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..... Applicant
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Sent 10/29/18

October 3, 2018

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OCT - 4 2018
PB 6-15
DEPT. OF TECHNICAL SERVICES
PLANNING DIVISION

Chris Kehoe, AICP
Town Hall
1 Heady Street
Cortlandt Manor, NY 10567

Re: JMC Project 14088
Proposed Specialty Hospital
2016 Quaker Ridge Road
Town of Cortlandt, NY

Well Pumping Program and Test Results Report

Dear Chris:

Attached please find the "Well Pumping Program and Test Results" report by LBG.

Thank you.

Sincerely,

JMC Planning, Engineering, Landscape Architecture & Land Surveying, PLLC

Robert B. Peake, AICP
Project Manager

cc: David Douglas, Chairman and Members of the
Town of Cortlandt Zoning Board of Appeals
Mr. Steve Laker
Robert Davis, Esq.
Mr. Ralph Mastromonaco, PE

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WELL PUMPING PROGRAM AND TEST RESULTS

HUDSON RIDGE WELLNESS CENTER PROPERTY
2016 QUAKER RIDGE ROAD
CORTLANDT, NEW YORK

PROJECT NO.: 31401341.000
DATE: OCTOBER 2018

LBG HYDROGEOLOGIC & ENGINEERING SERVICES, P.C.
MEMBER OF WSP
4 RESEARCH DRIVE, SUITE 204
SHELTON, CT 06484

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Senior Supervising Hydrogeologist

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Contained on the enclosed CD

EXECUTIVE SUMMARY

LBG Hydrogeologic & Engineering Services, P.C. (LBGHES), member of WSP, conducted a 72-hour pumping test on the Hudson Ridge Wellness Center property located on Quaker Ridge Road in the Town of Cortlandt (Town), Westchester County, New York in August 2018. The primary goal of the pumping test was to evaluate potential impacts to water levels in nearby offsite potable supply wells while pumping the new water-supply at twice the average water demand of the project. To achieve this goal, a simultaneous pumping test was conducted on Well 1 and Well 2 between August 20 and August 23, 2018 with pre- and post-water level monitoring of the offsite wells. The two Hudson Ridge Wellness Center wells were pumped concurrently for three days, each at a pumping rate of 9 gpm (gallons per minute), for a combined yield of 18 gpm or 25,920 gpd (gallons per day).

The average water demand for the project is 12,660 gpd (8.8 gpm) based on the water demand requirement of 110 gpd per hospital bed and 15 gpd per staff, and accounting for the main hospital building and several existing ancillary buildings that will be used for storage, office space, supplemental patient quarters and an existing residence. The calculated average water demand from the project was approved for use by the WCDH in a letter dated December 14, 2017.

Prior to conducting the 72-hour pumping test, a testing and monitoring protocol (aka Pumping Test Plan) was prepared. The Pumping Test Plan, dated July 5, 2018, was submitted to the Town and their hydrogeologic consultant HydroEnvironmental Solutions Inc. (HES), and Westchester County Department of Health (WCDH) for review. Comments received from the Town and HES and the WCDH were incorporated into the Pumping Test Plan. The WCDH indicated approval of the plan on August 2, 2018 and the Town and their consultant granted approval on August 10, 2018.

During the pumping test program, water-level measurements were collected from a total of four onsite wells, including two onsite bedrock monitoring wells and the two wells pumped during the testing program (Well 1 and Well 2) and 16 residential wells. Minimal drawdown (less than 0.50 foot) was documented in the two onsite bedrock monitoring wells. Water-level effects related to the pumping test was observed in two adjacent properties located on Quaker Hill Drive with a drawdown of approximately 18.5 and 24.5 feet. Because both wells had a significant amount of available water above their respective pumps at the end of the test, during a test that was conducted to demonstrate extreme conditions that will not occur during the hospital occupancy (72 hours of continuous pumping at a combined rate of double the average water demand), these wells are not expected to be adversely affected by the use of the HRWC wells. Additionally, no discernible water-level impacts were measured in any of the other offsite monitoring locations that were attributed to pumping in Well 1 and Well 2.

Water samples were collected from the onsite wells and analyzed for the parameters required by the NYSDOH Sanitary Code Part 5, Subpart 5-1 for community water-supply wells without the extra compounds of dioxin, endothall, diquat, glyphosate asbestos and propylene glycol. In addition, microscopic particulate analysis (MPA), giardia and cryptosporidium samples were collected from Well 2 to assess for potential Groundwater Under the Direct Influence (GWUDI) because of its proximity to an onsite pond and wetlands. The results of the water samples collected from the two proposed supply wells met all NYSDOH drinking water standards except for iron, manganese and the presence of total coliform in Well 2. Elevated concentrations of iron and/or manganese is very common and can easily be treated. The bacteria detection in this well was likely the result of the use of the temporary well appurtenance for the pumping test and the absence of a sanitary sealed well cap on the well during the test period. Disinfecting the well will eliminate the coliform bacteria prior to placing the well into service.

The results for the MPA sample from Well 2 reported a low risk for potential GWUDI and giardia and cryptosporidium were not detected.

1.0 INTRODUCTION

The following are the results of the pumping test program conducted in August 2018 by LBG Hydrogeologic & Engineering Services, P.C. (LBGHES), member of WSP USA, on the proposed bedrock water-supply wells (Wells 1 and 2) located at the Hudson Ridge Wellness Center (HRWC) property located at 2016 Quaker Ridge Road in Cortlandt, New York (figure 1).

Prior to completion of the 72-hour pumping test, a testing and monitoring protocol (aka Pumping Test Plan) was prepared. The Pumping Test Plan, dated July 5, 2018, was submitted to the Town of Cortlandt, and their hydrogeologic consultant HydroEnvironmental Solutions Inc. (HES) and Westchester County Department of Health (WCDH) for review. The WCDH indicated approval of the plan on August 2, 2018 and the Town and their consultant granted approval on August 10, 2018.

2.0 WATER DEMAND

The project is proposing to develop a specialty hospital that will provide care for a maximum of 92 full-time patients (92 beds) and a staff of 86 people. The existing ancillary buildings will be used for storage, office space, centers for some of the 92 patients and an existing residence. Based on the water demand requirement of 110 gpd (gallons per day) per hospital bed and 15 gpd per staff, the average water demand for the project is 12,660 gpd or 8.8 gpm (gallons per minute). The calculated average water demand from the project was approved for use by the WCDH in a letter dated December 14, 2017.

3.0 WELL CONSTRUCTION

Well 1 (well near the Main Hospital building[1]) and Well 2 (well near the pond) were drilled by P.F. Beal & Sons, Inc. in August 2015 on the project site. Well 1 was completed in bedrock to 385 feet on August 13, 2015 and Well 2 was completed in bedrock to 500 feet on August 18, 2015. In July 2017, Well 2 was deepened from 500 feet to 810 feet to gain more yield. Based on the driller's geologic log, bedrock was encountered at approximately 40 ft bg (feet below grade) at Well 1 and 20 ft bg at Well 2. A copy of the well logs are included in Appendix I.

4.0 PUMPING TEST PROGRAM

The purpose of the 72-hour pumping test on Well 1 and Well 2 was to monitor for potential offsite water-level impacts to private potable supplies in the vicinity of the HRWC wells. The HRWC wells were previously

[1] Note that the original driller well log and laboratory Chain of Custody refers to this well as Well "by the Castle"

tested in 2015 and 2017 without any offsite monitoring. In 2015 (September 28 to October 1, 2015), both wells were pumped simultaneously, each at a constant rate of 9 gpm for 72 hours. In 2017 (July 31, 2017 to August 3, 2017), an additional 72-hour pumping test of Well 2 was conducted after the well had been deepened. During the 2017 test, Well 2 was pumped at twice the average daily demand (18 gpm) with the best well (Well 1) out of service. However, because there was no offsite monitoring during either the 2015 or 2017 test, the purpose of the 2018 72-hour pumping test was to determine the extent of potential drawdown impacts to nearby existing offsite potable supply wells.

The simultaneous 72-hour pumping test was conducted on Well 1 and Well 2 between August 20 and 23, 2018 with each individual well pumping at a rate of 9 gpm (for a combined withdrawal of two times the average demand) during the entire 72-hour test. During the pumping test program, water-level measurements were collected from the two bedrock pumping Well 1 (well near the Main Hospital building) and Well 2 (well near the pond); two onsite bedrock monitoring wells (MW-1 and MW-2); and 16 existing offsite residential wells. Water-level data was collected using manual water-level meters and vented pressure transducers. The onsite well locations are shown on figure 2. The locations of the offsite wells that were measured during the test are shown on figure 3.

Water-level measuring equipment was installed between August 14 through August 16, 2018 to collect background water-level data prior to the start of pumping the onsite wells. Immediately prior to the test, one residential owner (74 Quaker Hill Drive) requested to be included in the monitoring program. Previously, they had granted permission and then verbally declined participating in the program. Consequently, the water-level equipment was installed in the well on August 20, 2018, approximately one hour after the pump in Well 1 had been turned on, but approximately three hours before both wells were pumping at the full test rate.

On August 20, the 72-hour pumping test on Well 1 and Well 2 began with the start of the pump in Well 1 (by the Main Hospital building) followed by a staggered start of the pump in Well 2 (by the pond) approximately two hours later. A staggered startup of the wells was conducted to allow for potential differentiation of drawdown impacts to the pumping wells and the monitoring wells being measured. Because the pump in Well 2 could not sustain a pumping rate of 9 gpm for the first hour of pumping, the pump was shut off and pulled out of the well. Upon inspection, a crack in the pump column pipe was observed and the column pipe was replaced and the pump was reset to 200 ft btoc (feet below the top of casing) and restarted 66 minutes after the pump had been shut down. Throughout this period, Well 1 remained on, pumping at a constant rate of 9 gpm. The wells were pumped concurrently for three days (following the reactivation of Well 2) until the test was shut down on August 23, 2018. Water-level recovery data was collected following shutdown and equipment removal began on August 27, 2018.

