

**WATER QUALITY AND CONTAMINATION**

**TESTIMONY BEFORE THE  
SENATE STANDING COMMITTEE ON HEALTH  
SENATE STANDING COMMITTEE ON ENVIRONMENTAL CONSERVATION  
ASSEMBLY STANDING COMMITTEE ON ENVIRONMENTAL CONSERVATION  
ASSEMBLY STANDING COMMITTEE ON HEALTH**

***TESTIMONY OF DONNA LIEBMAN***

Homeowner, Plains Road, New York and Member, Plains Road Water Watch

September 7, 2016

My name is Donna Liebman. I have good news for you! We are homeowners in New Paltz, not politicians or activists. Thank you for the opportunity to speak.

You have been hearing about serious water issues for a long time. Our water crisis hasn't happened yet. **You can keep it from happening altogether.**

A backup water source in New Paltz is required for 3 10-week shutdowns of the New York City aqueduct. Several potential sites were explored only superficially. The Town Board chose a site at 101 Plains Road. Not only is this site inadequate; pumping water at 101 will put the aquifer at unnecessary risk and possibly do it permanent, irrevocable damage.

The events leading up to and following this decision are highly questionable regarding motivation and methods practiced by certain individuals.

Safe yield of an aquifer is defined as the amount of water that can be withdrawn from it without producing an undesired effect. Safe yield was never

established for the aquifer at 101 Plains Road. All efforts have focused on the Plains Road site without creating a "Plan B."

The water to be pumped at 101 would be supplemented by water from other sources. Recently it was revealed that the water from one of those sources is not usable. Instead, local government officials are now actually considering drawing water from a local environmental preserve.

In May of 2014, 2 test wells were drilled at 101 Plains Road. The engineer in charge never contacted residents. He did not establish a baseline for any private homeowner wells. These two steps are the two most basic practices prior to test pumping.

Before the 72-hour test was completed, three homeowner wells across the street from the pump site were dewatered. Many others were contaminated with **coliform and lead.**

The engineer later explained that he didn't inform residents because he thought no well would be affected.

Some community members prefer municipal water while others want to keep their wells. Our group, **Plains Road Water Watch**, wants to protect the aquifer.

We want good science that supports whichever site is chosen.

Over the last 2 years, we have frequently attempted communication with the New York State Department of Environmental Conservation, New York City Department of Environmental Protection, the Ulster County Department of Health, and the Town and Village Boards of New Paltz. Our questions and concerns have fallen on unresponsive ears.

Plains Road Water Watch hired Paul Rubin, an expert hydrogeologist with 30 years experience in the region, to interpret the data provided in the engineer's report. In his review of the report, Mr. Rubin summarized the following: 1) the NYS Department of Environmental Conservation should require additional testing if a permanent water supply application is being sought; 2) the NYS Department of Environmental Conservation should deny a temporary 10-week water supply application because such pumping will unnecessarily and adversely affect a community when several alternate water sources may be suitable; 3) a complete

cost benefit analysis has not been conducted comparing full system costs, proven long-term safe yields, future water demand and system expansion; and 4) all further hydrologic work should be framed within SEQRA as part of a Draft Environmental Impact Statement. We have provided copies of Mr. Rubin's report to your committees for your review.

We come before you because practices and information involving this matter have raised grave concerns regarding the health of the aquifer. Due to the lack of expertise in planning for water usage, the aquifer will be put at risk. If it is ruined, it is irreplaceable.

In New Paltz, potential tragedy could be averted. State agencies could be models of pro-activity. The approach could be a willingness to heed a substantive warning and ensure everything is done properly. Here is an opportunity to create a positive outcome.

We ask that the state provide assistance, guidance, and direction to the residents and leaders of New Paltz so that proper planning, design, and construction of a backup water source will be implemented in our town. Further,

we urge that this practice become protocol as water needs change in communities throughout the state.

As EPA administrator Judith Enck wrote in an email to her colleagues regarding Hoosick Falls, "We need the state health department to focus on water supply issues fast... There is a clear need for regulatory oversight by either the state or EPA or both."



