Rupp Pfalzgraf LLC
People at law®

24 Aviation Road, Suite 204,
Albany, New York 12205
P 518.432.4100 ◂ www.RuppPfalzgraf.com

JOHN L. BARONE
Barone@rupppfalzgraf.com

March 5, 2025

VIA E-MAIL (dvollmer@townofcairo.com & planning@townofcairo.com)**:**
Town of Cairo Planning Board
Joseph Hasenkopf, Planning Board Chair
Edward Forrester, Member
Allen Veverka, Member
Beth Hansen, Member
Stacey Poulsen, Member
Raymond Pacifico, Alternate
P. O. Box 728
Cairo, NY 12413

Re: Blackhead Mountain Lodge
64 Crows Nest Road
Site Plan/Special Use Permit Application (2022-1101P)

Dear Chairman Hasenkopf and Planning Board Members:

As you are aware, this law office has been retained by Friends of Round Top, Inc. ("Friends of Round Top") and the Sierra Club Atlantic Chapter in relation to the site plan and special use application filed by RCBG JV Manager LLC (the "Applicant") for the Blackhead Mountain Lodge (the "Project"). We submit these comments in anticipation of the Town of Cairo ("Town") Planning Board ("Planning Board") addressing the determination of significance under SEQRA for the Project, and to submit the attached expert opinion letter of Katherine J. Beinkafner, Ph.D., a New York State Professional Geologist, doing business as Mid-Hudson Geosciences.

The Applicant has indicated they have submitted their final SEQRA documents.[1] In light of this, the Planning Board is in "receipt of all information it may reasonably need to make the determination of significance."[2] The Planning Board has correctly recognized that the Project is a Type 1 action under SEQRA. For a Type 1 action like this Project, "[a] lead agency must prepare a positive declaration if it finds, based on comparing the information in the EAF to the criteria in the SEQR regulations (617.7(c)), that one or more adverse environmental impacts may be significant."[3] As set forth in the regulations, "the fact that an action or project has been listed as a

[1] *See* Planning Board Minutes Feb. 6, 2025, p. 4.
[2] 6 NYCRR § 617.6(b)(3)(ii).
[3] SEQR Handbook, p. 86, *available at* https://extapps.dec.ny.gov/docs/permits_ej_operations_ pdf/seqrhandbook.pdf. *See also Matter of UPROSE v. Power Authority of State of New York,* 285 A.D.2d 603, 608 (2d Dept. 2001) ("Because the operative word triggering the requirement of an EIS is 'may,'

Type I action carries with it the presumption that it is likely to have a significant adverse impact on the environment and may require an EIS."[4] The EIS is "'the heart of the SEQRA process."[5]

While the Applicant has indicated its view that a negative declaration of significance should be issued, the Project presents numerous potentially significant impacts that still require further review in an EIS. Notably, the Town's contracted engineer raised during the last Planning Board meeting that the Applicant's engineer has "more homework to do".[6] This office's letter dated September 10, 2024, clearly identified numerous areas of environmental impact, including without limitation, as follows: over 63 acres of disturbance; over 11 acres of new impervious surfaces; a substantial increase in traffic; up to 1,300 tons of solid waste per month; and over 46,000 gallons of maximum water demand, generating equivalent wastewater discharge into an on-site stream.

In relation to the water withdrawal requirements for the Project, the Applicant's submissions present significant issues regarding the water demands for the Project and ability of the proposed wells to support such demands. While the Applicant's hydrogeology consultant accepted the calculated demand for the project, Dr. Beinkafner has concluded that "[t]he water supply estimates for daily project use are too low for the hotel, condos, restaurants, day spa, pool and other amenities, as proposed" and "[r]evised calculations suggest a minimum daily water demand of 51,439 gpd, supplied by water sources(s) with a minimum yield of 35gpm", in excess of the 32gpm tested.[7] Furthermore, both Hanson Van Vleet Hydrogeologic Consultants, PLLC (Town's hydrogeologic consultant) and Dr. Beinkafner have concluded that the "proposed safe yields of 32 gpm for both Well-4 and Well-5 respectively are in question."[8] Both have noted the lack of sufficient recharge. Hanson Van Vleet notes that "additional analysis would be needed to support the conclusions of the report."[9]

Significantly, Dr. Beinkafner concludes, based upon her independent review of the Sterling pump data, that during the 72 hour pumping tests the pumped water was discharged too close to the wells 4 and 5 during the tests.[10] The point of discharge remained within the cone of depression

---

there is a relatively low threshold for the preparation of an EIS") (quoting *Matter of Omni Partners v. County of Nassau,* 237 A.D.2d 440, 442 (2d Dept. 1997)).

[4] 6 NYCRR § 617.4(a)(1). *See also Shawangunk Mountain Environmental Ass'n v. Planning Bd. of Gardiner*, 157 A.D.2d 273, 275 (3d Dept. 1990) (stating that for a "Type I project, there is a relatively low threshold for requiring an EIS").

[5] *Matter of Munash v. Town Bd. Of the Town of East Hampton,* 297 A.D.2d 345, 347 (2d Dept. 2002) (quoting *Matter of Jackson v. New York State Urban Dev. Corp.,* 67 N.Y.2d 400, 415 (1986)).

[6] *See* Planning Board Minutes Feb. 6, 2025, p. 4.

[7] Beinkafner Report p. 1-3.

[8] Hanson Van Vleet Report p. 2; Beinkafner Report p. 8 ("recharge is slow and insufficient based on the tests conducted").

[9] Hanson Van Vleet Report p. 4, 5 ("additional testing should be completed that incorporates the other existing project wells in a combined pumping scenario that may prove to better distribute the drawdown of the aquifers present, and allow the rate of withdrawal to be better accommodated by the available groundwater recharge to the wells.").

[10] Beinkafner Report p. 7-8.

for the wells likely resulting in recirculation.[11] This indicates that the well recovery, which was already noted to be slow and insufficient, was accelerated and aided by the inflow of the pumped water. Consequently, the Sterling 72-hour pumping data are unreliable.

Finally, Dr. Beinkafner notes that there is "no evidence in the Sterling report that [required] samples were taken for either of the pumping tests for Well 4 or Well 5."[12] Thus, the experts raise significant questions regarding the water withdrawal demand and capacity necessitating an EIS to further explore this issue and potential mitigation efforts.

As set forth above, we contend that the record fully supports a positive declaration, which is therefore required. Friends of Round Top has heard that members of the Planning Board are concerned about a challenge to a positive declaration by the Applicant. However, under New York law, "a positive declaration imposing a DEIS requirement is usually not a final agency action, and is instead an initial step in the SEQRA process" not ripe for judicial review, unlike a negative declaration of significance.[13] Thus, it is much more likely that an Article 78 will be filed against a negative declaration than a positive declaration.

I want to thank the Town of Cairo Planning Board for its openness to and consideration of these comments on behalf of Friends of Round Top as part of its review of the Project. I request that this letter be added to the record of the Project.

Yours truly,

John L. Barone, Esq.

Encl.
Cc: Friends of Round Top, Inc.
Sierra Club Atlantic Chapter
Tal Rappleyea, Esq.

[11] *Id.*
[12] *Id.*
[13] *Ranco Sand & Stone Corp. v. Vecchio,* 27 N.Y.3d 92, 100 (2016) (citing *Matter of Rochester Tel. Mobile Communications v. Ober,* 251 A.D.2d 1053, 1054 (4th Dept. 1998)). *See also Sour Mt. Realty Inc. v. New York State Department of Environmental Conservation,* 260 A.D.2d 920, 921 (3d Dept. 1999).

Review of

Water Supply Hydrogeologic Report

For

Blackhead Mountain Lodge

Cairo, NY

Such Report was prepared by
Sterling Environmental Engineering, PC
24 Wade Road, Latham, NY 12110
For Their Client
RCBG JV Manager, LLC
50 Beale Street, Suite 2300, San Francisco, CA

March 3, 2025

Review Prepared by
Katherine J Beinkafner, Ph.D., NYS P.G. #1176
Mid-Hudson Geosciences
1003 Route 44/55, PO Box 32, Clintondale, NY 12515
(845) 873-7821 rockdoctor@optonline.net

For Client
Friends of Round Top, Inc.
PO Box 282, Round Top, NY 12473
friendsofrt.inc@gmail.com

TABLE OF CONTENTS

Katherine J Beinkafner, Ph.D., NYS Professional Geologist #7611, doing business as Mid-Hudson Geosciences (see resume at end of document) has been retained by Friends of Round Top, Inc. to review the Blackhead Mountain Lodge Water Supply Hydrogeologic Reports and revisions prepared by Sterling Environmental Engineering P.C. (Sterling Report) dated November 19, 2024, revised January 17, 2025, and revised February 5, 2025. Unless otherwise noted, references for this report were taken from the Sterling Report dated February 5, 2025.

Generally, the project involves building a hotel/residential complex with restaurants on property which was originally a golf course in the hamlet of Round Top, in the Town of Cairo, County of Greene, New York. This report reviews (1) the accuracy of the future required water demands for the project used by Sterling for the 72-hour pumping tests, (2) that the procedures which Sterling used to conduct the 72-houir Pumping Tests followed guidance as outlined in the New York State Department of Environmental Conservation document entitled "PUMPING TEST PROCEDURES FOR WATER WITHDRAWAL APPLICATIONS" (June 2019) and (3) identify additional hydrogeologic conditions which may alter the conclusions presented by others based on their interpretation of the Sterling Report.

Project Water Demands on a Daily Basis

Two tables are provided showing future water demand calculations.

The Sterling Report and Hanson Van Vleet opinion letter appear to accept at face value the estimates originally calculated by Crawford & Associates (April 22, 2024; G.2 Appendix 4). However, a full review of KARC's submission found many omissions along with an occasional error. Table 2 calculations suggest a minimum daily water demand of 51,439 gpd, supplied by water source(s) with a minimum yield of 35 gpm. A review of the data in Table 2 found it to be a rigorous and thorough assessment of the facility's operations at full buildout and full occupancy, described in KARC's submission materials.

The following statement in the Sterling report is misleading: "The developer reports a projected average stabilized annual occupancy of 52% for the resort use. Therefore, the actual long-term water demand is expected to be substantially lower than the 32 gpm pumping rate assessed in this report (p.1)." If by "stabilized" the developer meant "annualized," then an occupancy rate of 90% or more would presumably occur during peak season (i.e. summer and fall), offset by an occupancy rate of 20% or less during low season (i.e. winter and spring). Therefore, well testing conducted at anticipated full buildout and full occupancy levels is appropriate.

The numerical standards and calculations presented in Table 2 are discussed below.

Lodging

The most consequential omissions occur in the estimated load rates for lodging units. Sterling applies a 110 gpd load rate for all lodging units (the 2014 NYS Design Standards load for hotel rooms only), even though so-called "branded residences" and townhouses will be sold as condo units (Building Series 1 and 15). Common sense suggests that most prospective buyers of these condo units will expect amenities such as full-size kitchens with dishwashers and potentially in-sink garbage disposals, jacuzzi baths and/or shower systems, washing machine hook-ups, and maybe hot tubs. Furthermore, certain demographic groups who rent lodging units with at least two bedrooms (e.g., families with children) may also prefer units with kitchens. Such amenities will increase the daily water demand.

Restaurants

Load rates for dining facilities vary by opening hours. If lodging units aren't built with kitchens or kitchenettes, common sense suggests that the restaurant at the Main Lodge will offer guests meals during extended hours (i.e., breakfast and lunch), rather than only during limited dinner hours at the separate "destination" restaurant. If the 200-seat restaurant at the Main Lodge offers three meals per day, then the actual use is more likely to be closer to a 24-hour restaurant. Therefore, the daily load rate could increase to 50 gpd per patron for a total of 10,000 gpd. The same methodology applies to staff dining.

Multi-Use or Event Barn

The 2014 NYS Design Standards' load rate for an assembly hall is 5 gpd. It is unknown what category Sterling chose that uses 10 gpd.

Bar

The load rate for the bar includes a 20% water reduction which is correct but not footnoted.

Day Spa

The 2014 NYS Design Standards' load rate for a health club is 20 gpd per patron. A 20% water saving reduction brings the usage down to 16 gpd. Sterling perpetuates Crawford's error by using a load rate of 8 gpd which is a 60% reduction.

Laundry Services

Crawford's original reference, *General Laundry Planning Calculation for 100 room resort hotel* (2009), was provided by UniMac, a company that manufactures and sells commercial laundry equipment. More information is required to assess whether Sterling's load rate (464 gpd per machine with water savings reduction) remains stable. For example, the 2014 NYS Design Standard calls for a 580 gpd load rate/per commercial washing machine. UniMac's UW washer-extractor series touts a water reduction rate of 56%, which could reduce the total daily demand for laundry to 975 gpd (580 x .56 x 3). However, UniMac also bases its laundry sizing (for resort hotels) at 18 lbs per room without details on the amenities provided per room (e.g, extra pillows, terry robes, duvets/coverlets, etc.), food service (e.g., tablecloths and/or cloth napkins), and staff uniforms. If these items increase the laundry per room to (say) 25 lbs., then an additional washer-extractor could be required, keeping the daily demand for laundry roughly the same as Crawford's estimate (580 x .56 x 4 = 1,300).

Pool

The 2014 NYS Design Standards lists a load rate for pool use at 10 gpd per swimmer, while Sterling omits this usage. Furthermore, without the final dimensions of the outdoor pool, it's not possible to calculate the gallons of water that amenity will need, although it's highly unlikely that a resort pool will be filled and regularly maintained with water purchased from an outside vendor and trucked in as needed. If summertime use is doubled, daily water demand for pool use would increase to a total of 1,400 gpd or more (140 swimmers x 10 gpd).

Review of 72-hour Pumping Tests of Well 4 and Well 5

The ten page NYS DEC June 2019 document entitled "PUMPING TEST PROCEDURES FOR WATER WITHDRAWAL APPLICATIONS" is Attachment A to this report. The following 15 items are listed in the DEC guidance document, accompanied by data from Sterling and relevant assessments.

1. Time of year:
   The 72-hour pumping test Well 5 started pumping at 9:30AM on November 4, 2024, pumping ceased at 9:30AM on November 7, 2024.
   The 73-hour pumping test for Well 4 began at 11:00AM on December 2, 2024 and pumping ceased at 12:00PM on December 5, 2024.

2. Test Pumping Rate:
   Pumping rates were maintained throughout both pumping tests cited above in item (1) at 32 gallons per minute.

3. Length of Test and Stabilized Drawdown
   Sterling's report indicated well 5 exhibited a stabilized drawdown for the final 7 hours 50 minutes of pumping (Sterling, page 7). Well 4 exhibited stabilized drawdown for the final 28 hours 10 minutes of pumping (Sterling, page 8).

4. Pre-Test Conditions
   Static water levels were recorded for all wells prior to the test. No pumping occurred for one week prior to the 72- and 73-hour tests.

5. Discharge of Water
   The points of discharge of pumped water from both pumping tests of Well 4 and Well 5 were reported and shown on a map (Map 2) to be 300 feet northeast from the pumping well and not to the south as stated in the Sterling Report (Well 5, page 10; Well 4, page 11). As will be described later with well measurements, both points of discharge were

located within overlapping cones of depression, thus likely causing recirculation of pumped water. This recirculation of water suggests that the wells are not likely capable of producing 32 gallons per minute simultaneously, nor independently. This oversight raises concerns that the pumping tests were not properly conducted and may explain why these wells, even if pumped simultaneously wells 4 and 5 would be inadequate sources of water to provide sufficient yield for the project. The DEC guidance document says discharge should be **at least 300 feet to eliminate recharge into the aquifer.**

Review of drawdown versus time hydrographs (shown in the section entitled November-December Drawdown Graphs near the back of the report) of the nearby wells shows a very similar pattern of drawdown beyond 300 feet from the pumping wells indicating that the discharge point is within the cone of depression of the pumping well **Map 3**. The point of discharge should be beyond the cone of depression or radius of influence of the pumping well. Comparison of the drawdown plots for the pumping well and nearby observation wells is easily done by examining Appendix D from the Sterling Report, where drawdown graphs are presented for the pumping well 5 and nine other wells. Review of the graphs shows that drawdown was significant and generally the same type curve as the pumping well for the following wells: Well 4, Well 2, and the Green Well. Similar patterns with evidence of the observation well being pumped for household usage are shown for Well 1 and the E. Maassmann well. Apparently, well 1 is not a house well, but it does show some drawdown similar to household usage. The graphs for the Henne well and the P Maassman well show routine household withdrawal, but no evidence of drawdown from the pumping of Well 5. The Palka well appears to be beyond the radius of pumping influence. The Yanashusky well showed a water table rise of roughly one foot during the pumping of Well 4 and Well 5; Yanashusky may be down gradient and received discharge from both pumping wells that raised its water table (See Graph 8.a Detail of R Yanashushuky Well for Well 4 pumping Test; found in DRAWDOWN GRAPHS FOR NOVEMBER DECEMBER 2024 PUMPING TESTS).

For the 72-hour pumping tests of well 5 and well 4, discharge distances of 1300 and 1500 feet down gradient are recommended, respectively based on the distance where observation wells show drawdown and recovery (Table 4 and the November-December 2024 Drawdown Graphs).

6. Measuring schedules

Well water level measuring schedules were a reduced version from the DEC guidance. For the first 15 minutes measurements were taken every minute and after that every 10 minutes for the remainder of the 72-hour test. Actually many more measurements were taken on this schedule than the DEC listed. With electronic programmable transducer measurements, such a schedule is fine.

7. Observation Wells

   All wells appear to be water wells of similar construction. No small observation or monitoring wells were constructed specifically for this project. No wells were constructed with PVC.

8. Multiple Production Wells

   Section 8 states "If wells might have to be operated simultaneously to meet demand, the test must be designed to produce data representative of these conditions. See Section 3.e for additional detail about multiple wells.

   Section 3 e. "For multiple wells in close proximity to each other, a rigorous 72-hour test must be performed on at least one well. After the initial test, additional tests on the other nearby wells may be shortened to 24 hours if all the following conditions are met: i. ii. iii. iv. v. vi. All wells are in a relatively "homogenous" sand and gravel aquifer; Results of the first test are unambiguous; Well logs prove the wells are in the same formation; The wells are of substantially identical construction (e.g., diameter, depth, and screened section); All other nearby production wells were monitored during the first test. Wells that must be pumped simultaneously to meet anticipated demand must be tested simultaneously. See Section 8 for additional detail."

   The above procedures are relevant because wells 4 and 5 are only 235 feet apart and therefore share very similar cones of depression in the bedrock (see Attachment B). There is no reason to try to pump both wells simultaneously and expect a combined 64 gallons per minute yield, because the point of discharge of pumped water was only 300 feet from each pumping well during their respective 72-hour pumping tests (November and December 2024). **Sterling only demonstrated that you could keep pumping a well forever at 32 gpm by discharging it back into the cone of depression.** That situation describes the **concept of recirculation. Discharging 32 gallons per minute into the bedrock cone of depression and continuing to pump 32 gallons per minute out of the same area of the aquifer (Map 2 and Figure 9.29).**

9. Recovery Period

   A check valve was installed in the pump column pipe of the pumping well to eliminate backflow of water into the well. Pumping drawdown and recovery was provided for pumping and observation wells in Sterling's Report Appendix B and included in this report in the section entitled November-December Drawdown Graphs. The graphs are useful because they show which wells mimic the drawdown and recovery of the pumping wells and other patterns of drawdown and recovery in various other wells. Recovery water levels were measured at a regular time interval for several days after the pump stopped. **None of the wells reached 90% recovery in 24 hours and most did not reach full recovery after 10 days**. These conditions are quite likely because there was little water to recharge the aquifer after pumping.

10. Rainfall Measurement
    Weather measurements were recorded during the pumping tests. No significant amount of snow or rain were observed during the pumping tests.

11. Surface Water Measurements
    Elevations of water were taken in the pond east and southeast of the pumping wells. The water level held constant during the pumping test at approximately 894 feet above mean sea level.

12. Water Quality Samples
    In the last hour of the 72-hour pumping test, samples for many potential contaminants must be taken as shown in a Table 3 prepared by York Analytical Laboratories. **There is no evidence in the Sterling report that these samples were taken for either of the pumping tests for Well 4 or Well 5.**

13. Analysis of Pumping Test Data
    This section of the regulations list all items of concern in pumping tests and graphic analyses including time drawdown graphs, distance drawdown graphs, well recovery graphs

14. Submission of Data
    This section lists every type of data or document that must be submitted to NYS DEC for a groundwater withdrawal application including: pumping test data, appropriate vertical time scales, pre-test water levels, recovery and post-test data, pumping of nearby wells, well construction diagrams and geologic well logs, graphs, formulae, and calculations to estimate transmissivity, storage coefficient and safe yield, scaled site plan, coordinates of wells and other significant features, topographic map of project site. **It is not known if this data or the Sterling Report has been submitted to NYSDEC, or NYSDOH.**

15. Control of Discharged Water
    Location and elevation and distance from pumping well and potential rate of infiltration into an unconsolidated medium or bedrock is helpful information when describing the site where pumped water is discharged. All we know from the Sterling report is that for both pumping tests (Well 5 in November 2024 and Well 4 in December 2024) the water was discharged 300 feet to the east northeast and cross or downgradient from Well 5. Well 5 is 249 feet higher in elevation than Well 4.

