Vanasse Hangen Brustlin, Inc.
Transportation | Land Development | Environmental Services

October 25, 2010

Ref: 57407.03

Mr. Dennis Nealon
Hydrogeologist – Water Resources Section
Water Supply Division
Vermont Department of Environmental Conservation
103 South Main Street, The Old Pantry Building
Waterbury, Vermont 05671-0403

Re: Beaver Wood Energy Pownal, LLC
Groundwater Withdrawal Permit Application

Dear Dennis:

Enclosed please find a Groundwater Withdrawal Permit Application for the proposed use of the existing gravel-packed well as a source of process water for the planned Beaver Wood biomass energy facility in Pownal. A narrative report is enclosed presenting all the information specified on the application form. A check for the $1,500 application fee also is enclosed.

This submittal has been prepared in accordance with 10 VSA, ch. 48, subchapter 6 as amended by Act 199. Because the administrative rules for groundwater withdrawal permitting are currently in draft form, this permit application has been developed in accordance with the statute, and the draft administrative rules have been followed as a guidance in instances where the statutory language is not specific.

Please do not hesitate to contact me with any questions or comments you may have.

Sincerely,

VANASSE HANGEN BRUSTLIN, INC.

Meddie Perry
Senior Hydrogeologist

MJP/cpc
Enclosures

cc: Karen Burrington, Pownal Town Clerk
Pownal Selectboard
Pownal Conservation Commission
Bennington County Regional Commission
Tom Emero, Beaver Wood Energy Pownal, LLC
Bill Bousquet, Beaver Wood Energy Pownal, LLC
Hans Huessy, Kenlan, Schwiebert & Facey P.C.

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Beaver Wood Energy Pownal LLC
82 Village Street
Medway, MA 02053
(508) 321-1181

CHITTENDEN TRUST COMPANY
Chittenden Bank, a Division of People's United Bank
Montpelier, VT 05602
58-6/116

221

10/21/2010

PAY TO THE ORDER OF State of Vermont $ **1,500.00

One Thousand Five Hundred and 00/100** DOLLARS

State of Vermont

MEMO
Groundwater Withdrawal, Process Water Supply

MP

⑈000221⑈ ⑆011600062⑆⑈67⑉03⑉1476⑉6⑈

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State of Vermont 10/21/2010

Groundwater withdrawal, Process water supply 1,500.00

Received

OCT 25 2010

Groundwater Withdrawal Permit
Application Narrative

BEAVER WOOD ENERGY BIOMASS: PROCESS WATER SUPPLY

Pownal, Vermont

Prepared for **Beaver Wood Energy Pownal, LLC**
230 West Street
Rutland, Vermont 05701

Prepared by **VHB**
7056 US Route 7
Post Office Box 120
North Ferrisburgh, VT 05473

October 25, 2010

Vanasse Hangen Brustlin, Inc.

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1.0 Introduction

On behalf of Beaver Wood Energy Pownal LLC (Beaver Wood), Vanasse Hangen Brustlin, Inc. (VHB) presents this application for a Groundwater Withdrawal Permit persuant to 10 VSA, Chapter 48, Subchapter 6 as amended by Act 199 of 2008. The signed permit application form is on pages 1 and 2 of Appendix 1. Because the administrative rules for groundwater withdrawal permitting are currently in draft form, this permit application has been developed in accordance with the statute. The current version of the draft administrative rules (September 20, 2010), have been followed as a guidance in instances where the statutory language is not specific.

The project consists of a proposed biomass electric generation plant with a wood pellet production facility. The project would obtain potable water from an existing gravel packed water supply well that was previously permitted as a Transient Non-Community (TNC) source for the former Green Mountain Race Track (WSID #2585). The former Green Mountain Race Track is no longer in operation and the facility does not currently serve 25 or more people for 60 or more days a year. Therefore the current facility is not classified as a public water system, and the TNC water system was deemed inactive by the Vermont Department of Environmental Conservation (DEC), Water Supply Division following a sanitary survey in 2007.

The potable water system for the proposed Beaver Wood biomass project would be classified as a public Non-Transient Non-Community (NTNC) water system because it would employ more than 25 of the same people year round. Typically 41 people would be employed at the plant. Potable water demands for the plant are equal to 1.1 gallon per minute (gpm), or 780 gallons per day (gpd).

Separate from the public NTNC water system, the biomass plant also would require a source of process water to create steam for generating electricity and for cooling. Normally the Hoosic River would be utilized to provide process water. The River is the preferred source of water because the quality of the river water is more suitable as a process water source, and because of local concern about the use of groundwater in an area where many wells have marginal yields. The lower mineral concentrations in the River are more compatible with the plant equipment than the well water. On occasion, it may be necessary to use the existing well to supply process water. This groundwater withdrawal permit application is for the proposed use of the existing gravel packed well as a process water source. See page 3 of Appendix 1 for a Project Location Map.

The proposed use of the existing gravel packed well as potable water source is being permitted separately from this Groundwater Withdrawal permit application, via a public NTNC Source and Construction Permit Application, in accordance with the Vermont Water Supply Rule (2005).

This permit application, and the hydrologic testing that is proposed herein, will address the statutory requirements that:

1. the proposed withdrawal must be planned in a fashion that provides for efficient use of the water;
2. the proposed withdrawal must meet Vermont standards for establishing a safe yield;
3. the proposed withdrawal must be consistent with the town and regional plan;
4. the proposed withdrawal must not have an undue adverse effect on existing uses of water dependent on the same water source;
5. the proposed withdrawal must not have an undue adverse effect on a public water system permitted by the VT DEC;
6. the proposed withdrawal must not have an undue adverse effect on significant wetlands under the Vermont Wetland Rules, or on other water resources hydrologically interconnected with the well; and
7. the proposed withdrawal must not violate the Vermont Water Quality Standards.

As discussed in detail below, an initial conceptual model of the site indicates that the proposed withdrawal is not likely to cause adverse affects to any existing wells, water sources, wetlands, or surface waters; the withdrawal will be planned for efficient water use and will meet Vermont standards for safe groundwater yield, and will conform to the Pownal Town Plan and the Bennington County Regional Plan.

1.1 Applicant Information

The applicant is Beaver Wood Energy Pownal, LLC, 230 West Street, Rutland VT 05701. The primary contact person is Mr. Thomas Emero, Managing Director: (508) 321-1181.

The applicant has signed a long-term lease with Progress Partners, LLC for the use of the property and well that is the proposed source for this proposed withdrawal. A copy of the Memorandum of Lease is on pages 4 and 5 of Appendix 1.

1.2 Purpose of the Proposed Withdrawal

The purpose of the proposed withdrawal is to enable Beaver Wood to obtain adequate quantities of water for generating steam to turn the electric generating turbines, and for cooling. A groundwater source of water is being proposed as a backup to the primary water source, the Hoosic River, that flows adjacent to the site.

Withdrawal from the Hoosic may be restricted during times of low streamflow, which would require use of the well. Because the rate of water usage is very small relative to the flow of the Hoosic River, the river withdrawal is being designed as a *de minimis* withdrawal under the jurisdiction of the Vermont DEC, which would allow withdrawal to occur regardless of streamflow so long as the withdrawal rate is sufficiently small. However, U.S. Army Corps of Engineers and Fish & Wildlife Service requirements may restrict withdrawal during periods of low streamflow, regardless of the Vermont DEC *de minimis* policy. As a result, it may be necessary to obtain process water from the well for periods of time.

The well would also serve as a backup source of water in case of equipment problems, excessive sediment or turbidity levels in the river, or physical damage to the intake structure by ice, debris, or flooding.

1.3 Source Location

The GPS coordinates of the existing gravel well are 42.75434° north latitude and -73.23332° west longitude. This site is located along Lovett Cemetery Road in Pownal.

See page 3 of Appendix 1 for a Project Location Map depicting the well site.

1.4 Proposed Withdrawal Rate

Water needs will vary based on the ambient temperature, humidity, and other factors. The proposed biomass plant's normal process water consumption rate is 321.6 gpm, and the peak consumption rate is 465.2 gpm (based on a revised water balance analysis, September 29, 2010). Note that these rates are for the overall plant, and that actual usage from the well would be much lower on an annual average basis because the well is intended to be used infrequently, only on such occasions when the primary Hoosic River intake is not being used.

As a long-term average, the well is expected to be used for about 20 percent of the plant's water needs, or 72 gpm (103,080 gpd). On individual days when the well is used to provide process water, the withdrawal would vary from 129 gpm (185,800 gpd) to 465.2 gpm (669,900 gpd). Proposed withdrawal rates are summarized in Table 1.

Table 1: Proposed Groundwater Withdrawal Rates

	Mean (gpm)	Mean (gpd)	Peak (gpm)	Peak (gpd)
Daily	72	103,080	465	669,900
Monthly	72	103,080	438	630,000
Annual	72	103,080	194	279,500

An additional withdrawal from the well of 1.1 gpm would occur to meet potable needs at the facility, as addressed in the public NTNC Source and Construction Permit Application (Bruno Associates, 2010).

1.5 Applicant's Other Sources, Approvals, and Withdrawals

The Applicant does not own, use, or plan to use any water sources at the site other than the proposed river intake for process water, and the existing gravel-packed well. When the well was previously permitted as a TNC source for the Green Mountain Race Track, the water system's design demand was 30,000 gallons per day (20.8 gpm) as maximum day demand, according to the water system file WSID#2585 on record with the DEC, Water Supply Division. Prior hydrogeologic testing of the well included a 7-day pumping test conducted at a rate of 514 gpm, by Lincoln Applied Geology in 1994 (LAG, 1995). The testing indicated a yield of 626 gpm according to the safe yield standards in the Vermont Water Supply Rule, A-11.6.2.1 for public non-community sources.

1.6 Estimated Amount of Water That Will Not Be Returned to the Watershed

The nature of the use of water for electricity generation and cooling will result in evaporation of approximately 85 percent of the total process water that is used in the plant, including River water. Thus, 15 percent of the total process water used in the plant, including River water, would be returned to the groundwater on-site.

Annual average return flow rates are expected to be 48.5 gpm, equal to 69,840 gpd. Therefore, compared to the 103,080 gpd average annual groundwater withdrawal rate, a net annual average of 33,240 gpd of pumped groundwater would be evaporated rather than directly returned to the watershed. As an annual average, the net amount of flow that will not be returned to the watershed would be 32 percent of the groundwater withdrawal rate.

1.7 Location of Proposed Return Flow

The remaining 15 percent of the total water used in the plant process would be returned to the groundwater on-site via a subsurface leachfield that is being permitted under the Vermont Underground Injection Control Rule (1982). The Project Location Map on Page 3 of Appendix 1 shows the return water location.

1.8 Pre-Application Public Informational Meeting Certification

VHB certifies that the applicant has met the requirements of 10 VSA Ch 48.6 §1418(c)(1), as amended by Act 199, requiring an informational meeting to be warned and held at least 30 days prior to the submittal of this application. The hearing was warned as required by the statute, took place at the site on September 23, 2010, and was attended by approximately 50 members of the public as well a the Vermont DEC, Water SupplyDivision.

1.9 Notification of Application

In accordance with §1418(c)(2) of the statute, VHB will notify the required statutory parties of the application by mail. A copy of the notification and map to be used is provided in Appendix 1, pages 6 and 7, and an address list follows. The following parties will receive the notification, as required by the statute.

- Pownal Town Clerk
- Pownal Selectboard
- Pownal Conservation Commission
- Clerks of adjoining Vermont municipalities (see address list and map, pages 8 through 10 of Appendix 1)
- Bennington Regional Planning Commission

- Landowners and Mobile Home Park residents within the project well's Estimated Area of Influence (see list on page 9, and map on page 12 of Appendix 1.)
- All other active Public Water Systems in Pownal (see map, page 10 and list on page 11 of Appendix 1.)
- Voluntarily, to all landowners within 3,000 feet of the well even if beyond the estimated Area of Influence (see Well Testing and Parcel Map on page 13, and address list on page 14 of Appendix 1.)
- Voluntarily, to interested parties who have requested notification (see interested party list, page 15 of Appendix 1).

In accordance with §1418(c)(3) of the statute, VHB also will place a notice of the application in the Bennington Banner newspaper and in the Pownal Town Clerk's office. See page 16 of Appendix 1 for a sample of this notification.

Complete copies of this application are being mailed to the following:

- Pownal Town Clerk
- Pownal Selectboard
- Pownal Conservation Commission
- Bennington Regional Planning Commission

1.10 Proposed Permitting Approach and Timeline

1. The Vermont DEC will accept comments from the public regarding the Permit Application for 30 days (until November 24). During this time, the Vermont DEC will review the application and conduct a site visit.

2. A public meeting regarding the application may be held, if requested in writing or at the decision of the Vermont DEC. The meeting would be warned 10 days in advance by a posting in the Bennington Banner newspaper legal notices section, and in the Pownal Town clerk's office. The meeting will provide an opportunity to comment on

the application in general, and on the proposed well testing plan in particular. (Anticipated date is December 6, or later depending on time for the VT DEC to review the application.)

3. The DEC may determine that Source Testing may commence. The Source Testing Plan may be revised in response to comments before approval to conduct the testing is issued.

4. Once the DEC has issued approval to conduct the testing, permission forms requesting permission to monitor private wells will be mailed to property owners and public water systems within the approved testing area. 30 days will be provided for well owners to respond to the permission request before the test will begin (testing could start on or after January 6, 2011).

5. The existing well at the Green Mountain Race Track will be tested to measure its yield and to determine what effect, if any, it causes to other wells and water resources in the area.

6. A report of the testing and hydrogeologic study shall be submitted to the VT DEC within 90 days of the completion of the test.

7. A groundwater withdrawal permit may be issued after the VT DEC has completed its review of the report.

2.0 Hydrogeologic Setting

The site is located in the Taconic range in far southwestern Vermont. The well is situated along the bottom of the Hoosic River Valley, near the floodplain. Flowing northward towards its confluence with the Hudson River, the Hoosic River has a watershed of 211 square miles at the project site.

The valley bottom contains sands and gravels, as well as layers of alluvial sediments including silt and clay. Layers of silt and clay above and below the gravel provide partially confining conditions in the gravel aquifer, and protect the underlying bedrock aquifer from potential surface sources of contamination. Significant quantities of water recharge the productive gravel aquifer in the valley bottom, originating on the higher terrain along the hills flanking the valley. In the higher terrain above the valley floor, soils are thin sands and glacial tills, enabling recharge to the underlying bedrock. The bedrock in the area, identified as chiefly the Bascom and Hortonville formations, generally support low-yielding wells.

2.1 Well Details

The driller's log for the existing gravel well is provided on page 6 of Appendix 2. This well was drilled in 1962 as part of the original construction of the Green Mountain Race Track (GMRT). The well is 18 inches in diameter with a 24-inch diameter gravel pack surrounding the screen. Well construction is appropriate for a gravel packed water well, and includes 52 feet of 18-inch diameter steel casing below grade, 15 feet of 18-inch diameter screen with 0.120-inch slotting. The well is protected within a concrete wellhouse that houses the pump, backup generator, piping and valving, and storage tank. The well casing extends approximately 2 feet above the cement floor inside the wellhouse, and the well is sealed with a tightly fitting cap that allows the vertical turbine pump motor shaft to operate. Well construction and yield characteristics of the well are presented in Table 2.

Table 2: Summary of Well Characteristics

Source ID	Total Depth (ft)	Static Water Level (ft)*	Diameter (in)	Pump Intake Setting (ft)	Well Screen Setting (ft)	Well Screen Slot Size (in)	Estimated Safe Yield (gpm)
Beaver Wood Gravel Well	67	13.8	18	57	52-67	0.120	626

* elevation benchmark is top of well casing, 543.04 feet above mean sea level

The well location is adequately protected from potential contaminant sources. Testing has confirmed that the water quality meets all Maximum Contaminant Levels from the 2005 Vermont Water Supply Rule, and that the well is not impacted by natural or manmade contaminants. The well is located on land owned by Progress Partners, Ltd. and is leased to Beaver Wood, who also leases the property near the well where the biomass facility has been proposed (refer to the Memorandum of Lease, pages 4 and 5 of Appendix 1). Agricultural lands are not present within the well's estimated area of influence or recharge area. Section 3.3 below provides a detailed assessment of the potential sources of contamination in the estimated area of influence and recharge area.

2.2 Other Water Uses

In addition to the proposed use of the gravel well for process water, the proposed Beaver Wood Energy Pownal, LLC biomass project would be classified as a public Non-Transient Non-Community (NTNC) water system because it would employ more than 25 of the same people year round. Typically 41 people would be employed at the plant. Potable water demands for the plant are equal to 1.1 gallon per minute (gpm), or 780 gallons per day (gpd). A Public NTNC Source and Construction Permit Application is pending (Bruno Associates, 2010).

When the well was previously permitted as a TNC source for the Green Mountain Race Track, the water system's design demand was 30,000 gallons per day (20.8 gpm) as maximum day demand, according to the water system file WSID#2585 on record with the DEC, Water Supply Division. The race track is not active currently.

2.3 Surficial Geology

In the valley floor where the well is located, surface soils consist of sand and gravels to depths of approximately ten to twenty feet below grade. Beneath the sands and gravels, the soils grade finer to silts and clays. The Surficial Geologic Map of Vermont (2008) indicates that surficial materials at the project site consist of alluvium (silt), and clay (see the Surficial Geology Map on page 1 of Appendix 2). Well drilling records generally confirm the Surficial Geologic map, and indicate the presence of silt and clay beneath the surficial materials. At least 60 feet of overburden is present above the bedrock.