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## HydroQuest – Paul A. Rubin Review of Chazen-Clouser Report

Nov. 26, 2014

On behalf of the Plains Road Water Watch, a community group comprised of 40 concerned resident families, HydroQuest has reviewed the Village of New Paltz Phase II Backup Water Supply Investigation - Final Project Report prepared by David Clouser & Associates, The Chazen Companies, and Brinnier and Larios, PC dated September 2014. This Phase II feasibility study was conducted by the Village of New Paltz. The stated purpose of the engineering and hydrogeological investigation was “... to examine potential backup water supply sources that will provide for the community’s water supply during two planned 10-week Catskill Aqueduct maintenance shutdowns. ... Specifically, the purpose of the investigation was to identify potentially feasible water supply sources that were previously identified in the 2013 Phase I backup water supply investigation.” HydroQuest’s review paid particular attention to whether 1) residents of the Plains Road area proximal to planned production wells PW-1 and PW-2 at 101 Plains Road (Parcel 5) would be adversely impacted, 2) sufficient hydrogeologic data supported temporary withdrawal of 400 gallons per minute (gpm) for two 10-week periods when New York City aqueduct water is not available (Oct. - Dec. 2016 and Jan. - March 2017), and 3) sufficient hydrogeologic data supported approval of the Plains Road aquifer for use as a permanent groundwater supply for the Village of New Paltz. Key conclusions and recommendations specific to this review are provided within this review report.

Key conclusions and a recommendation provided include 1) NYS DEC should require additional testing if a permanent water supply application is being sought, 2) NYS DEC should deny a temporary 10-week water supply application because doing so will unnecessarily and adversely affect a community when several alternate water sources may be suitable (e.g., Wallkill River, connection to Town of Lloyd’s Highland Water District), 3) a complete cost benefit analysis has not been conducted comparing full system costs (Plains Road project costs do not include likely multi-million dollar parcel acquisition cost), proven long-term safe yields, future water demand and system expansion, and 4) all further hydrologic work should be framed within SEQRA as part of a Draft Environmental Impact Statement.

## Hydrogeologic Conclusions

- **Water production from the Plains Road production wells will dewater area homeowner wells. Temporary, ten-week, pumping of the Plains Road aquifer will dewater homeowner wells that were previously dewatered during the July 2014 aquifer test and, most likely, many others. This is because aquifer drawdown during a 10-week**

pumping period will far exceed the level previously reached during the aquifer test. During the pumping test, at least 38 homeowner well water levels were documented as being impacted. The affected area encompasses much of the community with homes along Plains Road, Woodland Drive, Shawangunk View Drive, Locust Lane, and Cedar Ridge Road. The study conducted did not identify pump levels in many homeowner wells, thus it is not known which wells will run out of water first. This adverse impact equates to a "taking" of homeowners' natural groundwater supply because it will deprive property owners of reasonable use of their homes for extended periods of time. This will reduce property value. Apparently, this taking would occur without approval, compensation, or provision of an alternate water supply at no cost to homeowners. A taking and adverse impact of this broad nature should be subject to full SEQRA review, with full homeowner involvement. The fact that there are other alternate viable water source options available should tip the scales in favor of the "hard look" required by SEQRA vs. restricting the use of private property to somehow legitimize public ends. Beyond this, the stated goal of the water study was to identify possible temporary, not long-term, water sources. Following completion of temporary maintenance work on the NYC aqueduct, New Paltz can opt to continue its current purchase of NYC waters.

- **Projections of potential water level decline in homeowner wells based on an aquifer pumping rate of 275 gpm are influenced by aquifer recovery and should not be relied upon.** Drawdown projections based on a reduction in pumping rate from 400 gpm to 275 gpm, as provided in the report for a number of homeowner wells, rely on an extremely limited data set that is mostly influenced by aquifer recovery (see HydroQuest Figure 2; pressure data used to construct HydroQuest figures was obtained via FOI, as it is not included in the Chazen report). Thus, the limited data set used to project homeowner well water decline is not of sufficient duration or quality for use. Examples include 109 and 121 Plains Road where pumping for 10 weeks shows little drawdown, indicating near equilibrium conditions will be achieved. There is no long duration data to support these projections.
- **Approval of even a 10-week Plains Road groundwater source application would violate NYS DEC permit application criteria established to protect other aquifer users from adverse impact.** For potential approval of a new groundwater source application (as per NYS DEC Appendix 10, TOGS 3.2.1 Water Withdrawal Supply Permit Program Application Processing March 2013 Pumping Test Procedures for Water Withdrawal Applications), NYS DEC "... *must determine that the proposed well or wells will adequately meet the needs of the applicant without adversely affecting others who may rely on the same aquifer.*" As has been demonstrated, it is clear that even temporary ten week exploitation of the confined Plains Road aquifer will adversely affect homeowners. Other alternate water supply sources are available, thus negating need to approve a Plains Road aquifer permit application,
- **The longitudinal extent and recharge sources of the buried sand and gravel aquifer are not well known.** The aquifer tested is comprised of a permeable, heterogeneous, sand and gravel deposit confined beneath a thick, low permeability, clay-rich glacial lake



