment for chemical storage and day tanks
- Chlorine residual analyzer
- Drain piping for floor drain and sample water to a dry well
- Ventilation

Estimated costs for a new pump station and treatment facility to serve all 24 services are as follows:

| | |
|--|-----------------|
| Atmospheric storage tank. | \$44,900 |
| Level sensor for well pump control | \$10,400 |
| Duplex booster pumps with VFD control | \$35,500 |
| Small hydropneumatic tank | \$1,500 |
| Hypochlorinator with flow meter control | \$4,000 |
| Corrosion control chemical feed system with flow meter control | \$4,000 |
| Pump station water piping | \$14,200 |
| Automatic transfer switch and generator (permanent) | \$20,500 |
| Electrical | \$25,000 |
| Alarm monitoring & dialer | \$3,200 |
| Sitework | \$24,500 |
| Building envelope | \$51,800 |
| Secondary containment pallets | \$4,500 |
| Chlorine residual analyzer | \$9,000 |
| pH analyzer | \$1,250 |
| Floor drain, sample sink, piping | \$4,400 |
| Drywell for sampling, analyzer | \$2,000 |
| Ventilation fan, louvers | \$2,300 |
| Distribution & well connection piping | \$85,000 |
| Miscellaneous & contingency | \$86,800 |
| Engineering | <u>\$86,800</u> |
| Total | \$520,600 |