Soil logs from six monitoring wells that VHB installed in the unconfined water table in the vicinity of the proposed return water leachfield, and from 6 monitoring wells installed by LAG in 1994, indicate that the water table is present in sand and gravel materials that extend to depths of approximately 10 to 20 feet below grade. Silt and clay were identified beneath the sand and gravel. The Cross-Section Reference Map on Page 2 of Appendix 2 shows the well locations on a map. Cross sections generated from the soil logs from the monitoring wells, the project supply well, and the Alta Gardens Mobile Home Park (MHP) well are shown on pages 3 and 4 of Appendix 2. Soil logs from the monitoring wells at the site are shown on pages 7 through 22 of Appendix 2.

At the project well, the lithology consists of 30 feet of topsoil, gravel, "hardpan" and stone, then an 11 foot thick layer of clay and silt, and then gravel to the bottom of the well 67 feet below ground surface. About 3,000 feet north of the project well, the Alta Gardens Mobile Home Park (MHP) well is a drilled bedrock well. The well completion report indicates 10 feet of gravel at the surface, which is underlain by 40 feet of clay, then another 10 feet of gravel above the bedrock which was encountered 60 feet below ground surface. Another 3,000 feet north of the Alta Gardens MHP site, the Pownal Fire District #2 gravel well is screened from a depth of 62.5 feet to 68.8 feet, in a gravel deposit that is buried below a deep layer of clay. See pages 29 to 70 of Appendix 2 for all available well drilling records for the area.

In the higher terrain outside the valley bottom, more permeable materials such as sand, glacial till, and kame deposits (sand and gravel) are mapped, enabling groundwater recharge. See the Surficial Geology Map on page 1 of Appendix 2.

2.4 Bedrock Geology

Bedrock at the site is buried approximately 60 feet below the clay, silt, sand, and gravel surficial materials. According to the Centennial Geologic Map of Vermont (1961), bedrock at the site is comprised of the Ordovician-age Bascom formation, and undifferentiated Luke Hill, Naylor Ledge, and Hastings Creek Limestones, which consist of interbedded dolomite, limestone, and marble; calcareous sandstone, quartzite, and limestone breccia. To the west of the leachfield site, bedrock is identified as the Ordovician-age Hortonville formation, which consists of black, carbonaceous and pyritic slate and phyllite, which is locally sandy, and commonly contains brown weathered limy beds near the base. Refer to the Bedrock Geologic Map on page 5 of Appendix 2.

2.5 Groundwater Hydrogeology

Two distinct groundwater aquifers are present in the vicinity of the site. A productive gravel aquifer exists in the valley bottom. Groundwater also is present in the water table in the upper ten to twenty feet of the soils in the valley bottom. Outside of the valley bottom, as well as beneath the gravel aquifer, a bedrock aquifer exists. The reported yields of wells drilled into the bedrock are significantly lower than those of the gravel wells, indicating a low-permeability and low-transmissivity aquifer that does not permit high rates of water flow.

Water Table

Hydrogeologic studies and monitoring of the 12 monitoring wells at the Beaver Wood site indicate a westward groundwater flow direction towards the Hoosic River in the unconfined water table. Groundwater elevation measurements indicated that the unconfined water table is found between 7 and 12 feet below grade in the vicinity of the proposed leachfield (see page 23 of Appendix 2 for data). The water table flows westward at a gradient of 2.5 percent between this location and the Hoosic River. Refer to the groundwater contour map shown on page 2 of Appendix 2. Prior groundwater contour maps developed by LAG (1995) are also provided, see pages 24 and 25 of Appendix 2. A flow velocity of 1.2 ft/day was determined for groundwater in the water table (see calculations, pages 26 to 28 of Appendix 2).

Project Water Supply Well

As indicated by the documented high yield of the existing gravel packed well that is the subject of this permit application, the gravel aquifer in the valley bottom has a very high yield. Initial testing of the project well in 1962 indicated that it could sustain pumping at rates of at least 520 gallons per minute. More detailed hydrogeologic testing was conducted in 1994, including a 7-day pumping test at an average rate of 514 gpm. The report of the 1994 test noted that the well's yield had increased compared to the initial testing in 1962. Based on the data collected from the 1994 test, a safe yield of approximately 630 gpm was calculated.

Appendix 3 presents the report of the 1994 pump test on pages 1 to 87 (Lincoln Applied Geology, 1995). Pages 84 to 87 show the original 1962 yield test data. Pages 88 through 91 of Appendix 3 present calculations performed by VHB analyzing the yield of the well by applying the safe yield standards from the Vermont Water Supply Rule, part A-11.6.2.1 to the 1994 test data. The yield of 630 gpm is based on a scenario of 180 days of continuous pumping.

As explained in detail in the LAG report in Appendix 3, the 7-day pumping test conducted in November 1994 took place following a period of very little rainfall, providing ideal conditions for testing the well's yield. Measurement of water levels in the monitoring wells surrounding the project well was conducted before, during, and after the 7 days of continuous pumping at 514 gpm. The measurements of drawdown in these wells were used to develop a computer model that determined the extent of the project well's groundwater capture zone, or area of influence, which is discussed further in the next section below.

Interestingly, the LAG report compared the drawdown in the project well from the 1994 test to the drawdown measured in the initial 1962 testing, and found that the well's capacity has increased despite over 30 years of use. Less drawdown was caused by a much longer pumping test at a similar rate in 1994 than in 1962, as summarized in table 3 below.

Table 3: Comparison of 1962 Test to 1994 Test: Beaver Wood Energy Project Gravel-Packed Well		
	1962 Test	**1994 Test**
Days of Pumping	3	7
Pump Rate, gpm	520	514
Maximum Drawdown, Feet	46	29
Specific Yield, gpm/foot of drawdown	11.3	17.7

In a letter dated June 11, 2004, the Vermont Water Supply Division determined that the project gravel well was not groundwater under the direct influence of surface water.

<u>Estimated Area of Influence</u>

The project well's groundwater capture zone, or area of influence, was determined by a computer model based on the measurements of water level drawdown in the monitoring wells and the project well from the 7 days of continuous pumping at 514 gpm conducted in 1994. The model was used to predict the capture zone for steady-state conditions pumping at 500 gpm, representing long term pumping conditions (i.e. constantly pumping at 500 gpm until the cone of depression has reached equilibrium and has stopped expanding). This zone indicates the well's maximum area of influence where groundwater levels would be affected by the well. In contrast to the actual capture zone that had been measured at the end of the 7-day test, the steady-state area of influence is much larger.

Groundwater recharge is limited within the area of influence because of the layers of silt and clay that cover the gravel aquifer in this area. More recharge originates in the higher terrain east of the area of influence, and flows as groundwater passively under the influence of gravity until it encounters the well's area of influence. VHB delineated the area of additional recharge based on the surface topography to represent the area upgradient from the estimated area of influence. The well's estimated area of influence and additional recharge area are shown on the Surficial Geologic Map on page 1 of Appendix 2.

Other Area Water Supply Wells

A public gravel well supplying the Pownal Fire District #2 is located approximately 6,500 feet north of the project well (see the Regional Hydrogeology map, page 1 of Appendix 4). The well completion report is on pages 29 to 30 of Appendix 2, and shows that the well is screened from a depth of 62.5 feet to 68.8 feet, in a gravel deposit that is buried below a deep layer of clay. It has a static level of ten feet and an estimated 75 gpm yield according to the driller. Sanitary Surveys on file with the Vermont Water Supply Division (1999, 2004, 2007, 2009) indicate that the well is 8 inches in diameter with a 12-inch diameter gravel pack. The well has an approved safe yield, in accordance with Vermont standards for public community sources, of 97 gpm, demonstrating the high yield of the gravel aquifer in contrast to the bedrock aquifer. Metered usage of water for the Fire District has been reported to the Water Supply Division, and the sanitary survey (2004) noted an average daily usage of 30,000 gpd, equal to 42 gpm. Compared to the safe yield of 97 gpm, the metered usage suggests that the well has a reserve capacity on the order of 55 gpm.

Like the project well, this gravel well also is located in a valley bottom gravel aquifer, and while it is not hydrogeologically connected to the project well, it provides information about the large physical extent and abundant yield of the gravel formation that is in the valley.

Because of the significant distance to the Pownal Fire District well, the project well is highly unlikely to affect its water supply. The project well is not within the hydrogeologically delineated wellhead protection area for the Pownal Fire District #2 well. Likewise, the Beaver Wood well's estimated area of influence and recharge area do not overlap the wellhead protection area for the Pownal Fire District #2, and therefore Beaver Wood's proposed withdrawal of water cannot affect its yield.

The well supplying the Alta Gardens Estates MHP PCWS is located about 3,000 feet north of the project well. The well is a drilled bedrock well with a yield of 15 gpm reported by the driller, and a total depth of 170 feet. Bedrock was encountered 60 feet deep beneath layers of gravel and clay. The static level was reported as 30 feet below grade. See the well completion report on pages 31 and 32 of Appendix 2. According to the Permit to Operate the Alta Gardens Estates water system (October 20, 2004), the well is not under the direct influence of surface water. A formal pumping test does not appear to have been conducted on this well, but an Engineering Evaluation of the Alta Garden Estates Water System (Wright Engineering, 2001) notes has been able to meet the water needs of the MHP, which are identified as 3,596 gpd on average, and 10,800 gpd maximum, based on meter readings.

The Alta Gardens Estates Delineated Source Protection Area report (ANR, 2002), provided on pages 92 to 101 of Appendix 3, summarizes the known information about the well's hydrogeology. Recharge to the bedrock aquifer originates in the hills east of the well. Because of the significant distance to the Alta Gardens well, the project well does not affect its water supply. The project well is not within the hydrogeologically delineated wellhead protection area for the Alta Gardens well, and is in a gravel aquifer that is separate from the bedrock aquifer at the Alta Gardens well. Likewise, the Beaver Wood well's estimated area of influence and recharge area do not overlap the wellhead protection area for the Alta Gardens well, and therefore, Beaver Wood's proposed withdrawal of water is highly unlikely to affect its yield.

Yields of drilled bedrock wells in the area are fairly low. As summarized in Table 4 below, the average yield of the twenty area bedrock wells on record at the Vermont DEC, Water Supply Division was 8.8 gallons per minute (gpm), with several wells yielding zero, or less than 1 gpm. Well completion reports for all known wells within 3,000 feet of the project well are in Appendix 2, pages 31 to 70. Page 71 of Appendix 2 provides a detailed summary of the well information. The Well Testing and Water Resources Map on page 5 of Appendix 4 shows the approximate locations of the wells, as reported to the DEC by the well drillers.

Table 4: Area Well Summary: Well Completion Reports Within 3,000 Feet of Project Well

Well Report #	Well Depth (ft)	Yield (gpm)	Static Water Level (ft)	Over Burden (ft)	Well Type	Lithology
73	245	2	20	9	Bedrock	0-9: Clay; 9-245: Shale
141	230	2	30	50	Bedrock	0-50: Hardpan; 50-230: Shale
146	249	55		8	Bedrock	0-90: Hardpan and Clay; 90-340: rock
155	115	8		10	Bedrock	0-10: Soil; 10-115: Schist Ledge
156	170	15	30	60	Bedrock	0-10 Gravel; 10-50 clay; 50-60 gravel; 60-170 shale, quartz, marble, granite
234	305	2		62	Bedrock	0-62: Sand and Silt; 62-305: Granite
235	505	0.0		97	Bedrock	0-97: Sand, Silt; 97-505: Granite
270	500	0.0	6	20	Bedrock	0-20: Gravel; 20-300: Black Slate; 300-500: Blue Granite
288	482	4	100	130	Bedrock	0-60: Sand and Gravel; 60-130: Hardpan and Clay; 130-482: Gray Shale and Limestone
309	500	0.5	200	30	Bedrock	0-30: Brown Gravel and Clay; 30-50: Black Shale; 50-500: Black Shale-Water
313	222	20	40	10	Bedrock	0-10: Hardpan; 10-222: Gray & Black Shale with seams of quartz, water

**Table 4: Area Well Summary:
Well Completion Reports Within 3,000 Feet of Project Well**

Well Report #	Well Depth (ft)	Yield (gpm)	Static Water Level (ft)	Over Burden (ft)	Well Type	Lithology
363	500	0.0	100	16	Bedrock	0-16: Clay Sand; 16-500: Bedrock (Gray Black Shale)
405	625	5	16	109	Bedrock	0-7: Gravel; 8-108: Hardpan and Rocks; 109-625: Mostly Black Slate, some Spots of Green
5101	600	2	400	5	Bedrock	0-5: Sand; 5-600: Blue/Black Shale
6783	500	0.75	300	90	Bedrock	0-20: Fine Gravel; 20-90: Clay; 90-500: Black Shale
24722	320	10	5	10	Bedrock	0-6: Sandy Loam; 6-10: Hardpan; 10-320: Black/Gray Slate/Shale Rock
27757	280	40	15	39	Bedrock	0-39: Till, Sand, Rocks; 39-105: Black, Gray Shale; 105-280: Gray Shale
33815	702	1	140	39	Bedrock	0-39: Brown Clay; 39-702: Black Shale
41372	125	8	40	67	Bedrock	0-67: Clay; 67-125: Black Shale with Quartz Soft
41414	500	1.25	85	115	Bedrock	deepened existing well: 115-500: Black Shale med.
n	20	20	16	20		
Mean	384	8.8	95	49		
Median	401	2.0	40	39		
Minimum	115	0	5	5		
Maximum	702	55	400	130		

Groundwater Recharge and Discharge Areas

Groundwater in the valley bottom aquifer most likely originates as recharge on the higher terrain along the hills flanking the valley. In the higher terrain outside the valley bottom, more permeable materials such as glacial till and kame deposits (sand and gravel) are mapped, enabling higher rates of groundwater recharge. The gravel aquifer in the valley floor is beneath a clay and silt layer that inhibits local recharge and protects against surface contaminants. On the east side of the Hoosic River, groundwater flows from east to west, towards the River. The groundwater flow velocity in the shallow water table along the valley floor was calculated to be 1.2 ft/day. Groundwater recharging vertically through the clay layer to the underlying materials would take approximately 70 years.

2.6 Surface Water Hydrology

The major surface water resource in the vicinity of the project is the Hoosic River. Ladd Brook is the largest tributary in the immediate project vicinity. Some wetlands that have been mapped as significant by the Vermont Significant Wetlands Inventory (2010) are present along the River and its tributaries. Two manmade ponds are present at the project site. The manmade ponds were excavated during the early 1960's as part of the race track construction, and were built to manage stormwater runoff and provide ornamental features in the center of the horse track. Page 1 of Appendix 4 shows surface water features in the project vicinity.

Hoosic River

At the project site, the Hoosic River has a relatively large watershed area of 211 square miles. See page 2 of Appendix 4 for a map of the watershed showing the location of the project and the two USGS gauges that are situated upstream of the project site. Rising in the Berkshire Mountains of western Massachusetts, the Hoosic flows northward through Vermont and New York en route to the Hudson River.

Statistical streamflows were determined by analyzing USGS gauge data from the Hoosic watershed in accordance with standard hydrologic procedures. 7Q10 Streamflow was determined in accordance with USGS procedures (Riggs, 1972) based on 70 years of data from the USGS Hoosic River near Williamstown, MA gauge. See pages 3 and 4 of Appendix 4. A 7Q10 flow of 65 cubic feet per second (cfs), equal to 0.31 cfs per square mile of watershed area (csm), was determined at the project site based on 70 years of flow records. In contrast, the statewide average 7Q10 flow in Vermont is 0.10 csm. The Hoosic River's drought flow rate is relatively high on a per-square-mile of watershed basis, indicating that the Hoosic River watershed has ample amounts of water.

To compare the proposed withdrawal rate to the lower range of flows that can be expected in the Hoosic River, a *de minimis* flow of 5 percent of the site specific 7Q10 flow was determined. Water may be withdrawn from the Hoosic River in accordance with the Vermont Agency of Natural Resources' Streamflow Procedure (1993) at a *de minimis* rate of 1,458 gallons per minute. See pages 3 and 4 of Appendix 4. In contrast, the proposed water demand for the project on peak days is only 465.2 gpm.

2.7 Initial Conceptual Model

The project well obtains water from a productive gravel aquifer located along the bottom of the Hoosic River Valley. Two distinct groundwater aquifers are present in the vicinity of the site. A productive gravel aquifer exists only in the valley bottom, where glacial and fluvial processes deposited deep layers of overburden. Outside of the valley bottom, soils are thin and the bedrock aquifer is the only underground source of water present. The reported yields of wells drilled into the bedrock are significantly lower than those of the gravel wells, indicating a low-permeability and low-transmissivity bedrock aquifer that does not permit high rates of water flow.

Groundwater in the valley bottom aquifer most likely originates as recharge on the higher terrain along the hills flanking the valley. In the higher terrain above the valley floor, soils are thin sands and glacial tills, enabling recharge to the underlying bedrock. Layers of silt and clay above and below the gravel provide partially confining conditions in the gravel aquifer, and protect the underlying bedrock aquifer from potential surface sources of contamination. On the east side of the Hoosic River, groundwater flows from east to west, towards the River. The groundwater flow velocity in the shallow water table along the valley floor was calculated to be 1.2 ft/day. Groundwater recharging vertically through the clay layer to the underlying materials would take approximately 70 years.

The bedrock in the area, identified as chiefly the Bascom dolomite, marble, and limestone; and the Hortonville slate and phyllite formations, generally support low-yielding wells.

The Hoosic River is the dominant surface water in the area, draining a 211 square mile watershed at the project site. Significant wetlands are located sporadically along the banks of the river, although none are present in the well's area of influence. Surface waters likely have limited hydraulic connectivity to the gravel aquifer due to the confining layers of clay and silt above the aquifer.