deposit (up to 104<sup>+</sup> feet thick on Parcel 5; 153<sup>+</sup> feet on Parcel 2). The sand and gravel deposit is on the order of 26 to 34 feet thick. While the axial extent of the buried valley aquifer extends for more than a mile, its width is constrained by shale and sandstone bedrock walls of the Martinsburg Formation. The bedrock valley walls of a pre-glacial gorge extend to a maximum depth of about 200<sup>+</sup> feet where an ancestral Wallkill River once flowed to a deeply incised Hudson River before being infilled by assorted glacial sediments. Relict river valley aquifers deeply buried by sediments are elongate in nature, often with limited recharge available from surrounding and underlying low permeability bedrock formations and overlying low permeability clay-rich sediments. The term strip or channel aquifer is used when referring to aquifers within long narrow valleys or buried channels. Key issues relative to long-term, high-yield, water withdrawal from these confined aquifers are the lateral continuity of aquifer material and the quantity and rate of groundwater recharge available from adjacent low permeability and leaky geologic units. In the study area, the steeply descending slope of semi-log time-drawdown plots (HydroQuest Figures 1 and 4), coupled with slow aquifer recovery rates, indicate poor connectivity with recharge sources. Furthermore, it is likely that with increasing test duration, production wells will exhibit rapidly increasing drawdown owing to the channel boundaries.

- **Use of the Plains Road aquifer, like Wallkill River water (a potential alternate water supply source), will require treatment of a number of water quality parameters. Chazen states that the “... results indicated the River is a treatable source, but advanced treatment processes would be required.”** Review of water chemistry analyses specific to PW-1 and PW-2, when compared with NYS DOH Part 5, Subpart 5-1 Drinking Water MCLs and other guidance, indicate that iron, manganese, sodium, and total coliform are of concern. In addition, the turbidity problem associated with well PW-2 water requires resolution. Once corrected, iron may no longer be an issue. Low levels of arsenic in PW-2 (0.01 mg/L; NYSDOH Part 5 MCL: 0.01 mg/L; NYSDEC Part 703 groundwater standard: 0.025 mg/L) should also be reviewed. The Department of Health may require additional sample collection and analysis, as it is often wise to confirm the presence or absence and concentration of parameters of concern that have been found close to or at maximum contaminant levels.

Table 1 (below) identifies water quality parameter exceedances in both the Wallkill River and in the Plains Road aquifer. Clearly, both potential water supply sources will require treatment inclusive of disinfection. However, as addressed in this report, the long-term quantity of water available (i.e., safe yield) from the Plains Road aquifer has not been determined and even if several hundreds of gallons per minute were available, there would be little room for water district expansion.

Table 1: Wallkill River and Plains Road Aquifer – Identified Water Quality Parameters of Concern

Parameter	Wallkill River <sup>3</sup>							Plains Road		Standards
	1-29-14	3-10-14	3-25-14	4-22-14	5-27-14	6-23-14	7-21-14	PW-1 7-15-14	PW-2 7-16-14	
Color	20	30	35	25	30	50	40	< 1	< 1	15 <sup>#</sup>
Odor	8	8	8	20	40	8	8	< 1	< 1	3 T.O.N. <sup>#</sup>
Turbidity	2.8	3.07	11.2	3.97	2.60	3.95	3.80	< 0.20	27.6	5 NTU <sup>#</sup>
pH	7.92	8.08	7.82	8.04	8.04	8.66	8.50	8.09	8.23	6.5-8.5 <sup>#</sup>
Iron	0.271	0.278	0.824	0.620	0.631	0.237	0.221	0.031	0.84	0.3 mg/L <sup>#*</sup>
Manganese	0.036	0.056	0.057	0.055	0.064	0.067	0.088	0.092	0.076	0.05 mg/L <sup>#</sup> 0.3 <sup>*</sup>
Sodium	41.9	47.9	22.7	28.2	28.6	15.8	33.5	54.9	50.2	20 mg/L = Guidance Value <sup>4</sup>
Total Coliform <sup>1</sup>	Present	Present	Present	Present	Present	Present	Present	Present	Present	No positive sample
E. coli <sup>2</sup>	Present	Present	Present	Present	Present	Present	Present	Absent	Absent	Non positive sample