Consideration of Fatal Errors in Conducting Pumping Tests

The recirculation of the pumped water was not considered by Sterling and Hanson Van Vleet hydrogeologists. The discharge of pumped water is described in the DEC guidance document in section 5:
"Water discharged during the pumping test must be conducted away from the pumping well in a down gradient direction and at sufficient distance (at least 300 feet away) to eliminate recharge of this water to the aquifer." Although Sterling followed minimal DEC guidelines regarding the distance of water discharge away from the pumping well, the rise in water level in the Yanashusky well during the pumping test of Well 4 (November 2024) and Well 5 (December 2024) indicated a likelihood of recirculation that was never investigated.

Because the monitored privately-owned wells were located at distances greater than 1000 feet from the pumping well(s) and showed typical drawdown and recovery patterns as seen in the pumping wells, the first thing hydrogeologists would consider is moving the location of pumped water discharged. Given the observed drawdown for Well 4, the discharge distance should be greater than 1300 feet; for Well 5, the discharge distance should be greater than 1500 feet in a downgradient direction and location. See drawdown graphs and Table 4 (Sterling, page 9) for the observed wells identified as Green, Henne, P. Maassmann, and E. Maassmann.

Furthermore, once recirculation was identified as occurring during the pumping test, it seemed logical to try to identify the size and location of a cone of depression (explained in Attachment B) for each of the two pumping wells. Although Sterling plotted three distance drawdown graphs in their reports (Sterling 11/25/2024, Appendix D; and Sterling 2/05/2025, Appendix D), no approximate cones of depression were calculated.

For the well 5 pumping test, two graphs indicated that the cone of depression is likely oval, not circular in shape. Graph 1 indicated a radius of 5460 feet in line from well 5 through well 2. Graph 2 indicated a radius of approximately 1650 to 1900 feet in line with well 5 and E. Maassmann well. The outline of the radius of influence for the cone of depression is shown on Map 3.

The distance drawdown graph for the well 4 pumping test (Graph 3) also indicated an oval cone of depression, 1800 to 1900 foot radius in line with well 4 and E. Maassmann well and 600 foot radius in line with wells 4 and 5. The 600 foot radius did not seem to fit with the model. A circular radius of 1900 feet was drawn on Map 4.

Former BHML Leach Field Found in Area of Wells 4 and 5

In the process of site review, a discovery was made that the former Blackhead Mountain Lodge maintained an off-site septic system with a leach field, located at 45 Crows Nest Road (Tax #117.00-5-1). The resort holds a permanent easement to access that septic system (Attachment

C) which operated under a SPDES Permit that expired in 2015 (#NY0241857). From map review, one would find this off-site septic system falls within the overlapping cones of depression for both Well 5 and Well 4 and poses an enormous environmental risk to the future water supply in the form of leaching contaminants into the water drawn from these wells (Map 5). In other words, contaminants from the former leach field could be in the water pumped from Wells 4 and 5. If Sterling had conducted the laboratory testing required by NYS DEC in the pumping test guidance document (Attachment A, section 12), this potential life-threatening situation would have been identified by the laboratory analytical work (Table 3).

Conclusions

(1) The water demand estimates for daily project use presented by Sterling are too low for the hotel, condos, restaurants, day spa, and other amenities as proposed. A more appropriate estimate is a demand of 51,539 gallons per day (35 gallons per minute).

(2) The 32-gallon per minute yield (an underestimate of the maximum daily demand for the project) could only be produced in tests for wells 5 and 4 because the water was recirculated. The recirculation was a result of discharging pumped water in areas much too close to the pumping well. The point of discharge should have been at least 1300 feet away from the pumping well 4 and 1500 feet away from the pumping well 5, not just 300 feet. Without recirculation, the wells would have pumped far below 32 gallons per minute.

(3) The lack of full recovery to the pre-pumping static water table for all wells indicates that recharge is slow and insufficient based on the tests conducted. After pumping, the 90% recovery in 24 hours was not achieved for any pumping well, nor for observation wells.

(4) Cones of depression or radius of influence (see Attachment B) were estimated from distance drawdown graphs provided in the report. The point of discharge is near the center of the cones for both pumping tests of well 5 and well 4.

(5) The close proximity of wells 4 and 5 at only 235 feet of separation is really much too close. A new production well might be drilled into the bedrock aquifer at a distance of perhaps 750 to 1000 feet or more away from wells 4 or 5.

(6) The aquifer is very large as shown by the water level drawdown in many wells. However, new tests will have to be designed and conducted to establish actual water yield and find out if the wells can supply the project needs. The topography might be considered if another well is drilled to avoid the elevation differences between wells 4 and 5.

(7) Given the documented presence of the former BHML leach field close to the pumping wells, laboratory testing (outlined in Table 3) must be conducted to determine if life-threatening contaminants are present in the bedrock aquifer tapped by wells 4 and 5 and possibly other household wells in the project area. In accordance with the NYS DEC guidance document

(Attachment A), conducting one 72-hour pumping test for well 4 is recommended with discharge distance a minimum of 1300 feet away from and downslope from well 4.

(8) Keep that in mind if more than one well is required to meet the project water demand, DEC requires that pumping tests must be conducted with all source wells pumped simultaneously. In other words, the individuals yields of Well 4 and Well 5 *cannot* be combined to assume a yield of 64 gpm. Additional pumping tests must be conducted. In addition, per DEC and DOH regulations, twice the daily demand must be demonstrated, i.e., redundancy. Source well(s) must produce the daily demand with the highest-yielding well offline.

(9) Sections of the Sterling Report and the Hanson Van Vleet opinion letter (2/6/2025) concerning mitigation were reviewed, but no comments have been made at this time. Correction of mistakes made in the pumping tests should be considered for the project and attempts to find sufficient water for the project should be of primary importance at this time in the siting process.

(10) Based on the author's years of experience as a practicing hydrogeologist and years serving on a planning board and representing clients before planning boards, the current hydrogeologic conditions indicate a positive declaration is the appropriate SEQRA determination.

ATTACHMENTS

A. NYS DEC (June 2019) PUMPING TEST PROCEDURES FOR WATER WITHDRAWAL APPLICATIONS
B. Cone of Depression
C. Deed granting permanent easement to Blackhead Mountain Lodge LLC for access to off-site septic system

ATTACHMENT A

New York State Department of Environmental Conservation
Division of Water
Bureau of Water Resources Management
625 Broadway, Albany, NY 12233-3508
Phone: (518) 402-8086 • **Fax:** (518) 402-8082
Website: www.dec.ny.gov

Basil Seggos
Commissioner

June 2019

PUMPING TEST PROCEDURES FOR WATER WITHDRAWAL APPLICATIONS

Department regulations require that pumping test results be submitted as part of any Water Withdrawal Application involving new or additional groundwater sources or reassessment of previously permitted wells. In reviewing any such application, the Department must determine if the proposed well(s) will adequately meet the needs of the applicant and if others who may rely on the same aquifer will be adversely affected. The requirements that follow have been designed to produce the accurate and complete information that is vital to these determinations and whether modifications to the application or conditions in a potential permit are required.

Applicants are advised to submit their pumping test plans to DEC prior to conducting a pumping test if the proposed test will deviate from these procedures in a substantive way.

FOR INFORMATION AND ASSISTANCE
Water Quantity Management Section (518) 402-8238
Email: DOWinformation@dec.ny.gov

IMPORTANT NOTE: Before starting construction, it is advisable to submit a location map of the proposed new wells and any related construction to the Division of Environmental Permits in the appropriate DEC Regional office for a determination for whether that construction requires any other DEC permits, such as for disturbance of protected streams, protected freshwater wetlands, or for storm water runoff from a construction site. Other factors to consider when siting a project include flood plain location, agricultural districts, conceptual wellhead protection/recharge areas, existing or potential groundwater contamination sources, and existing subsurface utility corridors whose location could provide a preferential path for groundwater flow or contamination.

1. **TIME OF YEAR** – The pumping test of unconfined sand and/or gravel aquifer wells must be conducted during a time of average or below average seasonal stream flow conditions; that is, when "normal" groundwater gradients have not been reversed or significantly altered. Typically, this eliminates the months of March, April, and May. Tests conducted during the winter must not be affected by snow melt. Pumping tests for rock wells or confined sand and/or gravel wells not significantly influenced by overlying unconsolidated ground or surface water may be conducted during any month of the year, however the applicant must demonstrate that the test well(s) will not be affected by spring recharge.

2. **TEST PUMPING RATE** – NYS DEC's expectation is that a constant pumping rate will be a fundamental part of the test design. Any deviation from this philosophy must be discussed with NYS DEC prior to carrying out the test. Therefore, major changes in pumping rate must not occur as part of a **72-hour constant rate pumping test** unless prior agreement with the Department is obtained.

   Varying the pumping rate may diminish the usefulness of early-time data. The early data can be used to determine transmissivity, satisfy various test assumptions, reveal delayed yield, well storage, problems with the pump, and more. Significant changes in pumping rates will mask these effects. Later changes in pumping rate could cause inaccuracy in long term drawdown projections.

   During the first hour of the test, **failure to pump within 10 percent of the test pumping rate for any reason will require termination of the test**, recovery of water levels to static, and a restart of the test. Later pump failures must be demonstrated to have no significant effect on the data or a similar termination and restart will be necessary.

   When the most efficient or maximum design pumping rate is uncertain, a **step-drawdown test** must be conducted prior to the 72-hour constant rate test. Before proceeding to the 72-hour test, water levels must be allowed to recover to static levels. The scientific literature is unequivocal on this point.

   The **pumping test must be performed at or above the pumping rate for which approval will be sought** in the water supply application. If **multiple wells** are to be pumped simultaneously to achieve the necessary yield, the test must incorporate such a pumping plan. To reproduce the anticipated stress on the aquifer, the pumping test must take place when **nearby wells** normally in operation are active. Other pumping wells in the test area must be **monitored.** For complex tests it is highly recommended that the Department be consulted prior to finalizing the pumping test plan.

   The pumping rate must be **measured accurately and recorded frequently**. A decrease in discharge from a pump will normally occur with increasing drawdown as the pump works against a greater hydraulic head and increasing friction in the system. This effect must be compensated for during the test. Pumps and generators must be **inspected and known to be in good operating condition** prior to test start. Interruption of a test will require an extension of test time or may invalidate the results thus requiring a repeat of the test.

NYS DEC recognizes that occasionally minor variation is unavoidable. For example, when water levels in the pumping well decline at a rate faster than expected, changes in the pumping rate can result. Thus, for the purposes of determining whether a given yield is sustainable (the primary goal of a NYS DEC pumping test) some variation in pumping rate may be acceptable. Even so, the test analysis report must address this variation in a scientifically disciplined manner including the impact on the ability of the pumping test to determine the test well's sustainable yield.

Measurement of pumping rate must be carried out in accordance with Section 6.b.

3. **LENGTH OF TEST** – Regardless of the type of aquifer, pumping tests shall be conducted for a minimum of 72 hours at a constant pumping rate. The following points must be addressed.

    a. A minimum of six hours of **stabilized drawdown** must be displayed at the end of the test. Stabilized drawdown is defined herein as:

        i. a water level that has not fluctuated by more than plus or minus 0.5 foot for each 100 feet of water in the well over at least a six-hour period of constant pumping flow rate. <u>The water column is measured from pre-test static water level to the top of the deepest water bearing fracture that contributes at least 10% of total well yield</u>,

        and,

        ii. plotted measurements that have not shown a trend of decreasing water level.

        Note: Stabilization can often be incorrectly attributed to hydrogeologic factors such as precipitation or snowmelt recharge, a recharge boundary due to a minor surface water body (e.g., small headwater streams or ponds), or limited leakage from overlying or underlying formations. In these cases, the test must be extended as per Section 3.c, below.

    b. If **stabilized drawdown is not achievable during the 72-hour test period** other methods may be employed to demonstrate the ability of the aquifer to meet withdrawal demands.

        i. Continue the test period until stabilization occurs, or

        ii. Construct a semi-logarithmic plot showing a 180-day projection of the time-drawdown curve. See Sections 13.b and 13.e. Water level in the test well must remain above the intake plus a margin of 5% but no less than 5 feet of the pre-test water column, or

iii. For other methods, pre-approval by the Division of Water is highly recommended to ensure acceptance of the test. All methods must be described in the final test report.

c. Positive (recharge) or negative (barrier) **boundary conditions** encountered during the test must have a record of at least 24 hours.

d. Excessive **rainfall** normally will require extension or rescheduling of the test unless it can be clearly demonstrated that it provided no immediate recharge to the aquifer in which the test wells are located.

e. For **multiple wells** in close proximity to each other, a rigorous 72-hour test must be performed on at least one well. After the initial test, additional tests on the other nearby wells may be **shortened to 24 hours** if all the following conditions are met:

i. All wells are in a relatively "homogenous" sand and gravel aquifer;

ii. Results of the first test are unambiguous;

iii. Well logs prove the wells are in the same formation;

iv. The wells are of substantially identical construction (e.g., diameter, depth, and screened section);

v. All other nearby production wells were monitored during the first test.

vi. Wells that must be pumped simultaneously to meet anticipated demand must be tested simultaneously. See Section 8 for additional detail.

4. **PRE-TEST CONDITIONS** – No pumping should be conducted at or near the test site for at least 24 hours prior to the test. If on-site or nearby pumping cannot be curtailed due to system supply needs or other factors, this must be noted and discussed in the final report as it relates to the test accuracy. Static water levels at the pumping well and observation wells must be measured at least daily for one week prior to the start of the test, including immediately prior to the start of the test.

5. **DISCHARGE OF WATER** – Water discharged during the pumping test must be conducted away from the pumping well in a down gradient direction and at sufficient distance (at least 300 feet away) to eliminate recharge of this water to the aquifer. The discharge line and discharge point must be shown on the site plan referenced in Section 14(i). If the aquifer is confined or if it can be otherwise demonstrated that discharged water will not recharge the aquifer being tested, a more convenient method of discharge can be used (within the caveats of Section 15).

6. **MEASURING SCHEDULE** –

   a. Water levels in observation wells and at the pumping well must be measured to provide at least ten observations of drawdown within each log cycle of time, beginning one minute after the start of pumping. A suggested schedule of measurements at all wells is as follows:

Time After Pumping Started	Time Intervals
0 to 15 minutes	1 minute
15 to 50 minutes	5 minutes
50 to 100 minutes	10 minutes
100 to 500 minutes	30 minutes
500 to 1000 minutes	1 hour
1000 to 5000 minutes	4 hours

   b. Test discharge pumping rate – **during the first hour of the test the pumping rate must be measured, adjusted, and recorded continuously.** Following this period measurements can be recorded less often if the drawdown rate has slowed and pumping has stabilized. At all times during the test, pumping rate observations and recordings must be conducted at least every hour.

   c. Recovery period measurements – see Section 9.

   d. Weather measurements – see Section 10.

   e. Surface water measurements – see Section 11.

   f. Water quality sampling – see Sections 12 and 13.

7. **OBSERVATION WELLS** – Whenever possible, at least three observation wells should be monitored during the pumping test. The horizontal distance between each observation well and the pumping well shall be measured to the nearest 0.1 foot. The vertical elevation of a fixed reference point on each observation well and on the pumping well (e.g., "top of casing") must be established to the nearest 0.01 foot and reported in NAVD 1988 (or in NGVD of 1929 if this is the standard at the test site). If three or more observation wells are available, one observation well must be located outside of the expected influence of the pumping well; this observation well will serve to monitor background conditions during the pumping test. The remaining observation wells must be placed to best define the hydrogeologic characteristics of the aquifer with respect to the pumping well. In some circumstances a representative sample of nearby homeowner wells must be monitored during the pumping test including nearby wells that may be outside the anticipated zone of influence.

   Observation wells should be just large enough to allow accurate and rapid measurement of water levels. **Small diameter wells are recommended** because the volume of water contained minimizes time lag during ongoing drawdown. Existing, larger diameter wells can be utilized if they are in good condition and were properly installed.

For **unconfined aquifers**, one well should be located approximately 30 feet from the pumping well, a second well should be no farther than 300 feet from the pumping well, and at least one additional observation well should be placed beyond the 300-foot radius. For thick confined aquifers that are considerably stratified, at least two observation wells should be placed within 700 feet of the pumping well and at least one observation well located further than 700 feet from the pumping well.

Observation wells must be screened in, or open to, the same formation as the pumping well. When appropriate, additional observation wells beyond the specified minimum number may be screened in, or open to, formations above or below the one tapped by the pumping well to determine if there is any hydraulic connection between formations. Water levels in nearby water bodies must be measured prior to and during the test. Weir flow measurements must be conducted for small streams (see Section 11).

8. **MULIPLE PRODUCTION WELLS** – For cases in which an applicant is seeking approval for multiple production wells, all such wells must be monitored during the test. In addition, the test must be conducted in a way that will obtain information pertinent to the operational needs of the wellfield. If wells might have to be operated simultaneously to meet demand, the test must be designed to produce data representative of these conditions. See Section 3.e for additional detail about multiple wells.

9. **RECOVERY PERIOD** – Water level measurements must be collected during the recovery period for all wells using the same procedure and time pattern followed at the beginning of the pumping test (see Section 6). Measurement must commence at least one minute prior to shutdown of the pumping well and continue for at least 12 hours or recovery to the static water level. Water level measurements should be made to the nearest 0.01 foot. To obtain accurate data during the recovery period, a check valve must be installed at the base of the pump column pipe in the pumping well to eliminate backflow of water into the well. Water level measurements must also be collected during the recovery period in all potentially affected offsite monitoring wells, such as homeowner wells.

10. **RAINFALL MEASUREMENT** – Rainfall must be measured to the nearest 0.01 inch and recorded daily at or near the site for one week preceding the pumping test, during the test, and during the recovery period. A log of weather conditions during this period must also be kept, including barometric pressure recorded on the same schedule as rainfall. Weather station data available from within a reasonable distance of the test site can be utilized. Current precipitation must be compared to historic precipitation records to determine impact on the test results.

11. **SURFACE WATER MEASUREMENTS** – Fluctuations in surface water stages (or stream flow) for all surface waters, including wetlands, within 1000 feet of the pumping well should be measured to the nearest 0.01 foot. Measurements must be made using, as appropriate: weirs, staff gages (with stilling wells as necessary),

nested piezometers, etc. Weir flow measurements must be conducted for small streams. The horizontal distance between each observation point and the pumping well must be measured to the nearest 0.1 foot. The vertical elevation of a fixed reference point on each observation point must be established to the nearest 0.01 foot and reported in NAVD 1988 (or in NGVD of 1929, if this is the standard at the test site). Measurements must be read and recorded at least once daily for one week prior to the start of the test and at least twice per log cycle after the first ten minutes for the duration of the test. Measurements should be made more frequently if surface water levels are changing rapidly. The degree and nature of hydraulic connection with the surface water body must be quantified.

12. **FOR PUBLIC WATER SUPPLIES** The NYS Department of Health (NYS DOH) must be consulted on all issues related to the following:

    a. WATER QUALITY SAMPLES - Comprehensive water samples must be obtained from the pumping well during the last hour of pumping. Samples must be analyzed to establish acceptable quality as per NYS DOH requirements.

    b. WELLS UNDER THE DIRECT INFLUENCE OF SURFACE WATER - If the pumping well is or may be hydraulically connected to a surface water body, water samples from the well must be analyzed in the field at least once every four hours for the following parameters: pH, temperature, conductivity, and hardness. Further, representative water samples from the surface water body must be measured at both the beginning and the end of the pumping test and analyzed for the same parameters. For public water supplies, the NYS DOH must be consulted on all issues related to groundwater under the influence of surface water.

    c. REDUNDANCY - 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.