The proposed use of the well would involve intermittent use at a long-term average rate of 72 gpm. On peak use days, a rate of 465 gpm would be withdrawn. In addition, a small amount of water, 1.1 gpm, would be withdrawn routinely for potable uses.

Based on the data collected from the 1994 test of the project well, a safe yield of approximately 630 gpm was calculated. The aquifer is able to sustain long term use of the well, based on the observation that the well's yield had increased following its initial testing in 1962. The well's area of influence was determined for long-term steady-state conditions, and shows that groundwater flow to the well primarily originates from the south and east, with a small component of groundwater flow from the direction of the Hoosic River to the west. Under transient pumping conditions, such as the proposed use of the well, the area of influence is smaller and does not extend as far as the River. Long term conditions of constantly pumping at 500 gpm until the cone of depression has reached equilibrium and has stopped expanding, were predicted using a computer model based on the results of the 7-day pumping test conducted in 1994. The well's estimated area of influence and additional recharge area are shown on the Surficial Geologic Map on page 1 of Appendix 2.

3.0 Water Resource Inventories

3.1 Water Sources Within Area of Influence

No water sources, aside from the project well itself, are known within the estimated area of influence. The land within the estimated area of influence consists of the grounds of the former Green Mountain Race track, which was supplied from the project well. Most of the former race track outbuildings and stables have been demolished to allow the development of the proposed EOS solar electric project, which will not use a water supply. Refer to the Well Testing and Water Resources Map on page 5 of Appendix 4.

Because no water sources exist within or near the estimated area of influence, the proposed withdrawal is expected to comply with §1418(e) (4) of the statute, which requires that the proposed withdrawal will not have an undue adverse effect on existing uses of water dependent on the same water source, and with §1418(e) (5) which requires that the proposed withdrawal will not have an undue adverse effect on a public water system permitted by the agency of natural resources. The proposed source testing program will confirm whether the proposed use of the existing gravel well does not affect other water sources.

Although it is not required to monitor any water sources during the testing, because none are present within the estimated area of influence, in response to public concern about water supplies in the area, and to obtain more data about the groundwater hydrology of the site, Beaver Wood will be offering voluntarily to monitor all water sources within a

3,000-foot radius of the project well, and thus many wells and water sources that are beyond the estimated area of influence may be monitored. This extra monitoring will provide additional data to confirm that the withdrawal does not cause any adverse effects to existing water sources.

3.2 Surface Waters and Wetlands Within Area of Influence

The only surface water resource that is in the estimated area of influence is the Hoosic River, which is adjacent to the area. Outside the estimated area of influence, but in the estimated recharge area, is a manmade pond that was excavated during the early 1960's as part of the race track construction. The regional hydrogeology map on page 1 of Appendix 4 shows surface water features in the project vicinity.

The proposed withdrawal is not anticipated to have a significant effect on streamflow in the Hoosic River, or water levels in the manmade pond, because the silt and clay layers that are above the aquifer most likely inhibit hydrologic interconnections between the well and the surface waters. Additionally, because the withdrawal rate is extremely small in proportion to streamflows in this large watershed river, any potential hydrologic interconnection would have a *de minimis* effect to streamflows.

The proposed withdrawal is expected to comply with §1418(e)(6) of the statute, which requires that the proposed withdrawal will not have an undue adverse effect on significant wetlands under the Vermont Wetland Rules (2010), or on other water resources hydrologically interconnected with the well or spring from which the proposed withdrawal would be made. No significant wetlands exist within the estimated area of inlfluence, and the two manmade ponds on the Beaver Wood project site have been detemined to be not significant wetlands by the Vermont DEC, Wetlands Division. The proposed source testing will confirm whether the proposed use of the existing gravel well does not affect surface water resources and wetlands.

3.3 Potential Sources of Contamination Within Area of Influence

A Source Protection Plan has been developed for the NTNC use of the well, based on a wellhead protection area (WHPA) that is identical to the estimated area of influence and additional recharge area for the proposed withdrawal (VHB, 2010). Potential Sources of Contamination (PSOCs) within the WHPA were identified through site research and inspection, and are discussed below. All PSOCs are identified on the PSOC map on page 6 of Appendix 4. Page 7 of Appendix 4 lists PSOC identification and owner information. Table 5 below provides a brief summary of the PSOCs.

Table 5: PSOC Summary

PSOC ID	Location	PSOC Description	Risk Level
PSOC 1	Est. Area of Influence	Underground Storage Tanks	Low
PSOC 2	Est. Area of Influence	Historic Leachfield	Low
PSOC 3	Additional Recharge Area	Municipal Sewer Line	Low
PSOC 4	Additional Recharge Area	U.S. Route 7	Low
PSOC 5	Additional Recharge Area	Railroad	Low
PSOC 6	Additional Recharge Area	Stormwater Pond	Low
PSOC 7	Additional Recharge Area	Lovett Yard Cemetery	Low
PSOC 8	Additional Recharge Area	Gravel Pit	Low

The PSOCs that are within the estimated area of influence are described below, and pose a low level of risk to the gravel well and to other water sources.

PSOC #1, Pulled Underground Storage Tanks, low risk: Ruanaidh Realty Corporation is the responsible party for four underground storage tanks (UST's) that were removed from the former Green Mountain Race Track site on November 10 and 11, 1993. Three of the pulled UST's were located within the well's estimated area of influence, and the closest UST was located approximately 185 feet away from the gravel well. The fourth UST was located outside the area of influence to the north of the race track. Initial groundwater and PID test results showed elevated levels of volatile organic compounds (VOC), benzene, toluene, ethylbenzene, and xylene (BTEX), and methyl tertiary butyl ether (MTBE) in the immediate vicinity of the USTs. As a result, the site was designated as Vermont Hazardous Site #93-1511. Groundwater samples collected the following year before, during, and after the 7-day long pump test at the well and six installed monitoring wells contained no detectable contaminant concentrations. Due to the absence of contamination, the hazardous site was closed, and the Vermont DEC issued a Site Management Activities Complete (SMAC) determination on May 2, 1995. Additionally, the gravel well was tested for all contaminants required for an NTNC water source and no VOCs were detected in samples collected from the gravel well on August 24, 2010. Risk of contamination to the gravel well is low because no VOCs have been detected in groundwater at the site. Likewise, there is no risk that the proposed withdrawal would affect water quality at other locations by causing the movement of a groundwater contaminant plume, because none exists.

PSOC #2, Historic Leachfield, low risk: The GMRT formerly operated a leachfield that served the track manager's office and was located approximately 530 feet away from the gravel well, within the estimated area of influence. The leachfield is non-operational, and groundwater samples collected on June 4, 2010 and August 24, 2010 contained low concentrations of nitrate measuring 0.36 mg/L and 0.40 mg/L, respectively. The nitrate concentrations are well below the Vermont Drinking Water Maximum Contaminant Level (MCL) of 10 mg/L (ANR 2005) and are typical of natural ambient levels in groundwater. Therefore, this PSOC is a low risk of contamination to the gravel well. Likewise, there is no risk that the proposed withdrawal would affect water quality at other locations by causing the movement of any wastewater-related groundwater contamination.

4.0 Consistency with Town and Regional Plan

The proposed withdrawal is consistent with the Town and Regional plans, because the withdrawal will not adversely affect other water supplies or surface water resources, because the Beaver Wood project will be supplied with water from the project site without burdening a municipal water system, and because the project site contains a productive gravel aquifer that is suitable for providing a supply of water. The Regional Plan encourages new development to take land suitability issues, such as the availability of water supply, into consideration, and specifically describes the gravel aquifer in the Hoosic River valley in Pownal as able to produce large quantities of water. The source testing program will ensure that supplies of groundwater and surface water are of sufficient quality and quantity to meet the future needs of the Town.

4.1 Pownal Town Plan

The Pownal Town Plan states that the natural environment is its "single greatest asset." To protect this asset, the town dictates that land development should occur in an environmentally sound manner in areas for which it is best suited and that it must consider water quality and supply in current and future land use decisions.

The Pownal Town Plan notes that approximately 3000 of Pownal's residents obtain water from shallow wells, deep wells, or springs, and that small water systems serve the remainder of the town's population. The Plan notes that in Pownal Village, 85 percent of residents are served by the Pownal Fire District #2 small water system.

A key objective of the Pownal Town Plan states that the town must "ensure a supply of water, both underground and surface, that is sufficient in quality and quantity to meet the future needs of the town to the greatest extent possible." Natural areas such as streams, wetlands, and forests that provide surface or groundwater supplies for shallow wells should be protected from disturbances that affect the quantity of water supplied.

The Town Plan states that "it is imperative that any future development be sensitive to the need to protect the public health and safety and avoid diminishing the quality of the air or surface and ground water." Specifically, Pownal desires to ensure that "energy-related facilities are properly sited with consideration to natural and scenic resources and environmental impacts." The Plan does not distinguish between the use of water by residential, commercial, or industrial development. The Plan states that the rate of growth of residential development in Village areas must be consistent with the capacity of centralized water systems.

Using the Pownal Town Plan as a framework for evaluating Beaver Wood's proposed withdrawal, the proposed use of the project well is consistent with the Plan as long as it is demonstrated that a sufficient quantity of clean water remains available to meet the town's needs. The proposed source testing will verify whether the use of the project well will have no adverse impact to any existing water supply, as is expected.

4.2 Bennington County Regional Plan

The Bennington County Regional Plan states that new development must: "take into consideration land suitability such as water supply. . ." and not "place excessive burdens on public utilities, facilities, or services."

Adequate new and existing public facilities such as water supply systems are "critical to the sustenance of existing communities, and are necessary to support future growth and development." The Regional Plan states that water supply is a critical component of infrastructure, so sufficient quantity and quality of surface and groundwater is "essential to the well being of the area's residents and visitors as well as the region's economy."

The Regional Plan is based on an understanding of hydrogeology that is consistent with the conceptual model presented above. The Plan states that groundwater is the primary supply of potable water in the region, especially from bedrock fractures, and notes that while wells producing water from these bedrock features typically have lower yields, "the Hoosic River Valley in Pownal and Stamford also contains sufficient thickness of water bearing gravel to produce large quantities of water."

The Regional Plan states that the protection of all public water supplies is of great importance. To ensure sufficient quality and quantity of the water systems, "aquifers and ground water recharge areas . . . must be protected . . . source protection areas have been identified and mapped; uses within these designated areas should be monitored. All of these efforts should be directed toward providing adequate supplies of clean water to residential, commercial, and industrial users, while supporting new development in designated growth centers."

Withdrawal from the project well is consistent with the Bennington County Regional Plan as long as it is demonstrated that the proposed rate of extraction does not interfere with the aquifers, recharge areas, or delineated Source Protection Areas of surrounding water supplies, which will be accomplished through the proposed source testing program. Unlike many of the surrounding wells that draw from the fractured bedrock aquifers that extend throughout Pownal's hills, the project's well draws water from the high-yielding gravel aquifer in the Hoosic River Valley that is described as a separate and distinct source of water in the Bennington County Regional Plan. The gravel aquifer is hydrogeologically separate from the surrounding bedrock aquifers, limiting the likelihood of interference.

5.0 Alternatives Analysis

Alternative water sources have been evaluated, including surface water withdrawal from the Hoosic River, surface impoundments, and connection to a public community water system. Use of the Hoosic River withdrawal at all times is being pursued, in order to reduce the amount of withdrawal that would be needed from the well. The project has been designed to conserve water and will incorporate the newest, most advanced process technology to maximize efficiency.

A public community water system is not available at the project site, and extension of water mains to existing public community water systems is not feasible, as nearby PCWS do not have the surplus capacity to supply the project.

Due to the more suitable water quality in the Hoosic River and in response to public concerns about the use of groundwater for a private commercial enterprise and about the low yield of many domestic bedrock wells in Pownal, full reliance on the Hoosic River as the process water source for the poject is being investigated. The well is indeed considered as a backup supply, or alternative to the River, which is the primary proposed source. Use of the well would be required only on such occasions when withdrawal from the River was not possible, because the river is the preferred source of water due to superior water quality. The lower mineral concentrations in the River are more compatible with the plant equipment than the well water.

The proposed groundwater withdrawal rate of 72 gpm (103,080 gpd) stated above in section 1.4 is based on the application of a streamflow-based limitation on withdrawal from the river, which may be applied through the USACE Section 404 review of the project. Although Vermont regulations allow the project's entire water needs to be withdrawn from the River at all times, in accordance the *de minimis* policy due to the very small rate of withdrawal in proportion to the River's 7Q10 drought flow rate, the current interim Federal procedures may prohibit withdrawal from the River when its flow is less than the aquatic base flow rate of 89 cfs at the site. The Federal procedures present the aquatic base flow limit as a default, and do also allow site specific studies to be considered. Therefore, Beaver Wood is working with the US Army Corps of Engineers to determine whether the downstream effects of the withdrawal can be considered to be sufficiently insignificant that use of the river would be allowed at more times. In such a case, the proposed groundwater withdrawal rate could be reduced.

Surface impoundments, such as the existing manmade pond at the site, have been evaluated as alternative sources of water. Impoundments were analyzed to determine if sufficient water could be stored to enable the plant to rely on the stored water during times of low streamflow when the Hoosic River could not be used. The existing manmade pond stores approximately 12 million gallons (Mgal) of water, which is insufficient to supply the plant through the expected periods when withdrawal from the river could not occur. Enlargement of the pond to 83.4 Mgal would be required, which is not possible because sufficient area does not exist on site. Additionally, use of storage impoundments would be unacceptable because the water used for steam generation must be clean and free of algae, sediment, and suspended matter whereas water ponded in storage normally develops high levels of these substances.

5.1 Mass Balance Hydrograph Analysis

A comprehensive numerical analysis that explains the basis of the proposed plant water demands, the proposed groundwater and surface water withdrawal rates, and the analysis of storage volumes, is presented as Appendix 5. A mass balance hydrograph analysis was performed to evaluate potential alternative source scenarios, with the essential goal of meeting the plant's water demands at all times.

National Weather Service data were used to determine wet bulb temperature and relative humidity for every day that data are available, in order to calculate the daily water demands. 63 years of record, from 1947 through 2009, are available. Pages 1 and 2 of Appendix 5 present water demand rates for the biomass plant's entire process water needs. The portion of this demand that would be met by the well was determined based on the mass balance analysis that evaluated daily streamflow and demand.

USGS streamflow gauge data from the Williamstown, MA station were used to determine the amount of streamflow at the intake site for every day during the period of record for the National Weather Service data. The data were adjusted for the differences in watershed area between the USGS station and the project site.

The mass balance analysis computer model determined daily demand, river water availability, well water availability, and storage volumes for every day over the 63 year period of record. Statistical analysis of the 63 years of daily data was performed in order to evaluate the results. Various scenarios were evaluated, including several combinations of different storage volumes, well yields, and streamflow limitations.

Page 3 of Appendix 5 presents a summary of the results. Results from individual scenarios follow and include a detailed tabulation of the results, and hydrographs depicting the streamflow, river withdrawal, well production, storage, plant usage, and demand.

Scenario 1

Scenario 1 consists of a river intake, no withdrawal when streamflows are less than ABF, no well, and no storage. On average, 78% of the annual water needs would be met. Plant demand would be fully met in only 3% of all years. Therefore this scenario is unacceptable. See pages 4 to 8 of Appendix 5.

Scenario 2

Scenario 2 consists of a river intake, withdrawal when streamflows are less than 89 cfs, and no storage. Plant demand would be fully met in all years and the withdrawal would not affect aquatic habitat or biota. Therefore this scenario is acceptable. See pages 9 to 13 of Appendix 5.

Scenario 3

Scenario 3 consists of a river intake, no withdrawal when streamflows are less than 89 cfs, no well, and the 12 Mgal of storage that would be available in the existing on-site manmade pond. On average, 93% of the annual water needs would be met. Plant demand would be fully met in only 33% of all years. Therefore this scenario is unacceptable. See pages 14 to 18 of Appendix 5.

Scenario 4

Scenario 4 consists of a river intake, no withdrawal when streamflows are less than 89 cfs, no well, and the amount of storage that would be needed to enable demand to be met at all times. Plant demand would be fully met in all years. However, the requisite 83.4 Mgal of storage could not be constructed at the site and is not feasible. Therefore this scenario is unacceptable. See pages 19 to 23 of Appendix 5.

Scenario 5

Scenario 5 consists of a river intake, no withdrawal when streamflows are less than 89 cfs, use of the on-site well at up to 500 gpm when Hoosic River flows are less than 89 cfs, and no storage. This scenario preferentially relies on the river, and uses the well as a water source only when streamflows are below 89 cfs, or when only a portion of demand can be met with the River intake.

Plant demand would be fully met in all years. Therefore, this scenario is acceptable.

Well water would comprise 22 percent of plant usage on average. Thus, the average rate of groundwater withdrawal would be 37.6 Mgal per year, equal to 103,080 gpd or 72 gallons per minute, and a Groundwater Withdrawal Permit would be required. In a peak well usage year, the well would need to provide 58 percent of the water used in a year by the biomass plant, equal to 102 Mgal per year, 279,500 gpd, or 194 gpm. At a peak monthly rate, the well would be called upon to produce 630,000 gpd, equal to 438 gpm. In some years, the well would not need to be used at all. See pages 24 to 28 of Appendix 5.

Scenario 6

To evaluate options for using a well without exceeding the 57,600 gpd threshold for needing a groundwater withdrawal permit, scenario 6 consists of a river intake, no withdrawal when streamflows are less than 89 cfs, use of the well for up to 39 gpm, and no storage. On average, 81 percent of the annual water needs would be met. Plant demand would be fully met in only 3 percent of all years. Therefore this scenario is unacceptable. See pages 29 through 33 of Appendix 5.