\*: NYS DOH Part 5, Subpart 5-1 Drinking Water MCLs.

<sup>#</sup>: EPA maximum contaminant level (MCL).

<sup>1</sup>: Total coliforms include bacteria that are found in the soil, in water that has been influenced by surface water, and in human or animal waste. Total coliform counts give a general indication of the sanitary condition of a water supply. They are not necessarily disease bearing. For the Wallkill River, a Class B surface water, NYSDEC Part 703: Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations states that the monthly median value and more than 20 percent of the samples, from a minimum of five examinations, shall not exceed 2,400 and 5,000 coliforms per 100 ml, respectively. For groundwater, the maximum allowable limit is 50.

<sup>2</sup>: Escherichia coli (E. coli) is the major species in the fecal coliform group. Of the five general groups of bacteria that comprise the total coliforms, only E. coli is generally not found growing and reproducing in the environment. Consequently, E. coli is considered to be the species of coliform bacteria that is the best indicator of fecal pollution and the possible presence of pathogens. Disinfection treatment is required.

<sup>3</sup>: Water quality samples collected at the Route 299 bridge over the Wallkill River.

<sup>4</sup>: People on restricted sodium diets are advised to not consume drinking water with sodium concentrations in excess of 20 mg/L.

- **Sulfurous odors in PW-1, PW-2 and interconnected homeowner well water may increase over time.** It is possible that as more and more water is removed from aquifer storage that recharge water from surrounding and underlying black shales of the Martinsburg Formation will comprise a greater percentage of Plains Road aquifer water. Chemical alteration of pyrite in the Martinsburg shale commonly results in hydrogen sulfide (i.e., sulfur water). This may increase with time as groundwater in contact with the Martinsburg replenishes the sand and gravel aquifer. This issue has been raised by Plains Road Water Watch.
- **The July 2014 pumping test determined that there is sufficient recharge available to temporarily sustain the two new wells for 10 weeks.** Assessment and analysis of hydrogeologic data associated with a pumping test of the Plains Road aquifer confirm that the buried valley sand and gravel aquifer is capable of providing up to 400 gpm on a temporary (i.e., 10-week) basis (HydroQuest Figure 1B). However, testing conducted shows that continuous, long-term (greater than 180 days), pumping of the aquifer at 400 gpm will dewater or mine it because water recharging it does so at a slower rate than that at which water would be pumped.
- **The safe yield of the Plains Road aquifer has not been proven and is not sufficient to meet a projected 10-week water supply deficit.** Additional testing is needed if a permanent, long-term, water supply is sought. While aquifer testing conducted to date does support the Plains Road aquifer's ability to serve as a 10-week back-up water supply, testing has not hydrogeologically established the aquifer's ability to sustain long-term, high-yield production. Adequate evidence has not been provided for determination of any long-term safe yield value because 1) equilibrium conditions were not achieved at 400 gpm, and 2) much of the drawdown measured after the pumping rate was decreased to 275 gpm was influenced by recovery occurring during much of the ensuing 25 hours (see HydroQuest Figure 2). Furthermore, it is important to note that Chazen Table 2.1-A (Projected Reservoir Yield and Water Supply Deficit) indicates that a 451 gallon per minute water supply deficit will exist during the first NYC aqueduct shutdown period. Thus, even if a safe yield of 400 gpm were available from the Plains Road aquifer, it would not be sufficient
- **Logically, it would be prudent to pursue a water supply that will 1) meet temporary 10-week water supply demands, 2) meet long-term water supply demands, 3) allow for population and business growth far into the future, 4) not require the expensive purchase of private property for acquisition of a water supply that does not have sufficient capacity to meet long-term Village of New Paltz water demands, 5) not incur costs associated with the creation of a new water district to meet the needs of a community whose natural water supply would remain intact if excessive exploitation of the Plains Road aquifer is not pursued, and 6) not require the community to incur hookup and use fees for a water supply they now have.** Chazen (report section 2.2) identifies the Wallkill River surface water source as one having " ... ample capacity to serve the New Paltz community as a temporary or permanent water supply source."