During the pumping test program, LBGHES was in communication with the Town Hydrogeologist consultant William Canavan (HES) and representatives from HES conducted periodic site visits to review the progress of the pumping test. During the pre-test activities, a representative of HES observed the water-level equipment installation at several locations including 3 Quaker Hill Court West, 6 Quaker Hill Court East, 14 Little Lake Road and 12 Glendale Road (property numbers 13, 6, 29 and 40 respectively on figure 3). The representative from HES was also onsite at the start-up of the two pumping wells, however, he was not present for the replacement of the column pipe and restart of Well 2. The representative from HES was onsite the mornings of August 21 and August 22 to confirm the flow rates and water levels at the wells and collected the drawdown data from the wells on August 23, 2018. On August 24, 2018, the representative from HES was on site prior to the test shut down to confirm flow rates and water levels and was present for the shutdown of both wells.

Hydrographs and summary tables of water-level measurements collected from the pumping wells are in Appendix II, the onsite monitoring well hydrographs are in Appendix III and offsite monitoring well hydrographs are in Appendix IV and Appendix V. An electronic copy of the water-level data collected from the pumping wells, monitoring wells and offsite homeowner wells has been provided on the attached CD.

The discharge locations used during the test period were placed approximately 225 feet topographically downgradient of each pumping well (figure 2). Each discharge location was sited to allow the water to flow away from the pumping wells to prevent artificial recharge of the bedrock aquifer during the test. The well discharge rates were measured using a calibrated bucket and stop watch at the end of their respective discharge hoses.

On August 23, 2018, water samples were collected from both wells for analysis for all parameters required by the NYSDOH Sanitary Code Part 5, Subpart 5-1, excluding analysis of the extra synthetic organic compounds (SOCs) (as approved in an email dated August 2, 2018 from Zaw Thein, included in Appendix VI). Microscopic particulate analysis (MPA) and giardia and cryptosporidium samples were also collected from the Well 2 (near the pond) to assess for potential GWUDI. The water samples were taken to Envirotest Laboratories, Inc. located in Newburgh, New York for analysis. Copies of the laboratory reports from the samples collected are included in Appendix VI.

4.1 TEST WELL 1 (NEAR THE MAIN HOSPITAL BUILDING)

The pump in Well 1 was started at 12:55 on August 20, 2018. Prior to the test start-up the well showed minimal oscillation (less than 0.25 feet) during the background data collection period. The water level in the well prior to the start of the test was 40.42 ft btoc (feet below the top of casing).

Upon startup of the pump in Well 1, the pumping rate was adjusted to 9 gpm using a valve on the discharge line and remained constant at that pumping rate throughout the test until the pump was shut down at 17:31 on August 23, 2018. The final water level in Well 1, just prior to turning the pump off, was 91.19 ft btoc. Based on a static water level of 40.42 ft btoc from before the start of the test on August 20, the total drawdown in Well 1 was 50.77 feet at the end of the simultaneous pumping test period.

The water-level change in Well 1 over the final 6 hours of pumping between 12:31 and 17:31 on August 23, 2018 was – 0.11 feet at a constant pumping rate of 9 gpm. This value meets the criteria of demonstrating less than 0.5 foot per 100 feet of available drawdown in the well over the final 6 hours of the test period and there was no overall drawdown trend measured in the well.

The water level in Well 1 recovered following shut down of the pump in the well. The water level reached 90% of the pre-test level approximately 39 hours after the end of the test and continued to rise.

4.2 TEST WELL 2 (NEAR THE POND)

The pump in Well 2 was started at 15:00 on August 20, 2018. Prior to the test start-up, the well showed minimal oscillation (less than 0.25 feet) during the background data collection period. The water level in the well prior to the start of the test was 7.17 ft btoc.

At the startup of the pump in Well 2, the pumping rate was adjusted to 9 gpm using a valve on the discharge line. Because the pump in Well 2 could not sustain a pumping rate of 9 gpm (a continuous drop in rate from 9 gpm to 5 gpm was noted between 15:45 and 16:00), the pump was shut off at 16:18 and the pump was pulled out of the well. Upon inspection, a crack in the pump column pipe was observed and the column pipe was replaced and the pump was reset to 200 ft btoc and restarted at 17:24. The pump was readjusted to 9 gpm and the pumping rate remained constant at that pumping rate throughout the test until the pump was shut down at 17:45 on August 23, 2018. The final water level in Well 2, just prior to turning the pump off, was 93.10 ft btoc. Based on a static water level of 7.17 ft btoc from before the start of the test on August 20, the total drawdown in Well 2 was 85.93 feet at the end of the simultaneous pumping test period.

The water-level change in Well 2 over the final 6 hours of pumping between 12:45 and 17:45 on August 23, 2018 was + 0.14 foot at a constant pumping rate of 9 gpm. This value meets the criteria of demonstrating less than 0.5 foot per 100 feet of available drawdown in the well over the final 6 hours of the test period and there was no overall drawdown trend measured in the well.

The water level in Well 2 recovered following shut down of the pump in the well. The water level reached 90% of the pre-test level approximately 93 hours after the end of the test and continued to rise.

4.3 ONSITE MONITOR WELLS

Water-level measurements were collected from two other previously existing wells where were utilized as onsite bedrock monitoring wells during the 2018 pumping test. Water-level data was collected using manual water-level meters and vented pressure transducers. The table below shows an assessment of the distance and drawdown values for the two onsite monitor wells measured. Although there was a two-hour staggered start-up, there was no obvious indication that one pumping well had more influence in drawing water levels down in the monitor wells. However, as shown on the hydrographs by the fluctuating water levels, Monitor Well 1, which is equipped with a pump and serves the caretaker house, was periodically used during the testing period. In addition, the water level in Monitor Well 2 was influenced by pumping of nearby water supplies as shown by discreet drops in water levels throughout the test. Overall, there was no significant impact to the water levels (less than 0.50 foot) in the onsite monitoring wells caused by pumping of the two onsite wells.

Table 1: Drawdown Measured in the Onsite Monitoring Wells During the 72-Hour Pumping Test

Well ID	Approximate Distance to Well 1 (feet)	Approximate Distance to Well 2 (feet)	Drawdown (feet)
MW-1	645	270	0.42
MW-2	158	900	0.15

4.4 OFFSITE MONITOR WELLS

Prior to the initiation of the pumping tests, permission to conduct well monitoring was requested from 67 residential property owners located within 1,500 to 2,000 feet of the Hudson Ridge Wellness Center property, including all nine who counsel for Citizens for Responsible Hudson Institute Site Development Inc. (Citizens Group) requested be included. Initially WSP solicited nearby homeowners to participate in the program in April 2018. However, after discussions with the Town and their consultant, property owners were sent solicitation letters (dated June 20, 2018) by regular and certified mail with a deadline of June 29, 2018 to be considered for the monitoring program. Because of concerns expressed by the Town of adequacy of time for potential property owners to respond, the deadline was extended to July 31, 2018, allowing approximately 7 ½ weeks for homeowners to respond. Of the 67 property owners, 18 granted permission including five of the nine requested by Citizens Group counsel. However, because accessing two of the wells for which permission was granted posed a potential sanitary risk, 16 wells were included in the offsite monitoring program. Table 2 of properties that were contacted prior to the test is included in Appendix IV. The table below summarizes the 16 monitoring program participants. These wells included homes within close proximity (located less than 1,500 feet) of the two test wells, wells with purported water-supply shortages or water pressure issues (as reported by Langan, the hydrogeologic consultant for the Citizens Group) and wells located along mapped fracture-trace patterns. The offsite wells that were included in the monitoring program provided excellent spatial coverage to determine any impacts from the pumping test. Locations of the properties that were contacted and those that were included in the monitoring program are shown on figure 3.

Table 2: Summary of Offsite Well Monitoring Program Participants

Tax Lot ID#	Map	Address
79.7-1-19	6	6 East Quaker Hill Ct. Croton-on-Hudson, NY 10520
79.7-1-29	13	3 Quaker Hill Court W Croton-on-Hudson, NY 10520
79.7-1-30	14	74 Quaker Hill Drive Croton-on-Hudson, NY 10520
79.11-1-3	20	78 Quaker Hill Drive Croton-on-Hudson, NY 10520
79.11-1-4	21	83 Quaker Hill Drive Croton-on-Hudson, NY 10520
79.11-1-6	23	3 Quaker Hill Court E Croton-on-Hudson, NY 10520
79.11-1-12	29	14 Little Lake Ridge Ossining, NY 10562
79.11-1-19	35	2022 Quaker Ridge Road Croton-on-Hudson, NY 10520
79.11-1-20	36	2028 Quaker Ridge Road Croton-on-Hudson, NY 10520
79.14-1-3	40	12 Glendale Road Ossining, NY 10562
79.15-1-2	44	26 Glendale Road Croton-on-Hudson, NY 10520

Tax Lot ID#	Map	Address
79.15-1-16	49	56 Glendale Road Ossining, NY 10562
79.15-1-17	50	60 Glendale Road Ossining, NY 10562
79.11-1-1	51	5 Little Lake Road Ossining, NY 10562
79.11-1-3	52	6 Little Lake Road Ossining, NY 10562
79.7-1-15	59	29 Quaker Hill Drive Croton on Hudson, NY 10520

Water-level data was collected using dedicated, vented pressure transducers installed in the offsite wells and periodically checked manually throughout the testing period. Copies of the hydrographs for the offsite wells are included in Appendix IV along with tables containing the manual measurements collected at each offsite monitoring location.

Water-level effects as a result of the pumping test were observed in only two of the 16 participating residential wells, which are located on Quaker Hill Drive (78 and 83 Quaker Hill Drive; properties 20 and 21 on figure 3). During the test, the water level at 78 Quaker Hill Drive lowered from approximately 60 ft btoc at the start of the test to approximately 84.5 ft btoc (approximately 24.5 feet of water-level drawdown). Records indicate that the well is 610 feet deep and its pump is set to 560 ft. Based on this information there was approximately 475 feet of water available above the pump at the time of the test shut-down (as shown on the hydrograph included in Appendix V). During the test, the water level at 83 Quaker Hill Drive lowered from approximately 45 ft btoc at the start of the test to approximately 63.5 ft btoc (approximately 18.5 feet of water-level drawdown). Records indicate that the pump is set at 240 ft and the well is 375 feet deep (information previously reported by Langan). Based on this information, there was approximately 176 feet of water available above the pump at the time of the test shut-down (as shown on the hydrograph included in Appendix V). However, because of interference from the domestic use (i.e. pump cycling on and off as a result of showering, laundry, toilet flushing etc.) in the wells prior to and at the start of the test, the water level effects could not be attributed to one particular pumping well. Because both wells had significant available water above their respective pumps at the end of the test, a test that was conducted to demonstrate extreme conditions that will not occur during the hospital occupancy (72 hours of continuous pumping at a combined rate of double the average water demand), these wells are not expected to be adversely affected by the use of the HRWC wells.