13. **ANALYSIS OF PUMPING TEST DATA** – In order to accurately analyze pumping test data it is necessary to use the methods and formulae appropriate for the hydrogeologic and test conditions encountered at, and specific to, the pumping test site. Knowledge of the hydrogeologic conditions of the area is necessary to ensure the use of appropriate techniques of analysis. Accordingly, analysis of pumping test data must be carried out by a hydrogeologist, professional engineer with hydrogeologic training, or other appropriately trained evaluator.

    a. **Data Correction** - Water level data, graphs, and interpretations must be corrected as appropriate or deemed significant for the effects of ambient water level trends; partially penetrating production well(s); partially penetrating observation wells; delayed yield from unconsolidated aquifers; aquifer thickness, recharge and/or impermeable boundaries; barometric pressure changes; changes in stage in nearby surface water bodies; recharge events (rainfall, snow melt) during the week preceding the test, during the test, or during the recovery period; influence from nearby pumping wells; and any other hydrogeologic influences. All such data and calculations must be included in the test information report.

b. Theoretical **time drawdown graphs** must be prepared from the recorded drawdown by setting time equal to the length of the pumping test and groundwater withdrawal equal to the pumping test production rate. The graphs must be constructed on semi-logarithmic scale with time plotted on the log scale. Additionally, a semi-logarithmic plot showing a 180-day projection of the time-drawdown curve must be constructed on semi-logarithmic scale with time plotted on the log scale. Based on these graphs and the remaining standing water in the well at the end of the pumping test, a maximum safe pumping rate (yield) must be established for each production well or for the well field if simultaneous pumping of multiple production wells is planned (taking into account well interference). Water level in the test well must remain above the intake plus a margin of 5% but no less than 5 feet of the pre-test water column.

c. Theoretical **distance-drawdown graphs** must be prepared by plotting the drawdown in each observation well versus the distance of those wells from the pumping well. The graphs must be set time equal to the length of the pumping test and groundwater withdrawal equal to the pumping test production rate. The theoretical cone of depression so determined should be used to establish the area of influence of the well(s). It is highly recommended that the following **wellhead protection areas** be delineated using all available information (e.g., published hydrogeologic information, local knowledge, pumping test results, etc.) and best professional judgment: 60-day time of travel area, zone of contribution area or recharge areas (for confined or bedrock aquifers), and aquifer boundary area. Note that for bedrock wells (which do not normally hold to porous principles) the zone of contribution is often an irregular shape extending much farther in some directions than others. Thus it is difficult to delineate a zone of contribution for bedrock wells. Estimates should be made based on contributing watershed, gradient, the nature and orientation of fractures/lineaments, and best professional judgment. Some bedrock aquifers if extensively fractured can be treated or simulated as an unconsolidated aquifer.

d. Recovery data must be analyzed in a manner similar to that used for drawdown data.

e. All graphs must be annotated to contain pumping rates, time of pump start and finish, depth of pump intake, record of precipitation, and other useful information. The scale of the Y-axis (water level/drawdown) must be expanded as much as reasonable to allow better resolution of small-scale water level fluctuations and slope.

14. **SUBMISSION OF DATA** – Data submitted in support of a requested

groundwater withdrawal must include:

a. **raw pumping test data** (preferably in electronic format) with the following included:

   i. identification of tested well(s)
   ii. identification of observation well(s)
   iii. date, clock time, and elapsed time (minutes)
   iv. measuring point (top of casing) elevation
   v. water level measurements including static water level
   vi. calculated drawdown
   vii. depth of pump intake
   viii. pumping rate measurements of tested well

   If possible, superfluous data points should be reduced. For example, presenting data points collected once per second or once per minute after the first hour unnecessarily clutters reports and spreadsheets and does not contribute to efficient analysis.

b. **The time scale** of these measurements should approximate the logarithmic scale although **for later in the test the time between measurements should be increased**. It is recommended that a spreadsheet file of this raw data be submitted in place of a written record.

c. **pre-test water levels** of the pumping well, observation wells, surface water;

d. **recovery** and other post-test water level measurements;

e. **pumping rate(s) of nearby wells** including times on and off, surface water level and stream flow measurements, rainfall and weather information;

f. **engineering diagrams** showing construction details (e.g. well casing, screen setting and casing stickup, etc.) and depths of pumping wells and observation wells;

g. **geologic logs** must be submitted. For potable water supplies, completed NYS DEC well registration reports must also be included. For bedrock wells the depth of primary fractures must be noted in the log;

h. **graphs, formulae, and calculations** used to estimate transmissivity, storage coefficient, and safe yield[1];

i. **scaled site plan** showing:
   i. water level elevation controls (e.g., top of casing)
   ii. grade elevation for all wells
   iii. staff gages and other water measuring points
   iv. pumping test discharge piping and discharge point
   v. the location of nearby surface water bodies

vi. and, if applicable, the 100-year flood plain and elevation;

j. **coordinates** presented in either latitude and longitude (in degrees, minutes, seconds, tenths of second) or UTMs for all production wells and any observation wells which are to remain, preferably in NAD 1983 (specify the method and datum used to locate the wells);

k. **a topographic map** showing the locations of existing or potential groundwater contamination threats. Delineation of a wellhead protection area is recommended; and

l. **interpretations** including methodology, references and rationale. All documentation submitted must be legible and professionally presented. Plans and maps should use shading, cross hatch patterns, symbology, etc., such that features are readily distinguishable and remain readable when photocopied in black and white.

15. **CONTROL OF DISCHARGED WATER** – Please note, it is not legal to discharge water into any water body or wetland if such discharge results in turbidity or erosion leading to turbidity or downstream flooding. Accordingly, if it is anticipated that discharged water will create flooding, erosion and/or turbidity, water must be directed to a holding area and released in a controlled manner to prevent such problems. The discharge of water in the act of drilling and testing a well is covered under NYS DEC Regulations, Subpart 750-01:

    Obtaining a SPDES Permit, §750-1.5 Exceptions: *Paragraph 11. Discharges of yield test, well test and cutting water from water well drilling operations provided such discharges are handled in accordance with best management practices and are for limited duration during well development only.*

[1] Note for bedrock investigations -- transmissivity and storage calculations in bedrock aquifers may be misleading due to failure of the media to meet the assumptions necessary for carrying out such calculations. However it may be legitimate to treat or simulate extensively fractured bedrock as an unconsolidated aquifer. These matters should be discussed in the pumping test report. In addition, any de-watering of major fractures must be noted and the consequences discussed.

jdg 8/18

Attachment B
Cone of depression

Cone of depression is a circular area surrounding a well where groundwater levels are reduced from pumping.[1][2] In an unconfined aquifer (water table), this is an actual depression of the water levels. In confined aquifers (artesian), the cone of depression is a reduction in the pressure head surrounding the pumped well.

When a well is pumped, the water level in the well is lowered. By lowering this water level, a gradient occurs between the water in the surrounding aquifer and the water in the well. Because water flows from high to low water levels or pressure, this gradient produces a flow from the surrounding aquifer into the well.

As the water flows into the well, the water levels or pressure in the aquifer around the well decrease. The amount of this decline becomes less with distance from the well, resulting in a cone-shaped depression radiating away from the well. This, in appearance, is similar to the effect one sees when the plug is pulled from a bathtub. This conical-shaped feature is the cone of depression.

Physical properties

The size and shape (slope) of the cone of depression depends on many factors. The pumping rate in the well will affect the size of the cone. Also, the type of aquifer material, such as whether the aquifer is sand, silt, fractured rocks, karst, etc., also will affect how far the cone extends. The amount of water in storage and the thickness of the aquifer also will determine the size and shape of the cone of depression.

As a well is pumped, the cone of depression will extend out and will continue to expand in a radial fashion until a point of equilibrium occurs. This usually is when the amount of water released from storage equals the rate of pumping. This also can occur when recharge to the aquifer equals the amount of water being pumped.

Cones of depression's are typically thought as being a circular feature surrounding the pumped well. However, aquifer characteristics can affect the shape of the cone of depression. For example, if there is a steep ground-water gradient in the area of pumpage, the cone will tend to be shorter in the upgradient direction and elongated in the downgradient direction. This is because the water is already flowing towards the well from the upgradient direction, so the cone of depression does not need to extend as far out to obtain water, whereas the water is flowing away from the well in the downgradient direction, so the cone of depression needs to reach further to obtain water.

The shape of the cone of depression also can be affected when the cone intersects a source of water, such as a lake or stream. In such cases, water from the lake or stream supplies water to the cone of depression and therefore the cone will not expand as far in this direction. Conversely, if the cone of depression contacts a barrier, such as massive bedrock ridge, a clay body, or the edge of the aquifer, the cone of depression will decline to greater depths in order to supply water to the well.

When two cones of depression intersect one another, they tend to have a combined effect on drawdown and result in water levels or pressures much lower than a single cone of depression would produce. This can be an important consideration when planning well placement and pumping rates. In the case of water supply wells, whether for domestic use or irrigation, wells typically are placed far enough apart in order to avoid intersecting cones of depression. This way, drawdown in the aquifer is minimized. However, in the case of dewatering for mines and landfills where the goal is to lower water levels and pressures, wells often are placed close together in order to reduce head in the aquifer to the maximum amount.

Analysis and utility

Contour maps of water levels and pressures often show “bulls-eyes” around pumped wells that represent cones of depression. With large municipal wells, cones of depression can extend many miles from the well. For domestic wells, the cones are often too small to show up on such maps.

Cones of depression can be very useful when dealing with contaminant plumes in ground water. Often, a well can be placed near a contaminant plume and pumped at a sufficient rate to create a cone of depression. This cone of depression can act to capture the contaminant flow (essentially pulling it out of the aquifer). The pumped water can then be treated. The use of capture wells has been helpful in protecting water supply wells and for isolating contaminants near spills, landfills, and other sources.

References

1 • *"Aquifers and Groundwater | U.S. Geological Survey". www.usgs.gov. Retrieved 2024-03-24.*

2. • *"Groundwater and Wells". Well Water Program. 2020-08-26. Retrieved 2024-03-24.*

ATTACHMENT C

LIBER 729 PAGE 85

FORM 587 N. Y. DEED—Covenant Against Grantor with Lien Covenant

TUTBLANX REGISTERED U. S. PAT. OFFICE
TUTTLE LAW PRINT, PUBLISHERS, RUTLAND, VT 05701

This Indenture,

Made the 9 day of MAY
Nineteen Hundred and Ninety

Between

State of New York } ss.
County of

Recorded on the day of A. D., 19 at o'clock M. in liber of DEEDS at page and examined.

Clerk

EWALD MAASSMANN and WALTROUD MAASSMANN, his wife, having a mailing address of P.O. Box 96, Round Top, New York 12473

parties of the first part, and

BLACKHEAD MOUNTAIN LODGE, INC., a New York Corporation having a mailing address of P.O. Box 96, Round Top, New York 12473

party of the second part,

Witnesseth that the parties of the first part, in consideration of ---------------

-------------------ONE and NO/100------------------------Dollar ($--1.00----) lawful money of the United States, and other good and valuable consideration paid by the party of the second part, do hereby grant and release unto the party of the second part, its successors and assigns forever, all

see annexed description

2227

RECEIVED
MAY 21 1990
REAL ESTATE TRANSFER TAX
GREENE COUNTY

MAY 21 9 14 AM '90
CATSKILL, N.Y.

Parcel 1

ALL that certain piece or parcel of land situate, lying and being in the Town of Cairo, County of Greene and State of New York, and bounded and described as follows:

Being the south part of two hundred acres of land, granted to William Cockburn, now deceased, viz: Beginning at the southwest corner of the farm conveyed to Elias Stone and runs south one degree east twenty-two chains and thirty-six links to the southwest corner of the patent; thence north eighty-nine degrees east forty-four chains seventy-three links to the southeast corner; thence north one degree west twenty-two chains thirty-six links to Elias Stone's corner; thence south eighty-nine degrees west forty-four chains and seventy-three links to the place of beginning.

Also the right and privilege to take water, by means of a one and one-quarter inch pipe installed on the surface of the ground from the stream of water, at or near the boundary line of the lands of King over and across the lands conveyed to Percy W. Decker by Nelson A. Haines by deed dated December 1, 1919, and recorded in Greene County Clerk's Office December 3, 1919, in Liber 222 of Deeds at page 59, said pipe line shall run from a point on said stream to the road and then along said road to lands of the party of the second part, and not across the lands of the party of the first part on the northerly side of said road.

Also conveying a permanent easement to the party of the second part, her heirs and assigns, to use and maintain the sewage disposal system, including the cesspool, pipes and leach field and all accessories and parts of said system, as now located and used on the land conveyed by Carol L. McKee and Hugh McKee, her husband, to Alfred Eisenbach by deed dated October 5, 1951, recorded in Liber 326 of Deeds at page 140, including the right at all times to enter upon said premises for the purpose of cleaning, repairing and replacing, if necessary, the pipes, cesspool, leach field and all accessories and parts of said system, doing no unnecessary damage to the premises.

This conveyance is made subject to the rights of Philip Cottone and family to the use for himself and family of a plot of land 200 feet by 200 feet on the southeast corner of the 100 acre parcel hereinabove described, which plot is restricted to the private use of said Philip Cottone and family and which use shall cease at the end of 50 years from March 16, 1946.

Excepting that part of said premises conveyed by Karl and Elizabeth Lutz to Ewald Maassmann and Waltraud Maassmann, by deed dated May 5, 1972, recorded in Liber 459 of Deeds page 275.

Also excepting and reserving therefrom and thereout all that part thereof conveyed by Ewald Maassmann and Waltraud Maassmann and Elizabeth Lutz to Elizabeth Lutz by deed dated October 12, 1972, recorded October 12, 1972 in the Greene County Clerk's Office in Liber 462 of Deeds at page 782.

Further excepting and reserving therefrom all that parcel described as Parcel "B" in a deed from Blackhead Mountain Lodge, Inc., Ewald Maassmann and Waltraud Maassmann to Edward Maassmann and Janet Maassmann dated April 23, 1985 and recorded April 23, 1985 in Liber 574 of Deeds at page 204.

Being a portion of the same premises conveyed by Elizabeth Lutz to Ewald Maassmann and Waltraud Maassmann by Deed dated June 8, 1973, and recorded in the Greene County Clerk's Office in Book 466 of Deeds at page 1048.

This Mortgage is subject and subordinate to a first mortgage Lien in favor of Key Bank N.A. Said Mortgage was dated July 27, 1989, and recorded in the Greene County Clerk's Office in Book 741 of Mortgages at page 213. Said Mortgage was in the principal amount of $350,000.00.

Together with easement and right of way for ingress and egress and the transmission of utility lines, 50 feet in width over a second parcel of land owned by the Grantors, acquired by them by Deed dated November 1, 1982, and recorded in the Greene County Clerk's Office in Book 521 of Deeds at page 85.

Together with the appurtenances and all the estate and rights of the parties of the first part in and to said premises,

To have and to hold the premises herein granted unto the party of the second part, its successors and assigns forever.

And the parties of the first part covenant that they have not done or suffered anything whereby the said premises have been incumbered in any way whatever.

And That, in Compliance with Sec. 13 of the Lien Law, the grantors will receive the consideration for this conveyance and will hold the right to receive such consideration as a trust fund to be applied first for the purpose of paying the cost of the improvement and will apply the same first to the payment of the cost of the improvement before using any part of the total of the same for any other purpose.

In Witness Whereof, the parties of the first part have hereunto set their hands and seals the day and year first above written.

In Presence of

BLACKHEAD MOUNTAIN LODGE, INC.

EM by Ewald Maassmann
EWALD MAASSMANN, President
Grantee

WM Waltraud Maassmann
WALTROUD MAASSMANN, Grantor

EM Ewald Maassmann
EWALD MAASSMANN, Grantor

State of New York
County of COLUMBIA } ss. On this 7 day of MAY Nineteen Hundred and Ninety before me, the subscriber, personally appeared

EWALD MAASSMANN and WALTROUD MAASSMANN

to me personally known and known to me to be the same persons described in and who executed the within Instrument, and they duly acknowledged to me that they executed the same.

RICHARD M. KOWEEK
Notary Public, State of New York
Columbia County Reg. #4684257
Commission Expires Jan 31, 1991

Notary Public

STATE OF ~~FLORIDA~~ New York
COUNTY OF Columbia SS.:

On this 7 day of MAY, 1990, before me personally came EWALD MAASSMANN to me personally known, who, being by me duly sworn, did depose and say that he resides in Round Top, New York, that he is the President of BLACKHEAD MOUNTAIN LODGE, INC., the corporation described herein, and which executed, the within Instrument; that he knowns the seal of said corporation; that the seal affixed to said Instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said corporation; and that he signed his name thereto by like order.

Notary Public

RICHARD M. KOWEEK
Notary Public, State of New York
Columbia County Reg. #4684257
Commission Expires Jan 31, 1991

FIGURES

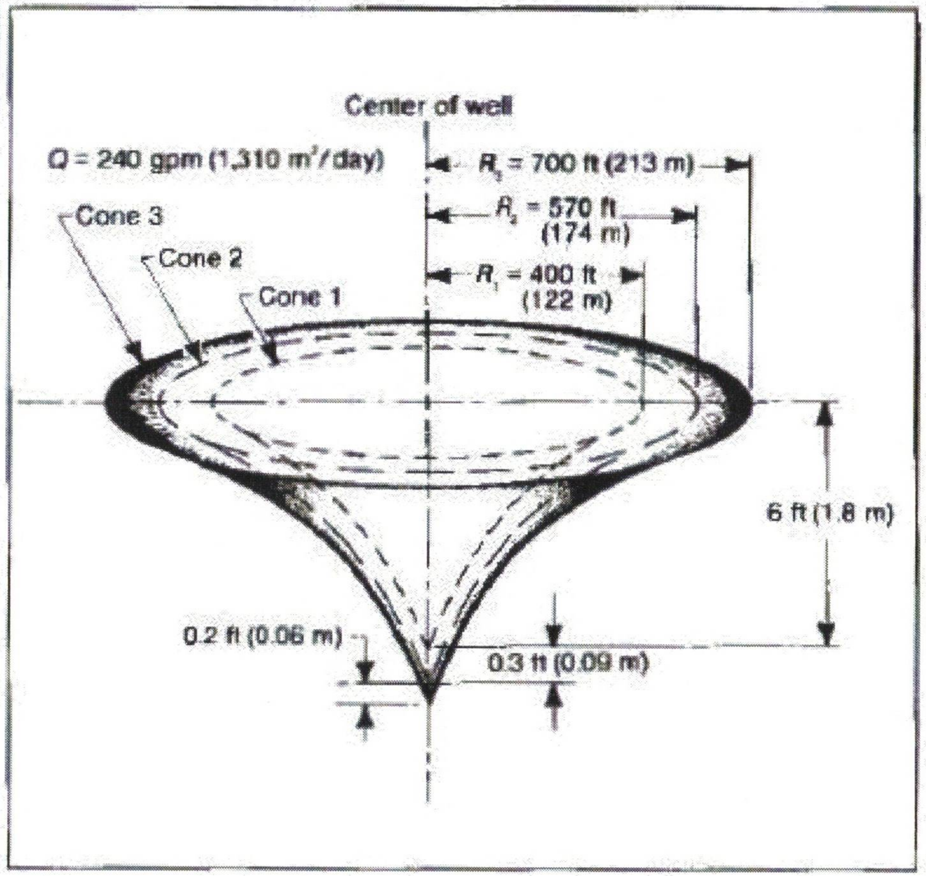


Figure 9.7. Changes in radius and depth of cone of depression after equal intervals of time, at constant pumping rate.

Source: Driscoll, Fletcher G., 1986, *Groundwater and Well*, second edition (Minnesota: Johnson Filtration Systems Inc.), p. 212

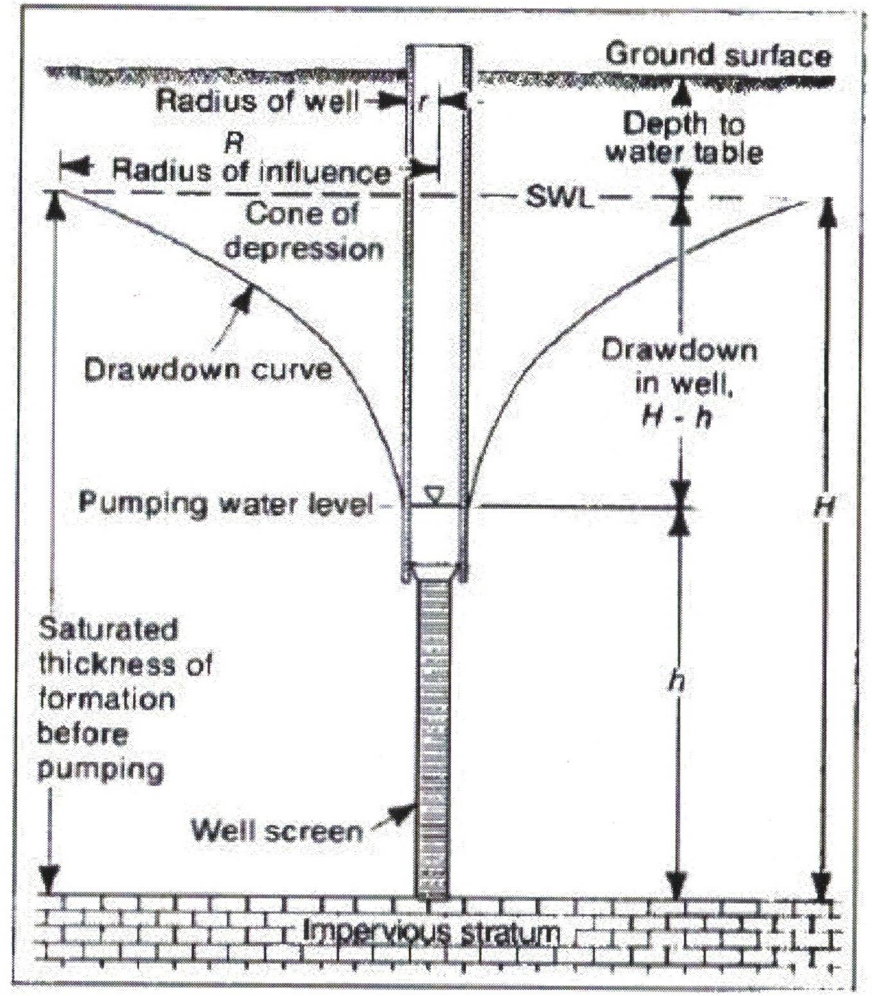


Figure 9.8. Well in an unconfined aquifer showing the meaning of the various terms used in the equilibrium equation.