All potential alternate water supply sources, ~~measured or some not addressed in the Chazen report~~, should be fully assessed prior to advancing a Plains Road application for a water supply permit. This should be coordinated through the SEQRA process.

- **The ability of the aquifer to meet long-term, permanent water supply, withdrawal demands has not been demonstrated.** According to NYS DEC Appendix 10, TOGS 3.2.1 (Water Withdrawal Supply Permit Program Application Processing March 2013 Pumping Test Procedures for Water Withdrawal Applications) for new groundwater sources:

*“3b. If stabilized drawdown is not achievable 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 Section 13.b. Water level in the test well must remain above the intake plus a margin of 5% but no less than 5' of the pre-test water column, ...”*

Stabilized drawdown (i.e., equilibrium conditions), as determined and portrayed in numerous professional and industry hydrogeologic texts, versus the very limited snapshot of time referred to in NYS DEC Appendix 10, TOGS 3.2.1 (i.e., < 0.5 feet of drawdown for each 100 feet of initial water column over 6 hours; see HydroQuest Figure 6), did not occur. Plotted measurements show a trend of decreasing water level as detailed in TOGS 3(a)(ii) (HydroQuest Figures 1, 1B and 4). The value of construction of a 180-day projection of the time-drawdown curve detailed in TOGS 3(b)(ii) as an excellent tool useful in assessment of many aquifer situations stands out when assessing the Plains Road aquifer setting. Here, as seen in HydroQuest Figures 1 and 4, it is clear that continuous pumping much beyond 180 days at a combined flow rate of 400 gpm will result in lowering the potentiometric surface of the confined aquifer beneath the confining clay bed toward and perhaps to pump intakes, thus resulting in unconfined conditions and potential dewatering of the aquifer. As detailed in this review document, limited aquifer recharge is evident on semi-logarithmic drawdown plots, in Chazen observed drawdown plots 10B, 10C, and 10D, and in slow aquifer recovery rates in both production and homeowner wells. Thus, for these reasons, testing conducted to date and 180-day drawdown projection plots argue against approval of a Plains Road Water Withdrawal Application for 400 gpm or any discharge amount unsupported by rigorous hydrogeologic data not influenced by aquifer recovery following shut-off of one pump. It is likely for reasons presented in this HydroQuest report that The Chazen Companies, in the final paragraph of their Water Supply Investigation – Groundwater Options report, added the following disclaimer:

*“This report should not be construed in any way to guarantee the production of these water sources.”*

The "safe yield" of the confined aquifer targeted, when seeking a permanent, long-term, multi-year water supply permit must, in part, be based on drawdown data that demonstrates significant recharge capable of sustaining the aquifer over many years of continuous pumping.