No discernible water-level effect was observed in any of the other 14 offsite wells being measured as a result of the 72-hour pumping test.

The table below contains a summary of the water level effect observed as a result of the simultaneous pumping test and the distance of the offsite monitoring locations from the pumping wells.

Table 3: Distance and Drawdown Measurements for Offsite Wells for Simultaneous Pumping Test

Well Location	Map	Approximate Distance to Well 1 (feet)	Approximate Distance to Well 2 (feet)	Drawdown Attributed to Pumping at End of Simultaneous Pumping Test (feet)
6 East Quaker Hill Ct.	6	2,050	1,450	ND
3 Quaker Hill Court W	13	1,200	950	ND
74 Quaker Hill Drive	14	900	950	ND
78 Quaker Hill Drive	20	600	550	24.5
83 Quaker Hill Drive	21	800	400	18.5
3 Quaker Hill Court E	23	1,300	850	ND
14 Little Lake Ridge	29	2,300	1,500	ND
2022 Quaker Ridge Road	35	400	1,050	ND
2028 Quaker Ridge Road	36	600	1,150	ND
12 Glendale Road	40	1,500	1,850	ND
26 Glendale Road	44	1,550	1,600	ND
56 Glendale Road	49	2,100	1,500	ND
60 Glendale Road	50	2,250	1,600	ND
5 Little Lake Road	51	1,200	500	ND
6 Little Lake Road	52	1,650	850	ND
29 Quaker Hill Drive	59	2,500	2,250	ND

ND none discernible

Following the completion of the simultaneous pumping test, the water-levels in the wells that were not impacted by the test were monitored for approximately 3.5 days after the test shut-down. The water levels in the two wells with documented water level effects were measured for approximately 11.5 days following the test shut-down to monitor the water level recovery. The trend of water levels following shutdown of the test rose to pre-test static conditions on August 27th at 78 Quaker Hill Drive and on August 29th at 83 Quaker Hill Drive.

5.0 PRECIPITATION

As part of the pumping test program, precipitation information was monitored at the nearby North Ossining local weather station (KNYOSSIN8-Teatown) that publishes daily weather data on Weather Underground on the internet, and a manual rain gage installed on the project site. Precipitation was monitored in order to evaluate potential effects of any local rain events to the groundwater levels in wells being monitored prior to and during the test, as further discussed below. Precipitation values for the test period from these two locations are provided in the table below. The precipitation totals from the KNYOSSIN8 station have been included on the hydrographs for reference and the precipitation's effect, if any, are discussed in the section below for the wells. The data from KNYOSSIN8 was used on the hydrographs because of the measurement frequency (every 5 minutes), the data consistency with the measurements collected from the onsite manual rain gage, and because of the station's proximity to the project site.

Table 4: Daily Precipitation Totals for Local Station KNYOSSIN8

Date	KNYOSSIN8 Precipitation (inches)	Onsite Rain Gauge Precipitation (inches)
8/15/2018	0	Rain gauge installed
8/16/2018	0	
8/17/2018	1.22	
8/18/2018	0.06	
8/19/2018	0.13	
8/20/2018*	0	1.0 at 08:50 (pre-test accumulation)
8/21/2018*	0	
8/22/2018*	0.66	0.70 at 09:00
8/23/2018*	0.02	0.10 at 09:00
8/24/2018	0	
8/25/2018	0	
8/26/2018	0	
8/27/2018	0	
8/28/2018	0	
8/29/2018	0	
8/30/2018	0	
8/31/2018	0.09	
9/1/2018	0	
9/2/2018	0	
9/3/2018	0.01	
9/4/2018	0	

*Pumping test period

During the background data collection period from August 15 through August 19, a total of 1.41 inches of rain was measured at the nearby station KNYOSSIN8 and 1.00 inches in the manual gage on the Hudson Ridge Wellness Center property. As shown by the table, the rain during the background data collection period mainly occurred on August 17. During the simultaneous pumping test period (August 20 through August 23), a total of 0.68 inch of rain was measured at the KNYOSSIN8 station and 0.80 inch in the onsite manual rain gage. The majority of the rain measured during the simultaneous pumping test occurred in the middle of the test period on August 22. During the recovery period (August 23 through 27) there was no precipitation documented. A total of 0.1 inch of rain was recorded at the KNYOSSIN8 station from the end of the test (August 23 through September 4).

Prior to initiating the pumping test, the water-level data in the offsite homeowner wells were reviewed to determine if the pre-test precipitation had any influence on the bedrock wells. Of the 16 wells monitored, 7 wells showed a slight rise in water levels that was attributed to the August 17, 2018 precipitation event. The rise in water levels ranged from approximately less than 1 foot to less than 2 feet as summarized by the table below. Based on the overall pre-test water-level trends of the offsite wells, and in consultation with the Town consultant, it was determined that background monitoring conditions were acceptable to initiate the 72-hour pumping test.

Table 5: Water-Level Impacts from August 17, 2018 Pre-Test Precipitation

Well Location	Map	Approximate Change in Water Level Resulting from Pre-Test Precipitation (feet)
6 East Quaker Hill Ct.	6	ND
3 Quaker Hill Court W	13	1.9
74 Quaker Hill Drive	14	ND
78 Quaker Hill Drive	20	1.3
83 Quaker Hill Drive	21	ND
3 Quaker Hill Court E	23	ND
14 Little Lake Ridge	29	0.2
2022 Quaker Ridge Road	35	ND
2028 Quaker Ridge Road	36	1.2
12 Glendale Road	40	ND
26 Glendale Road	44	ND
56 Glendale Road	49	ND
60 Glendale Road	50	0.8
5 Little Lake Road	51	0.2
6 Little Lake Road	52	ND
29 Quaker Hill Drive	59	0.4

ND none discernible

During the test, two homes showed minor impact from the August 22nd rain event, including 78 Quaker Hill Drive and 60 Glendale Road. Water levels at both wells returned to pre-precipitation conditions within 24 hours of the rain event.

6.0 WATER-QUALITY RESULTS

Water samples were collected from Well 1 and Well 2 during the August 2018 72-hour pumping test for analysis for all parameters required by the NYSDOH Sanitary Code Part 5, Subpart 5-1. Analysis of the extra synthetic organic compounds (SOCs) dioxin, endothall, glyphosate, and diquat and asbestos and propylene glycol were not required by WCDH (email dated August 2, 2018 from Zaw Thein) because these parameters were not present above the laboratory detection limits when they were first sampled as part of the original 2015 72-hour pumping test. MPA and giardia and cryptosporidium samples were also collected from the Well 2 (near the pond) to assess for potential GWUDI. The MPA samples were collected from the well using the EPA Consensus Method which requires the flow of discharge water through a filter at 1 gpm for a period ranging from 8 to 24 hours. In order to avoid any potential interference with water levels as a result of the MPA sample apparatus, the MPA sample was collected after the completion of the 72-hour test and recovery period. Beginning on August 28, 2018, Well 2 was pumped separately for 20 hours at a rate of 9 gpm and the sample was collected on August 29, 2018. All of the groundwater samples were taken to Envirotest Laboratories, Inc. located in Newburgh, New York for analysis. Copies of the laboratory reports from the samples collected are included in Appendix VI.

6.1 WELL 1 (NEAR THE MAIN HOSPITAL BUILDING)

The sample results from Well 1 met all NYSDOH drinking water standards. Methyl tertiary-butyl ether (MTBE) was detected in the groundwater sample at a concentration of 0.737 µg/l (microgram per liter), well below the NYSDOH drinking water standard maximum contaminant level (MCL) of 10 µg/l. This detection is similar to the MTBE water quality result of 0.55 µg/l detected in the original 2015 groundwater sample collected from this well.

The Langlier Index value, which is a measure of corrosivity was -0.510. This value is slightly under the desired range of -0.5 to 0.5; however, there is no MCL for this parameter. This value should be taken into consideration in the water treatment design for this well.

6.2 WELL 2 (NEAR THE POND)

The sample results for Well 2 met all NYSDOH drinking water standards except for iron and the presence of total coliform. The iron concentration was 0.50 mg/L which exceeds the MCL of 0.3 mg/L; and the manganese concentration was 0.125 mg/L which does not exceed the individual MCL for manganese of 0.3 mg/L, but because of the iron concentration, does exceed the combined iron and manganese MCL of 0.5 mg/L. Based on the iron concentration, treatment will be required for this well. Elevated concentrations of iron and/or manganese in groundwater is very common and can easily be treated.

The sodium concentration reported in Well 2 was 19.9 mg/L which is slightly below the reporting limit of 20 mg/L for people on sodium restricted diets, and well below the recommended limit of 270 mg/L. The NYSDOH does not currently have an MCL for sodium.

The bacteria detection in this well is likely the result of the use of the temporary well appurtenance for the pumping test and the absence of a sanitary sealed well cap on the well during the test period. This well should be disinfected and resampled for total coliform before being used. Disinfecting the well will eliminate the coliform bacteria prior to placing the well into service.

The results for the MPA sample from Well 2 reported a low risk for potential GWUDI and giardia and cryptosporidium were not detected.

7.0 CONCLUSIONS

- The average water demand for the Hudson Ridge Wellness Center was calculated based on the WCDH-approved water usage rate of 100 gpd/bed for a maximum of 92 patients and 15 gpd/person for 86 staff and ancillary buildings to be used for storage, office space, patient centers is 12,660 gpd or 8.8 gpm. Previous testing was conducted on the new water supply wells to demonstrate the wells can meet the average water demand. The purpose of the 2018 72-hour test was to monitor for potential offsite water-level impacts to private potable supplies in the vicinity of the HRWC wells.