Scenario 7

To further evaluate options for using a well without exceeding the 57,600 gpd threshold for needing a groundwater withdrawal permit, scenario 7 consists of a river intake, no withdrawal when streamflows are less than 89 cfs, use of the well for up to 39 gpm, and the 12 Mgal of storage in the existing manmade pond on site. On average, 95% of the annual water needs would be met. Plant demand would be fully met in only 40% of all years. Therefore, this scenario is unacceptable. See pages 34 through 38 of Appendix 5.

Scenario 8

To further evaluate options for using a well without exceeding the 57,600 gpd threshold for needing a groundwater withdrawal permit, scenario 8 consists of a river intake, no withdrawal when streamflows are less than 89 cfs, use of the well for up to 39 gpm, and the amount of storage that would be needed to enable demand to be met at all times. Plant demand would be fully met in all years. However, the requisite 73 Mgal of storage could not be constructed at the site and is not feasible. Therefore this scenario is unacceptable. See pages 39 to 43 of Appendix 5.

Mass Balance Hydrograph Results Summary

The two acceptable scenarios are #2 and #5. Scenario #2, with no minimum streamflow limit because the withdrawals at no more than 465.2 gpm have no impact to the biota or habitat in the Hoosic River in accordance with the federal streamflow policy, would meet the biomass plant's water needs at all times. Scenario #5, which relies upon the onsite well when streamflows are low, also would meet the biomass plant's water needs at all times but would require up to 58 percent of the plant's water supply to come from the well, which is less suitable for the plant than the river water.

5.2 Alternatives Analysis Summary

The alternatives analysis has determined that the preferred alternative source is the Hoosic River, and that the well is only being proposed as a backup source of water because it might not be possible to withdraw from the river when streamflows are low. Connection to a public community water supply system is not an available option. Storage of pumped river water in surface impoundments for use in place of well water, to supply the plant when the river cannot be used directly, is not a viable option because insufficient volumes of water can be stored on the site and because of water quality problems that develop in stagnant water. Use of the well may be further reduced below the proposed annual average withdrawal rate of 72 gpm as a backup source, if Federal approval of greater Hoosic River water usage is issued.

6.0 Source Testing Proposal

The proposed pumping test would be conducted at a withdrawal rate of approximately 500 gpm and would last for 7 days (168 hours). All water wells within a 3,000-foot radius would be monitored, owner permission pending. Additional water level measurement would occur at existing and proposed monitoring wells and piezometers in the unconfined water table, in the gravel aquifer, and in nearby surface waters. Pre-test background monitoring would be conducted at all monitoring locations for at least 48 hours to establish baseline conditions. Post-test monitoring would be conducted for 48 hours to monitor water level recovery.

The test would be conducted during the winter of 2010-2011, when frozen ground would minimize recharge to the aquifer, providing conservative test conditions. Precipitation and air temperature would be monitored throughout the pre-test, test, and recovery periods using a recording weather station to be placed on the site. The amount of snowpack on the ground also would be monitored to assess snowmelt and recharge rates. Flow in the Hoosic River would be monitored by the USGS gauge upstream in Williamstown MA (#0133250) to assess regional hydrologic trends.

Automatic dataloggers will be used to measure water levels in the wells, and will be confirmed by periodic manual measurements. Water levels in the production well, monitored water supply wells, piezometers, and monitoring wells would be measured to the nearest 1/100th of a foot, via manual measurement or automated data logger.

6.1 Production Well Testing

Background monitoring would consist of water level monitoring in the project well for at least 48 hours prior to the 7-day pumping test. Water levels would be recorded using an automatic datalogger and pressure transducer.

The constant discharge test would be conducted for 7 days (168 hours) at a constant pumping rate of approximately 500 gpm, which exceeds the proposed peak withdrawal rate of 462.5 gpm, providing a margin of safety. The existing 40-hp vertical turbine pump would be used for the test. A calibrated water meter, rated to 600 gpm, will be used to determine well discharge during the pumping test. Due to freezing concerns, an orifice tube will not be used. As a backup flow measurement device, a calibrated weir will be installed at the discharge point and monitored throughout the test. The weir is not expected to freeze due to the high flow rate.

During the constant discharge test, the pumping rate would be kept steady using the existing valves in the wellhouse. Measurements of water level and discharge rate would be made at the intervals recommended in the Draft Groundwater Withdrawal Reporting and Permitting Rules (2010), §24-509 (b)(5)(C).

Water from the pumping test would be conveyed by pipe or hose away from the wellhead and discharged adjacent to the Hoosic River in a manner that would minimize erosion and potential aquifer recharge. VHB personnel would oversee the management of discharged test water to ensure the maintenance of surface water quality.

Recovery monitoring would commence immediately when the constant discharge test ends. Measurements of water level would be made at the intervals recommended in the Draft Groundwater Withdrawal Reporting and Permitting Rules (2010), §24-509 (b)(6)(A). The recovery monitoring would be conducted until the water levels in the project well have recovered to their pre-test levels, or for up to two days.

6.2 Interference Monitoring

Once the proposed source testing program has been approved, all landowners within 3,000 feet of the project will be provided with a monitoring permission form, well questionnaire, and an explanatory letter. This monitoring would be well above and beyond the Draft Rule's directive to monitor the water sources within the estimated area of influence, and is being proposed voluntarily due to the public concern that was expressed during the informational hearing. The list of landowners within 3,000 feet is in Appendix 4, pages 8 and 9. A sample informational letter and monitoring permission request are provided in Appendix 4, pages 10 through 15.

VHB will conduct background measurements of water levels for two days prior to the pump test in the production well and in all the observation wells. Recovery measurements will be conducted for two days after the end of the pumping test, or until the production well has fully recovered, whichever comes first. Measurements of water level would be made at the intervals recommended in the Draft Groundwater Withdrawal Reporting and Permitting Rules (2010), §24-509 (b)(5)(D).

The testing is not anticipated to cause any impact to a water supply well, because no wells are located within the project well's estimated area of influence. In the unlikely event that a well cannot supply its owner with sufficient water during the test, the following corrective measures would take place. First, the cause of the problem would be investigated to determine if a mechanical or pump problem, wiring or electrical problem, or other issue unrelated to the testing was responsible. Water levels measured in the affected well would be evaluated to determine if the testing has caused a loss of supply. Problems that occasionally occur due to installation of monitoring equipment, such as damage to the pump wiring, or a clogged whole-house water filter due to sediment stirred up by sounding tube installation, would be investigated and fixed at no cost to the well owner. In the highly unlikely event that the test was causing excessive drawdown in the affected well, the test would be discontinued.

6.3 Special Studies

Special studies would be performed to assess water resources and hydrology at the site.

Piezometers would be installed at the edge of the manmade pond north of the well, to assess the degree of hydrologic communication between the gravel aquifer and the pond. These piezometers would be installed along the pond's edge at the closest point to the well. A pair of piezometers, one shallow (approximately two feet) and one deep (approximately five feet), will be installed. Measurements of water levels in the piezometers will provide information regarding vertical gradients in the aquifer. Together with the pond stage data, this information will be used to determine if the pumping of the well affects vertical gradients in the aquifer or water levels in the pond. The piezometers will be monitored to evaluate the possible presence of a hydraulic connection between the gravel aquifer and the overburden water table, to determine the hydraulic gradient in the overburden, and to assess whether the gradient is affected by the pumping of the well. Water levels in the piezometers and in the pond itself would be monitored at the same intervals and duration as the project well and water sources. Refer to the Well Testing & Water Resources Map on page 5 of Appendix 4 for proposed piezometer locations.

Piezometers would be installed at the edge of the Hoosic River to assess the degree of hydrologic communication between the gravel aquifer and the river. These piezometers would be installed along the river at the closest point to the well. A pair of piezometers, one shallow (approximately two feet) and one deep (approximately five feet), will be installed. Measurements of water levels in the piezometers will provide information regarding vertical gradients in the aquifer. Together with the pond stage data, this information will be used to determine if the pumping of the well affects vertical gradients in the aquifer or water levels in the pond. The piezometers will be monitored to evaluate the possible presence of a hydraulic connection between the gravel aquifer and the overburden water table, to determine the hydraulic gradient in the overburden, and to assess whether the gradient is affected by the pumping of the well. Water levels in the piezometers and in the river itself would be monitored at the same intervals and duration as the project well and water sources. Refer to the Well Testing & Water Resources Map on page 5 of Appendix 4 for proposed piezometer locations.

Four monitoring wells (MW-7, MW-8, MW-9, and MW-10) are proposed to be installed into the gravel aquifer for the purpose of accurately refining the extent of the estimated area of influence. A hollow-stem auger drilling rig would be used to install 2-inch diameter monitoring wells into the gravel aquifer, at a depth of approximately 50 to 60 feet below ground surface. The 1994 pumping test involved six monitoring wells that had been installed in the unconfined water table above the clay layer, but no observation wells in the gravel aquifer itself. The addition of the four gravel aquifer monitoring wells will enable a more accurate delineation of the gravel well's area of influence. The existing monitor wells in the water table at the site also would be monitored during the proposed testing. Water levels in all monitoring wells would be monitored at the same intervals and duration as the project well and water sources. Refer to the Well Testing & Water Resources Map on page 5 of Appendix 4 for proposed well locations.

6.4 Data Analysis

Long-term safe yield will be calculated for the well based on data from the pump test using at least two standard hydrogeologic methodologies. The specific methods to be used will be determined based on the behavior of the project well and the monitoring wells, and by comparison of the data to type curves. Yield will be calculated for 180 days of usage without recharge.

Interference to all wells in the monitoring radius will be calculated based on the pump test results. Long-term interference will be calculated using standard methods based on the recommended safe yield of the project well, and the aquifer parameters measured at each of the observation wells. For any well affected by the project well, the affected well's ability to meet its owner's water needs will be calculated for long term pumping conditions.

The area of influence for the project well will be delineated based on aquifer parameters measured from the pump test and the responses of the observation wells. The extent of the well's zone of influence will be calculated for the design pumping conditions using standard methods, and distance-drawdown plots of the test data will be evaluated, so that the delineation will represent long-term usage conditions.

The initial conceptual model presented in section 2.7 above will be refined based on the test data. A final report presenting the test data, calculations, area of influence, conceptual model, and the results of the yield and interference analysis will be submitted to the Vermont DEC, Water Supply Division.

7.0 Conclusions and Recommendations

The proposed use of the existing gravel packed well at the former Green Mountain Race Track as a backup supply of process water for the proposed Beaver Wood Energy Pownal biomass facility is expected to meet the requirements of Act 199 for withdrawal of groundwater. A testing program has been proposed to measure the long term safe yield of the well, to delineate its area of influence and recharge area, and to predict its long term affects, if any, to surrounding water sources and surface waters. No water supply wells or significant wetlands are present within the project well's estimated area of influence, which has been delineated based on a rigorous hydrologic test conducted on the well that included pumping for 7 days at 514 gallons per minute. The proposed withdrawal would use water at an annual average rate of 72 gpm, and a peak daily rate of 465 gpm. Therefore, it is expected that the proposed withdrawal is a safe yield that will not cause any adverse effects to other water resources.

An initial conceptual hydrologic model indicates that the proposed withdrawal is not likely to cause adverse affects to any existing wells, water sources, wetlands, or surface waters; the withdrawal will be planned for efficient water use and will meet Vermont standards for safe groundwater yield, and will conform to the Pownal Town Plan and the Bennington County Regional Plan.

References

Bruno Associates, 2010. Beaver Wood Energy Pownal, LLC: Public NTNC Source and Construction Permit Application. October 25, 2010.

Driscoll, F.G., 1986. Groundwater and Wells. Johnson Screens, St. Paul MN.

LAG (1995). Green Mountain Race Track: 7-day Pump Test of the Production Well. Lincoln Applied Geology, Inc. February 20, 1995.

Riggs, H.C., 1972, "Techniques Of Water Resources Investigations Of The USGS, Chapter B1: Low-Flow Investigations"

Todd, D.K., 1980. Groundwater Hydrology. John Wiley & Sons, New York.

Vermont Geological Survey, 1961. Centennial Geologic Map of Vermont.

Vermont Geological Survey, 2008. Surficial Geologic Map of Vermont.

Vermont Agency of Natural Resources: Department of Environmental Conservation (1982). Environmental Protection Rules, Chapter 11: Underground Injection Control Rule.

Vermont Agency of Natural Resources: Agency Procedure for Determining Acceptable Minimum Streamflows (7/14/1993)

Vermont Agency of Natural Resources: Department of Environmental Conservation, Water Supply Division (1997). Protecting Public Water Sources in Vermont.

Vermont Agency of Natural Resources: Department of Environmental Conservation, Water Supply Division (2002). Alta Gardens Estates MHP (WSID 5628) Delineated Source Protection Area.

Vermont Agency of Natural Resources: Department of Environmental Conservation, Water Supply Division (2005), Environmental Protection Rules, Water Supply Rule, Chapter 21.

Vermont Agency of Natural Resources: Department of Environmental Conservation, Water Supply Division (2010). Environmental Protection Rules, Chapter 24: Groundwater Withdrawal Reporting and Permitting Rules. Draft September 20, 2010.

Vermont Agency of Natural Resources: Department of Environmental Conservation, Water Quality Division (2010). Vermont Wetland Rules.

VHB, 2010. Gravel Well: Source Protection Plan - Beaver Wood Energy Pownal, LLC. WSID #2585. October 8, 2010.

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APPENDIX 1

VERMONT
ENVIRONMENTAL CONSERVATION

APPLICATION

Water Supply Division

GROUNDWATER WITHDRAWAL PERMIT APPLICATION

This application initiates the Water Supply Division's review and permitting process for source development of a Groundwater Source to serve a Proposed or Existing Industrial/Commercial facility withdrawing greater than 57,600 gpd. Drinking water supply sources are required to obtain a separate permit.

A site visit will be scheduled following receipt of a complete application. Following construction of the source the applicant shall submit a source testing proposal (on a form provided by the Secretary) and the applicant and/or applicant's consultant shall attend a public meeting to address public concerns. Following the public meeting and after receiving state approval for the source testing proposal, the applicant shall conduct source testing and address undue adverse impact concerns. The applicant shall submit a source evaluation report that addresses these concerns. Once the applicant satisfies all administrative and technical requirements the state will issue a Groundwater Withdrawal Permit.

This line for WSD use only: WSD project ID #___________ Associated WSID #_________	Code	Date

For staff use WSD codes: C = completed **NR** = not required **IR** = info. required **TBD** = to be determined

1. Town: Pownal		
2. Facility name: Beaver Wood Energy Pownal, LLC		
3. Applicant name: Tom Emero		
Mailing address: 230 West Street		
Rutland, VT 05701		
Daytime phone: (508) 321-1181 e-mail: tomemero@gmail.com		
4. Source owner (if different from applicant): Progress Partners LTD., attn: Richard Hein		
Mailing address: 132 Larchmont Ave		
Larchmont, NY 10538		
Daytime phone: 914-907-6030 e-mail: rfhdesign@verizon.net		
5. Hydrogeologist: Meddie Perry, CGWP		
Mailing address: 7056 US Route 7, PO Box 120		
North Ferrisburgh, VT 05473		
Daytime phone: (802) 425-7788 ext 6454 e-mail: mperry@vhb.com		

6. Describe the purpose of the groundwater withdrawal (attach): attached				
7. *Time frame:*	*Peak amount:*	*Mean amount:*		
Estimated daily withdrawal:	669,900_gallons per day	103,080_ gallons per day		
Estimated monthly withdrawal:	630,000_gallons per day	103,080_ gallons per day		
Estimated yearly withdrawal:	279,500_gallons per day	103,080_ gallons per day		
8. Requested withdrawal rate: _465.2_ gallons per minute				

9. Describe the alternate means considered for satisfying the stated purpose of the water withdrawal (attach): attached		
10. Describe how the withdrawal is planned in a fashion that provides for efficient use of the water (attach): attached		

11. Source of the proposed withdrawal (check applicable type): ☐Bedrock drilled Well ☐Spring ☐Dug well *X* Unconsolidated drilled well ☐Other (describe):		
12. Provide detailed plans of the proposed source construction (attach): attached		
13. a) Identify proposed and existing withdrawal location(s) on a USGS map; attached		

b) Identify the withdrawal locations on a map showing the subject parcel and any adjoining parcels within 100 feet of the withdrawal point with any required isolation distances measured from the withdrawal point and showing the location of associated protective measures for protecting the source from adverse impacts (attach): attached		
14. GPS location(s) of the proposed withdrawal point(s), and of any existing water sources for the project, shall use the **NAD 83 format** (report in Degrees, Minutes, and Seconds) for the horizontal GPS coordinates (attach): attached		
15. Identify benchmarks and elevations for vertical references and identify their locations on an appropriately scaled map (attach): attached		
16. Describe the place and manner of the return flow for the withdrawn water: attached		
17. If applicable, identify the return flow location(s) on an appropriately scaled map: attached		
18. Estimated yearly amount of water that will not be returned to the watershed where the proposed withdrawal is located: 33,240 average daily Gallons		

19. Inventory of actual and potential contaminant sources, with locations identified on an appropriately scaled map (attach): attached		
20. Inventory of water resources and uses (such as drinking water supply sources, significant wetlands, surface waters, other water withdrawals and uses), with locations identified on the same map as the inventory of contaminant sources: attached		