- **The safe yield of the aquifer is less than 400 gpm and has not been established. Hydrologic testing conducted to date does not allow determination of any safe yield.** Chazen agrees that "... *additional testing would be conducted to determine the safe yield ...*" of the 101 Plains Road groundwater source to provide a permanent, supplemental source to the community's water supply system (Chazen report, page 70). Pumping-PW-1 (275 gpm) and PW-2 (125 gpm) simultaneously documented that the aquifer is not capable of sustaining a safe yield of 400 gpm (see HydroQuest Figure 1). At 400 gpm, the rate of aquifer water withdrawal exceeds the recharge rate. Drawdown projection indicates that long-term aquifer production beyond about 180 days will result in unconfined aquifer conditions and would dewater the aquifer over time if pumped at 400 gpm. After 73 hours, PW-2 was shut-off. PW-1 was pumped at 275 gpm for 25.3 hours. Aquifer recovery occurred throughout most or all of this time (HydroQuest Figure 2), possibly leveling off (stabilizing) during the last six hours of the test or, possibly, beginning a downward trend. This "*stabilization*" is of too short a duration to document a safe aquifer yield of 275 gpm, especially since significant aquifer recovery was occurring. It would not be prudent to permit a long-term water source based on testing conducted to date. Additional testing is required to project long-term drawdown and to establish safe yield. A safe yield of 275 gpm has not been proven.
- **The buried valley sand and gravel aquifer has a low transmissivity (T) and may not be capable of supplying adequate water for a municipal water supply.** Transmissivity values provide information regarding how much water will move through an aquifer. Calculated values of the coefficient of transmissivity of wells PW-1 and PW-2 indicate that the well yields may not be adequate for municipal purposes. Driscoll (Groundwater and Wells, 1986) states that transmissivity values of 10,000 gpd/ft or more can be adequate for industrial, municipal, or irrigation purposes. Transmissivity values calculated from PW-1 and PW-2 drawdown data that range between 1,400 gpd/ft and 2,800 gpd/ft provide justification for conducting new aquifer testing at a lower pumping rate, especially when considering long times required for aquifer recovery. Similarly, Chazen Figures 10B, 10C, and 10D document steep and narrow cones of depression which characterize low transmissivity aquifers. Because there is limited recharge to the aquifer, the area of drawdown of the potentiometric surface has and will expand indefinitely as the pumpage continues until a recharge boundary is encountered (e.g., end of permeable sediments, bedrock valley wall).
- **No significant sources of aquifer recharge were encountered during pumping (e.g., no direct recharge connection with the Wallkill River was encountered).** Pumping well discharges exceeded the rate of aquifer recharge. Hydrogeologic analysis of PW-1 and PW-2 drawdown data confirms that aquifer equilibrium conditions were not achieved

at the culmination of the 400 gallon per minute (gpm) pumping test (i.e., both drawdown and the radius of pumping influence of the wells were increasing; confirmed in Chazen Figures 10B and 10C where both drawdown and radius of influence/cone of depression are projected to increase substantially over time). This is demonstrated on the steep slopes depicted on semi-log HydroQuest Figures 1 and 4. The steady decline in slope of these two figures (vs. a near leveling off which did not occur) shows that no significant recharge is occurring directly from the Wallkill River, as well as no significant leakage from bedrock or sediments in direct contact with the sand and gravel aquifer material, at least as of the time of culmination of the aquifer test. Plotted measurements show a trend of decreasing water level, thereby bringing into question the ability of the aquifer to meet withdrawal demands year after year. Thus, the steady decline in pressure head over time (seen as constant drawdown projected as a straight line over multiple log cycles of time) raises questions regarding the deep, confined, aquifer's ability to rapidly recover following large-scale water withdrawal. It is possible that age dating the water may provide valuable information regarding storage time and aquifer recharge.

- **With time, continuous pumping of the Plains Road aquifer will increasingly lower well water levels outward from production wells.** As drawdown continues over time, the area of impacted aquifer will expand in an elliptical shape outward from production wells as water is removed from storage. A Chazen plot of water level drawdown observed during the pumping test shows drawdown impact in excess of one mile from the proposed production wells (see Chazen Figure 10B). A second Chazen plot (Chazen Figure 10C) predicts drawdown after ten weeks of pumping at 400 gpm will extend some 1.8 miles to the NNE and 1.1 mile to the SSW. The north-northeast to south-southwest oriented shape of the impacted area is that of an elongate oval. This shape is in keeping with the east and west bounding shale bedrock walls of the buried valley.
- **Failure of the aquifer to recover to pre-pumping conditions within a month raises serious concern regarding the ability of the aquifer to sustain long-term, high-yield, production over time (HydroQuest Figures 3 and 5).** Should the aquifer become sufficiently dewatered to lower its confined pressure below the base of the thick clay (see HydroQuest Figures 1 and 4), the aquifer will immediately convert to an unconfined aquifer. In this event, excessive pumping may dewater the thin aquifer. The March 2010 *New York State Department of Health Part 5, Subpart 5-1 Standards for Water Wells – Appendix 5B; Section 5-B.4 Well Yield and Water Flow; subsection (b)(3) The standard well yield test should include states:*

*“(3) The recovery period shall include observation of the water level in the well after cessation of pumping from the drawdown level back to at least 90 percent of the initial water level or for a period of 24 hours, whichever occurs first. If the water level does not recover to 90 percent after 24 hours, the tested flow rate may not be sustainable for an extended period of time (emphasis added).”*

HydroQuest Figure 3 shows that the aquifer failed to recover within one month of cessation of pumping. The line of best fit portrayed on HydroQuest Figure 6 shows that the maximum drawdown that occurred in PW-1 was about 91.9 feet, some 67.5 feet lower than the static pre-pumping water level of 24.4 feet. Reference to HydroQuest Figure 3 shows that 90 percent aquifer recovery (approximately 31 feet below top of casing) took two weeks recovery time. While aquifer testing conducted to date does support its ability to serve as a temporary 10-week back-up water supply, testing has not hydrogeologically established the aquifer's ability to sustain long-term, high-yield, production.