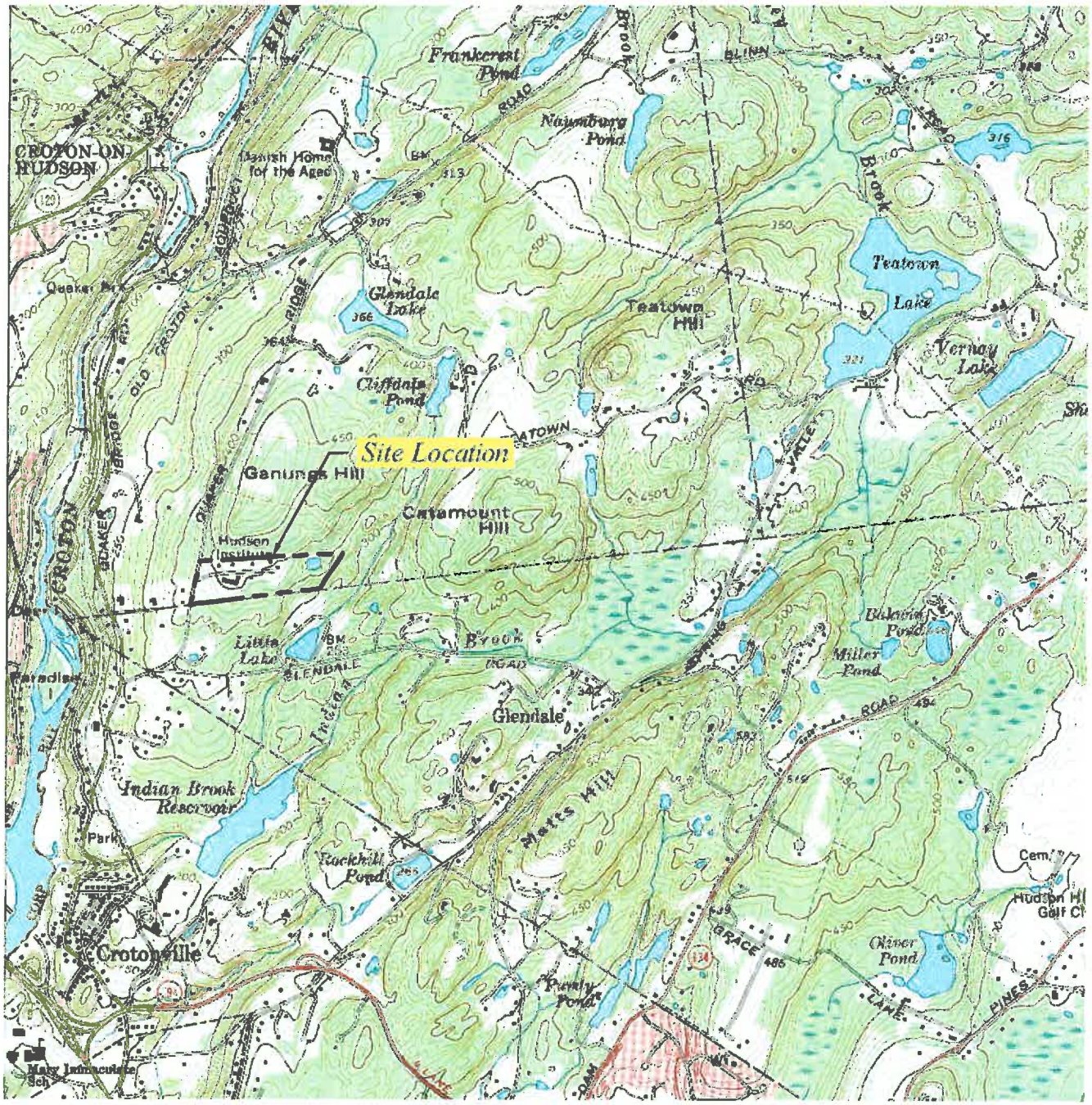
- A simultaneous 72-hour pumping test was conducted on proposed bedrock water-supply Well 1 and Well 2 located on the Hudson Ridge Wellness Center property between August 20 and 23, 2018. A staggered start up schedule of the wells was utilized to assess potential pumping-related effects between the wells. There were no discernible effects observed during the staggered start up. Because of a crack in the pump column pipe in Well 2, the pump had to be shut down after approximately an hour of pumping and the pipe was replaced and the pump was restarted approximately one hour later. The pumping test was ended 72 hours after the second start-up of Well 2 on August 23, 2018. The wells were pumped concurrently for approximately three days and each demonstrated stabilized yields of 9 gpm for a combined total yield of 18 gpm or 25,920 gpd.
- Well 1 and Well 2 demonstrated a water-level change of less than 0.5 per 100 feet of available drawdown in each well over the final 6 hours of the pumping test period per Section 3.a.i of the NYSDEC Pumping Test Procedures document.
- Following shut down of the simultaneous pumping test on August 23, 2018 water-level recovery measurements were collected from the wells. The water levels in Well 1 and Well 2 reached 90% recovery to the pre-test levels in 39 hours and 93 hours, respectively, and continued to rise.
- As part of the pumping test program, water-level measurements were collected from two older onsite monitoring wells to assess drawdown in the aquifer. Drawdown in monitor wells MW-1 and MW-2 were 0.42 foot and 0.15 foot at the end of the test.
- Water-level measurements were also collected from 16 offsite wells during the pumping test program. Offsite water-level effects were observed in two offsite wells located on Quaker Hill Drive that were attributed to the pumping test. The drawdown ranged from 18.5 feet to 24.5 feet. After the pumping test was ended, the water levels in the impacted offsite wells recovered to pre-static conditions. WSP will solicit these two homeowners to participate in the offsite well monitoring program, which would start three to six months before the certificate of occupancy is issued and continue for up to two years after 75 percent of full occupancy occurs.
- No discernible water-level drawdown was observed in any of the 14 other offsite wells that were included in the monitoring program.
- The pumping test, as conducted, was very conservative because it stressed the aquifer for 72 continuous hours at twice the average demand of the project. As a result, the impact observed in the two offsite wells was significantly greater than what is expected under normal pumping operations. Based on the demand requirements, the HRWC wells will never pump continuously at twice the average demand for three days straight under the proposed occupancy conditions. In addition, the proposed wellness center will be served by an onsite one-day reserve storage tank. The wells will be connected to the storage tank that is designed to fill when the tank capacity is lowered to a certain level, minimizing the wells from being pumped for extended periods of time to meet peak water demands. Therefore, utilization of the HRWC wells should have no discernible impact to the offsite wells. However, if long-term monitoring were to unexpectedly demonstrate any significant interference from the HRWC wells, mitigation options (including but not limited to, lowering the homeowner pump or deepening their well) will be evaluated and implemented.
- Water samples were collected from the two onsite wells during the pumping test and analyzed for the parameters required by the NYSDOH Sanitary Code Part 5, Subpart 5-1, not including the extra compounds of dioxin, endothall, glyphosate, diquat, asbestos and propylene glycol. In addition, MPA, giardia and cryptosporidium

samples were collected from Well 2 because it is located within 200 feet of surface-water bodies. The results of the water samples collected from the two proposed supply wells met all NYSDOH drinking water standards with the exception of iron, manganese and the presence of total coliform Well 2. Treatment of groundwater from Well 2 to reduce iron will be required. Note that elevated concentrations of iron and/or manganese is very common and can easily be treated. The bacteria detection in this well was likely the result of the use of the temporary well appurtenance for the pumping test and the absence of a sanitary sealed well cap on the well during the test period. Disinfecting the well will eliminate the coliform bacteria prior to placing the well into service. With treatment, the water quality is suitable for human consumption.

- Langlier Index values in Well 1 was -0.51, which is slightly outside of the desired range of -0.5 to 0.5; however, there is no MCL value for this parameter. The Langlier Index value should be taken into consideration in the water treatment design for this well.
- A trace detection of MTBE was reported in the sample from Well 1 at a concentration of 0.737 µg/l, well below the NYSDOH drinking water standard MCL of 10 µg/l. This detection is similar to the MTBE water quality result of 0.55 µg/l detected in the original 2015 groundwater sample collected from this well.
- The results for the MPA sample collected from Well 2 was reported to be low risk for potential GWUDI and the sample reported none detected for giardia and cryptosporidium.

nv
October 3, 2018
H:\Hudson Ridge Wellness Center\2018\Pumping Test Report\Report.docx

FIGURES



SOURCE: USGS TOPOGRAPHIC QUADRANGLE OSSINING, NEW YORK (1967).