Source: Driscoll, Fletcher G., 1986, *Groundwater and Well*, second edition (Minnesota: Johnson Filtration Systems Inc.), p. 213

A hydrogeologic phenomenon—*cone of depression*— is a depression in the groundwater table or potentiometric surface, that has the shape of an inverted cone and develops around a well from which water is being withdrawn. It defines the 3-dimensional area of influence of a well.

Figure 9.29

RECIRCULATION OF WATER PUMPED FROM TWO WELLS AND DISCHARGED INTO THE COMPOSITE CONE OF DEPRESSION

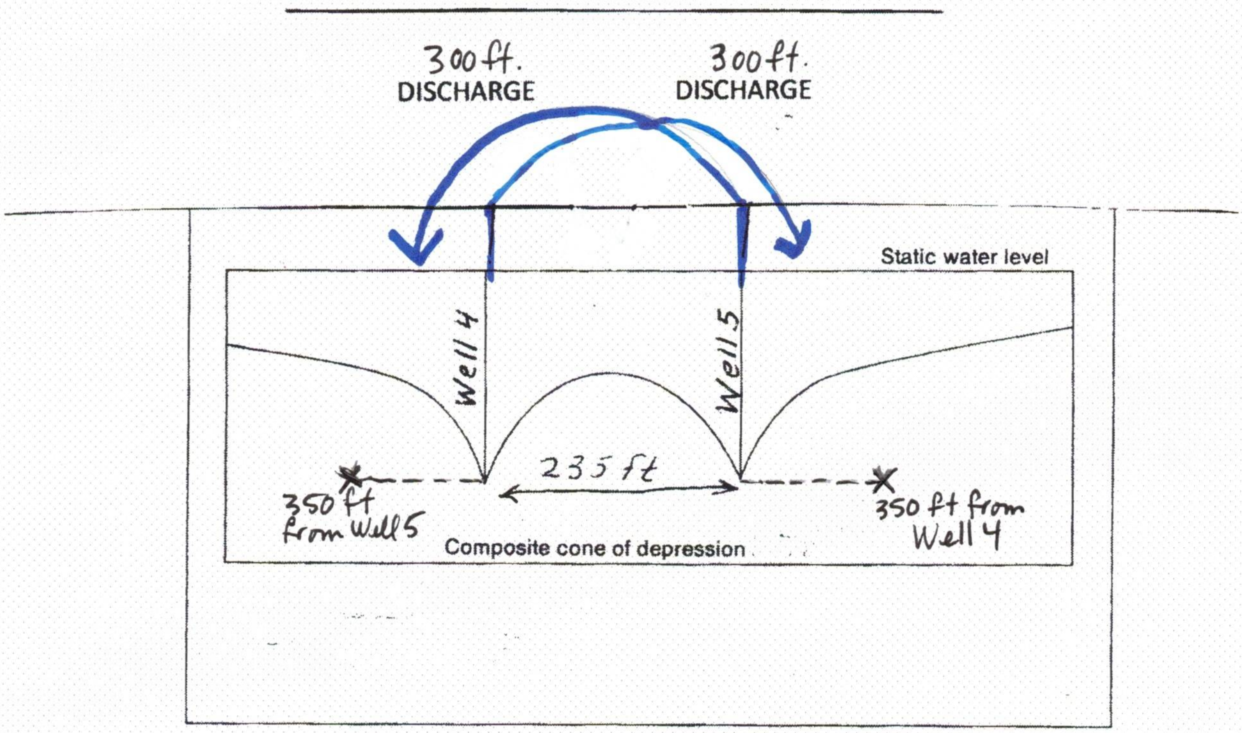


Figure 9.29. Interference between adjacent wells tapping the same confined aquifer. Composite cone is for both wells pumping simultaneously under the assumed conditions.

Source: Driscoll, Fletcher G., 1986, *Groundwater and Wells*, second edition, (Minnesota: Johnson Filtration Systems, Inc.) p242

NOTE: Locations of Well 4 and Well 5 as well as their discharge point are shown on Map 2.

TABLES

TABLE 1
Maximum Daily Water Demand
(presented in the Sterling Report; February 5, 2025)

Building Use	Maximum Capacity	Unit	Flow Rate (gpd)	Total (gpd)
Lodging	272	Bedroom	110	29,920
Restaurant	300	Seats	28	8,400
Amenity	80	Seats	5	400
Bar	45	Seats	16	720
Spa	70	Patrons	8	560
Laundry	3	Machines	464	1,392
Employee Kitchen	100	Seats	28	2,800
Event Barn	200	Seats	10	2,000
Utility/Backwash	1	Per day	20	20
			Maximum Daily Demand (gpd)	**46,212**
			Maximum Daily Demand (gpm)	**32**

Note: Flow rates obtained from NYS Design Standards for Intermediate Sized Wastewater Treatment Systems with 20% reduction for use of water saving plumbing fixtures. Utility/Backwash flow rate provided by the utility designer and accounts for 15 gpd of pool backwash and 5 gpd of WWTP sink use.

TABLE 2
Revised Daily Water Demand
(compiled by Friends of Round Top, Inc.)

Building Use	Amenities per unit, seats, or patrons	[Note]	NYS Design Standards Load Rates (gpd)	(category/page #)	Total Load rate per use
Lodging	272		110		29,920
Units with kitchen	**49**	**all branded**	**10**	units with kitchen (B-19)	490
in-sink garbage disposal	**24**	**1/2 branded**	**150**	units with in-sink garbage grinder (B-17)	3,600
dishwasher*	**49**	**all branded**	**3**		147
jacuzzi	**12**	**1/4 branded**	**20**	(B-19)	240
Front load washer hook up*	**49**	**all branded**	**10**		490
Two Restaurants+	300		28		8,400
Amenity	80		5		400
Multi-Use Barn	200		**5**	assembly hall, (B-18)	1,000
Bar	45		16		720
Employee Dining+	100		28		2,800
Day Spa	70		**16**	health club (B-19) with water savings	1,120
Laundry Services by Hotel	3	**machines**	464		1,392
Pool Utility/Backwash	1	per day	20		20
POOL per swimmer	**70**	**spa patrons**	10	(B-19)	700
				MINIMUM daily demand (gpd)	**51,439**
				MINIMUM daily demand (gpm)	**35**

Notes: ***The load rate for an Energy Star certified dishwasher came from EnergyStar.gov; the load rate for a high efficiency front loading washing machine came from Whirlpool.com.

+Per NYS Standards, load rates for dining facilities vary by opening hours. The actual load rates for these food service facilities may be as high as 50 gpd (i.e., the rate for a 24-hour restaurant).

TABLE 3

YORK

Laboratory Analysis Quotation

Client Contact: **Katherine Beinkafner**
Prepared for: **Mid Hudson Geosciences**
Prepared By: **Deb Bayer**

Prepared on: **12/17/2024**
Effective: **12/16/2024**
Expires: **12/31/2025**

Client Project ID: NYSDOH Part 5 Dec 2024

Pricing Summary (Commonly Requested Items-Call for Other Requests)

Parameter	Method	Quantity	TAT (days)	Unit Price	Extended Price
Drinking Water					
1,4-Dioxane by GC/MS/SIM EPA 522	EPA 522	1	20	$125.00	$125.00
Alkalinity-total- Newtown	SM 21-23 2320B (-97)	1	20	$26.50	$26.50
Asbestos (TEM) - Drinking Water	EPA 600/4-83-043(100.1)	1	20	$174.90	$174.90
Bacteria Profile-Newtown	varies	1	20	$37.10	$37.10
Calcium-200.7 Newtown	EPA 200.7	1	20	$12.00	$12.00
Gross Beta	EPA 900/903/908	0	20	$0.00	$0.00
Hardness-Total as CaCO3-Newtown	EPA 200.7	1	20	$0.00	$0.00
Heterotrophic Plate Count (HPC)-Newtown	SM 9215	1	20	$37.10	$37.10
Langelier Index	Calculation	1	20	$0.00	$0.00
Lead and Copper -Newtown	varies	1	20	$24.00	$24.00
Magnesium by 200.7- Newtown	EPA 200.7	1	20	$12.00	$12.00
Nits Profile -Newtown	varies	1	20	$31.80	$31.80
NY Part 5 - Table 8B	varies	1	20	$159.04	$159.04
NY Part 5 - Table 8D	varies	1	20	$109.18	$109.18
PFAS, EPA 537.1 Target List	EPA 537.1	2	20	$300.00	$600.00
pH-Newtown	SM 4500 HB	1	20	$12.00	$12.00
Radiochemicals Package-Newtown	varies	1	20	$530.00	$530.00
Radon-Newtown	SM7500Rn-23	0	20	$42.40	$0.00
SOCs, Phase II and Phase V-SUB	varies	1	20	$1,900.00	$1,900.00
Total Dissolved Solids-TDS	SM 21-23 2540C (-97)	1	20	$21.20	$21.20
Total Haloacetic Acids (HAA) (SUB)	EPA 552.2	1	20	$212.00	$212.00
Turbidity-Newtown	EPA 180.1	1	20	$12.00	$12.00
Volatile Organics, 524.2 NY List	EPA 524.2	1	20	$100.70	$100.70
Volatile Organics, Trihalomethanes-NY	EPA 524.2	1	20	$0.00	$0.00
Water					
Bromate (SUB)	EPA 300.0	0	20	$60.42	$0.00
Chlorite (SUB)	EPA 300.0	0	20	$60.42	$0.00
Ethylene and Propylene Glycols-SUB	GC/FID	0	20	$95.40	$0.00
				Bid Total:	**$4,136.52**

Table 4 – Offsite Private Monitoring Well Details

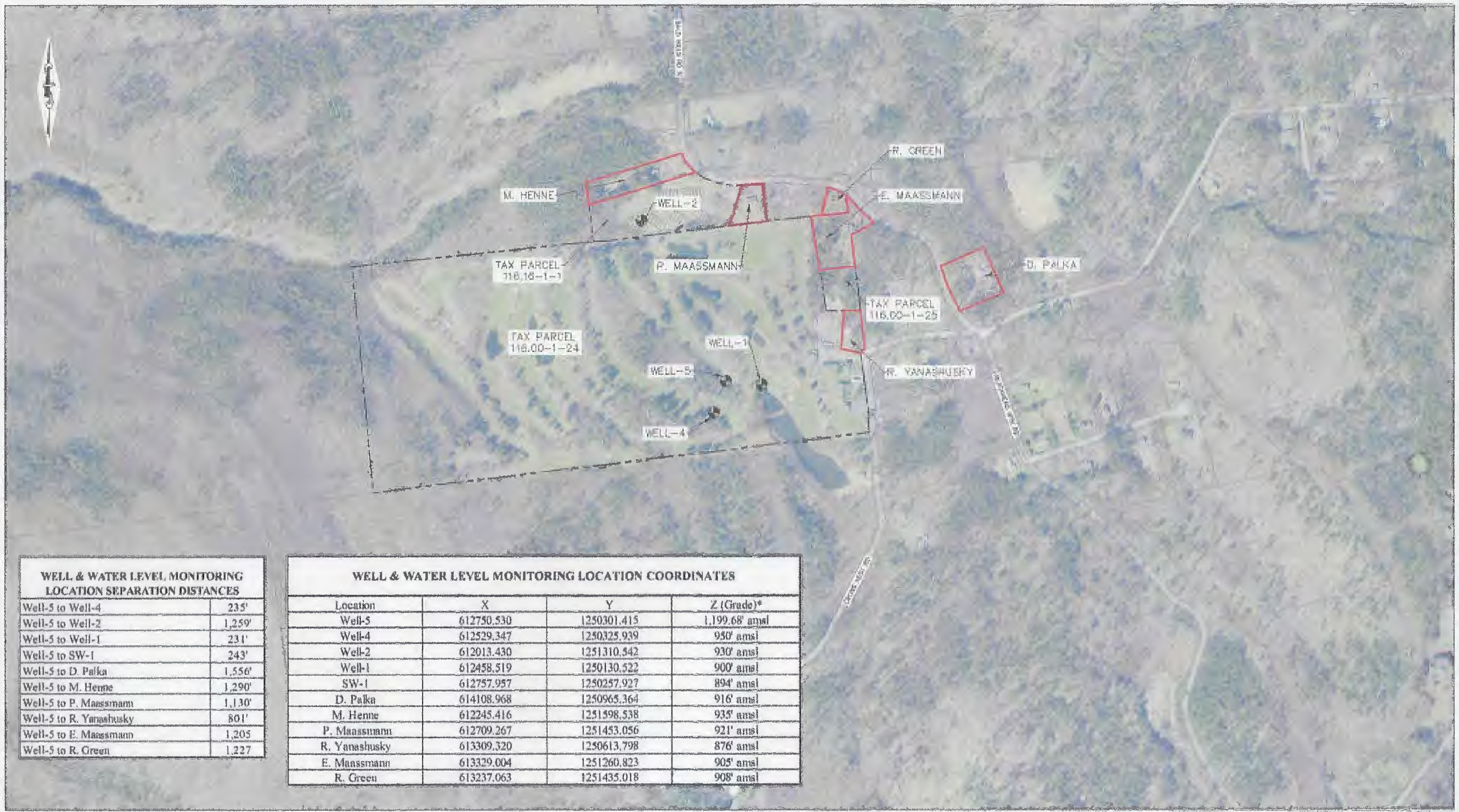
Monitoring Well	Address	Total Well Depth (ft)	Distance to Well 5 (ft)	Distance to Well 4 (ft)
David Palka (Tax Map #117.00-1-28.12)	22 Bald Hills Road N	Not Known. Pump Intake at 93.0 feet btoc	1,556	1,686
Mark Henne (Tax Map #116.00-1-34)	169 Bald Hills Road N	97	1,290	1,494
Rosemarie Green (Tax Map #116.00-1-22)	103 Bald Hills Road N	Not Known.	1,227	1,494
Edward Maassmann (Tax Map #116.00-1-21)	85 Bald Hills Road N	340	1,205	1,425
Peter Maassmann (Tax Map #116.00-1-16.12)	139 Bald Hills Road N	230	1,130	1,366
Robert Yanashusky (Tax Map #116.00-1-26)	56 Crows Nest Road	230	801	961
Stephen Petronio (Tax Map#134.00-2-3.1)	276 Crows Nest Road	383	2,465	**2,236
Michael DuVernoy (Tax Map#116.00-1-41)	154 Bald Hills Road N	160-170	1,403	**1,509
Joseph Merlino (Tax Map#116.00-1-33)	179 Bald Hills Road N	150-158	1,560	**1,612
Donald Delaney (Tax Map#116.00-1-23)	121 Bald Hills Road N	153	1,183	**1,416

**Offsite Well monitored during preliminary well pumping test of Well 5 only and not during November-December 2024 well pumping tests of Well 4 and Well 5.
Note: Distances are measured as the straight-line distance from the offsite property well to Well 5 and Well 4.

Source:

MAPS

1. Blackhead Mountain Lodge Area with Well Locations and Tables with Distances between Wells and X, Y, Z Locations for All Wells by Sterling (Figure 3)
2. Blackhead Mountain Lodge Map showing Discharge Locations for Pumping Tests for Well 5 and Well 4. Discharge for Well 5 is north of discharge for Well 4. Discharge points are 300 feet northeast of the pumping wells.
3. Blackhead Mountain Lodge Area showing Area of Discharge and Approximate Cone of Depression for 72-hour Pumping Test of Well 5.
4. Blackhead Mountain Lodge Area showing Area of Discharge and Approximate Cone of Depression for 73-hour Pumping Test of Well 4.
5. Blackhead Mountain Lodge Area showing location of off-site septic system within Well 5's approximate cone of depression



WELL & WATER LEVEL MONITORING LOCATION SEPARATION DISTANCES	
Well-5 to Well-4	235'
Well-5 to Well-2	1,259'
Well-5 to Well-1	231'
Well-5 to SW-1	243'
Well-5 to D. Palka	1,556'
Well-5 to M. Henne	1,290'
Well-5 to P. Maassmam	1,130'
Well-5 to R. Yanashusky	801'
Well-5 to E. Maassmann	1,205
Well-5 to R. Green	1,227

WELL & WATER LEVEL MONITORING LOCATION COORDINATES

Location	X	Y	Z (Grade)*
Well-5	612750.530	1250301.415	1,199.68' amsl
Well-4	612529.347	1250325.939	950' amsl
Well-2	612013.430	1251310.542	930' amsl
Well-1	612458.519	1250130.522	900' amsl
SW-1	612757.957	1250257.927	894' amsl
D. Palka	614108.968	1250965.364	916' amsl
M. Henne	612245.416	1251598.538	935' amsl
P. Maassmann	612709.267	1251453.056	921' amsl
R. Yanashusky	613309.320	1250613.798	876' amsl
E. Maassmann	613329.004	1251260.823	905' amsl
R. Green	613237.063	1251435.018	908' amsl

FIGURE 3

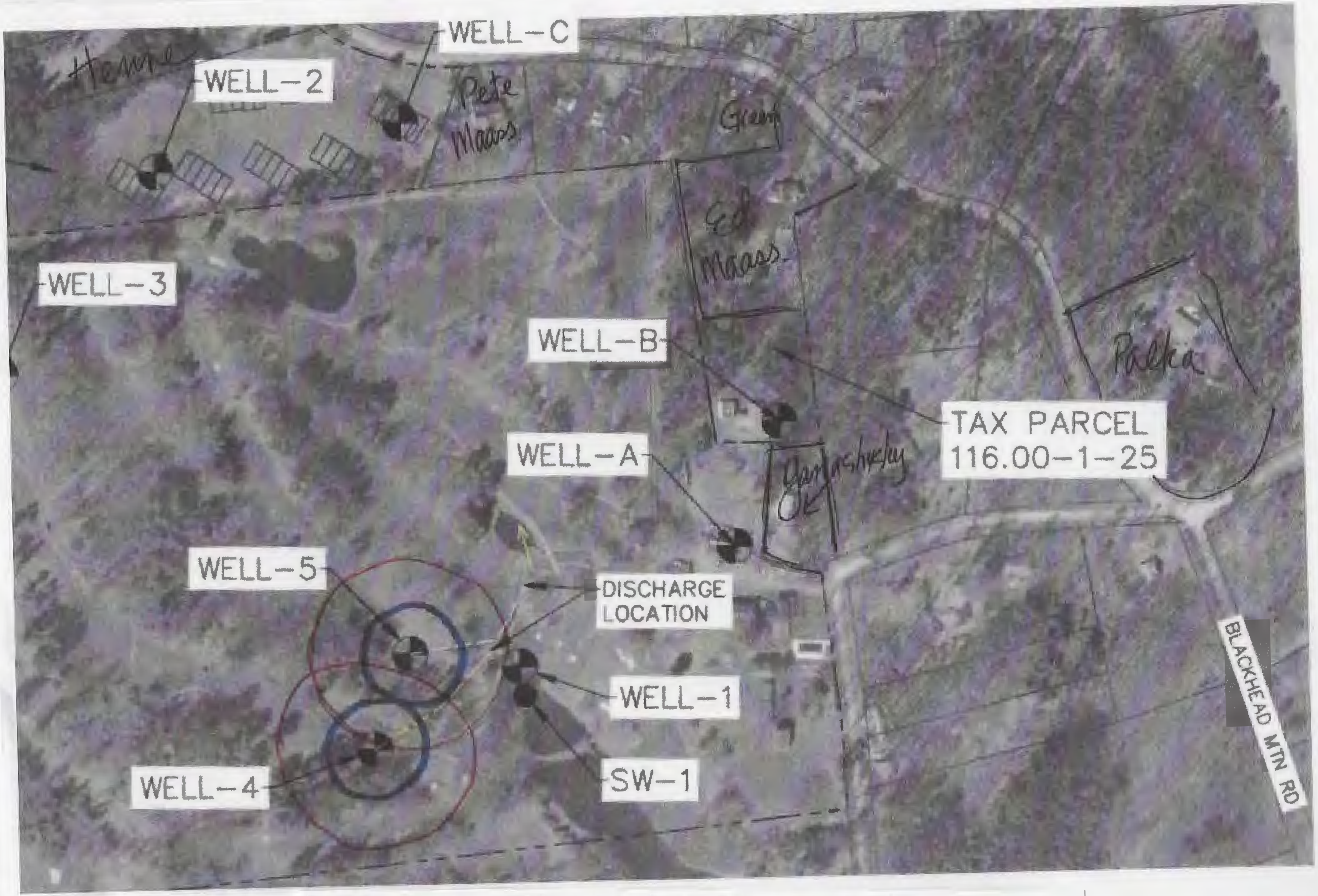
MAP 1. Blackhead Mountain Lodge Area with Well Locations and Tables with Distances between Wells and X, Y, Z Locations for All Wells by Sterling (Figure 3)

DATE	RECORD OF WORK			

PROJECT
PREPARED BY:
DRAFTED BY:
CHECKED BY:
APPROVED BY:
DATUM: NA
CONTOUR INTERVAL = NA FEET
1" = 260'

MONITORING LOCATIONS, DISTANCES, AND COORDINATES
BLACKHEAD MOUNTAIN LODGE
CROWS NEST ROAD
TOWN OF CAIRO GREENE CO., NY
STERLING
Sterling Environmental Engineering, P.C.
24 Wade Road Latham, New York

MAP REFERENCES: USGS HIGH RESOLUTION ORTHOIMAGERY, 2021.