21. Develop a water budget for the aquifer(s) the withdrawal is taking place from (attach): attached		
22. Develop a conceptual hydrogeologic model of the withdrawal considering the water budget developed (attach): attached		
23. Delineate the potential area of influence showing preexisting conditions and the conditions under proposed maximum withdrawal in both plan view and profile view at an appropriate scale, based on the conceptual hydrogeologic model (attach): attached		
24. Describe how the area was delineated using the model (attach): attached		
25. Provide a description of the withdrawal effects on each of the contamination sources, water resources, water uses, and long term response of the aquifer (attach): attached		
26. Describe the mitigation measures to be implemented to remedy any expected undue adverse impacts (attach): attached		

27. Attach a signed and dated certification by the applicant that they have met the pre-application public informational meeting requirements: attached		
28. Attach a signed and dated certification by the applicant that the proposed withdrawal is in conformance with the regional plan adopted for the area in which the proposed withdrawal is located, and that it is in conformance with the municipal plan adopted for the municipality that the proposed withdrawal is located within: attached		
29. If applicable, the previously assigned permitted withdrawal volumes, established safe yields, or the known flow or withdrawal rates of the applicant's other water sources on this or contiguous parcels (attach): attached		
30. Attach a list of all persons (name, address, and phone number) which are required to be notified of the proposed permit: attached		

31. Attach fee (payment by check or money order made payable to the State of Vermont): attached		

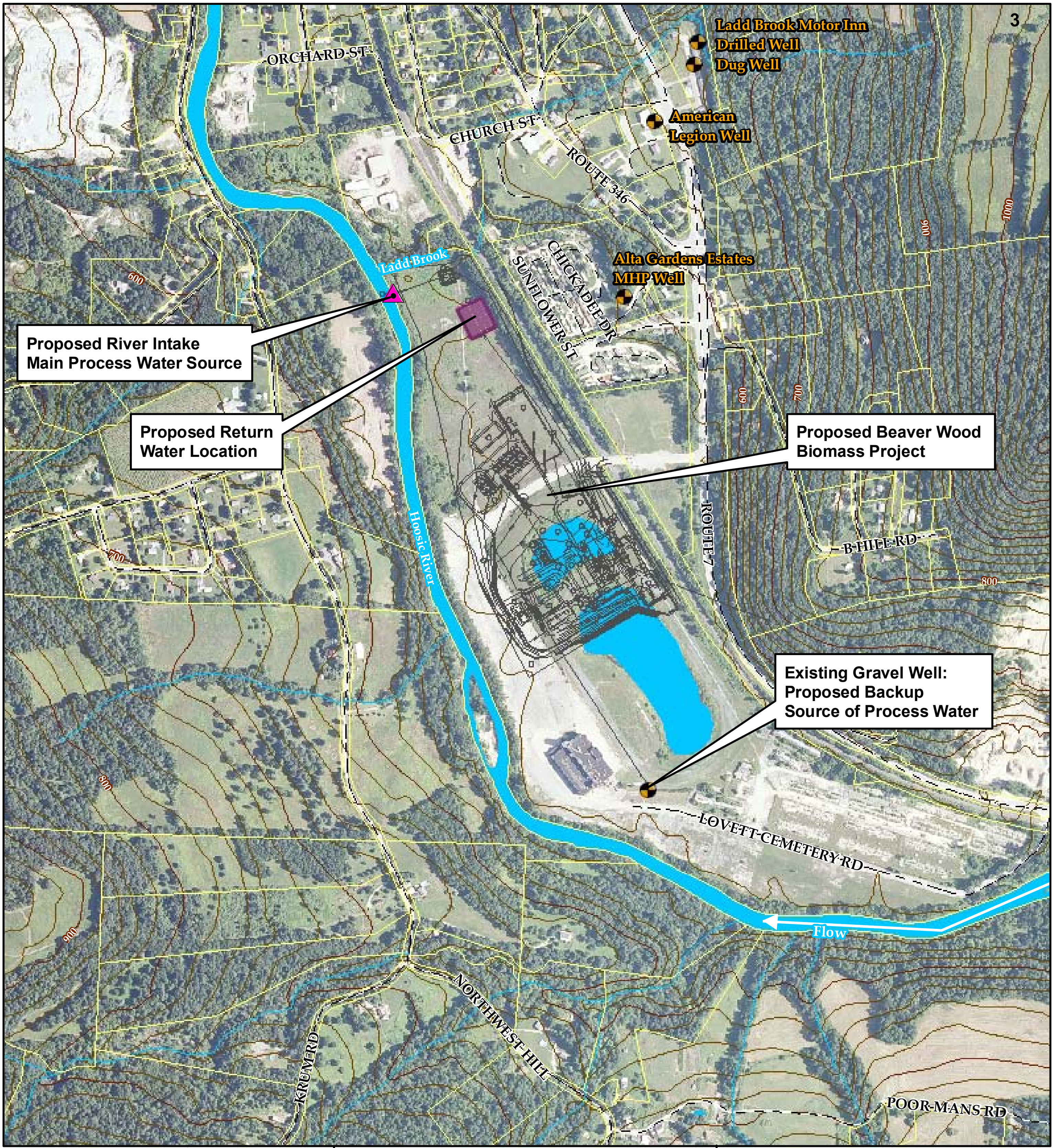
I recognize that by signing this application I am giving consent to employees of the State to enter the subject property for the purpose of processing this application.

[signature] Date 10/21/10

Signature of the Applicant

[signature] Date 10/19/10

Signature of the Co-applicant (Owner of Water Source, if different from the Applicant)



Legend

- River Intake
- Public Water Source
- Parcel Boundaries
- Streams (VHD)
- Waterbody (VHD)
- Roads
- Contour - 20 ft
- Contour - 100 ft

N
W E
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Beaver Wood Energy Pownal, LLC.
Pownal, Vermont
Project Location Map

October 12, 2010

800 400 0 800 Feet

Sources: Background - USDA NAIP Orthophoto - Bennington (2009); Streams and Waterbodies from Vt. Hydrography dataset and VCGI (2008); Contours from VHB (2010); Public Water Source from VTANR (2010); parcel boundaries obtained from Bennington County Regional Planning Commission (2006); Roads obtained from VTrans (2008); Source Site Plan provided by Bruno Associates (9/2/2010).

VHB Vanasse Hangen Brustlin, Inc.

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Prepared by: MJS/LBS

MEMORANDUM OF LEASE

Notice is hereby given of a certain Lease Agreement entered into on April 2, 2010 by and between **PROGRESS PARTNERS, LTD,** a Vermont corporation with an address of 158 Westmoreland Avenue, White Plains, New York (hereinafter referred to as "**Lessor**"), and **BEAVER WOOD ENERGY POWNAL, LLC,** a Delaware Limited Liability Company with an address of 82 Village Street, Medway, Massachusetts (hereinafter referred to as "**Lessee**").

The aforementioned Lease Agreement contains, among other provisions, the following:

1. Initial Term. The Initial Term of the Lease begins on April 2, 2010 and ends on October 1, 2010.

2. Second Term. At the end of the Initial Term, Lessee, in its sole discretion, shall have the right to extend the Lease for two twelve month periods, the first beginning at the end of the Initial Term and ending October 1, 2011 and the second beginning October 2, 2011 and ending October 1, 2012, (collectively, the "Second Term"), by providing Lessor five (5) days written notice prior to the expiration of any such period.

3. Extended Second Term. By providing thirty (30) days written notice prior to the expiration of the Second Term, Lessee, in its sole discretion, shall have the right to extend the Second Term for one (1) additional six (6) month term, (the "Extended Second Term"). In the event Lessee is prohibited from starting construction because of litigation or a matter outside of Lessee's control, Lessee shall have the right to extend the Second Term for up to three (3) additional one (1) year terms, each of which shall constitute an Extended Second Term.

4. Construction Term. By providing thirty (30) days written notice prior to the expiration of the Second Term (extended or otherwise), Lessee, in its sole discretion, shall have the right to extend the Lease for a twenty eight (28) month construction period (the "Construction Term").

5. The Premises consist of an approximately 45 acre portion of a lot consisting of 147 acres of land and premises located on Route 7 in the Town of Pownal, County of Bennington and State of Vermont, (formerly known as the Green Mountain Race Track), and more particularly described in a deed from John & Ellen Pietagens to Lessor dated Nov. 29, 1994, recorded at Book 1001, Page 223-4 of the Town of Pownal Land Records (the "Premises").

6. The terms and conditions of the Lease Agreement are incorporated herein by reference.

7. Nothing contained in this Memorandum of Lease shall constitute an amendment, change or revision of the terms and provisions of said Lease Agreement.

1 of 2

CW

Dated at White Plains, NY, this 19th day of April, 2010

PROGRESS PARTNERS, LTD:

By ______________________
Frank Cantatore, Partner

STATE OF New York
Westchester COUNTY, ss.

At White Plains, NY Westchester County, this 19th day of April, 2010, personally appeared Frank Cantatore, Partner of **PROGRESS PARTNERS, LTD.**, by Resolution of the Corporation, and he acknowledged this instrument, by him sealed and subscribed, to be his free act and deed and the free act and deed of **PROGRESS PARTNERS, LTD.**

Serafina E Russell
Notary Public, State of New York
No. 01RU6157754
Qualified in Westchester County
Commission Exp. Dec. 11, 2010

Before me,

Serafina E. Russell
Notary Public

BEAVER WOOD ENERGY POWNAL, LLC:

By ______________________
Thomas Emero, Managing Member

STATE OF Mass
Norfolk COUNTY, ss.

At Norfolk, ____________ County, this ___ day of April, 2010, personally appeared Thomas Emero, Managing Member of **BEAVER WOOD ENERGY POWNAL, LLC,** and he acknowledged this instrument, by him sealed and subscribed, to be his free act and deed and the free act and deed of **BEAVER WOOD ENERGY POWNAL, LLC**.

DEBORAH A. ANDERSON
Notary Public
Commonwealth of Massachusetts
My Commission Expires Jun 13, 2014

Before me,

____
Notary Public

Pownal, VT Town Clerk's Office
Received for Record
May ___ A.D. 2010
at ___ o'clock ___ minutes ___ M
and recorded in Book ___ Page ___
Attest: ______________________
Karen J. Burrington, Town Clerk

2 of 2

Notice of Application for Groundwater Withdrawal Permit (Act 199)

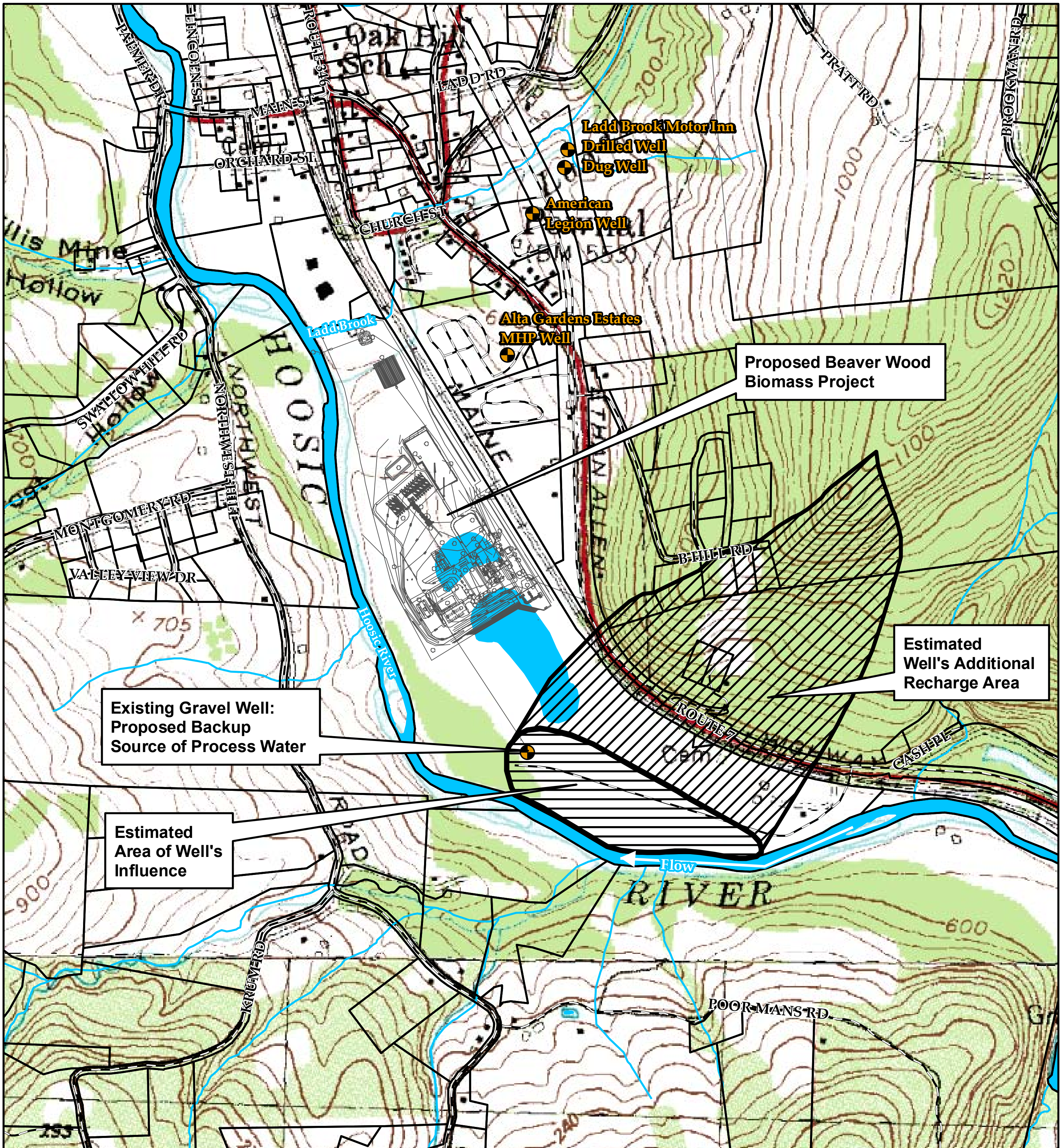
PLEASE TAKE NOTE that Beaver Wood Energy Pownal, LLC has applied for a permit application for a Groundwater Withdrawal Permit from the Vermont Agency of Natural Resources, in order to utilize an existing drilled well as a backup source of water for a proposed biomass energy plant at the former race track site in Pownal. The proposed withdrawal rate is estimated to be 72 gallons per minute on average, and 465 gpm on peak days.

The proposed withdrawal is located at the former Green Mountain Race Track on Lovett Cemetery Road in Pownal. A map of the source location and its estimated Area of Influence is attached.

Full copies of the application may be reviewed at the Pownal Town Office and the Vermont Water Supply Division office in Waterbury. A public comment period is open for 30 days from the date of the application, ending on November 24, 2010. Comments shall be directed to the Water Supply Division at the address below.

Contact information:

Dennis Nealon
Vermont ANR, Water Supply Division
103 South Main Street
Old Pantry Building
Waterbury, VT 05671-0403



Legend

- Public Water Source
- Estimated Area of Influence
- Estimated Additional Recharge Area
- Parcel Boundaries
- Streams (VHD)
- Waterbody (VHD)
- Roads

N W E S

Beaver Wood Energy Pownal, LLC.
Pownal, Vermont
Project Location Map

October 12, 2010

1,000 500 0 1,000 Feet

Sources: Background - USGS North Pownal Quadrangle (1995); Streams and Waterbodies from Vt. Hydrography dataset and VCGI (2008); Public Water Sources from VTANR (2010); parcel boundaries obtained from Bennington County Regional Planning Commission (2006); Roads obtained from VTrans (2008); Source Site Plan provided by Bruno Associates (9/2/2010); Area of Influence and Additional Recharge Area by VHB (2010).

Vanasse Hangen Brustlin, Inc.