QUADRANGLE LOCATION

0 2000

SCALE IN FEET

HUDSON RIDGE WELLNESS CENTER
2016 QUAKER RIDGE ROAD
TOWN OF CORTLANDT, NEW YORK

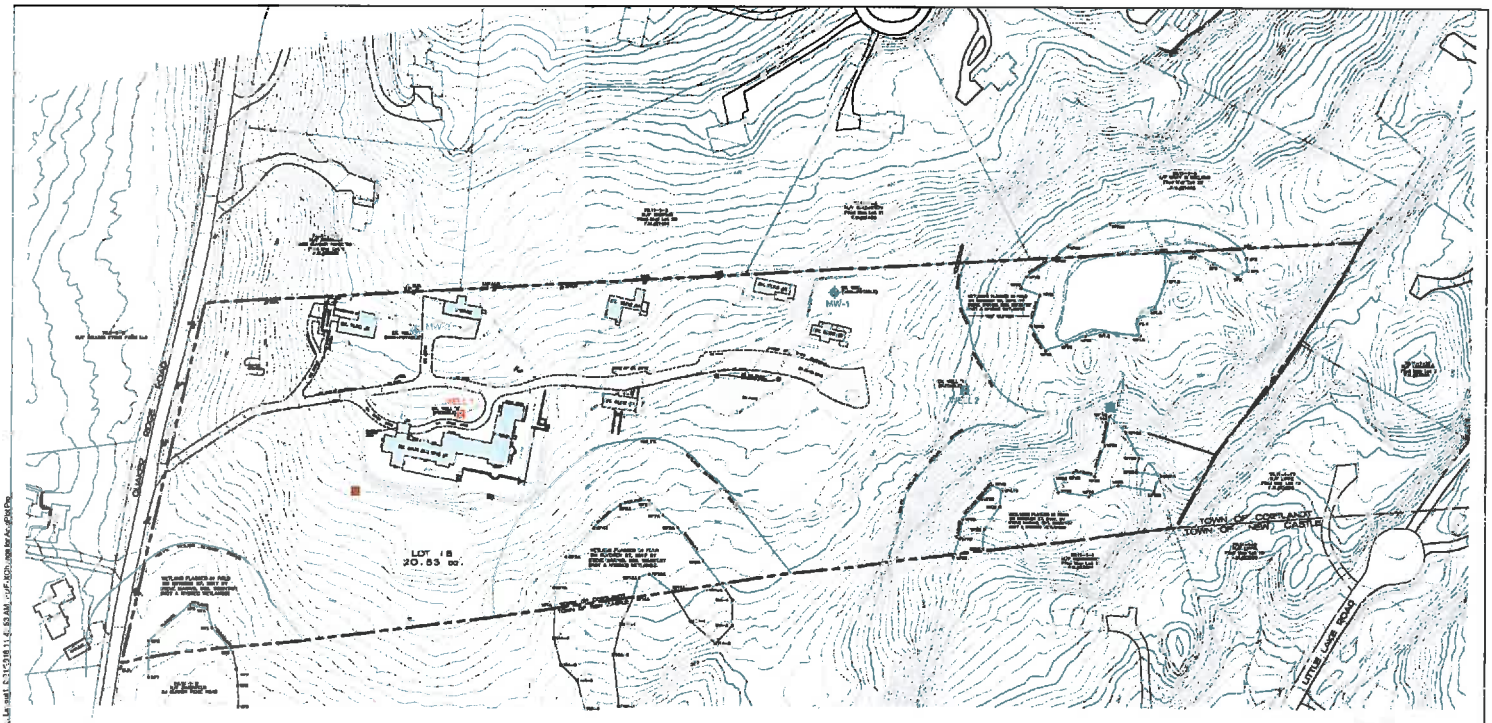
SITE LOCATION MAP

DATE	REVISED

PREPARED BY: LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Groundwater and Environmental Engineering Services
4 Research Drive
Suite 204
Shelton, Connecticut 06484
(203) 929-8555

DRAWN:	RAC	CHECKED:	BM	DATE:	12/07/16	FIGURE:	1

O:\DWG\Hudson Ridge Wellness Center\F1_SLM.dwg, Layout1, 12/7/2016 3:06:12 PM, AcroPlot.pc3



LEGEND

PROPERTY BOUNDARY

MONITOR WELL

PUMPING WELL

APPROXIMATE LOCATION OF WATER DISCHARGE DURING 72-HOUR AQUIFER TEST

0 150
SCALE IN FEET

SOURCE
RALPH G. MASTROMONACO, P.E., P.C. "HUDSON RIDGE WELLNESS CENTER" JUNE 21, 2018, PDF

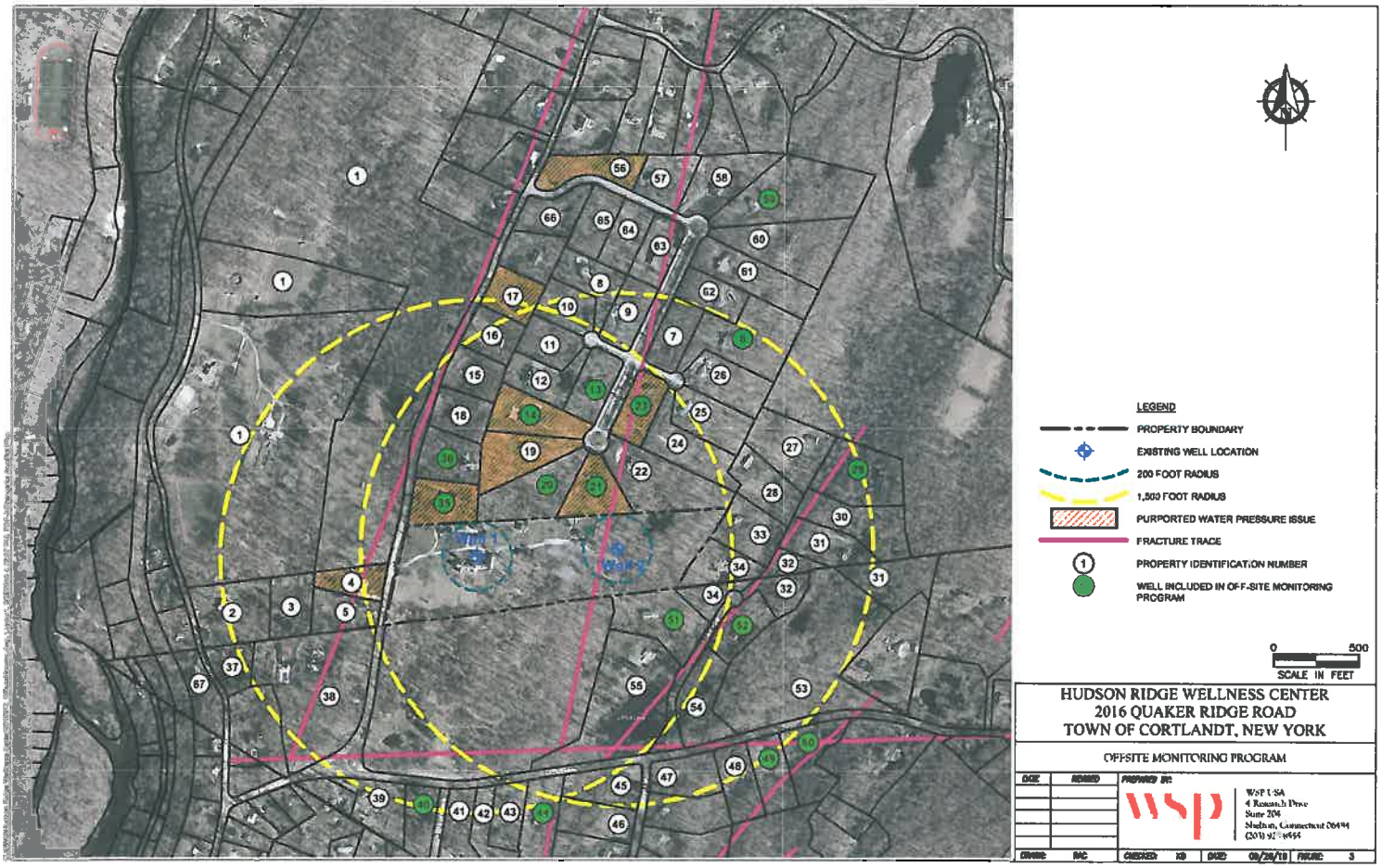
HUDSON RIDGE WELLNESS CENTER
2016 QUAKER RIDGE ROAD
TOWN OF CORTLANDT, NEW YORK

ON-SITE MONITORING LOCATIONS

DATE	REVISED

PREPARED BY
LBG HYDROGEOLOGIC & ENGINEERING SERVICES, P.C.
Professional Geologists & Environmental Engineers
Member of WSP
4 Research Drive
Suite 204
Shelton, Connecticut 06484
(203) 929-8555

DRAWN:	RAC	CHECKED:	KD	DATE:	08/21/18	FIGURE:	2


LEGEND
PROPERTY BOUNDARY
EXISTING WELL LOCATION
200 FOOT RADIUS
1,500 FOOT RADIUS
PURPORTED WATER PRESSURE ISSUE
FRACTURE TRACE
PROPERTY IDENTIFICATION NUMBER
WELL INCLUDED IN OFF-SITE MONITORING PROGRAM
0
500
SCALE IN FEET
HUDSON RIDGE WELLNESS CENTER
2016 QUAKER RIDGE ROAD
TOWN OF CORTLANDT, NEW YORK
OFFSITE MONITORING PROGRAM
DATE
REVISED
PREPARED BY:
WSP USA
4 Research Drive
Suite 204
Shelton, Connecticut 06484
(203) 926-0555
DRAWN: RC
CHECKED: KB
DATE: 09/26/18
FIGURE: 3

HydroEnvironmental
SOLUTIONS, INC.

November 8, 2018

Copies 1 Planning Board
..... Town Board
..... Zoning Board
1 Legal Dept.
1 DOTS Director
1 C.A.C.
..... A.R.C.
..... Applicant
1 ZBA
.....
Sent 11/9/18

Mr. Michael Preziosi, PE
Town of Cortlandt
Town Hall
1 Heady Street
Cortlandt Manor, New York 10567

RE: Hudson Ridge Wellness Center
72-hour Water Supply Testing and Report
2016 Quaker Ridge Road
Cortlandt, New York

Dear Mr. Preziosi:

As requested, HydroEnvironmental Solutions, Inc. (HES) has reviewed the report entitled Well Pumping Program and Test Results compiled by LBG Hydrogeologic and Engineering Services, P.C. (LBGHES) and dated October 2018. HES reviewed the pumping test report for completeness, technical standing and New York State regulatory compliance for water supply testing. In this regard, we offer the following:

Project Background

The Applicant proposes to renovate the existing 20.8-acre parcel and structures into a 92-bed drug and alcohol rehabilitation center. The Applicant's stated future water demand is 12,660 gallons per day (gpd) or 8.8 gallons per minute (gpm) which will be pumped from two recently drilled (2015) on-site bedrock wells, Wells 1 and 2. The septic system for the main building at the facility will be newly designed in accordance with modern Westchester County Department of Health (WCDOH) Regulations. The entire

One Deans Bridge Road • Somers, New York 10589

914.276.2560 • FAX 914.276.2664

facility will be serviced by on-site subsurface wastewater treatment systems (septic systems).

Previous Water Supply Testing and 2018 Pumping Test Plan

The Applicant conducted a simultaneous 72-hour pumping test in 2015 on Wells 1 and 2 at a pumping rate of 9 gpm at each well, for a combined pumping rate of 18 gpm. The pumping test indicated that the wells stabilized and recovered rapidly after shutdown. The results of the pumping test indicated that the wells can supply the proposed project more than twice the required 8.8 gpm. The Applicant's hydrogeologic consultant LBGHES conducted a second 72-hour pumping test in July and August 2017 on Well 2 (after Well 2 was deepened from 500 feet to 800 feet) at a pumping rate of 18 gpm. The second test demonstrated that more than twice the project demand could be met with the best well out of service (Well 1). Results from the second pump test show that Well 2 stabilized, recovering rapidly after shutdown, and that the water level in Well 1 was unaffected by the pumping. However, during the 2015 and 2017 pumping tests, no off-site well monitoring program was implemented. Therefore, HES and the Town recommended (with the Applicant's consultant in agreement), that another pumping test should be conducted in conjunction with an off-site well monitoring program. Following revisions made based on review and comments by HES, LBGHES submitted a final Pumping Test Plan, dated July 5, 2018 which was subsequently approved by the Town in August 2018.