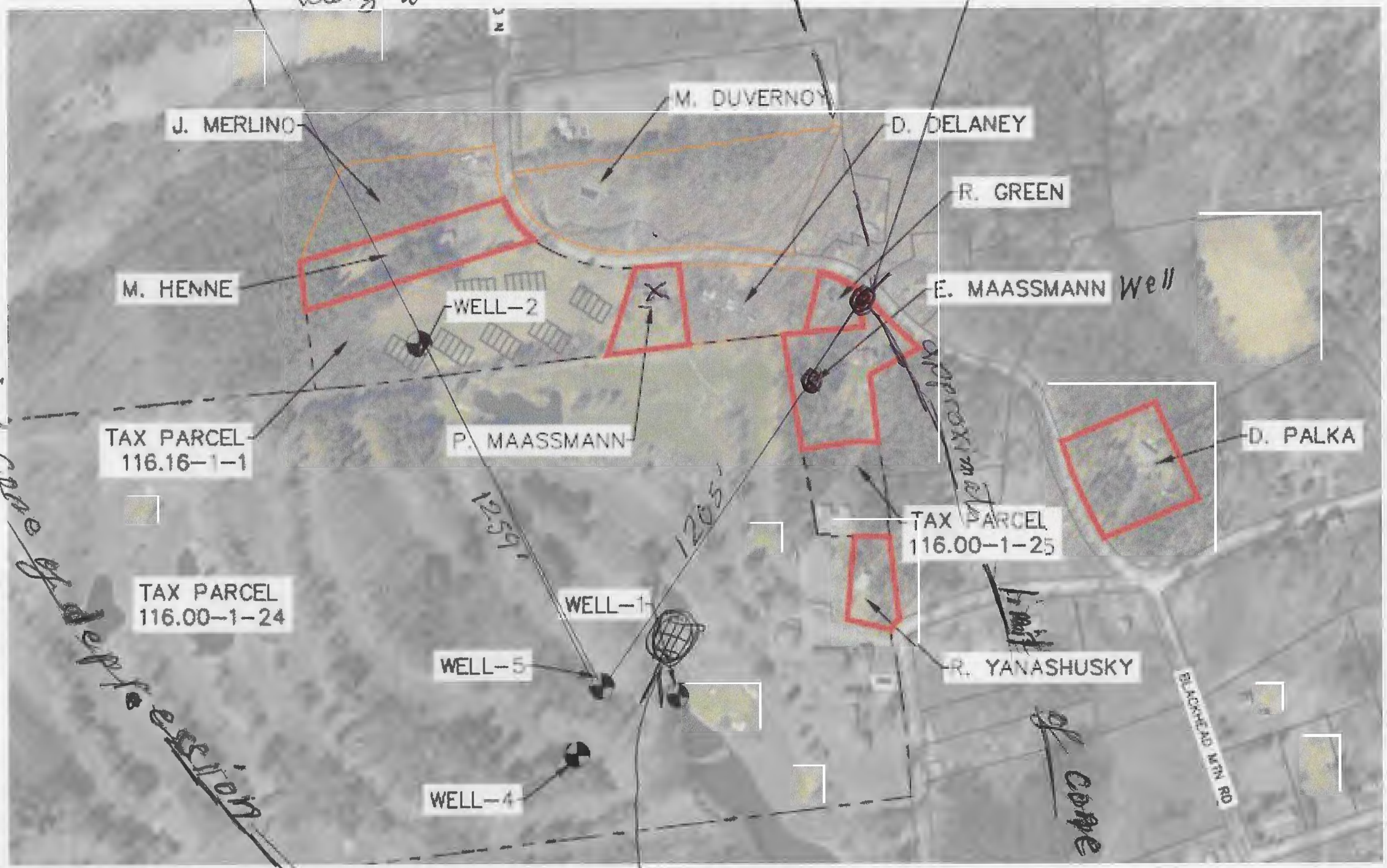


MAP 2. Blackhead Mountain Lodge Map showing Discharge Locations for Pumping Tests for Well 5 and Well 4. Discharge for Well 5 is north of discharge for Well 4. Discharge points are 300 feet northeast of the pumping wells.

outer limit of cone of depression from pumping well 5 is 5460 feet northnorthwest of pumping well 5 along a line extenting from well 5 to well 2

Based on a line from Pumping Well 5 extending north-northeast through E Maassmann We[ll] Outer limit of cone of depression from Pumping Wells

approximate limit of cone of depression

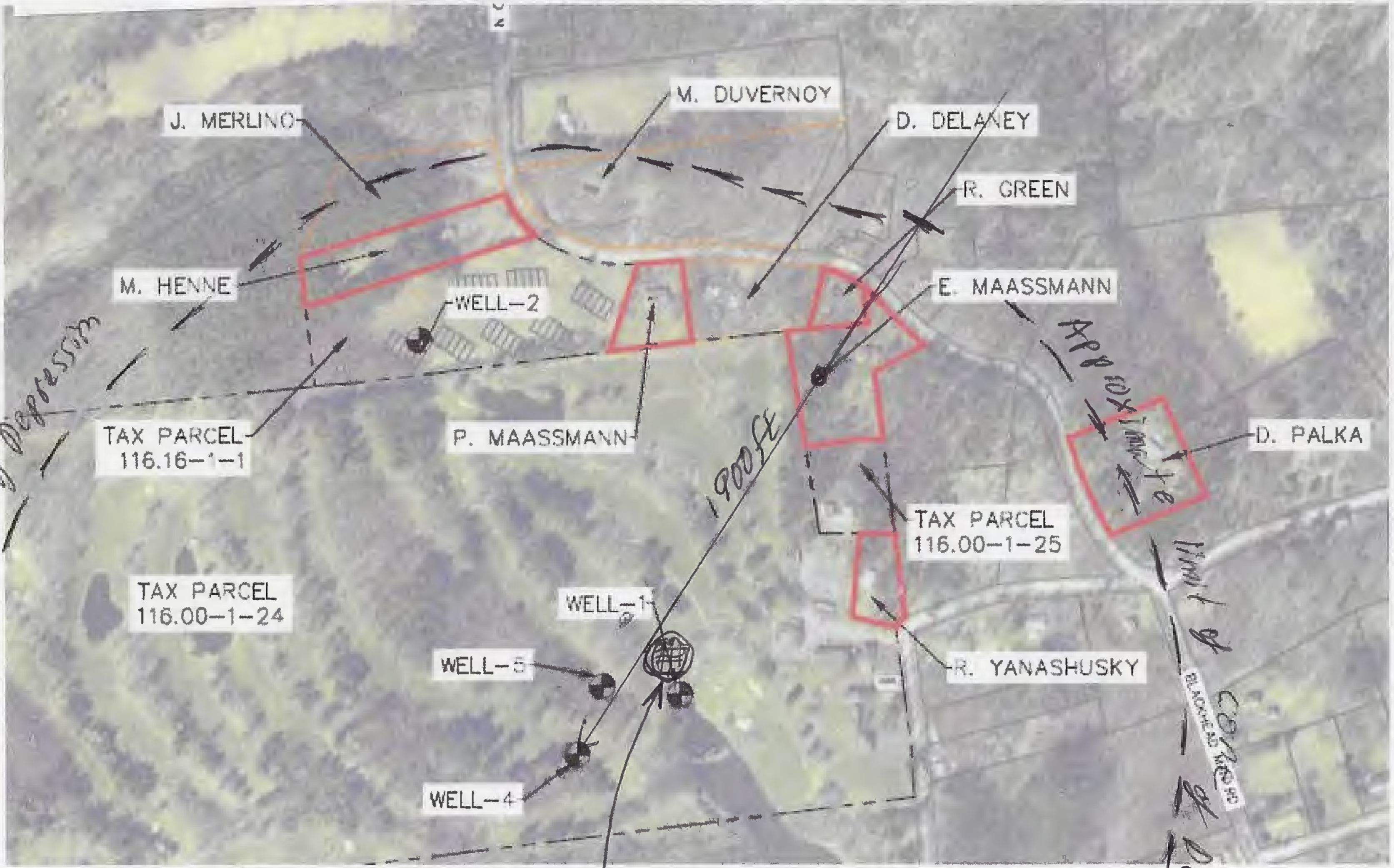


approximate limit of cone of depression

MAP 3. Blackhead Mountain Lodge Area showing Area of Discharge and Approximate Cone of Depression for 72-hour Pumping Test of Well 5.

Area of Discharge lies within huge cone of depression Pumping Well 5 is recirculating pumped water

MAP 4. Blackhead Mountain Lodge Area showing Area of Discharge & Approximate Cone of Depression for 73-hour Pumping Test of Well 4.

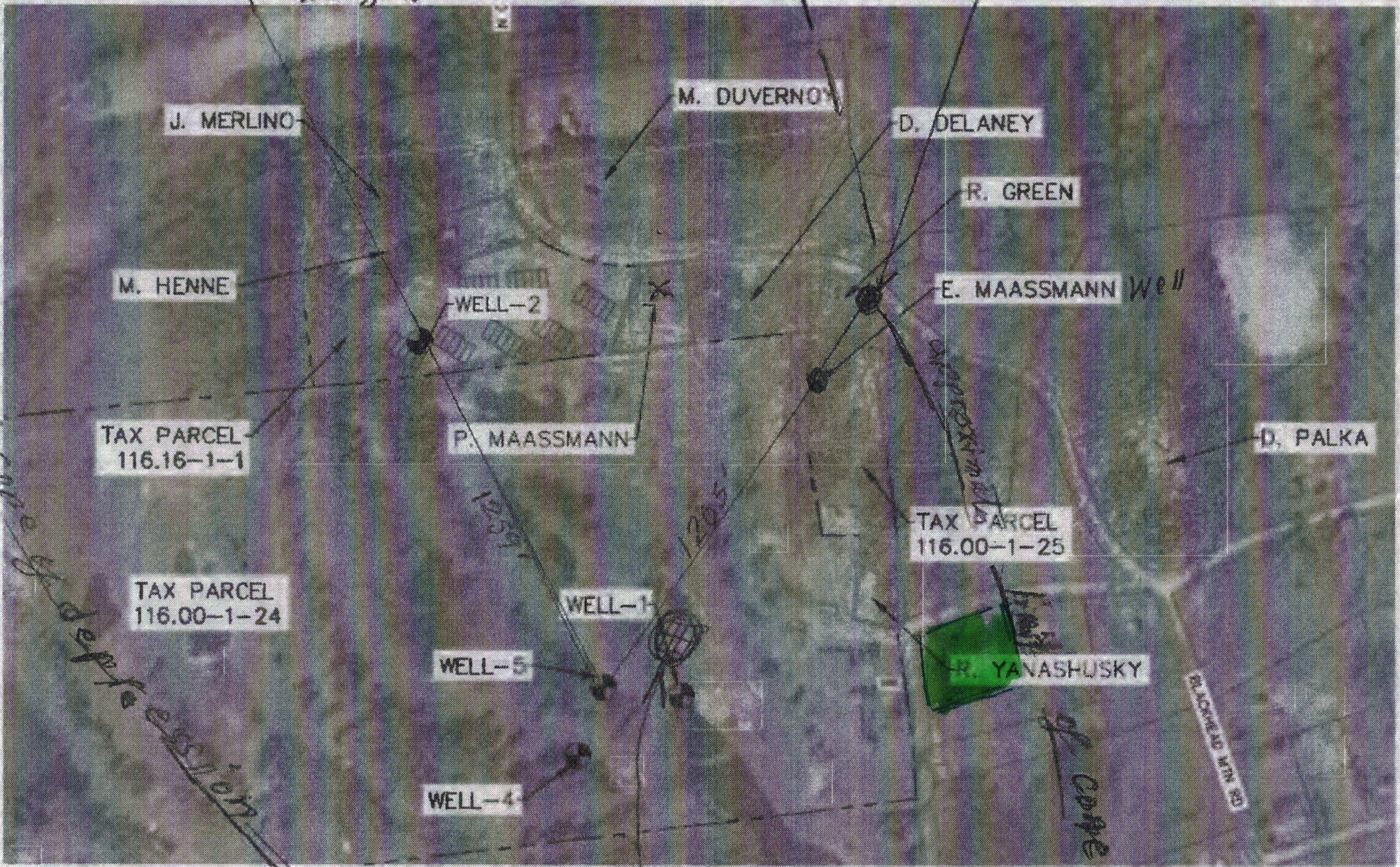


Area of Discharge lies with cone of depression defined as a radius of influence of 1900 ft around E Maassmann Well

outer limit of cone of depression
from pumping wells 5 is 5460 feet
north north west of pumping well 5
along a line extenting from well5 to well 2

Outer limit of cone of depression
from Pumping Wells

approximate limit of cone of depression



of depression

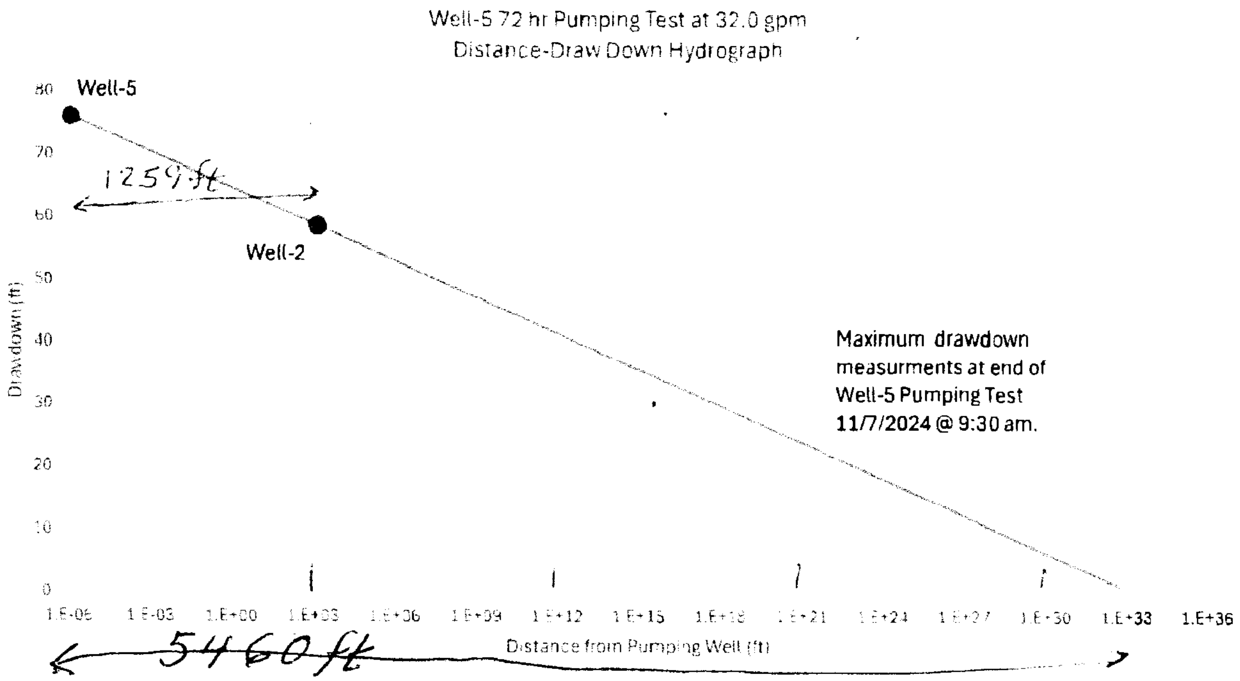
Area of
Dischange lies within
huge cone of depression
Pumping Well 5 is recirculating
pumped water

Green
patch
location of
BHML off-site
leach field
*
within the cone
of depression

GRAPHS

1. Well 5 Maximum Drawdown at end of 72-hour pumping test to estimate radius of influence or cone of depression in the direction of well 2
2. Well 5 Maximum Drawdown at end of 72-hour pumping test to estimate radius of influence or cone of depression in the direction of E. Maassmann well
3. Well 4 Maximum Drawdown at end of 72-hour pumping test to estimate radius of influence or cone of depression in the direction of E. Maassmann well

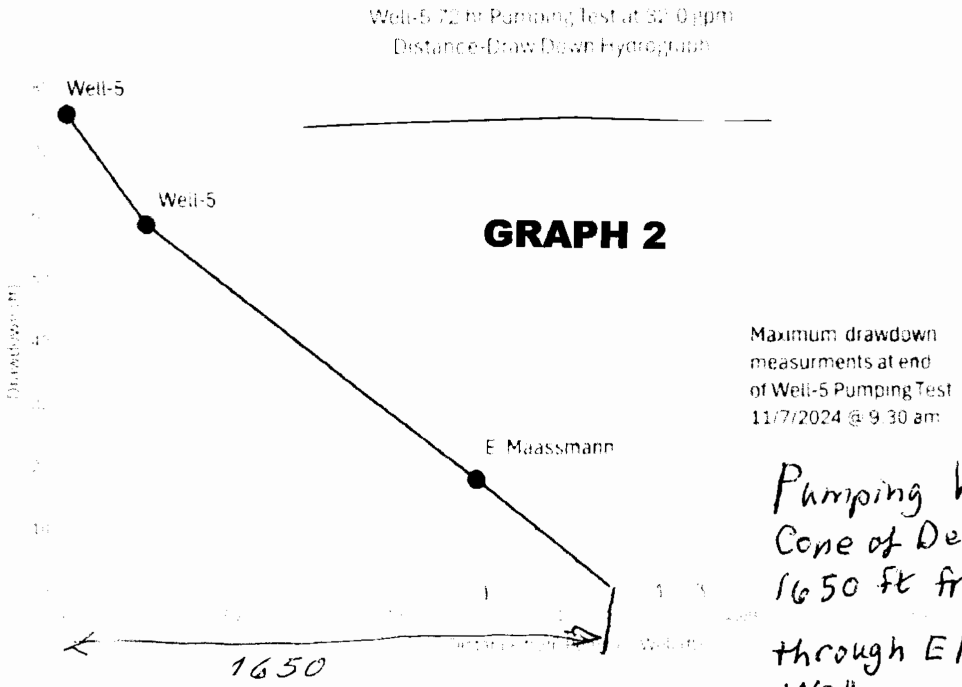
GRAPH 1



1260
4
5040
+420
5460 = radius of cone of depression pumping well 5

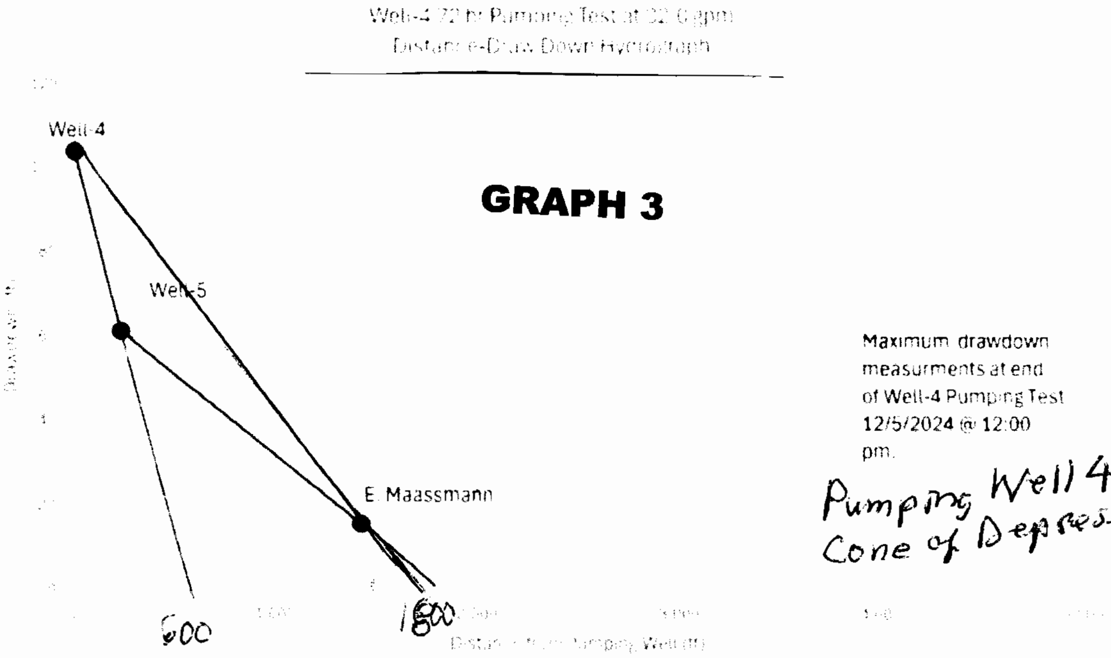
Well 2 is 1259 feet northnorthwest of pumping Well 5

Blackhead Mountain Lodge
Constant Rate Pumping Tests
Distance-Drawdown Hydrographs