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Prepared by: MJS/LBS

Beaver Wood Energy Pownal, LLC.
Public Notification for Groundwater Withdrawal Permit

- Pownal Town Clerk
  Karen J. Burrington
  Town of Pownal VT
  P.O. Box 411
  Pownal, Vermont 05261

- Pownal Selectboard
  Town of Pownal VT Selectboard
  P.O. Box 411
  Pownal, Vermont 05261

- Pownal Conservation Commission
  Town of Pownal VT Conservation Commission
  P.O. Box 411
  Pownal, Vermont 05261

- Clerks of adjoining Vermont municipalities (see location map, page 10 of this Appendix)

  Bennington Town Clerk:
  Timothy R. Corcoran
  205 South Street
  Bennington, VT 05201
  (802) 442-1037
  tcorcoran@bennington.com

  Woodford Town Clerk:
  Ron Higgins
  1391 VT RTE 9
  Woodford, VT 05201
  (802)442-4816
  woodfordvt@comcast.net

  Stamford Town Clerk:
  Nancy L. Bushika
  986 Main Road
  Stamford, VT 05352
  (802) 694-1361
  stamfdvt@sover.net

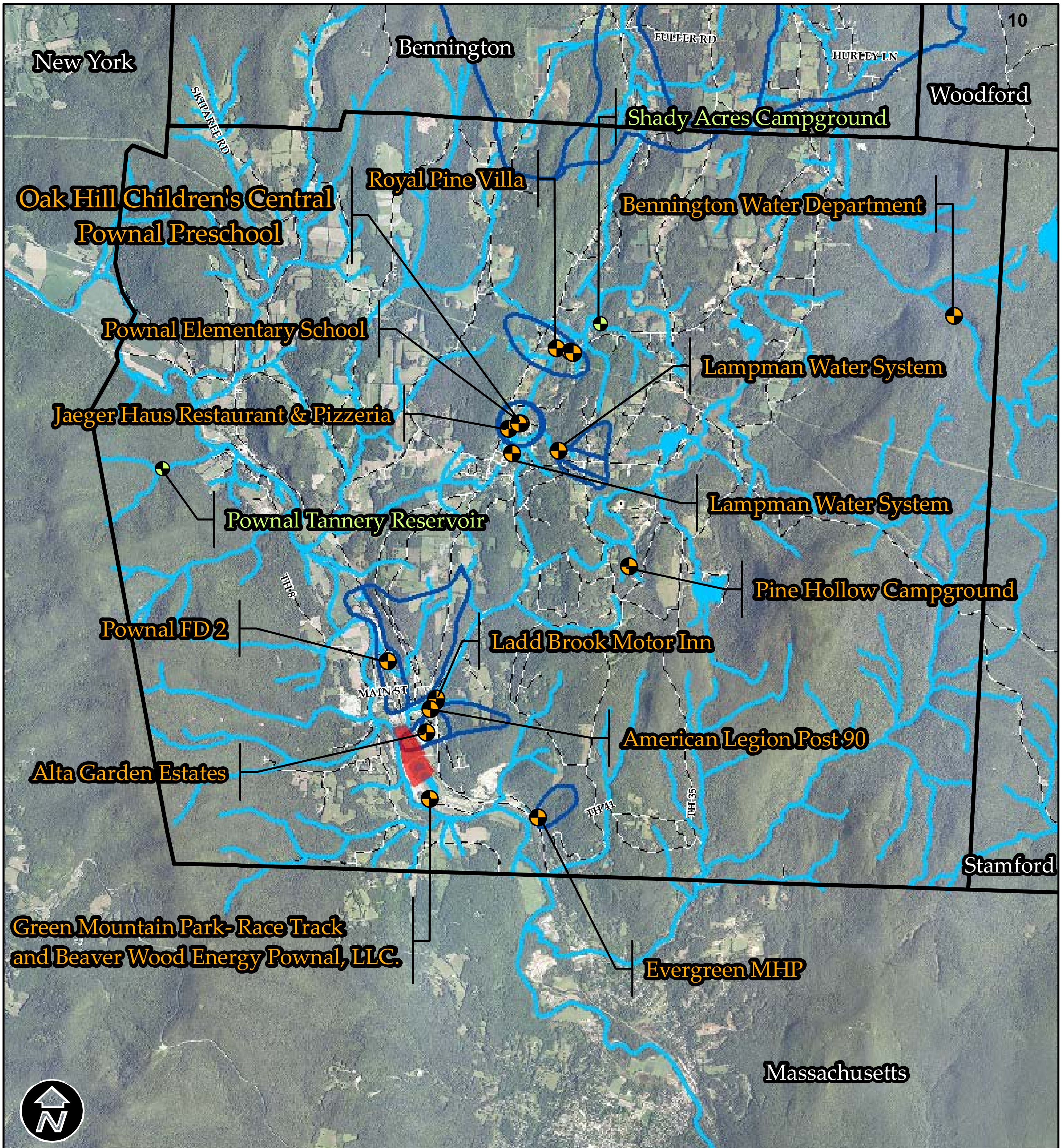
- Bennington Regional Planning Commission
  Bennington County Regional Commission
  111 South Street, Suite 203
  Bennington, Vermont 05201

- All other active Public Water Systems in Pownal (see map, page 10 of this Appendix and list on page 11.)

- Landowners and Mobile Home Park residents within the project well's Estimated Area of Influence (see map, page 12 of this appendix)
  Progress Partners, Ltd
  158 Westmoreland Ave.
  White Plains, NY 10606

- Voluntarily, notification will be sent to all landowners within 3,000 feet of the well, even if beyond the Estimated Area of Influence (see map, page 13 of this Appendix)

- Voluntarily, notification will be sent to interested parties who have requested to be informed (see list, page 15 of this Appendix)



Legend

- Active Public Water Source
- Former Public Water Source: Currently Inactive
- Town Boundary
- Beaver Wood Project Area
- Groundwater Source Protection Area
- Streams (VHD)
- Waterbody (VHD)
- Roads

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Beaver Wood Energy Pownal, LLC.
Pownal, Vermont
Pownal Public Water Sources Map

October 5, 2010

6,000 3,000 0 6,000 Feet

Prepared by: MJS

Sources: Background - USDA NAIP Orthophoto - Bennington (2009); Streams and Waterbodies from Vt. Hydrography dataset and VCGI (2008); Public Water Source from VTANR (2010); Groundwater SPAs obtained from Roads obtained from VTrans (2008); Town Boundary from VTANR Environmental Interest Locator (2010), VCGI (2008). Project Parcel Boundary from Bennington County Regional Planning Commission (2006).

Vanasse Hangen Brustlin, Inc.

Beaver Wood Energy Pownal, LLC.

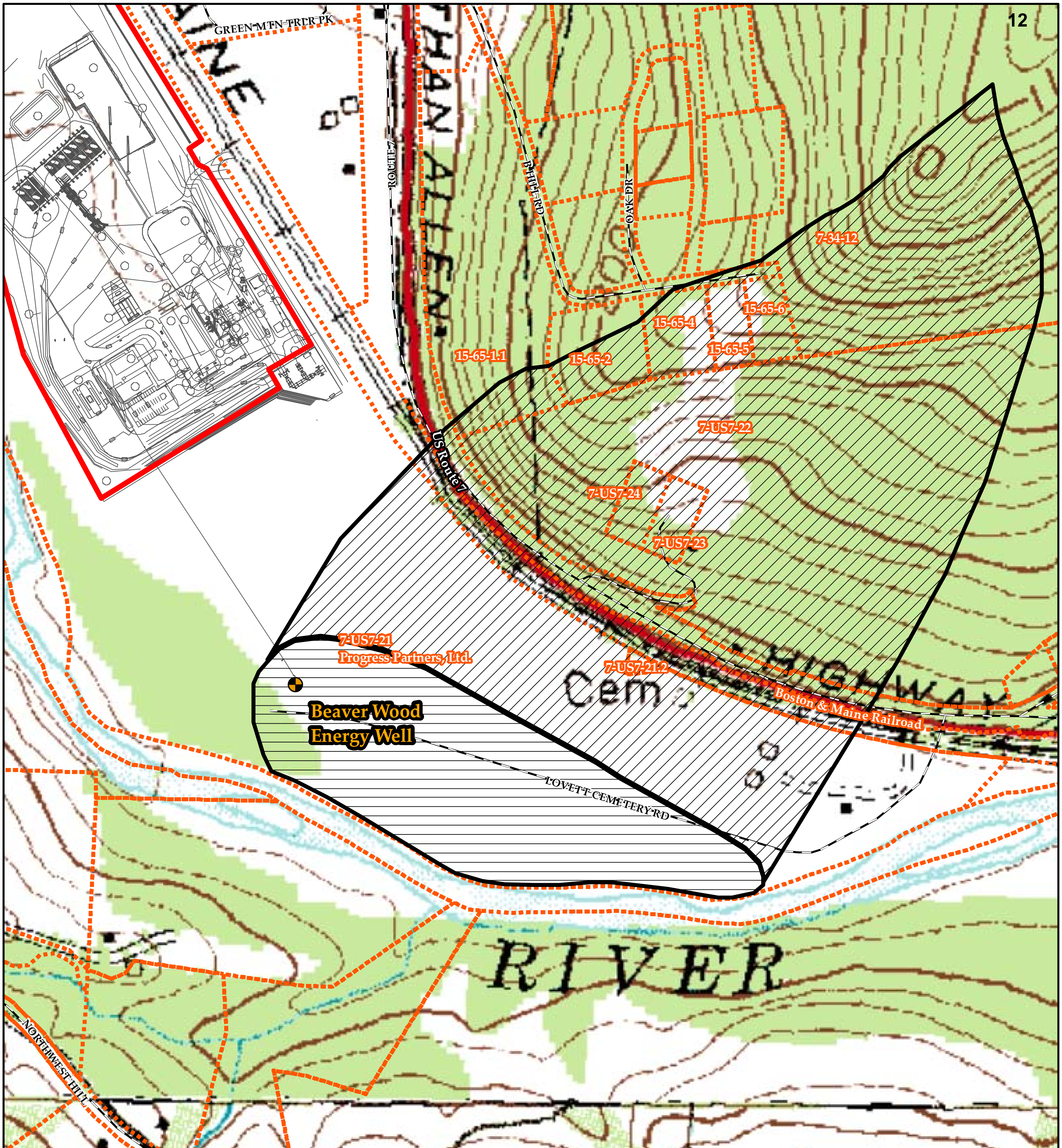
Public Notification for Groundwater Withdrawal Permit

Current Public Water Systems in Pownal

WSID #	System Name	Type of System	Number of Water Sources in Pownal	Types of Water Sources	Owner Name	Owner Mailing Address	Owner Phone Number
1269	Jaeger Haus Restaurant & Pizzeria	TNC	1	Well Point	Roger Szekeres	2848 Route 7, Pownal, VT 05261	823-5200
4076	Ladd Brook Motor Inn	TNC	2	Bedrock Well and Dug Well	Paul Kamal	Route 7, Pownal, VT 05261	261-5233
5016	Bennington Water Department	PCWS	1	Pond	Town of Bennington	205 South St., Bennington, VT 05201	442-1037
5026	Lampman Water System	PCWS	2	Spring and Bedrock Well	Scott Lampman	PO Box 45, Pownal, VT 05261	823-5222
5027	Royal Pine Villa	PCWS	3	Bedrock Well	Roy Leon	PO Box 168, Pownal, VT 05261	442-5079
5628	Alta Gardens Estates	PCWS	1	Bedrock Well	Alta Gardens	101 Tremont St, Barre, VT 05641	476-7683
5645	Evergreen MHP	PCWS	1	Gravel Well	Blake Marnetta	2346 Mason Hill Rd., Pownal, VT 05261	823-5036
6665	Pownal Elementary School	NTNC	1	Bedrock Well	Pownal Elementary School	94 Schoolhouse Rd, Pownal, VT 05261	823-7333
8152	Pine Hollow Campground	TNC	1	Bedrock Well	Ronald Luazon	342 Pine HollowRd., Pownal, VT 05261	823-5569
20734	Pownal FD 2	PCWS	1	Gravel Well	Alex Densamsonow	PO Box 350, Pownal, VT 05261	823-9351
20904	Oak Hill Children's Center Pownal Preschool	NTNC	1	Bedrock Well (221 ft)	Gail Tanzman	PO Box 152, Pownal, VT 05261	823-4626
21059	American Legion Post 90	TNC	1	Bedrock Well	American Legion	PO Box 35, Pownal, VT 05261	823-7839

Former Public Water Systems: Not current active

WSID #	System Name	Type of System	Number of Water Sources in Pownal	Types of Water Sources
5479	Pownal Tannery Reservoir	PCWS	1	Brook Impoundment
8101	Shady Acres Campground	TNC	1	Bedrock Well



Legend

- Public Water Source
- Estimated Area of Influence
- Additional Recharge Area
- Project Lease Line
- Parcel Boundaries
- Proposed Site Plan
- Roads

N W E S

Beaver Wood Energy Pownal, LLC. Landowners Within Estimated Area of Influence

October 12, 2010

500 250 0 500 Feet

Sources: Background - USGS Topographical Quadrangle - North Pownal (2005); public water sources from VTANR (2010); Parcel Boundaries obtained from Bennington County Regional Planning Commission (2006); Roads obtained from VTrans (2008); Source Site Plan providedby Bruno Associates (9/2/2010); Estimated Area of Influence and Additional Recharge Area by VHB (2010).

VHB *Vanasse Hangen Brustlin, Inc.*

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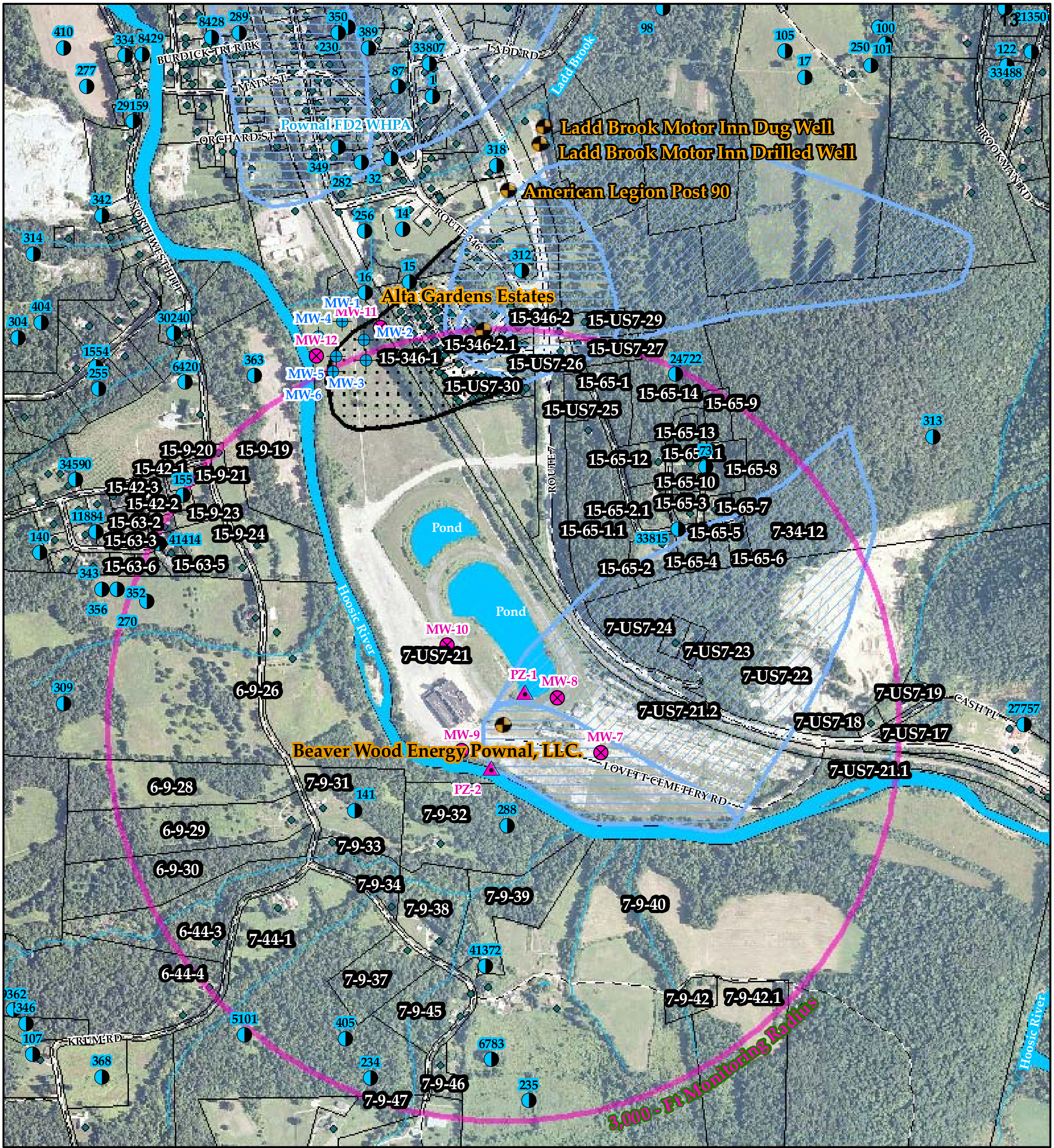
Prepared by: MJS/LBS



Legend

- Public Water Source
- Private Wells (Approx Location)

Monitoring Well

- Existing
- Proposed
- Proposed Piezometer

- WHPA Zone 1
- WHPA Zone 2
- WHPA Zone 3: Recharge Area
- WHPA Zone 3
- Parcel Boundaries
- Streams (VHD)
- Waterbody (VHD)
- Roads
- 911 Address Site

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Beaver Wood Energy Pownal, LLC.
3000-Foot Monitoring Radius: Well Testing and Parcel Map

October 11, 2010

1,000 500 0 1,000 Feet

F:\57407.03\GIS\Project\Parcels_PrivateWells.mxd

Prepared by: MJS

Sources: Background - USDA NAIP Orthophoto - Bennington (2009); Streams and Waterbodies from Vt. Hydrography Dataset and VCGI (2008); Public and Private Wells and WHPAs from VTANR (2010); Monitoring Wells delineated by VHB (2010); Investigation Area delineated by VHB (2010); Parcel Boundaries from Bennington County Regional Planning Commission (2006); 911 Address Sites from VCGI (2010). Roads from VTrans (2008).