August 2018 Pumping Test

HES reviewed the results of the August 20-23, 2018 72-hour simultaneous pumping test as described in the report entitled Well Pumping Program and Test Results, dated October 2018 and submitted to the Town by LBGHES on behalf of the Applicant. Our review indicated the following:

- Wells 1 (near main building) and 2 (near pond) were pumped simultaneously at a rate of 9 gpm for a total of 18 gpm or double the daily demand of the project (8.8 gpm) for 72 consecutive hours. About one hour into pumping, LBGHES determined that Well 2 was no longer meeting the 9 gpm pumping rate due to a defective pump. The Well 2 pump was subsequently removed and replaced. Pumping at Well 1 continued during this period and following the recommencement of pumping at Well 2, both wells were pumped simultaneously at 9 gpm for 72 consecutive hours. Pumping rates were confirmed by measurements (using the well head flow meters and 5-gallon bucket methods of flow measurement) independently collected by HES during daily site visits throughout the test.

- At the end of the pumping test, total drawdown at Wells 1 and 2 was 50.77 feet and 85.93 feet, respectively. Over the final 6 hours of the pumping test, water level

change was -0.11 feet and +0.14 feet at Wells 1 and 2, respectively. Therefore, both wells met the stabilization criteria defined by the NYSDEC as less than 0.5 foot of drawdown per 100 feet of available drawdown in the well over the final 6 hours of pumping without an overall drawdown trend. Drawdown levels for the on-site pumping wells were confirmed by measurements (using M-scope electric dropline and downloading data from LBGHES data loggers) independently collected by HES during daily site visits throughout the test.

- Off-site drawdown effects were observed in two of the sixteen (16) monitored wells located at 78 and 83 Quaker Ridge Road with respective drawdowns of 24.5 feet and 18.45 feet. The Applicant's consultant has stated that the impacts were negligible due to the submersible pump setting and depth of each well. HES concurs with LBGHES's recommendation to monitor both affected wells over time until the project is developed.

- No drawdown effects due to pumping were observed in the other fourteen (14) off-site wells as is supported by the hydrographs included in Appendix IV of the Pumping Test Report.

- On-site drawdown effects to the two monitor wells (MW-1 and MW-2) were minimal (<0.5 feet) indicating that on-site pumping did not affect the two existing bedrock supply wells to any significant degree.

- Precipitation measurements from the on-site rain gauge and the nearby North Ossining weather station indicate the on and off-site monitoring area experienced 1.00 - 1.41 inches of rain prior to the test, 0.68 – 0.80 inches of rain during pumping and 0.00 - 0.10 inches of rain during the recharge period. Although some recharge occurred in wells prior to the test (less than 2 feet), LBGHES and HES agreed that the precipitation and resulting recharge were acceptable background conditions and the test could commence as planned.

- The samples collected by LBGHES from Well 1 indicated that none of the applicable NYSDOH Part V parameters were detected above maximum contaminant level (MCL) concentrations, the drinking water standards set by NYSDOH. Results from the samples collected from Well 2 indicated that the 0.50 milligram per liter (mg/L) iron concentration exceeded the 0.3 mg/L MCL. Total coliform was also detected in Well 2 as part of the Part V analysis. Well 2 was also sampled for micro particulate analysis (MPA) due to its proximity to the on-site pond and wetland and was negative for cryptosporidium and giardia and groundwater under the direct influence of surface water (GWUDI). The GWUDI results also indicate that on-site pumping did not influence any nearby surface water body.

- As part of the pumping test review, HES also reviewed the sixteen (16) individual off-site monitor well letters to the individual well owners who participated in the program. HES concurs with LBGHES's interpretation of the water level data and the conclusions drawn in the letters. If they have not been sent to each of the well owners to date, the letters should be sent out for their review.

HES would be pleased to meet with the Town of Cortlandt and the Applicant if required to discuss this matter further. Please contact me at (914) 276-2560 if you have any questions or should you require any additional information.

Very truly yours,
HydroEnvironmental Solutions, Inc.

William A. Canavan

William A. Canavan, PG, LSRP
President

cc:
Christopher Kehoe – Town of Cortlandt
File

Well Pumping Program Hudson Ridge Wellness Center

December 4, 2018

72-Hour Pumping Test

August 20 – 23, 2018

- Simultaneous pumping of Well 1 and Well 2
- 9 gpm each, combined yield of 18 gpm (25,920 gpd)
- Average water demand is 12,660 gpd (8.8 gpm)

Pumping Test Plan

- Submitted to Town and WCDH for review on July 5, 2018
- WCDH approval granted on August 2, 2018
- Town approval granted on August 10, 2018

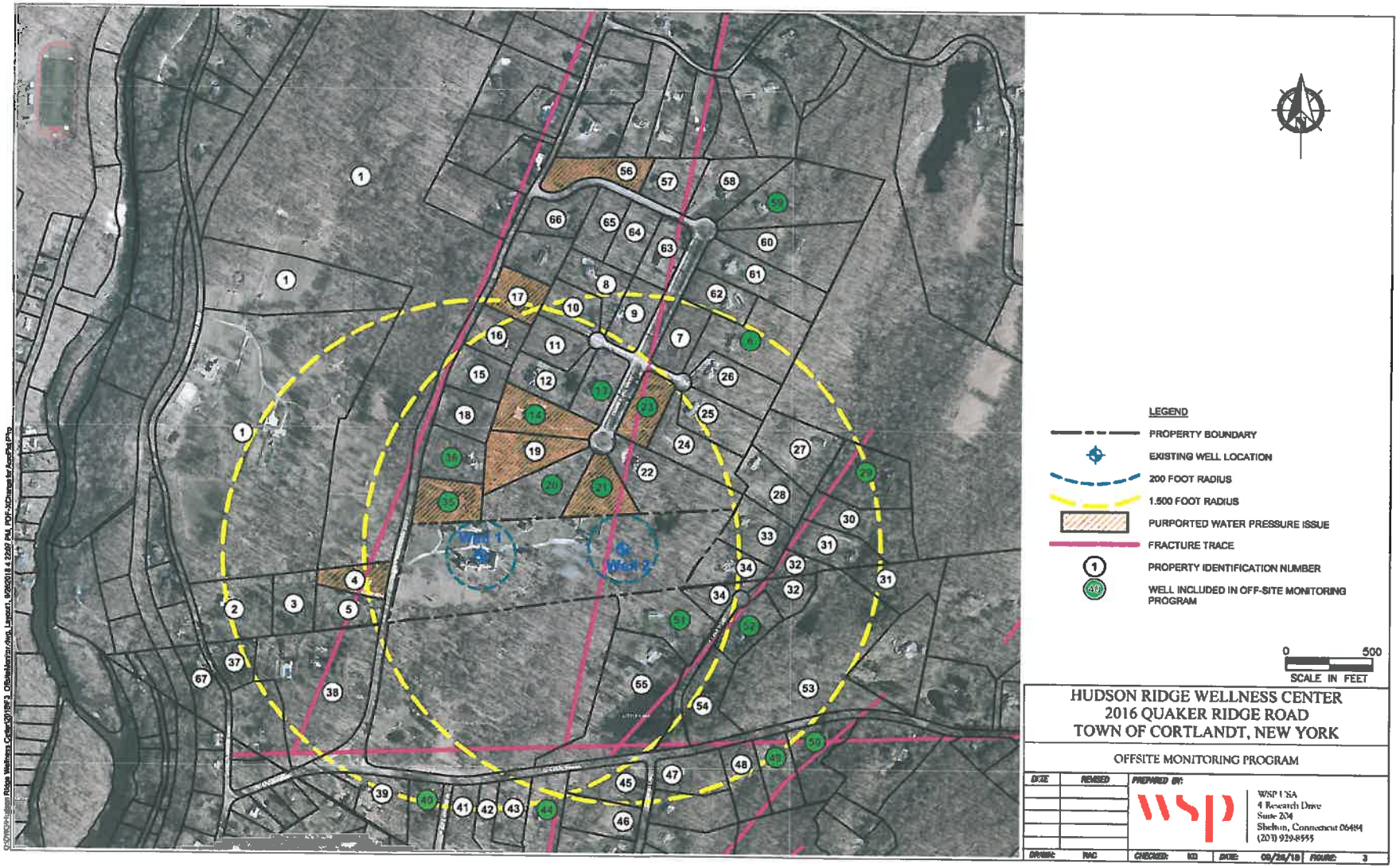
Monitoring Program

- Solicited 67 property owners within 1,500 – 2,000'
  - Included 9 property owners requested by Zarin & Steinmetz

- 18 property owners granted permission
  - Included 5 of the 9 property owners requested by Zarin & Steinmetz

- 16 private wells included in monitoring program (access issues with 2)

  - Provided good spatial coverage, include wells in close proximity, purported water-supply issues, on/near mapped fracture trace patterns


LEGEND
PROPERTY BOUNDARY
EXISTING WELL LOCATION
200 FOOT RADIUS
1,500 FOOT RADIUS
PURPORTED WATER PRESSURE ISSUE
FRACTURE TRACE
PROPERTY IDENTIFICATION NUMBER
WELL INCLUDED IN OFF-SITE MONITORING PROGRAM
0
500
SCALE IN FEET
HUDSON RIDGE WELLNESS CENTER
2016 QUAKER RIDGE ROAD
TOWN OF CORTLANDT, NEW YORK
OFFSITE MONITORING PROGRAM
DATE
REVISED
PREPARED BY:
WSP USA
4 Research Drive
Suite 204
Shelton, Connecticut 06484
(203) 929-8555
DRAWN: MAD
CHECKED: KD
DATE: 09/26/19
FIGURE: 3