Pumping Well 5
Cone of Depression
1650 ft from Well 5
through E Maassmann
Well

E Maassmann Well is 1205 ft NNE of Well 5



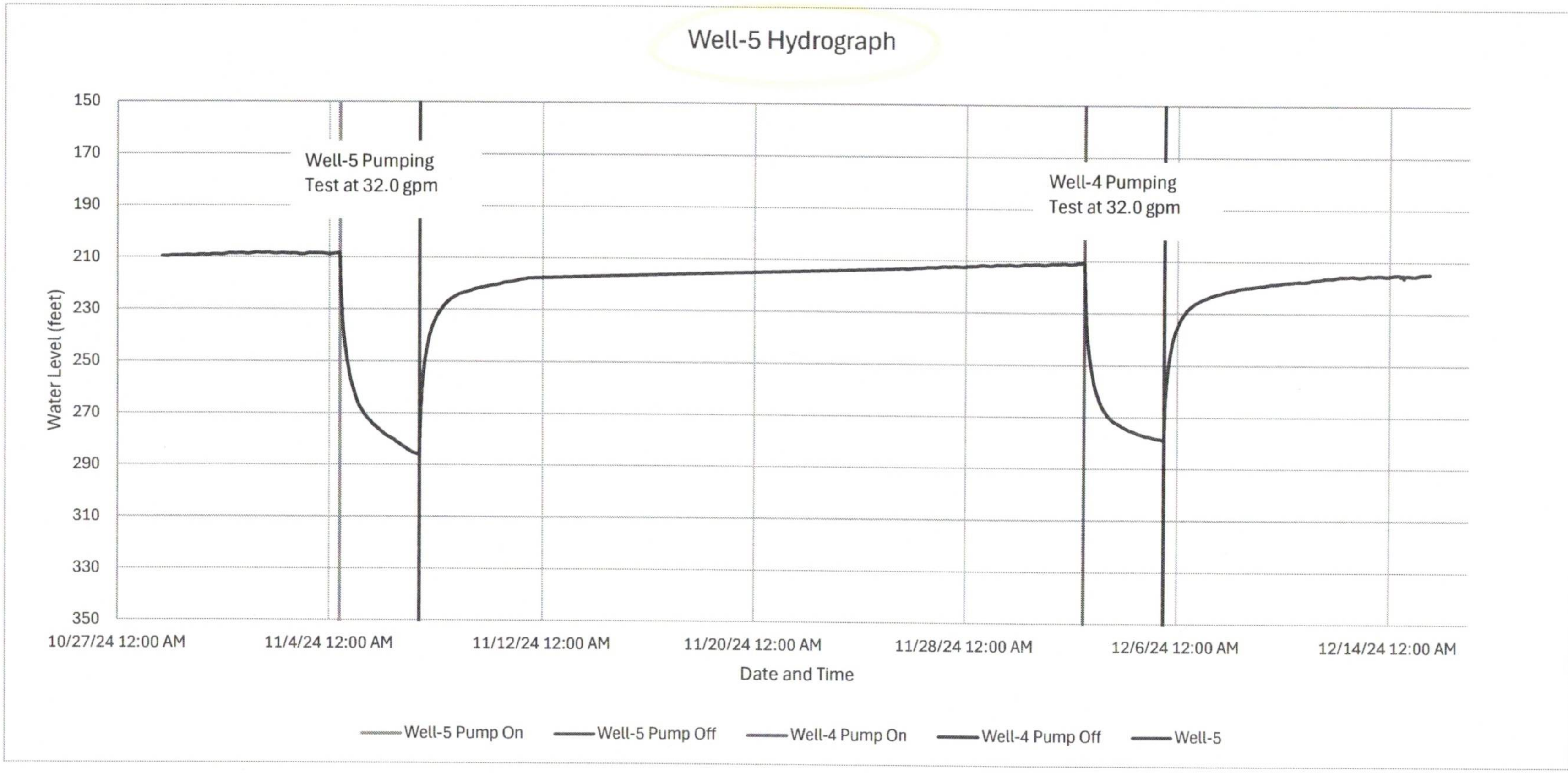
Pumping Well 4
Cone of Depression

E. Maassmann well is 1425 ft northeast of Well 4
Well 5 is 235 ft northnortheast of Well 4 -
does not fit the cone of depression model.

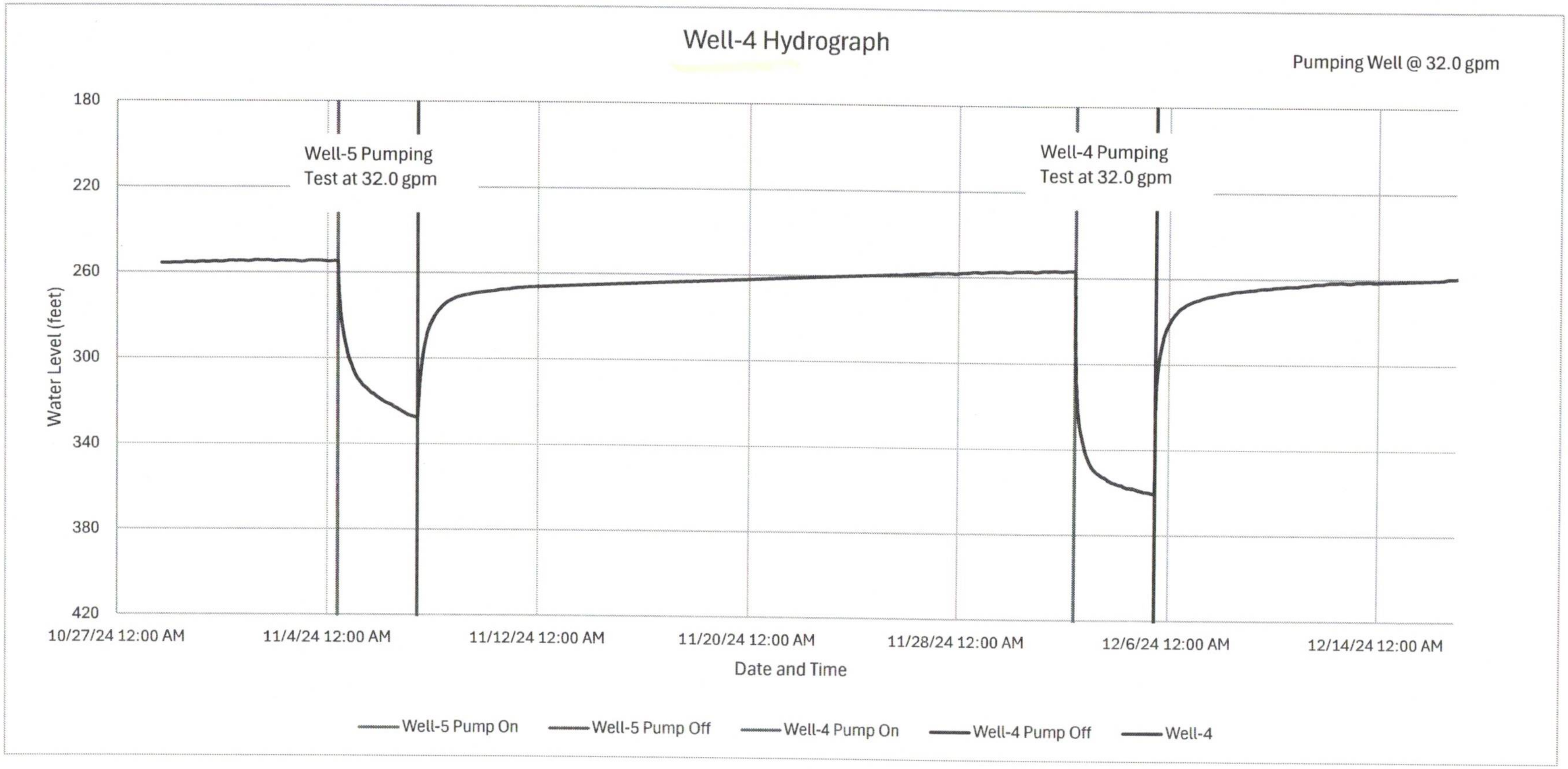
DRAWDOWN GRAPHS FOR NOVEMBER DECEMBER 2024 PUMPING TESTS

1. Well 5
2. Well 4
3. Well 2
4. Well 1
5. E. Maassmann Well
6. R. Green Well
7. D. Palka Well
8. R. Yanashusky Well
   a. Detail of R. Yanashusky Well, for Well 4 pumping test
9. P. Maassmann Well
10. M. Henne Well
11. SW-1 [Surface Water or Shared Pond]

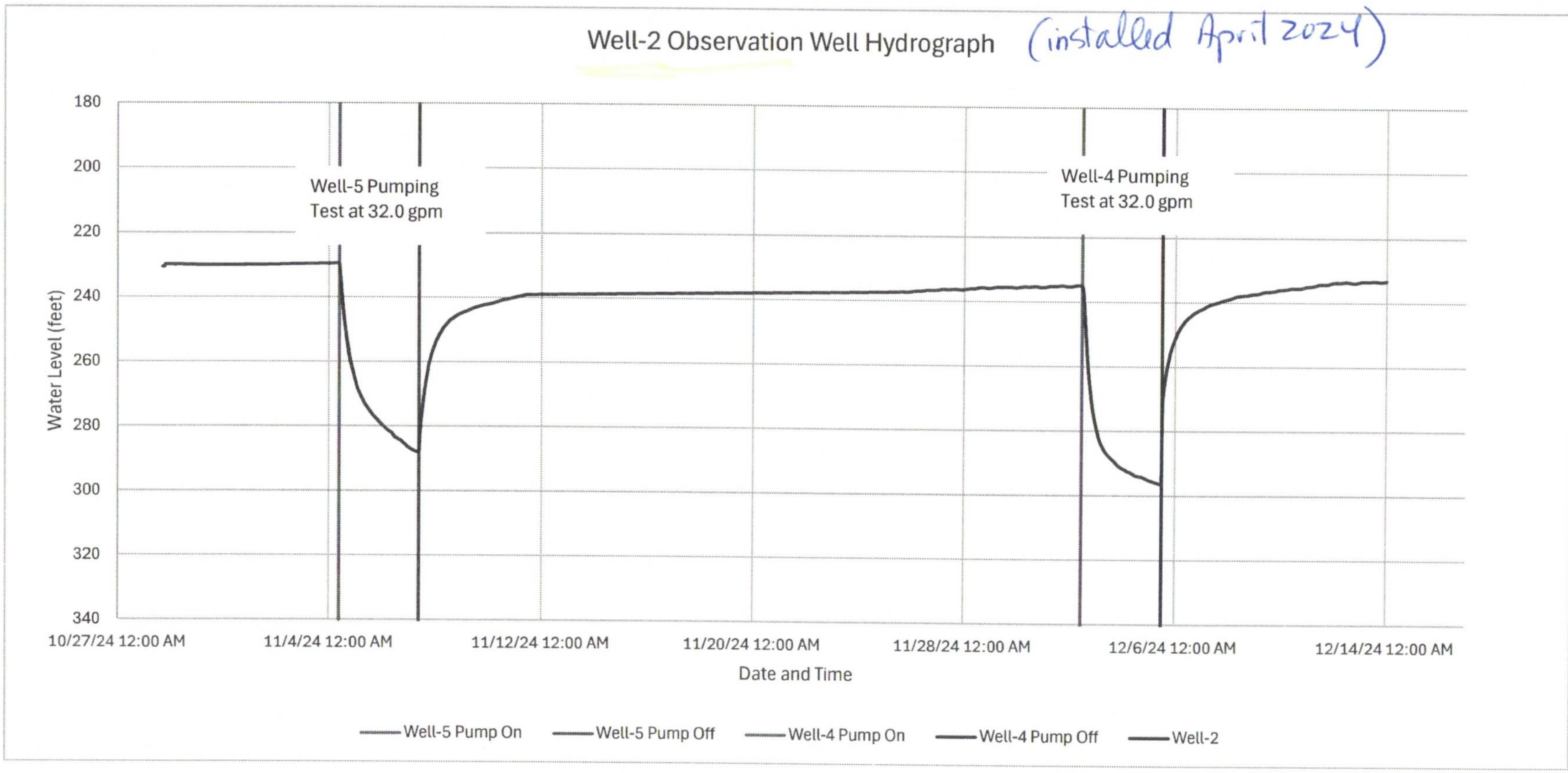
Blackhead Mountain Lodge Constant Rate Pumping Tests Hydrographs



Blackhead Mountain Lodge Constant Rate Pumping Tests Hydrographs

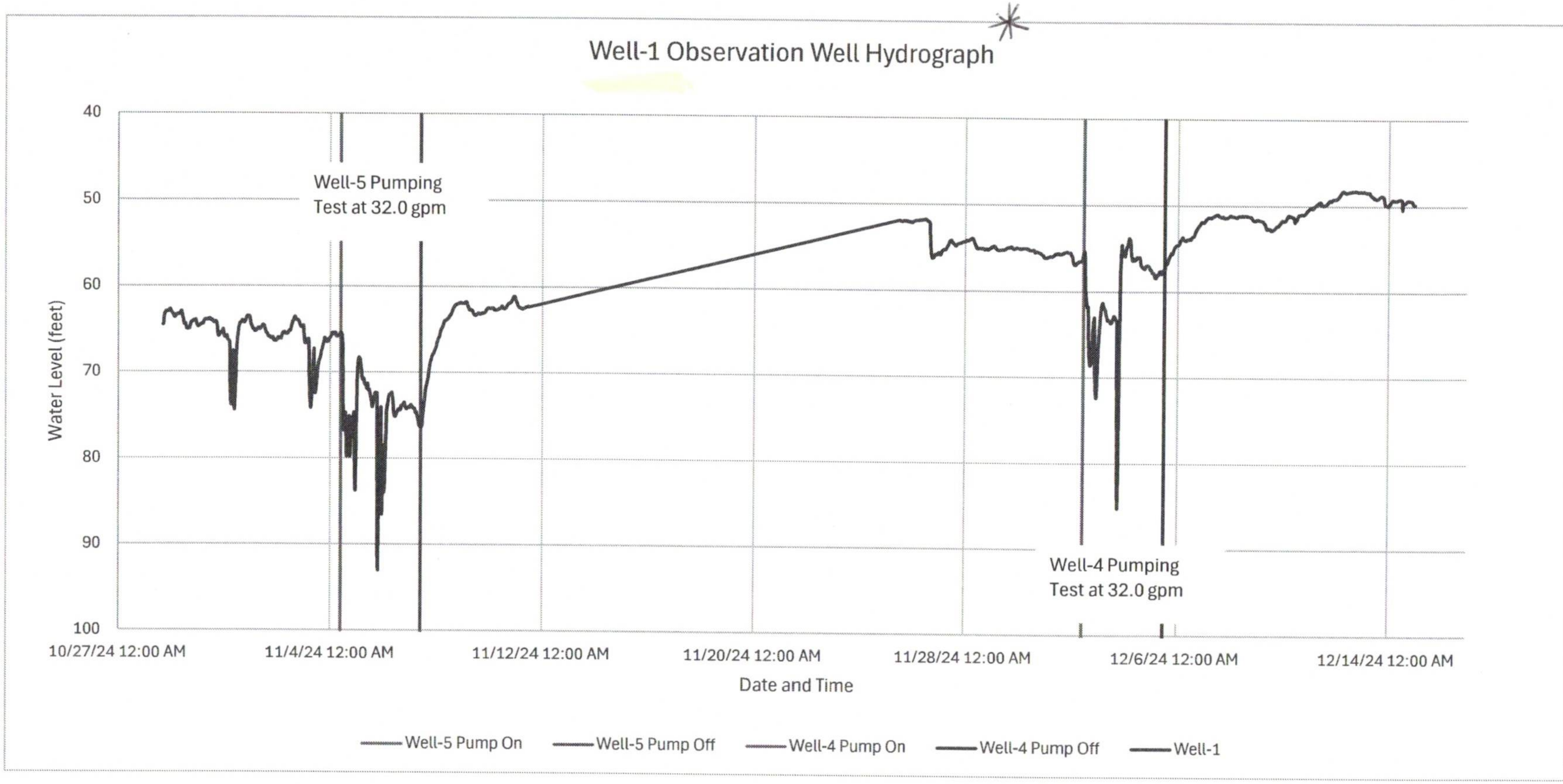


Blackhead Mountain Lodge Constant Rate Pumping Tests Hydrographs



Blackhead Mountain Lodge Constant Rate Pumping Tests Hydrographs

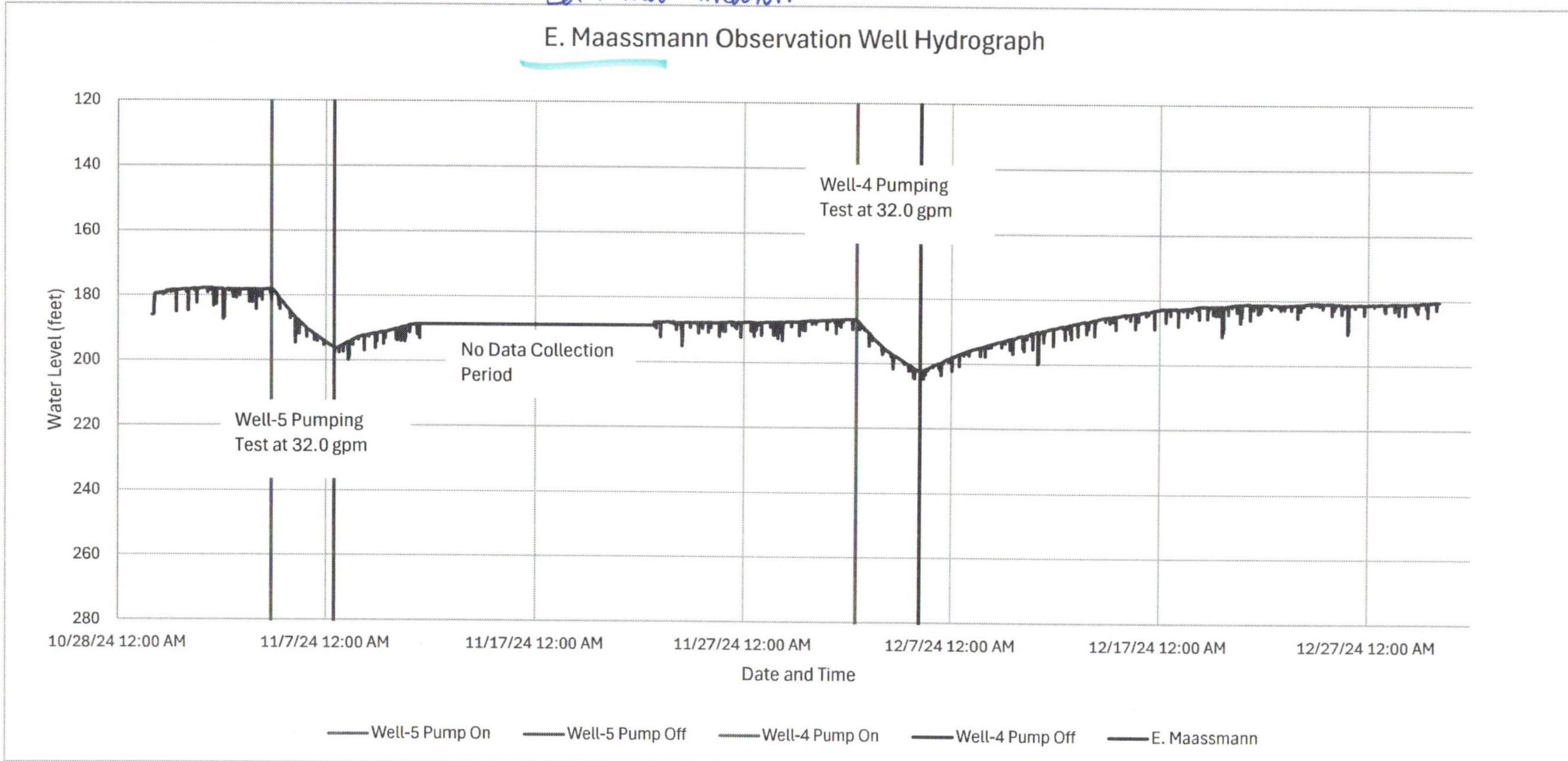
*



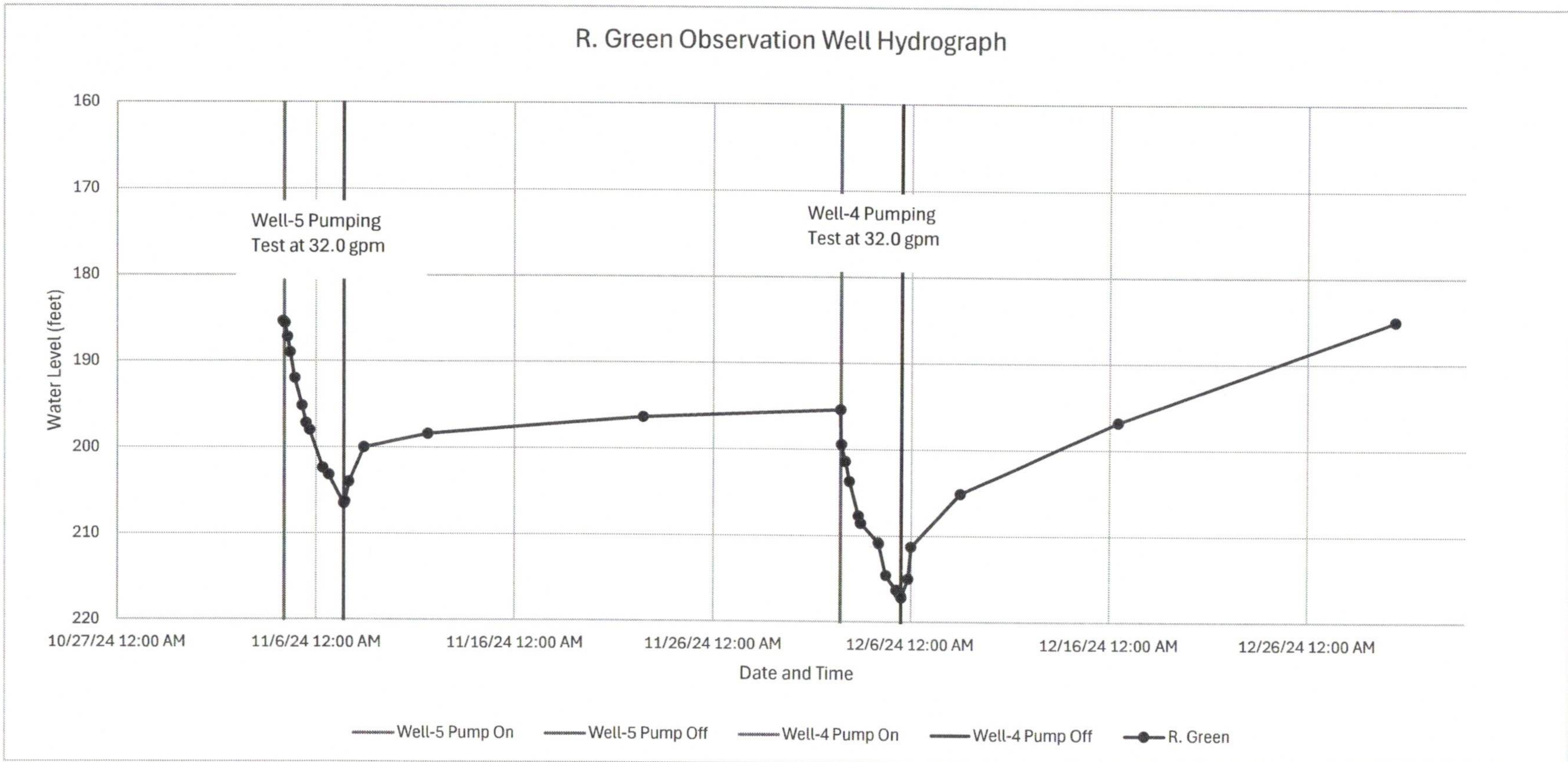
* Historically used for golf course irrigation.
The reason for water usage during pumping tests
is unknown.