- **Groundwater resources extracted from the Plains Road aquifer underlying homeowner wells would likely be sold to users without compensation to adversely impacted residents.** In the event that short-term (10-week) and/or long-term Plains Road water extraction is permitted for use as a permanent public water supply, hydrologically-connected homeowner groundwater supplies would be compromised and then sold without a use-based percentage compensation to homeowners being adversely impacted. Exploitation of groundwater resources tapped by Parcel 5 wells PW-1 and PW-2 that are hydrologically interconnected with homeowner wells constructed within the same aquifer, if this occurs, should be contingent upon an equal profit sharing framework (i.e., same water source, equal profit sharing). However, the Plains Road Water Watch wants their water source to remain intact in its current state.
- **Groundwater contour maps of flow in the buried sand and gravel aquifer, or lack thereof, are not presented in the Chazen report.** Groundwater contour maps of the slope of the potentiometric surface of the confined aquifer are not present in the Chazen report. These maps are important because there will be a gradient or slope to the potentiometric surface if there is steady movement of groundwater between areas of recharge and discharge. A lack of steady movement would indicate that the aquifer's ability to recharge after extended pumping may be questionable. Groundwater contour maps of static, non-pumping, conditions should be provided for hydrologic review. All available production and monitoring wells within the physical boundary of Chazen's 10-week, 400 gpm, projected drawdown Figure 10C should be used to construct these groundwater contour maps. Raw drawdown and recovery spreadsheet data specific to well PW-1, well PW-2, project-related monitoring wells, and private wells was not appended to the Chazen report. Chazen plots of much of this data were presented in the report and were reviewed.
- **If the Plains Road aquifer is targeted for a permanent water supply, it is likely that requirements of the 10 States Standards will need to be met.** The Recommended Standards for Water Works (2012; 10 States Standards) state that the total developed groundwater source capacity shall equal or exceed the design maximum day demand with the largest producing well out of service. If PW-1 is out of commission, then the tested PW-2 well yield of 125 gpm may not be sufficient to equal or exceed the design maximum day demand of 400 gpm desired for a permanent groundwater supply (vs. that required for a temporary 10 week supply). Chazen reports that fine-grained sediments

found when drilling PW-2 resulted in lower yield capacity than PW-1 where coarser-grained sediments are present. Pumping PW-2 at 125 gpm concurrently with PW-1 at 275 gpm may result in unconfined aquifer conditions at around 180 days. The impact of overlapping cones of depression between PW-1 and PW-2 must be factored into the determination of safe yield. Depending on the elevation (msl) of PW-2 compared to PW-1, pumping below the thinner clay bed in PW-2 may lead to loss of confined aquifer conditions sooner than at PW-1.

- **Some project costs have not been fully considered when comparing system expansion options.** A complete cost benefit analysis has not been conducted comparing full system costs (e.g., Plains Road project costs do not include likely multi-million dollar parcel acquisition cost), proven long-term safe yields, future water demand and system expansion. Importantly, the cost of acquiring the full 58-acre 101 Plains Road parcel with wells PW-1 and PW-2 will likely add millions of dollars to project costs for a water source that has, as yet, not had its safe yield determined and will allow little or no future system expansion. Inclusion of parcel purchase price, at fair market value, may make other water source options more attractive.
- **Based on aquifer testing information contained in the Chazen-Clouser report, conditions for permit approval for a permanent water supply have not been met.** A secondary goal of the aquifer characterization work appears to be designed to establish a high-yield and long-term permanent water supply for New Paltz. If a key goal of the aquifer and water quality testing is to obtain approval and a permit for a public water supply, then alternate long-term water supply sources should be completely assessed first. Assessment of this nature should be subject to a complete Draft Environmental Impact Statement as part of the SEQRA review process.