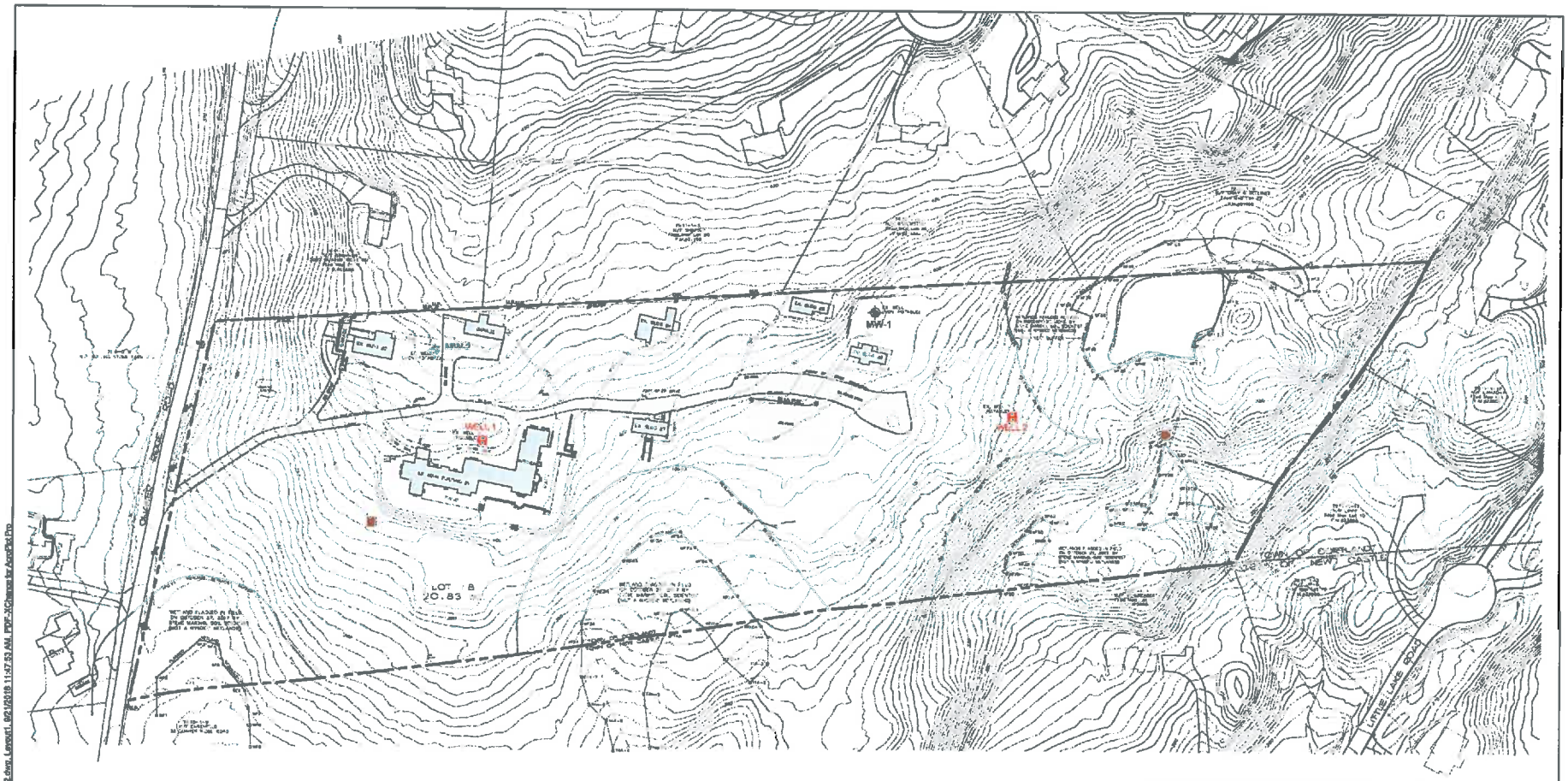
On Site Test Results

Pumping Wells

Well ID	Static Water Level (ft btoc)	Final Water Level (ft btoc)	Drawdown (ft)
PW-1	40.42	91.19	50.77
PW-2	7.17	93.10	85.93

Onsite Bedrock Wells

Well ID	Approximate Distance to Well 1 (ft)	Approximate Distance to Well 2 (ft)	Drawdown (ft)
MW-1	645	270	0.42
MW-2	158	900	0.15