Blackhead Mountain Lodge Constant Rate Pumping Tests Hydrographs

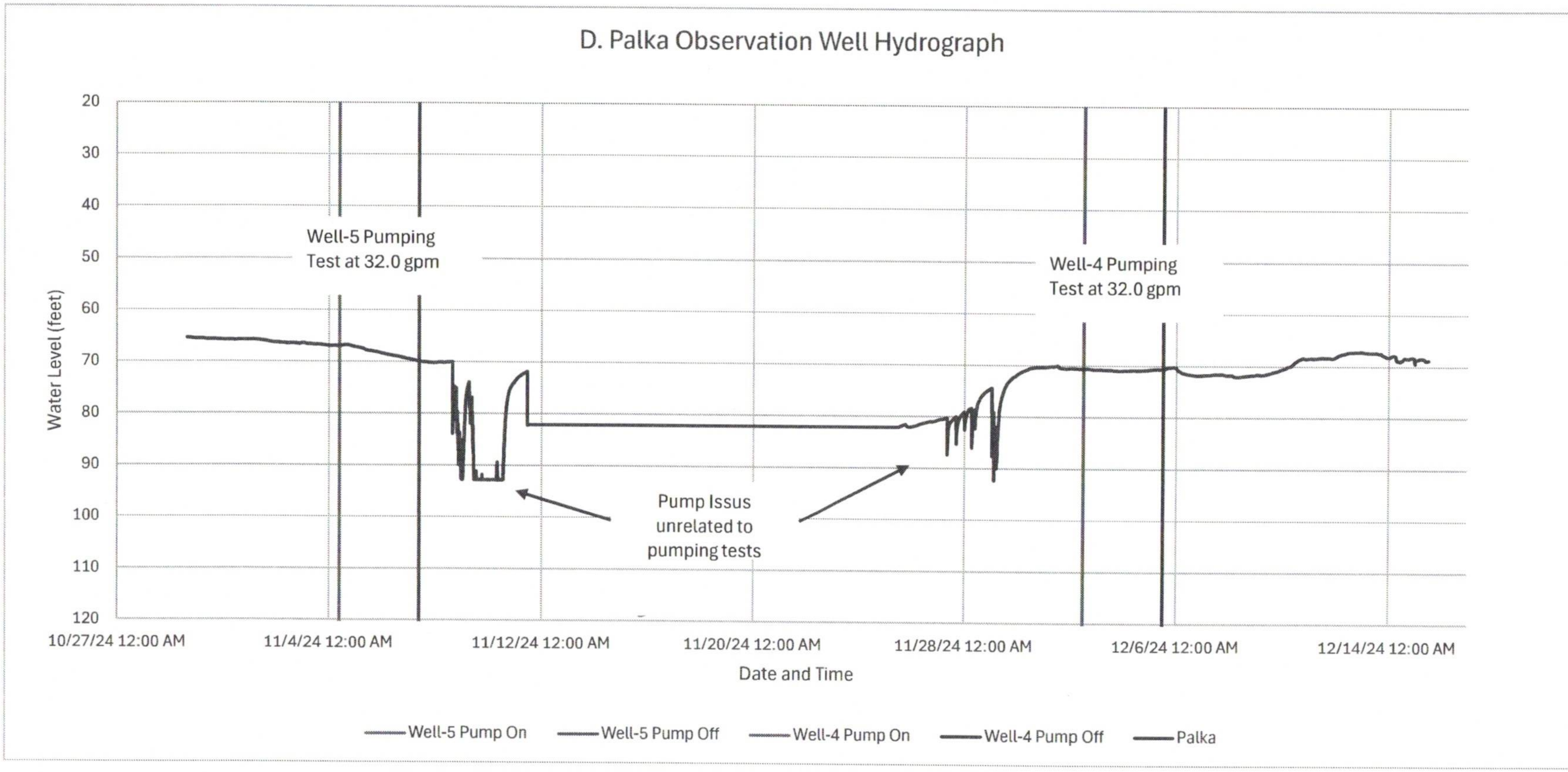
Ed Maassmann



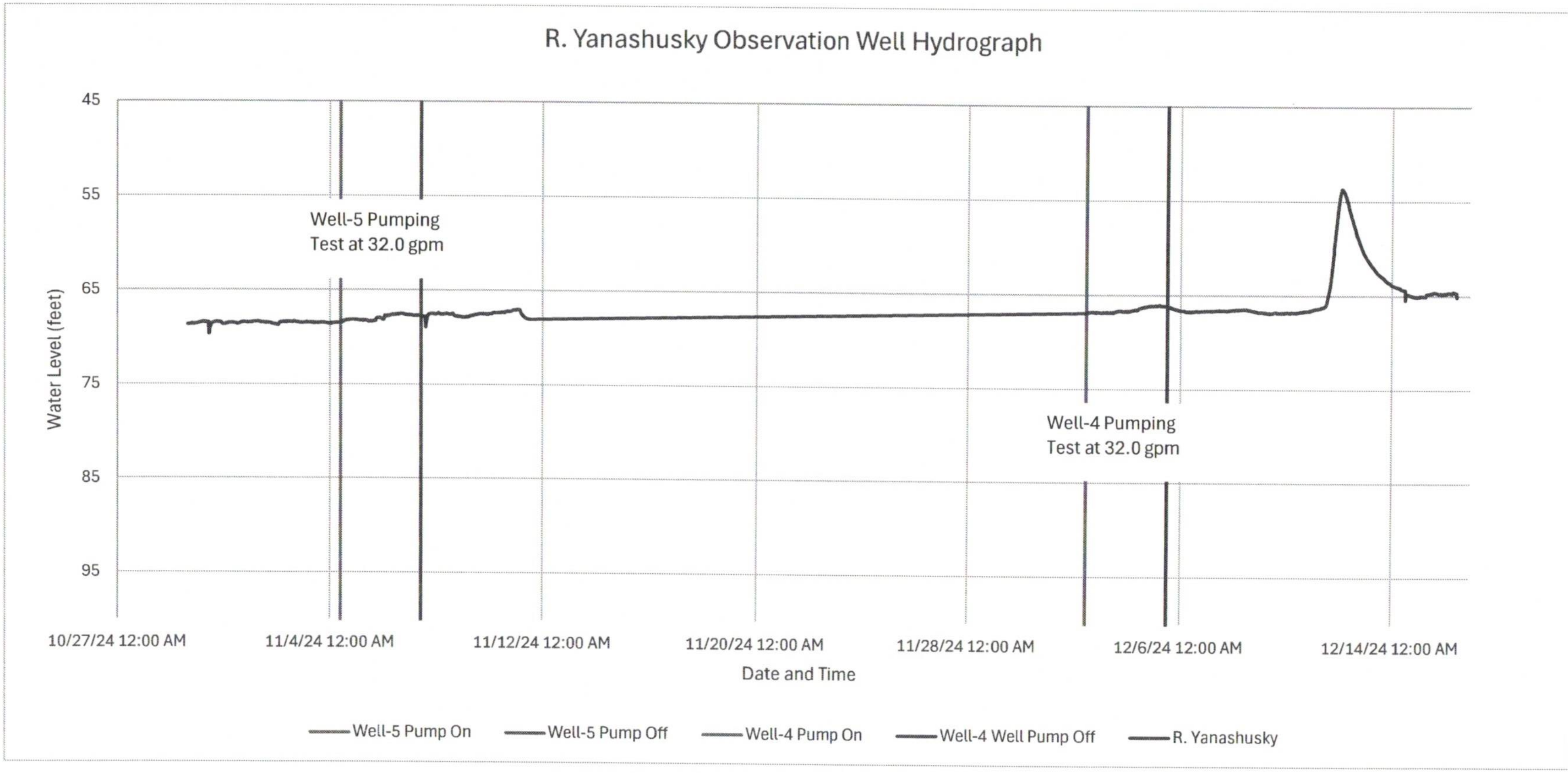
Blackhead Mountain Lodge Constant Rate Pumping Tests Hydrographs

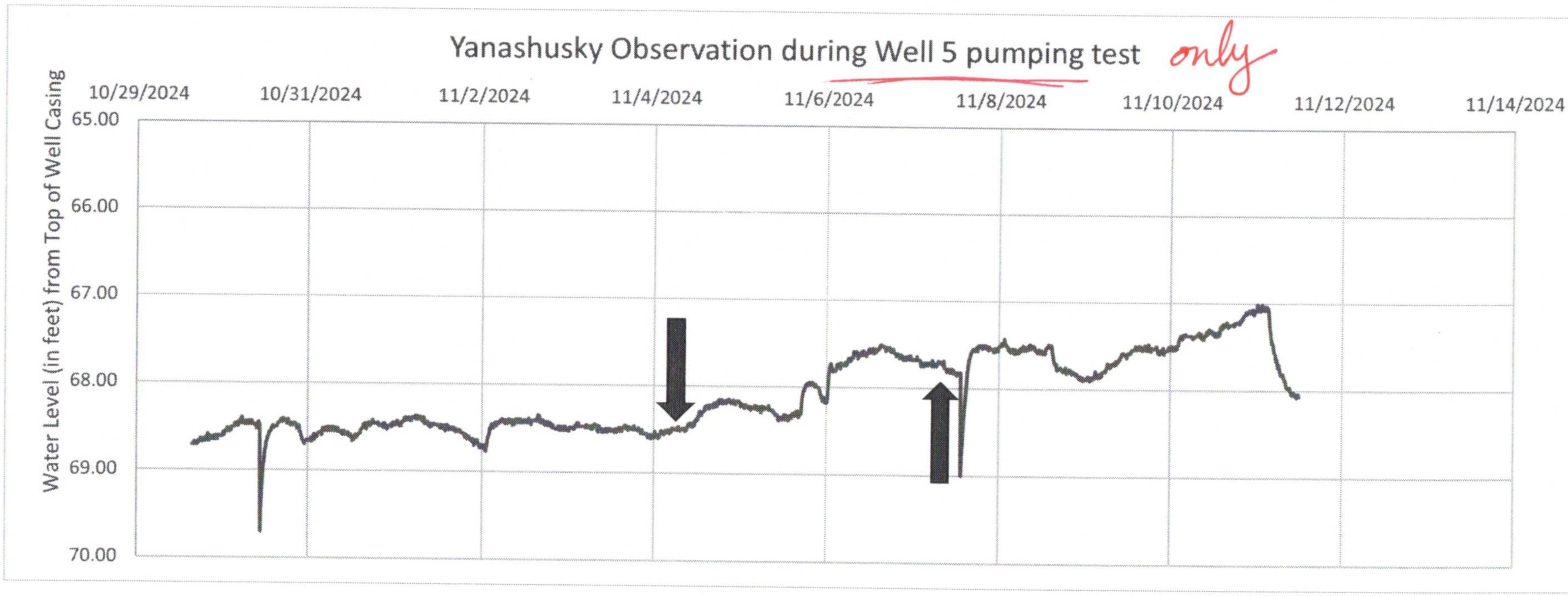


Blackhead Mountain Lodge Constant Rate Pumping Tests Hydrographs



Blackhead Mountain Lodge Constant Rate Pumping Tests Hydrographs





Static water level monitoring began on 10/29/2024 at 3:30 pm.

Continuous pumping of Well 5 at 32 gpm began on 11/4/2024 at 9:30 am (arrow pointing down). At this time, the water level was 68.45 ft.

Continuous pumping of Well 5 stopped on 11/7/2024 at 9:30 am (arrow pointing up). The water level was 67.78 ft, an **increase** of 0.67 ft from static level.

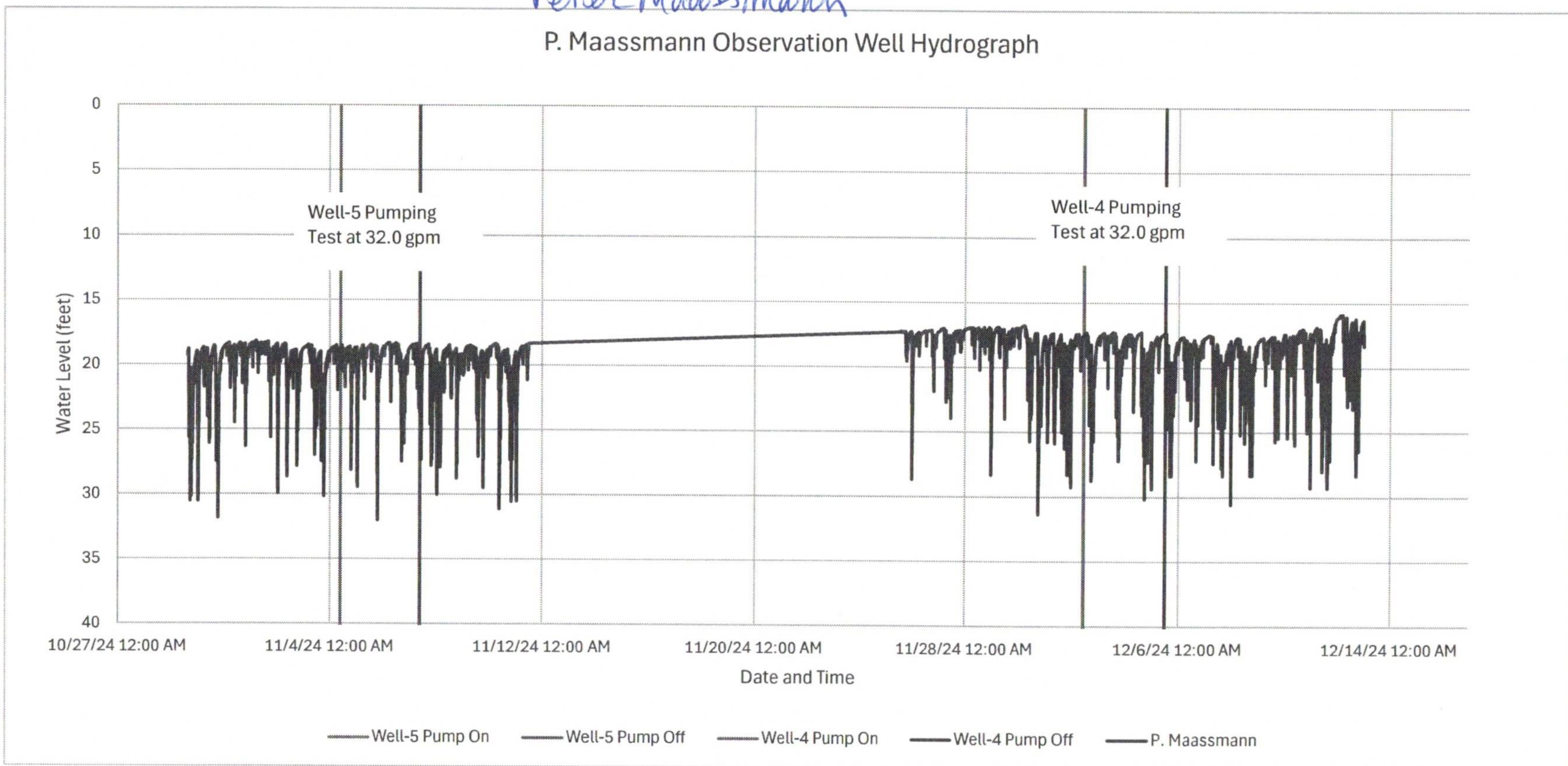
24 hours after the pumping of Well 5 stopped, the Yanashusky Well water level was 67.51 ft, an **increase** of 0.94 ft from static level.

72 hours after the pumping of Well 5 stopped, the Yanashusky Well water level was 67.38 ft. **NOTE:** The sharp fluctuations indicate water usage. **Although the Sterling Report reported that the continuous pumping of Well 5 has no impact on the Yanashusky Well (p 10/524), they fail to comment on the upward slope of its recovery trendline. This trendline indicates a higher water recovery rate than drawdown rate, caused when water pumped out of Well 5 was discharged too close to the aquifer supplying this observation well. In other words, the Yanashusky Well recharging behavior was aided by water pumped out of Well 5, within the cone of depression.**

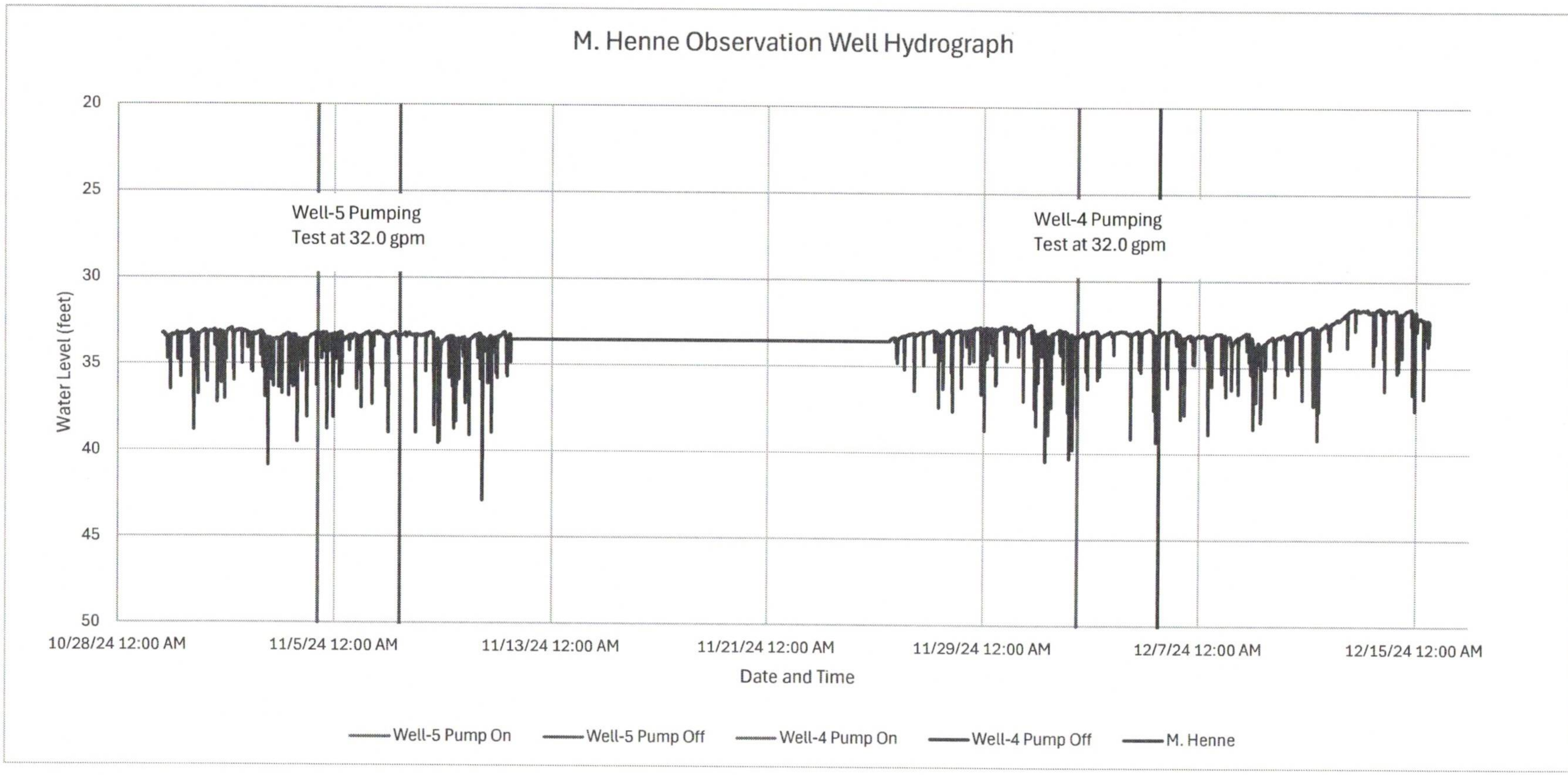
The same upward recovery trend was observed during the pumping test of Well 4 (December 2–5, 2024). When pumping started, the water level was 67.00 ft. from the top of the well casing. When pumping stopped, the water level was 66.22 ft. from the top of the well casing; an increase of 0.78 ft.