### **Recommendations - Temporary Ten Week Water Supply**

**Approval of a Plains Road groundwater source application would violate NYS DEC permit application criteria established to protect other aquifer users from adverse impact.** Specifically, NYS DEC "... *must determine that the proposed well or wells will adequately meet the needs of the applicant without adversely affecting others who may rely on the same aquifer.*" As has been demonstrated, it is clear that even temporary ten week exploitation of the confined Plains Road aquifer will adversely affect homeowners. Because other alternate water supply sources are available, thus negating need to approve a Plains Road Water Withdrawal Supply Permit, it seems unlikely that NYS DEC would provide a withdrawal permit without first requiring completion of a full SEQRA review. Should the Village of New Paltz elect to pursue use of the Plains Road aquifer on a temporary 10-week basis, with full knowledge that doing so will adversely impact the Plains Road Water Watch community, recommendations are provided below.



- Conduct no additional hydrogeologic testing of the Plains Road aquifer because the goal of ascertaining whether it can sustain a yield of 400 gpm for ten weeks has been documented.
- Focus evaluation efforts on alternate temporary water supply sources, inclusive of extraction from the Wallkill River, which will not adversely affect the large Plains Road Water Watch community.
- If the Plains Road aquifer is used as a temporary backup water source, the owners of existing wells should not be made to suffer any economic harm or inconvenience from operation of production wells. In the event that homeowner wells are dewatered due to well interference, homeowners should be provided with replacement water and needed plumbing hookups at no cost to them.

#### **Recommendations - Permanent New Paltz Water Supply Source**

If the Village of New Paltz seeks to obtain a permit for a permanent water supply, significant additional information is needed to assure that a sustainable safe yield is documented. Key recommendations that directly relate to this follow:

- Complete a full DEIS inclusive of assessment of alternate water supply sources in keeping with the SEQRA process. This should be subject to full public review and comment, inclusive of scoping. Other viable water supply options are available that would not adversely affect homeowners. These options include extraction and treatment of Wallkill River water and connection to the existing Town of Lloyd water supply. These, and other alternate options not explored here, would allow for future water demand in the Village of New Paltz and beyond.
- If further consideration is given to advancing the Plains Road aquifer as a potential permanent supplemental water supply source, with full knowledge that its development will adversely impact the large Plains Road Water Watch community, legal counsel should be sought.
- If further consideration is given to advancing the Plains Road aquifer as a potential permanent water source, construct groundwater contour maps of the buried valley aquifer for a number of dates. This should have been done and included in the Village of New Paltz Phase II Backup Water Supply Investigation - Final Project Report. Better definition of groundwater flow in the buried valley sand and gravel aquifer is needed. All wells constructed in the sand and gravel aquifer should be surveyed relative to mean sea level. Once the survey is completed (if it has not already been done), static water levels

should be plotted and groundwater contour maps should be constructed. These maps will provide insight into important aquifer characteristics, including information regarding connectivity, or lack thereof, between recharge sources and the aquifer.

- If further consideration is given to advancing development of the Plains Road aquifer, conduct a new constant rate aquifer test for at least 72 hours at a sufficiently lower discharge rate that is likely to achieve equilibrium conditions (i.e., aquifer discharge nearly equals aquifer recharge). No part of this test should be conducted while the aquifer is recovering from a former, higher, pumping rate. A safe yield value should reflect continuous, non-stop, pumping conditions where the aquifer discharge rate can be maintained for in excess of 180 days after near equilibrium conditions have been achieved (i.e., aquifer recharge equals or exceeds aquifer discharge as reflected in a nearly planar slope of a time-drawdown semi-log plot). Reference to NYS DEC Appendix 10, TOGS 3.2.1 (Water Withdrawal Supply Permit Program Application Processing March 2013 Pumping Test Procedures for Water Withdrawal Applications) for new groundwater sources details test procedures. As before, use PW-1 and PW-2 as production wells and monitor numerous wells to assess the cone of depression.
- If the Plains Road aquifer is ultimately selected as a permanent water source, owners of existing wells should not be made to suffer any economic harm or inconvenience from operation of production wells. In the event that homeowner wells are dewatered due to well interference, homeowners should be provided with permanent replacement water at no cost to them, inclusive of full hook-ups with their existing plumbing systems.