LEGEND

- PROPERTY BOUNDARY
- MONITOR WELL
- PUMPING WELL
- APPROXIMATE LOCATION OF WATER DISCHARGE DURING 72-HOUR AQUIFER TEST

0 150
SCALE IN FEET

SOURCE:
RALPH G. MASTROMONACO, P.E, P.C. "HUDSON RIDGE WELLNESS CENTER" JUNE 21, 2018, PDF

HUDSON RIDGE WELLNESS CENTER
2016 QUAKER RIDGE ROAD
TOWN OF CORTLANDT, NEW YORK

ON-SITE MONITORING LOCATIONS

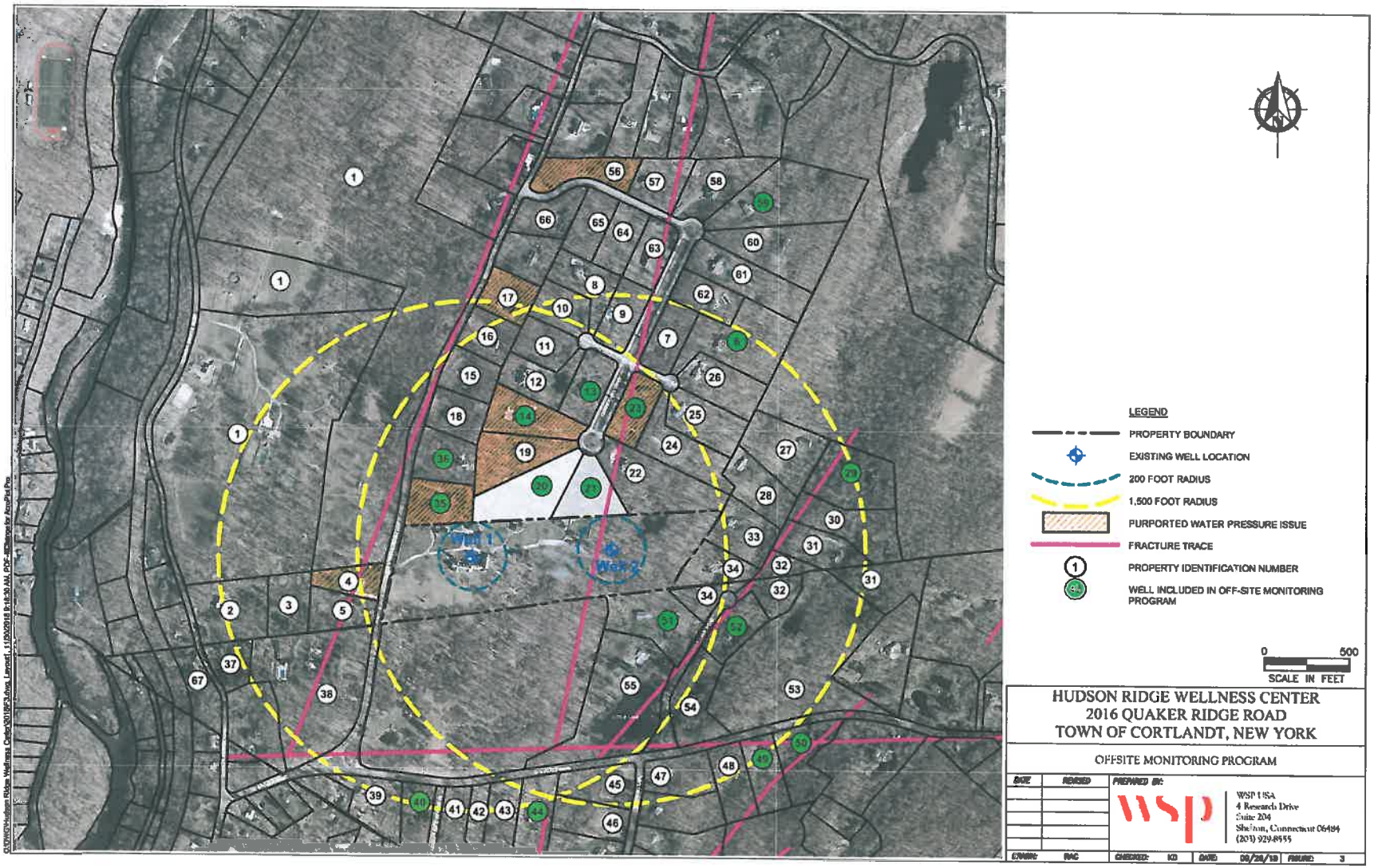
DATE	REVISED

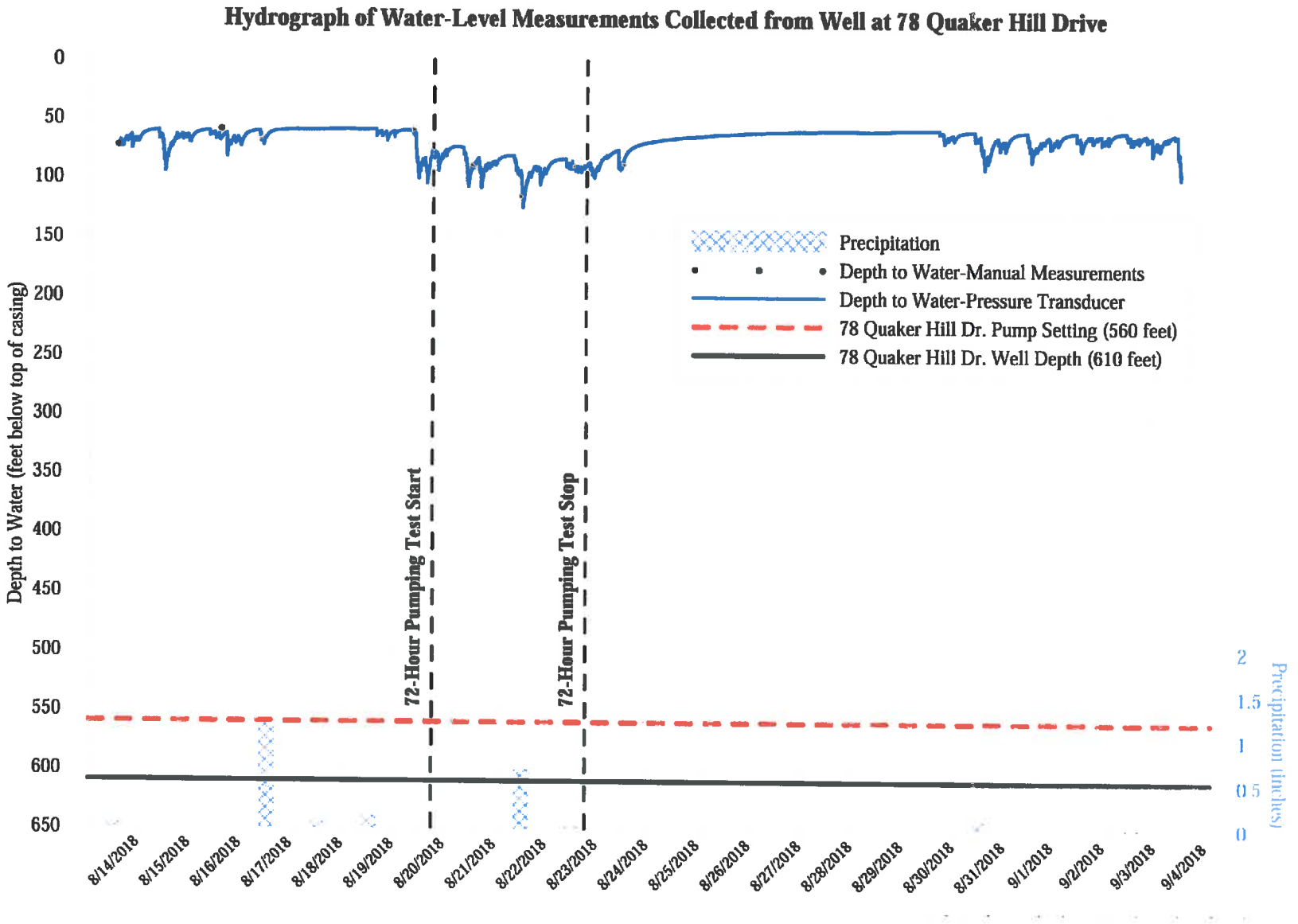
PREPARED BY
LBG HYDROGEOLOGIC & ENGINEERING SERVICES, P.C.
Professional Geologists & Environmental Engineers
Member of WSP
4 Research Drive
Suite 204
Shelton, Connecticut 06484
(203) 929-8555

DRAWN:	RAC	CHECKED:	KD	DATE:	08/21/18	FIGURE:	2

Off Site Test Results

Well Location	Map	Approximate Distance to Well 1 (feet)	Approximate Distance to Well 2 (feet)	Drawdown Attributed to Pumping at End of Simultaneous Pumping Test (feet)
6 East Quaker Hill Ct.	6	2,050	1,450	ND
3 Quaker Hill Court W	13	1,200	950	ND
74 Quaker Hill Drive	14	900	950	ND
78 Quaker Hill Drive	20	600	550	24.5
83 Quaker Hill Drive	21	800	400	18.5
3 Quaker Hill Court E	23	1,300	850	ND
14 Little Lake Ridge	29	2,300	1,500	ND
2022 Quaker Ridge Road	35	400	1,050	ND
2028 Quaker Ridge Road	36	600	1,150	ND
12 Glendale Road	40	1,500	1,850	ND
26 Glendale Road	44	1,550	1,600	ND
56 Glendale Road	49	2,100	1,500	ND
60 Glendale Road	50	2,250	1,600	ND
5 Little Lake Road	51	1,200	500	ND
6 Little Lake Road	52	1,650	850	ND
29 Quaker Hill Drive	59	2,500	2,250	ND


LEGEND
PROPERTY BOUNDARY
EXISTING WELL LOCATION
200 FOOT RADIUS
1,500 FOOT RADIUS
PURPORTED WATER PRESSURE ISSUE
FRACTURE TRACE
PROPERTY IDENTIFICATION NUMBER
WELL INCLUDED IN OFF-SITE MONITORING PROGRAM
0
500
SCALE IN FEET
HUDSON RIDGE WELLNESS CENTER
2016 QUAKER RIDGE ROAD
TOWN OF CORTLANDT, NEW YORK
OFFSITE MONITORING PROGRAM
DATE
REVISED
PREPARED BY:
WSP USA
4 Research Drive
Suite 204
Shelton, Connecticut 06484
(203) 929-8555
DRAWN: RAC
CHECKED: KD
DATE: 09/28/18
FIGURE: 3


Hydrograph of Water-Level Measurements Collected from Well at 78 Quaker Hill Drive
Depth to Water (feet below top of casing)
0
50
100
150
200
250
300
350
400
450
500
550
600
650
72-Hour Pumping Test Start
72-Hour Pumping Test Stop
Precipitation
Depth to Water-Manual Measurements
Depth to Water-Pressure Transducer
78 Quaker Hill Dr. Pump Setting (560 feet)
78 Quaker Hill Dr. Well Depth (610 feet)
Precipitation (inches)
2
1.5
1
0.5
0
8/14/2018
8/15/2018
8/16/2018
8/17/2018
8/18/2018
8/19/2018
8/20/2018
8/21/2018
8/22/2018
8/23/2018
8/24/2018
8/25/2018
8/26/2018
8/27/2018
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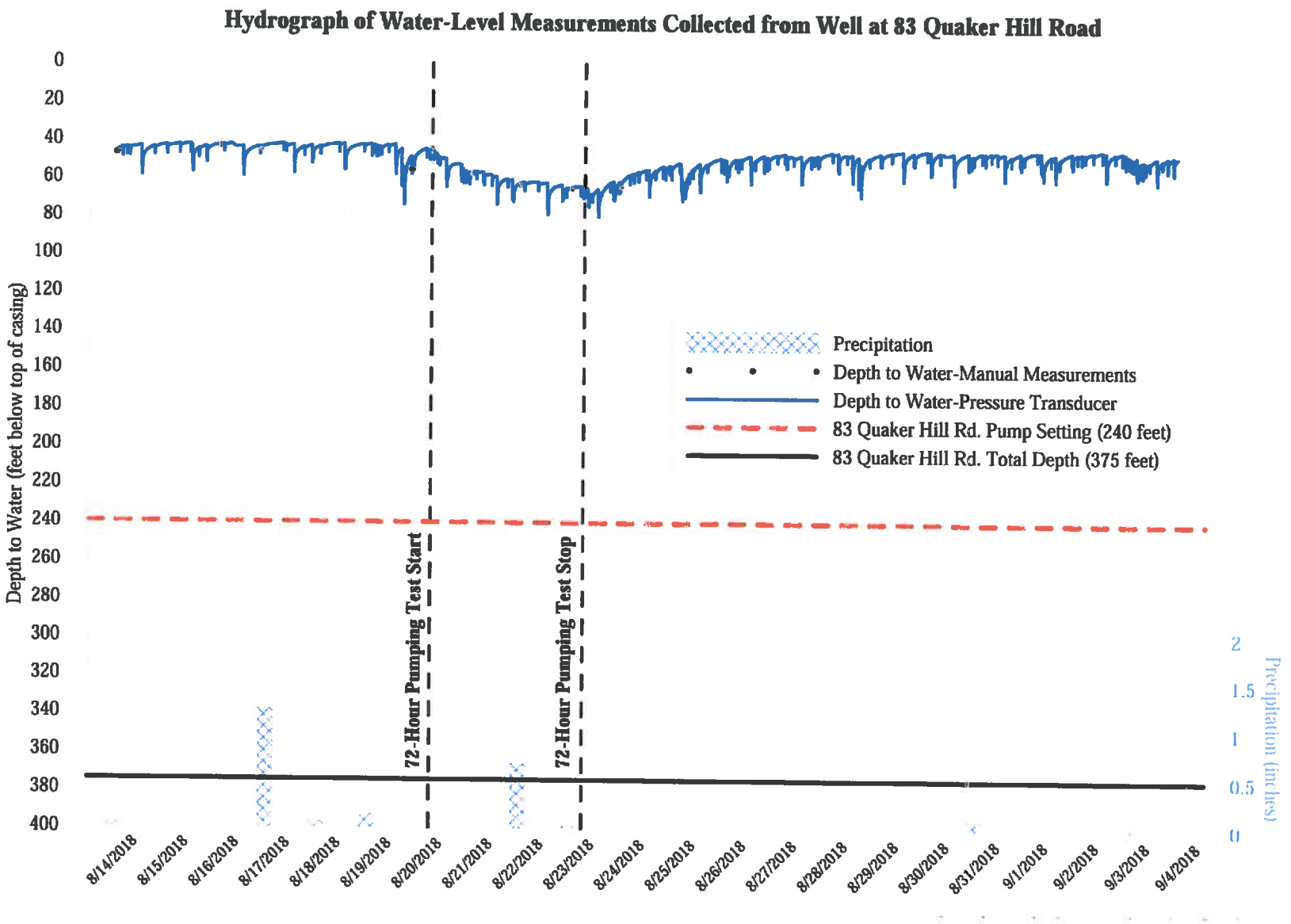
Hydrograph of Water-Level Measurements Collected from Well at 83 Quaker Hill Road
Depth to Water (feet below top of casing)
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
72-Hour Pumping Test Start
72-Hour Pumping Test Stop
Precipitation
Depth to Water-Manual Measurements
Depth to Water-Pressure Transducer
83 Quaker Hill Rd. Pump Setting (240 feet)
83 Quaker Hill Rd. Total Depth (375 feet)
Precipitation (inches)
2
1.5
1
0.5
0
8/14/2018
8/15/2018
8/16/2018
8/17/2018
8/18/2018
8/19/2018
8/20/2018
8/21/2018
8/22/2018
8/23/2018
8/24/2018
8/25/2018
8/26/2018
8/27/2018
8/28/2018
8/29/2018
8/30/2018
8/31/2018
9/1/2018
9/2/2018
9/3/2018
9/4/2018

Water Quality Results

- **PW-1**
  - Meets NYSDOH Drinking Water Standards
  - Trace detection MTBE (0.737 µg/l) (MCL = 10 µg/l)

- **PW-2**
  - Iron detected (0.50 mg/l) (MCL – 0.3 mg/l)
  - Total Coliform detected – disinfect well prior to putting in service
  - MPA low risk; giardia and cryptosporidium not detected