Blackhead Mountain Lodge Constant Rate Pumping Tests Hydrographs

Peter Maassmann

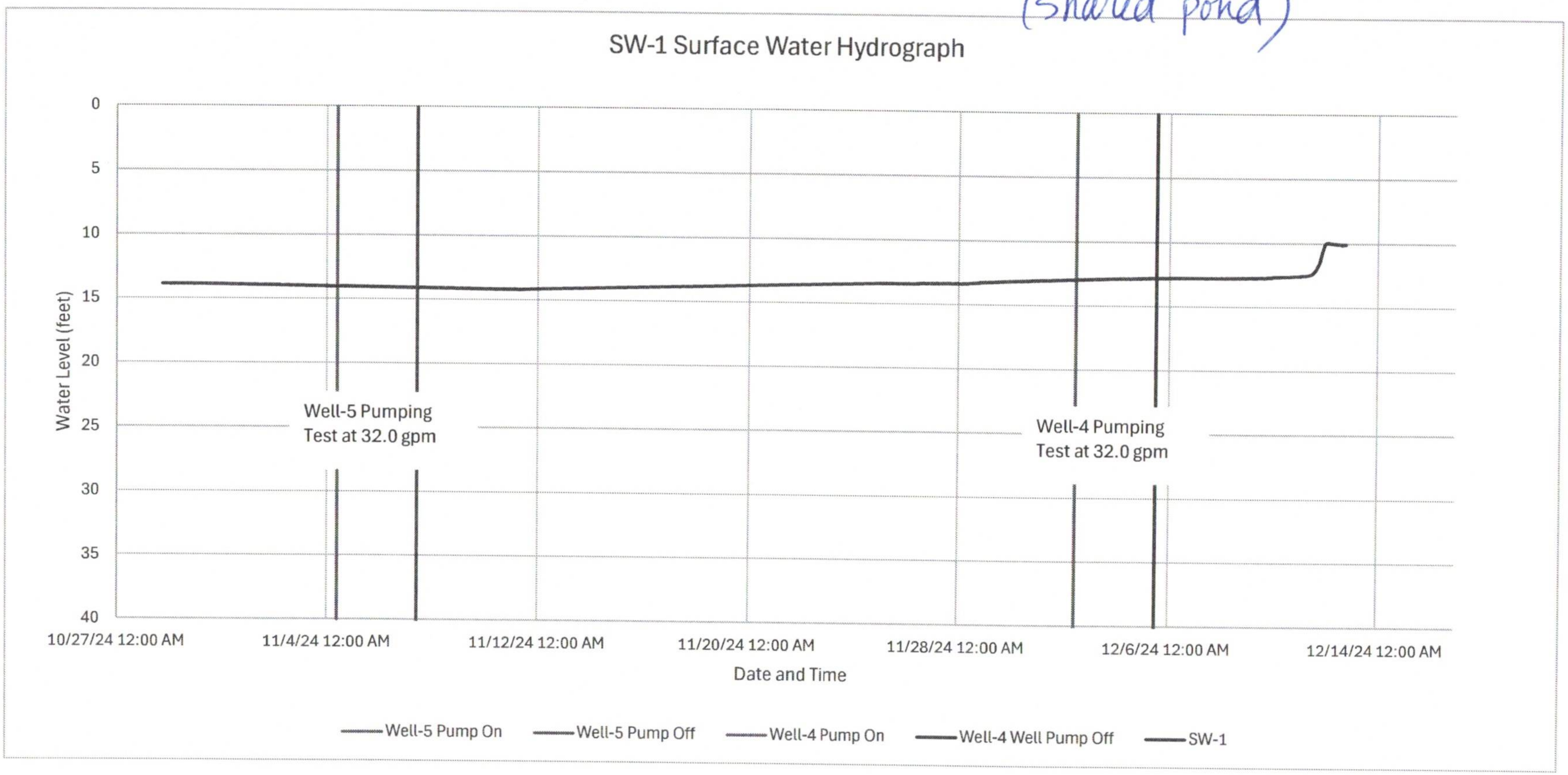


Blackhead Mountain Lodge Constant Rate Pumping Tests Hydrographs



Blackhead Mountain Lodge Constant Rate Pumping Tests Hydrographs

(Shared pond)



Resume of Katherine J Beinkafner, Ph.D.,

NYS P.G. #7611

RESUME
KATHERINE J. BEINKAFNER, Ph.D., CPG, NYS P.G. 1176
Geologist/Hydrogeologist

Mid-Hudson Geosciences rockdoctor@optonline.net
1003 Route 44/55; P.O.Box 32
Clintondale, NY 12515-0032 Cell (845) 873-7821

EXPERTISE: Investigation & Remediation of Subsurface Contaminants
Groundwater, Hydrology, and Wetland Studies
Environmental Regulatory Compliance, HazMat
QA, Senior Review, Expert Testimony
Surface and Borehole Geophysics
Computer Modeling of Groundwater Systems
Petroleum Geology, Geophysical Log Analysis, 3-D Mapping

EMPLOYMENT EXPERIENCE:

1999-2023 Mid-Hudson Geosciences has provided bioremediation services for cleanup of Chloinrated solvents in groundwater at Brownfield sites in Ulster and Orange Counties, NY

1997-1998	Sr. Hydrogeologist	Ballard Engineering, PC, New City, NY
Fall 1996	Adjunct Professor	Ramapo College, Mahwah, NJ
1991-1993	Sr. Hydrogeologist	EA Engineering, Newburgh, NY
1989-1991	Sr. Hydrogeologist	Dames & Moore, Pearl River, NY
Fall 1987	Adjunct Professor Groundwater-Hydrology	Rutgers, The State University of New Jersey, Newark Newark, NJ
1986-1987	Senior Consulting Hydrogeologist	Milton Chazen Engineering Associates Poughkeepsie, NY
1984-1986	Senior Reservoir Geologist	Lawrence-Allison West, Operations Contractor for Naval Petroleum Reserve #3, Casper, WY
1985	Dipmeter Consultant	Terrasciences, Inc., Lakewood, CO
1980-1984	Senior Development Geologist	Sohio Petroleum Company San Francisco, CA
1979	Summer Geologist	ARCO Oil and Gas Company Midland, TX
1979	Consulting Petroleum Geologist	Kirby Exploration Co. Houston, TX
1975	Adjunct Teaching Geologist	College of St. Rose Albany, NY
1972-1979	Scientist (Oil & Gas Geology)	Geological Survey, New York State Museum & Science Service, State Education Dept. Albany, NY 12234
1969-1972	Junior Scientist (Oil & Gas Geology)	Geological Survey (same as above)
1966-1968	Physics Teacher	F. D. Roosevelt H. S., Hyde Park, NY

EDUCATION:

1961-1965	S.U.N.Y. at New Paltz New Paltz, NY 12560	B.A. (Geology) M.A. (Geology)
1965-1966	Rensselaer Polytechnic Institute Troy, NY 12180	Geophysics
1968-1969	University of Pennsylvania Philadelphia, PA 19104	M.S. (Physics)
1977-1980	Syracuse University Syracuse, NY 13210	Ph.D. (Geology)

PUBLICATIONS:

Beinkafner, K.J., 1981, Quantitative Analysis of the Herkimer Formation (Upper Silurian) in the Subsurface of Central New York, NYS Museum & Science Service, Bulletin 437.

Beinkafner, K.J., 1983, Deformation of the Subsurface Silurian and Devonian Rocks of the Southern Tier of New York State, Ph.D. Dissertation, Syracuse University.

Beinkafner, K.J., 1983,, Terminal Expression of Decollement in Chautauqua County, New York, Northeastern Geology, v.5, nos. 3 and 4, page 160-171.

Beinkafner, K,J., 1983, Tracing the Sole of a Thrust Through Thick and Thin of Salina Group (Upper Silurian): Decollement Tectonics of Southern Tier, New York, Abstract, AAPG Bulletin, v. 67, Issue. 9, page 1452.

Beinkafner, K,J., 1984, Mapping Seismic Reflectors in Southern New York: Compensation for Velocity Anomalies in Glacial Overburden, Abstract, AAPG Bulletin, v. 68, issue. 12, page 1915-1916.

Beinkafner, K.J., 1986, Use of Dipmeter Logs to Refine Structural Mapping of Teapot Dome, Wyoming

Beinkafner, K.J., 2000, Increasing Water Resources with a Horizontal Well, Illinois Mountain, Highland Water District, Highland, NY: National Groundwater Association Eastern Focus Conference, Newburgh, NY October 5, 2000, 10:40 AM

UNPUBLISHED REPORTS:

"Geologic Interpretation of Dipmeter Logs," joint author with Andy Bengtson, SOHIO Petroleum Company, San Francisco, 1984.

"Log Analysis for (Petroleum) Wells Using Computer Hardware and Software, based on Terra Sciences log analysis and mapping software, Lawrence Allison West, 1985.

"Quantitative Geologic Model, Northern Second Wall Creek Reservoir," Lawrence Allison West, Casper, Wyoming, 1986.

"Radionuclide Transport to Human Access Locations, Transport Mechanism – groundwater and surface water (for Illinois LLRWSF License Application)," Dames and Moore, 1991.

"Subsurface Investigation Report, Town of New Paltz Landfill, Ulster County, New York." Mid-Hudson Geosciences, 1991.

"Sharkey Landfill Remedial Design, Groundwater Flow Model," Burns and Roe Industrial Services Co., 1991.

"Hydrogeologic Study of Wallkill Public Water Supply Watershed and Aquifer (Critical Environmental Area)," Mid-Hudson Geosciences, 1992.

"Ecological Risk Assessment of Benzene and Barium, Liquid Disposal Inc. Site, Michigan." EA Engineering, 1993.

"Complying with Hazardous Waste Laws and Requirements in New York State" notes for short course sponsored by NYS DOT Bureau of Environmental Analysis and Mid-Hudson Geosciences (Katherine Beinkafner), 1993 and 1994.

"Hydrogeologic Investigation: Van Etten Mobil Station, Liberty, New York." Mid-Hudson Geosciences, 1994.

"Closure Investigation Report for Youmans Flats Landfill in Harriman State Park: Geologic, Hydrogeologic, Gas Venting, and Vector Study," 2 Volumes. Mid-Hudson Geosciences, 1995.

"Groundwater Resources in the Town of Gardiner, Ulster County, New York." Mid-Hudson Geosciences, 1995.

"Designing, Conducting and Analyzing Aquifer Tests Applicable to New York State's Hydro-Geologic Conditions" Mid-Hudson Geosciences in conjunction with Hydrogeologic, Inc. and HKS Environmental, Inc. 1997 for 4-day NYS DEC training course.

"Hydrogeologic Investigation of Underground Fuel Oil Tank at Highland High School, 320 Pancake Hollow Road, Highland, NY NYSDEC Spill No. 97-06013" Mid-Hudson Geosciences,1998.

"Hydrogeology of Leipold Field, Ellenville Central School District, Edwards Place, Ellenville, NY" Mid-Hudson Geosciences, 1998.

"Investigation Summary and Remedial Plan Site No. 18 NYCDOT Nott Avenue Garage, Addendum No. 1" for NYC Dept. of Design & Construction, Ballard Engineering PC, March 20, 1998.

"Investigation Summary and Remedial Plan Site No. 13 NYCDOT Brookville Yard," for NYC Dept. of Design and Construction, Ballard Engineering PC, April 12, 1998.

"Investigation Summary and Remedial Plan Site No. 11 NYCDOT Flatlands Garage Addendum No. 1" for NYC Dept. of Design & Construction, Ballard Engineering PC, February 4, 1998.

"Final Site Investigation Report for Irvington Waterfront Park … Village of Irvington, Weschester County, NY" (NYS DEC Brownfields Program)Chapters on Physical Characteristics of the Site, Nature and Extent of Contamination, Contaminant Fate and Transport, and Exposure Assessment, Ecosystems Strategies, Inc. March 18, 1998.

"Report: Phase I: Exploration and Assessment for Development of Groundwater Resources on Illinois Mountain Watershed Property, Highland Water District, Highland, NY" Mid-Hudson Geosciences, December 1, 1999.

"Report: 72-Hour Pumping Test, Sunset Ridge Subdivision, Phillipsburg Road, Town of Goshen, Orange County", NY for Clients of Lanc & Tully Engineers by Mid-Hudson Geosciences, July 29, 2002.

"Shawangunk Recharge Area and Groundwater Management Plan" for New York-New Jersey Trail Conference by Mid-Hudson Geosciences, September 2002.

"Report: Aquifer Protection Study, Town of Hurley, Ulster County, NY" for Environmental Conservation Commission, Town of Hurley, Ulster County, December 2003, revised June 2004.

"Pumping Test Report for High Meadow School, Stone Ridge, NY" prepared for James L. Reynolds, Architect and Barry Medenbach, PE, Stone Ridge, NY October 28, 2004.

Letter Reports: "Hydrogeologic Analysis of Operation of Proposed Septic System Project," "Hydrogeologic

Analysis of Rainstorm and Operation of Proposed Septic System Project," "Hydrogeologic Analysis of Water Table Variation During Monitoring Period, " and "Method of Calculating Hydraulic Conductivity from Slug Testing, Addendum to Hydrogeologic Analysis of Operation of Proposed Septic System, Project: Plaza South, Newtown," CT for PW Scott, PE of Brewster,NY, April through October 2005.

Several Papers RE: "Calculations and Actions for Pesticide Remediation in Former Orchards, now Residential Subdivisions in Orange County:" Greiner and Wildflower Vista Subdivisions, BCM Development in Town of Newburgh, Palladino and Double R Subdivisions, as a subcontractor to William L. Going & Associates, Pine Bush, NY, 2004-2005.

"Review of FEIS (November 18, 2004) and DEIS (July 28, 2004) for Proposed Mushroom Production and Processing Facility by Yukiguni Maitake Manufacturing Corporation of America in the Town of Mamakating" and "Review of DEIS (July 28, 2004) for Proposed Mushroom …" and associated testimony at Planning Board Hearings for Bashakill Area Assocation, Wurtsboro, NY, April through October 2005. Other Reports: "Evaluation and Assessment of Design of a Process Wastewater Infiltration System" May 2009. "Groundwater Mounding Analysis beneath the Process Wastewater Infiltration Basin" August 2009. "Special Conditions Associated with NYSDEC Issuance of Yukaguni Maitake Permits" September 2009.

"Report: Aquifer Protection Study, Town of Marbletown, Ulster County, NY," for Environmental Conservation Commission, Town of Marbletown, Stone Ridge, NY, September 2005.

Report: "Geologic Assessment of Hudson Landing Site, Kingston, NY", Recommending stormwater management practices to protect groundwater from potential contamination by flow into karst pathways, Ecosystems Strategies, Inc. November 2007.

Reports concerning proposed Ulster Manor Project in Town of Ulster: "Comments for the Ulster Manor FEIS RE: Soils and Geology including evidence of Karst Features on site, Surface water, Wetlands and Groundwater Resources, July 2008. "Comments on 'Dworkin's Letter 11/8/08" RE: Ulster Manor indicating confirmation of Karst Features on site and needed mitigation measures, Ecosystems Strategies, Inc. December 2008.

Reports submitted to US EPA for Industrial Hazardous Waste Site: Former General Switch, Middletown, NY (as subcontractor to Ecosystems Strategies, Inc.): "Well Installation and Remedial Selection Report" (October 2007). "Evaluation of Cone of Depression and Capture Zone for Bedrock Well" July 2010. Short Term Pumping Test to Evaluate Use of Overburden Well" March 2011, ."Evaluation of Potential Matrix Diffusion Studies to Expedite Remediation of Chlorinated Solvents in Bedrock" at General Switch (2/13).

Report: "Review of Draft Environmental Impact Statement (DEIS) for Warwick Views Subdivision, submitted by Warwick Views, LLC to Town of Warwick Planning Board" March 2010.

Additional Reports Prepared in conjunction with Paul A. Rubin dba HydroQuest: "Karst Hydrology #1" June 2010, "Karst Hydrology #2" August 2010, "Revision of DEIS and Public Review Recommended"

Letter Report and Public Hearing Testimony (addressed to Planning Board Chairman Martin Lonstein, Town of Wawarsing,108 Canal Street, PO Box 671,Ellenville, NY 12428-0671*):* "Review of Draft Environmental Impact Statement for Proposed Mahamudra Buddhist Hermitage, Cragsmoor, NY***"*** (June 30, 2006), on behalf of Cragsmoor citizens group December 26, 2006.

"Review of Environmental Impacts of Geologic Conditions and Steep Slopes on the West Side of Byram Lake with Respect to Seven Springs Draft Environmental Impact Statement" prepared for private client August2008).

Report: "Review of Draft Environmental Impact Statement, Section 3.2 Groundwater & Appendix E for 7 Peaks At Mountain Road" Town of Mamakating, Sullivan County, NY (Dated January 22, 2010, prepared by The Chazen Companies), review by Mid-Hudson Geosciences for Basha Kill Area Association (Feb 9, 2010).

Letter Report and Expert Testimony at Public Hearing (addressed to: Hon. William R. Weaver, Supervisor, Town Board, Town of North Castle, 15 Bedford Road, Armonk, NY 10504) "Hydrological Concerns for the Site Plan and Project Design for Proposed Maintenance Garage 7 Round House Road @ Hobby Farm Road, Town of North Castle, Westchester County, New York" Prepared by JMC, John Meyer Consulting PC, dated 04/09/2010 In Consideration of a Special Use Permit representing neighborhood residents(6/2010)

Report: Geology and Hydrology Sections of "Lower Rondout Creek Interim Stream Management Plan" for Clearwater, *pro bono* coauthor with Jolanda Jansen (October 27, 2011).

Draft Summary Report: "Rinzler Proposed Subdivision Property, Prospect Hill Road, Town of Blooming Grove, Orange County, NY" (Pumping tests and well treatment in deep low recharge wells) for William L Going and Associates (December 29, 2011).

Review of "United Water New York, Inc. Application for Haverstraw Long-term Water Supply Project" Mid-Hudson Geosciences prepared with HydroQuest submitted to NYS Department of State, Secretary of State Cesar A. Perales on behalf of Rockland Water Coalition (April 20, 2012**).**

Report: "Carbonate Rock Area. Municipal Code suggestions for testing carbonate areas for karst terrain and potential environmental impacts" for Town of Rosendale (*pro bono*, July 2012)

Report: "Analysis of C&D Debris Collected at 290 Tarbell Road, Town of Wallkill, Orange County, NY on 4/3/13" Mid-Hudson Geosciences with William L. Going and Associates for private client (April 26, 2013).

Engineer's Report: "Supplemental Remedial Investigation Report for American Cleaners, Inc. Middletown, NY NYSDEC Site No. V-00461 Voluntary Cleanup Program" prepared by Jansen Engineering, PLLC and Mid-Hudson Geosciences (May 10, 2013).

Pumping Test Workplans and Reports for Remediation of Hazardous Waste Site, Bronx, NY for EcoSystems Strategies, Poughkeepsie, NY.

PROFESSIONAL AFFILIATIONS:
American Association of Petroleum Geologists
American Institute of Professional Geologists
National Ground Water Association
Hudson Mohawk Professional Geologists Association

PROFESSIONAL HONORS: Fellow of Geological Society of America

PROFESSIONAL CERTIFICATION:
Petroleum Geologist Number 2683 by American Association of Petroleum Geologists
Professional Geological Scientist Number 6611 by American Institute of Professional Geologists