VHB *Vanasse Hangen Brustlin, Inc.*

Beaver Wood Energy Pownal LLC.
Groundwater Withdrawal Testing: Existing Gravel Well at the Green Mtn Race Track
Address List: All Landowners Within 3,000 Feet of the Project Well
VHB 10/15/2010

Parcel #	Site Address	Owner	Mailing Address			
15-346-1	Post Drive	Alta Gardens Estates	101 Tremont Street	Barre	VT	05641-3507
15-346-2	41 Post Drive	Walter Adams	PO Box 62	Pownal	VT	05261-0062
15-346-2.1	61 Post Drive	Stacey Adams	PO Box 534	Pownal	VT	05261-0534
15-42-1	31 Montgomery Road	Richard Dorman	31 Montgomery Road	Pownal	VT	05261-9458
15-42-2	63 Montgomery Road	Linda Burlak	63 Montgomery Road	Pownal	VT	05261-9458
15-42-3	79 Montgomery Road	Barbara Harwood	79 Montgomery Road	Pownal	VT	05261-9458
15-63-2	67 Valley View Drive	Cheryl Palmer	67 Valley View Drive	Pownal	VT	05261-9464
15-63-3	91 Valley View Drive	Mark Atherton	91 Valley View Drive	Pownal	VT	05621-9464
15-63-5	101 Valley View Drive	Robert Wilcox	101 Valley View Drive	Pownal	VT	05261-9463
15-63-6	105 Valley View Drive	Harry Beals, Jr.	105 Valley View Drive	Pownal	VT	05261-9463
15-65-1	87 B Hill Road	Bishop Gary	PO Box 58	Pownal	VT	05261-0058
15-65-1.1	96 B Hill Road	Michael Morneault	PO Box 275	Pownal	VT	05261-0275
15-65-10	50 Oak Drive	David Hall	PO Box 244	Pownal	VT	05261-0244
15-65-11	86 Oak Drive	Andrew Dequasie	PO Box 211	Pownal	VT	05261-0211
15-65-12	83 Oak Drive	Brian Barcomb	PO Box 336	Pownal	VT	05261-0336
15-65-13	90 Oak Drive	James Carey	PO Box 7	Pownal	VT	05261-0007
15-65-14	183 Oak Drive	Robert Gallese	PO Box 402	Pownal	VT	05261-0402
15-65-2	320 B Hill Road	Robert Clermont	320 B Hill Road	Pownal	VT	05261
15-65-2.1	B Hill Road	Marjorie Hurley	457 Middle Pownal Road	Pownal	VT	05261
15-65-3	369 B Hill Road	John Werner	PO Box 28	Pownal	VT	05261-0028
15-65-4	364 B Hill Road	Jean Hall	PO Box 144	Pownal	VT	05261-0144
15-65-5	B Hill Road	Anthony Iannuccillo	5 Wood Dale Road	Ballston Lake	NY	12019-9359
15-65-6	382 B Hill Road	George Klemm	111 North Street	Williamstown	VT	01267-2042
15-65-7	377 B Hill Road	James Cirillo	PO Box 47	Pownal	VT	05261-0047
15-65-8	379 B Hill Road	John Holovach	PO Box 15	Pownal	VT	05261-0015
15-65-9	B Hill Road	Vincent Freccia, Jr.	11 Westwood Place	Stamford	VT	06902-1419
15-9-19	498 Northest Hill Road	Terry Pollert	498 Northwest Hill Road	Pownal	VT	05261-9435
15-9-20	555 Northwest Hill Road	Janet Schutzman	555 Northwest Hill Road	Pownal	VT	05261-9451
15-9-21	598 Northwest Hill Road	Norman Chaffee	598 Northwest Hill Road	Pownal	VT	05261-9436
15-9-23	652 Northwest Hill Road	Bert Atherton	652 Northwest Hill Road	Pownal	VT	05261-9453
15-9-24	719 Montgomery Road	Irving Tanzman	719 Northwest Hill Road	Pownal	VT	05261-9450
15-US7-25	6275 Route 7	Keith Pedercini	PO Box 167	Pownal	VT	05261-0167
15-US7-26	6213 Route 7	Gary Jelley	PO Box 176	North Pownal	VT	05260-0176
15-US7-27	23 B Hill Road	Ronald George	PO Box 98	North Pownal	VT	05260-0098
15-US7-29	6185 Route 7	James Winchester	PO Box 22	Pownal	VT	05261-0022
15-US7-30	Route 7	Millard Mobile Home Park, LLC.	34 Ashland Street	North Adams	MA	01247
6-44-3	180 Krum Road	Michael Hartman	180 Krum Road	Pownal	VT	05261-9461
6-44-4	242 Krum Road	Mark Miller	242 Krum Road	Pownal	VT	05261-9461
6-9-26	824 Northwest Hill Road	Deborah Nicholas	PO Box 178	Pownal	VT	05261-0178
6-9-28	Northwest Hill Road	David Walsh	136 C Shore Road	Peabody	MA	01960-3062
6-9-29	1104 Northwest Hill Road	Kenneth Held	1104 Northwest Hill Road	Pownal	VT	05261-9438
6-9-30	Northwest Hill Road	Deborah Nicholas	PO Box 178	Pownal	VT	05261-0178
7-34-12	1000 Brookman Road	William Strong	Mason Hill Mgt c/o WM Strong 477 Madison Ave 8th Floor	New York	NY	10022-6803
7-44-1	57 Krum Road	Gregory Maret	57 Krum Road	Pownal	VT	05261-9467
7-9-31	1125 Northwest Hill Road	Louis Canto	1125 Northwest Hill Road	Pownal	VT	05261-9448
7-9-32	1151 Northwest Hill Road	Pamela Lyttle	1151 Northwest Hill Road	Pownal	VT	05261-9448
7-9-33	1149 Northwest Hill Road	Susan Burgess	1149 Northwest Hill Road	Pownal	VT	05261-9448
7-9-34	1331 Northwest Hill Road	Jamyn Burgess	1331 Northwest Hill Road	Pownal	VT	05261-9447
7-9-37	1374 Northwest Hill Road	Karin Lubeck	1374 Northwest Hill Road	Pownal	VT	05261-9439
7-9-38	1427 Northwest Hill Road	Ryan Bottesi	1427 Northwest Hill Road	Pownal	VT	05261-9446
7-9-39	1503 Northwest Hill Road	Deanna Peaslee	1503 Northwest Hill Road	Pownal	VT	05261-9445
7-9-40	24 Poor Mans Road	Shelley Porter	24 Poor Mans Road	Pownal	VT	05261-9473
7-9-42	625 Poor Mans Road	Howard Maturski	625 Poor Mans Road	Pownal	VT	05261-9472
7-9-42.1	Northwest Hill Road	Harry Beals, Jr.	105 Valley View Drive	Pownal	VT	05261-9463
7-9-45	1546 Northwest Hill Road	Wilfred Labonte	1546 Northwest Hill Road	Pownal	VT	05261-9441
7-9-46	1633 Northwest Hill Road	Timothy Sedlock	1633 Northwest Hill Road	Pownal	VT	05261-9444
7-9-47	1744 Northwest Hill Road	Rosamond Smithers	1744 Northwest Hill Road	Pownal	VT	05261-9442
7-US7-17	7275 US Route 7	Janet Tornabene	7275 Route 7	Pownal	VT	05261-9494
7-US7-18	21 Cash Place	Cherie Smith	21 Cash Place	Pownal	VT	05261-9214
7-US7-19	79 Cash Place	Russell Pembroke	PO Box 330	Pownal	VT	05261-0330
7-US7-21	Route 7	Progress Partners, Ltd.	158 Westmoreland Ave	White Plains	NY	10606
7-US7-21.1	Route 7	John & Heather Tietgens	473 Main Steet	Stamford	VT	05352
7-US7-21.2	Route 7	Town of Pownal	467 Center Street	Pownal	VT	05261
7-US7-22	Route 7	Stephen Hart	24 Walnut Steet	Williamstown	MA	01267-2266
7-US7-23	141 Purcell Road	Michelyne Pinard	141 Purcell Road	Pownal	VT	05261
7-US7-24	136 Purcell Road	Robert Sweet	136 Purcell Dugway	Pownal	VT	05261

Mailing List – Interested Parties 9/23/2010 Informational Hearing for Groundwater Withdrawal Permit					
Name	**Address**				**Email**
Joan Soucie	136 Green Mountain	Pownal	VT	05261	
Penelope Fehr	239 Skyboro Road	Pownal	VT	05261	pfehr@comcast.net
Jeanne Davis	173 Pratt Road	Pownal	VT	05261	
Eve Pearce	141 Carpenter Hill	Bennington	VT	05201	
Rep. Bill Botzow					botzow@sover.net
Keith Whitcomb, Jr. Reporter Bennington Banner	425 Main Street	Bennington	VT	05201	kwhitcomb@benningtonbanner.com

Notice of Application for Groundwater Withdrawal Permit (Act 199)

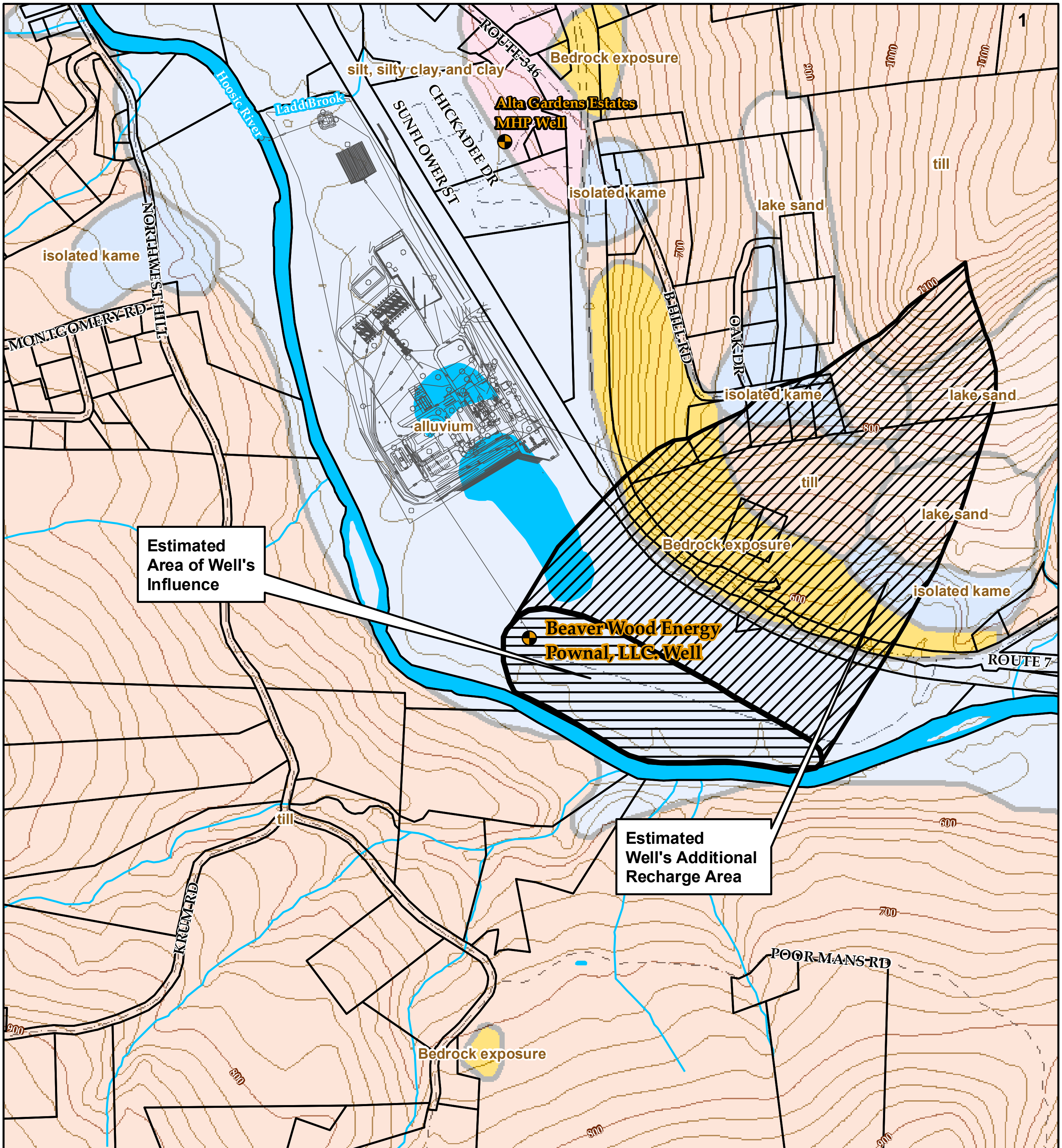
PLEASE TAKE NOTE that Beaver Wood Energy Pownal, LLC has applied for a permit application for a Groundwater Withdrawal Permit from the Vermont Agency of Natural Resources, in order to utilize an existing drilled well as a backup source of water for a proposed biomass energy plant at the former race track site in Pownal. The proposed withdrawal rate is estimated to be 72 gallons per minute on average, and 465 gpm on peak days.

The proposed withdrawal is located at the former Green Mountain Race Track on Lovett Cemetery Road in Pownal.

Full copies of the application may be reviewed at the Pownal Town Office and the Vermont Water Supply Division office in Waterbury. A public comment period is open for 30 days from the date of the application, ending on November 24, 2010. Comments shall be directed to the Water Supply Division at the address below.

<u>Contact information:</u>
Dennis Nealon
Vermont ANR, Water Supply Division
103 South Main Street
Old Pantry Building
Waterbury, VT 05671-0403

APPENDIX 2



Legend

Public Water Source	Surficial Geology	
Estimated Area of Influence		al
Estimated Additional Recharge Area		k
Parcel Boundaries		ls
Streams (VHD)		stc
Waterbody (VHD)		t
Roads		r
Contour - 20 ft		
Contour - 100 ft		

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Beaver Wood Energy Pownal, LLC.
Groundwater Withdrawal Evaluation
Surficial Geologic Map

October 12, 2010

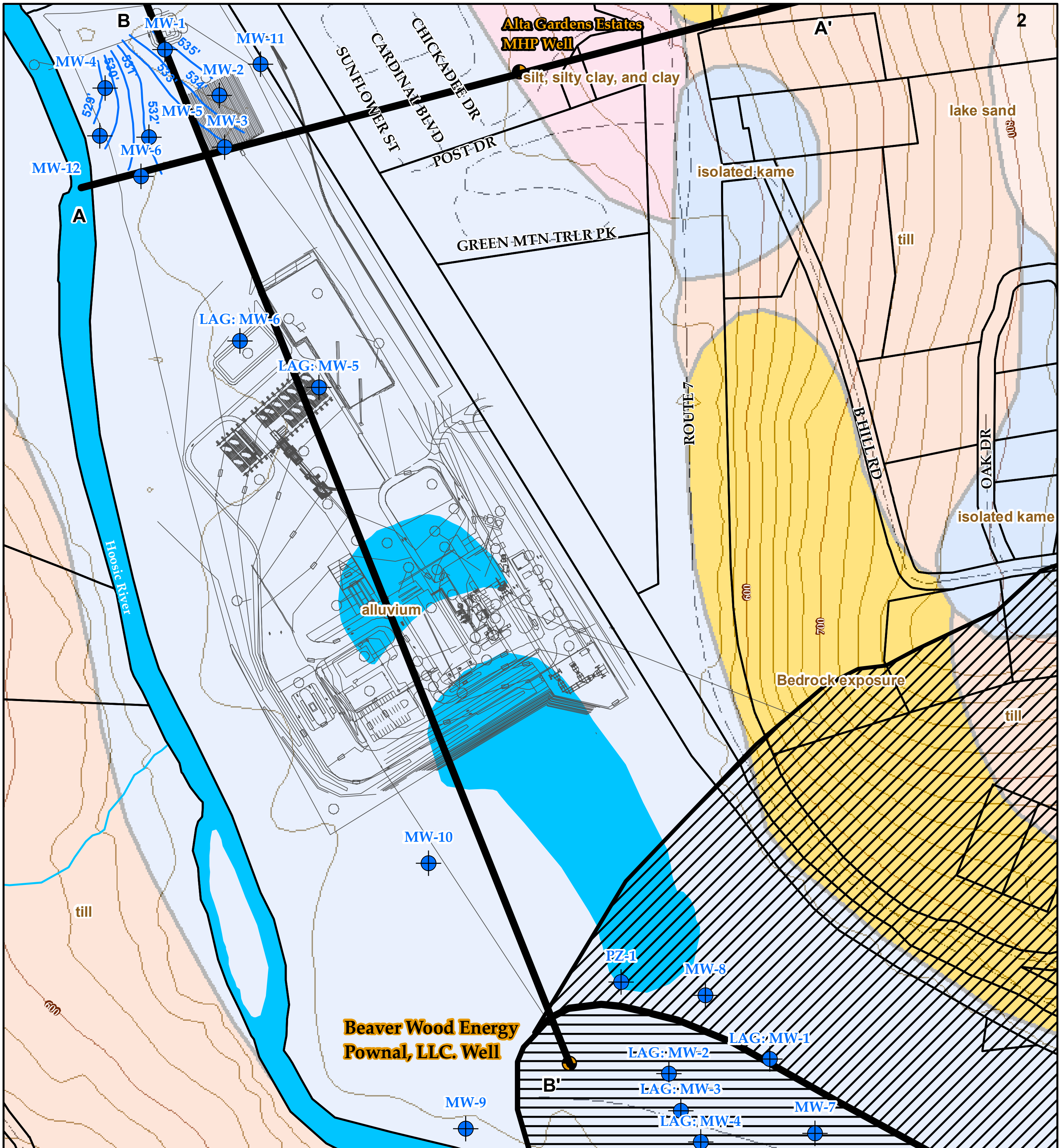
800 400 0 800 Feet

Prepared by: MJS/LBS

Sources: Surficial Geology from Surficial Geologic Map of Vermont (2008); Streams and Waterbodies from Vt. Hydrography dataset and VCGI (2008); Public Water Sources from VTANR (2010); parcel boundaries obtained from Bennington County Regional Planning Commission (2006); Roads obtained from VTrans (2008); Source Site Plan provided by Bruno Associates (9/2/2010); Topographic contours, Area of Influence and Additional Recharge Area by VHB (2010).

N W E S

VHB Vanasse Hangen Brustlin, Inc.



Legend

- Public Water Source
- Estimated Area of Influence
- Estimated Additional Recharge Area
- Monitoring Well
- Groundwater Contour
- Streams (VHD)
- Waterbody (VHD)
- Contour - 20 ft
- Contour - 100 ft
- Roads

Surficial Geology

- al
- k
- ls
- stc
- t
- r

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Beaver Wood Energy Pownal, LLC.
Groundwater Withdrawal Evaluation
Cross-Section Reference Map: Monitoring Wells

October 12, 2010

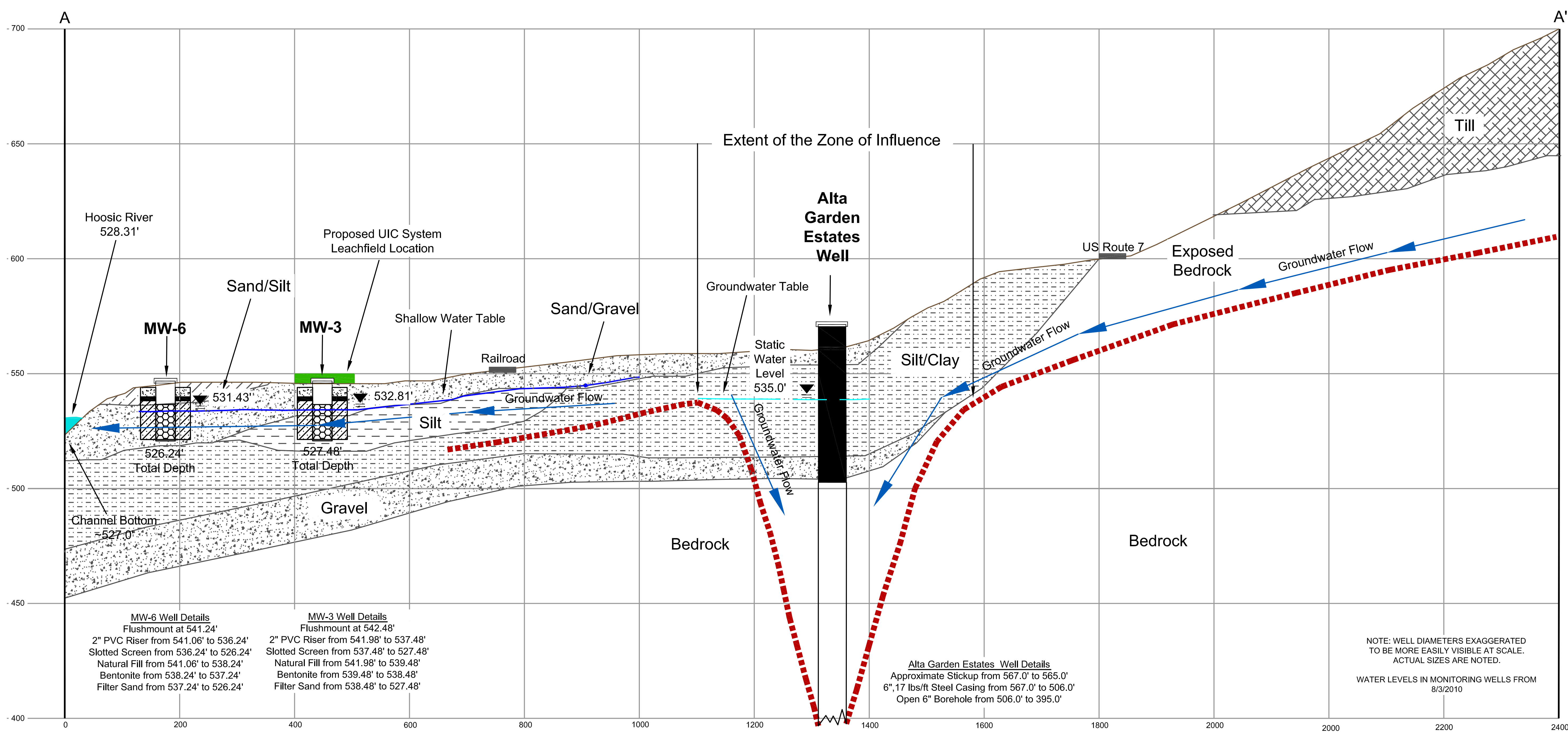
400 200 0 400
Feet

Prepared by: MJS/LBS

Sources: Surficial Geology from Surficial Geologic Map of Vermont (2008); Streams and Waterbodies from Vt. Hydrography dataset and VCGI (2008); Public Water Sources from VTANR (2010); parcel boundaries obtained from Bennington County Regional Planning Commission (2006); Roads obtained from VTrans (2008); Source Site Plan provided by Bruno Associates (9/6/2010); Topographic & groundwater contours, Cross-Sections, Monitor Wells, and Area of Influence and Additional Recharge Area by VHB (2010). LAG Monitor wells from Lincoln Applied Geology (1995).

N E S W

VHB Vanasse Hangen Brustlin, Inc.



PROJECT NO.	57407.00	REVISIONS		
DATE	9-20-2010	NO.	DATE	REMARKS
DRAWN BY	LBS			
DESIGNED BY	LBS			
CHECKED BY	MJP			
SCALE	AS NOTED			

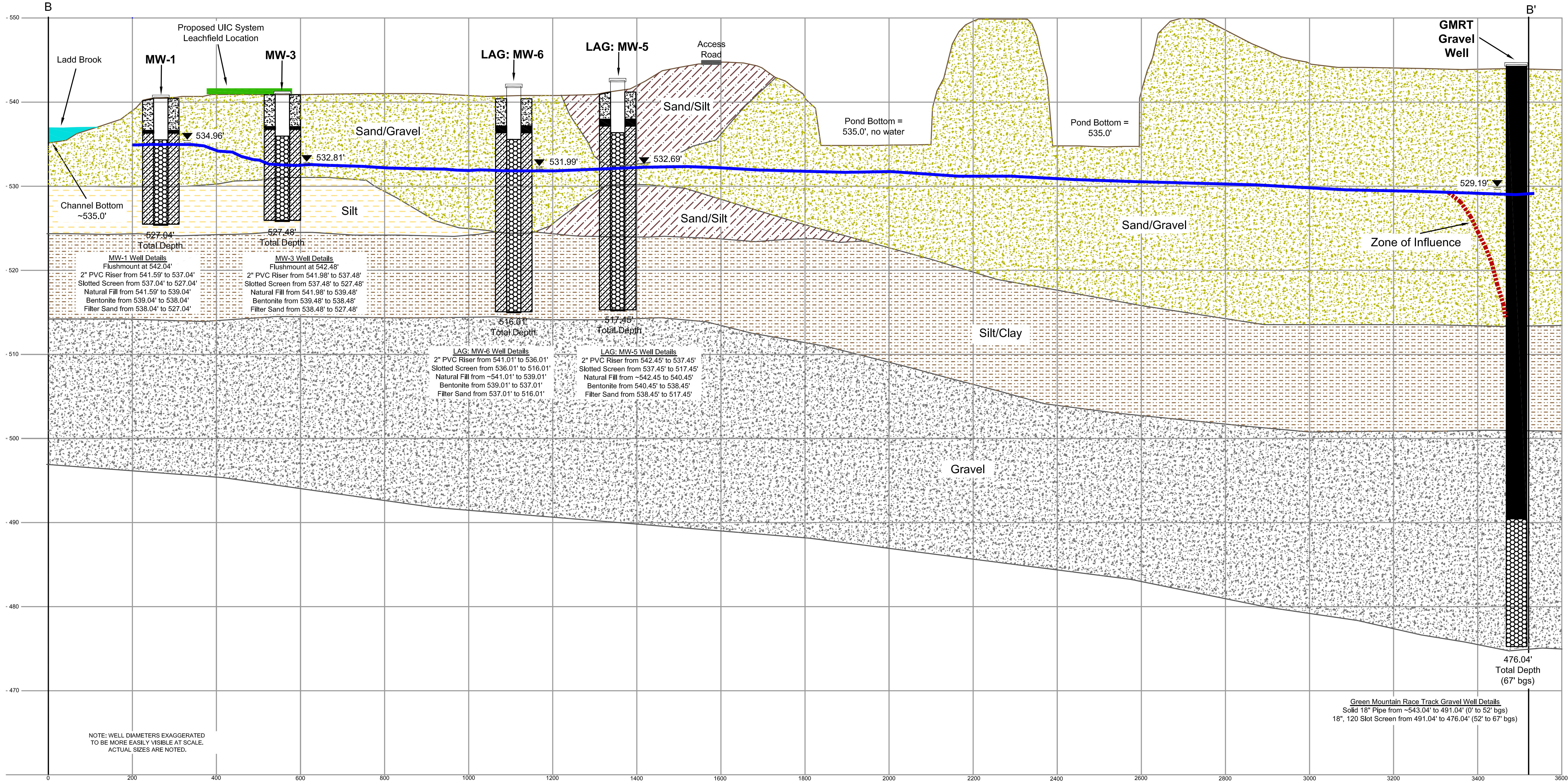
FILE PATH: F:\57407.00\cad\A-prjdwg\BWE Cross Sections.dwg

VHB Vanasse Hangen Brustlin, Inc.

Beaver Wood Energy, LLC.
Pownal, Vermont
Cross Section A-A'

SCALES:
VERTICAL SCALE = 50'
HORIZONTAL SCALE = 200'

SHEET/DRAWING NO.
1.0



PROJECT NO.	57407.00	REVISIONS		
DATE	9-20-2010	NO.	DATE	REMARKS
DRAWN BY	LBS			
DESIGNED BY	LBS			
CHECKED BY	MJP			
SCALE	AS NOTED			

FILE PATH: F:\57407.00\cad\A-prjdwg\BWE Cross Sections.dwg

VHB Vanasse Hangen Brustlin, Inc.

Beaver Wood Energy, LLC.
Pownal, Vermont
Cross Section B-B'

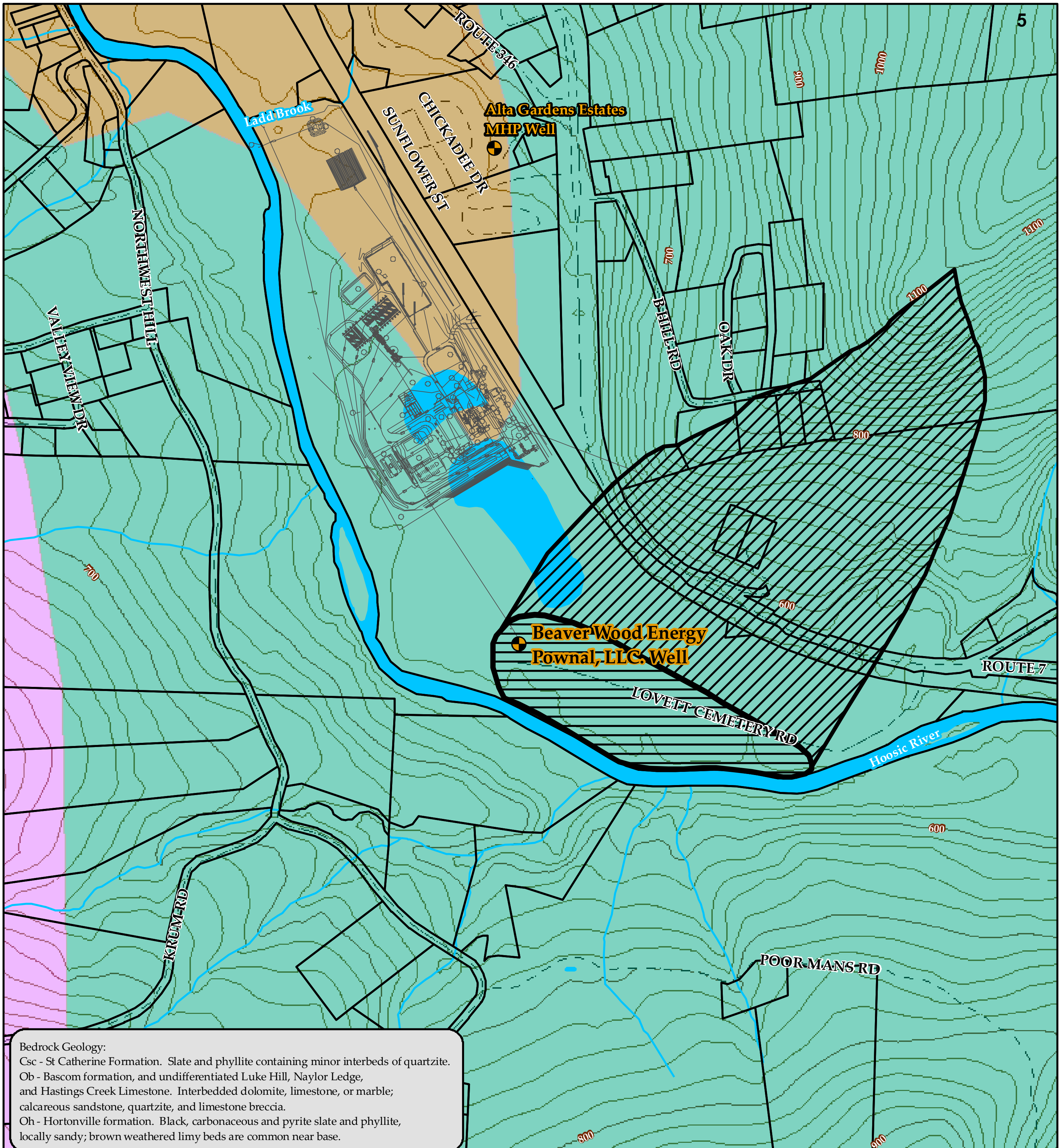
SCALES:

VERTICAL SCALE = 10'

HORIZONTAL SCALE = 200'

SHEET/DRAWING NO.

1.0



Legend

- Public Water Source
- Estimated Area of Influence
- Estimated Additional Recharge Area
- Streams (VHD)
- Waterbody (VHD)
- Contour - 20 ft
- Contour - 100 ft
- Roads

Bedrock Geology

- Csc
- Ob
- Oh

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Beaver Wood Energy Pownal, LLC.
Groundwater Withdrawal Evaluation
Bedrock Geologic Wells

October 12, 2010

800 400 0 800 Feet

Prepared by: MJS/LBS

Sources: Bedrock Geology from Centennial Geologic Map of Vermont (1961); Streams and Waterbodies from Vt. Hydrography dataset and VCGI (2008); Public Water Sources from VTANR (2010); parcel boundaries obtained from Bennington County Regional Planning Commission (2006); Roads obtained from VTrans (2008); Source Site Plan provided by Bruno Associates (9/2/2010); Topographic contours, Area of Influence and Additional Recharge Area by VHB (2010).

N E S W

VHB Vanasse Hangen Brustlin, Inc.

MAY 31 1962 6

Name of Driller Wm Cummings Names of Helpers Fred Finlay

Job: Name & Location De Mattis Construction Pownal Vt Race Track

Date Started 5-7-62 Date Finished 5-25-62 | Date Started Date Finished

Hole No. 1 24" x 18" Gravel Packed Well | Hole No.

Depth From	Depth To	Classification of Material	
0'	12'	top soil + Gravel	Feet of Screen Exposed 15'-0"
12'	30'	Hard Pan + Stone	Size of Screen & Slot 18" Screen 120 Slot
30'	41'	Clay + Silt	
41'	48'	Med. Gravel	Screen Left in ✓
48'	57'	Med. Gravel	
57'	64'	Med. Gravel	Screen Pulled Out
64'	67'	Sharp Light Gravel	
		Total depth of Well 67'-0"	Pipe Left in ✓ 52'-0 18"
			Pipe Pulled Out
			Remarks

Depth From	Depth To	Classification of Material	
			Feet of Screen Exposed
			Size of Screen & Slot
			Screen Left in
			Screen Pulled Out
			Pipe Left in
			Pipe Pulled Out
			Remarks

Pump Test on Hole No.

Date	Time	Dr. Down	G. P. M.	Static and Other Info.

Pump Test on Hole No.

Date	Time	Dr. Down	G. P. M.	Static and Other Info.

Monitoring Well Logs
Pownal, Vermont: Beaver Wood
Logged by OWM
July 26, 27 2010

Monitoring Well ID	Sampled Interval Log
MW-1	5.0 – 7.0’: Dark brown, moist, fine to coarse gravel.
	10.0 – 12.0’: Brown, saturated, fine to coarse gravel, sand.
	15.0 – 17.0’: Brown, saturated, fine to coarse gravel, sand at 15.25’ Gray, saturated, very fine sand, trace silt at 15.25’ to 15.7’. Light brown, saturated, very fine sand, trace silt at 15.7’ to 16.4.
	Well Construction Details: • *2” PVC pipe* • *Stick down = -0.45’* • *Well Depth = 15.0’* • *Filter sand = 4.0’ – 15.0’* • *Bentonite seal = 3.0’ – 4.0’* • *Natural backfill = surface – 3.0* • *Water level (BTP) = 6.38’*
MW-2	5.0 – 7.0’: Light brown, some gray and orange, damp, fine to medium sand at 5’-6.1’ Light brown, damp, coarse sand, fine gravel at 6.1’ to 6.6’
	10.0 – 12.0’:Light brown, some gray, saturated, fine to coarse gravel, trace sand, cobble.
	15.0 – 17.0’: Light brown, saturated, fine to coarse gravel at 15’ to15.2’. Light brown, saturated, very fine sand, trace silt at 15.2’ to16.5’. Light brown, saturated, more silt, very fine sand at 16.5’ 16.7’
	Well Construction Details: • *2” PVC pipe* • *Stick down = -0.55’* • *Well Depth = 15.0’* • *Filter sand = 4.0’ – 15.0’* • *Bentonite seal = 3.0’ – 4.0’* • *Natural backfill = surface – 3.0’* • *Water level (BTP) = 7.7’*
MW-3	5.0 – 7.0’ : Brown, damp, fine to medium sand, some gravel. Light brown, damp, fine to medium sand at 5.2’ to 6.25’.
	10.0 – 12.0’: No recovery, wet.
	15.0 – 17.0’: Light brown, gray, saturated, silt with trace very fine sand.
	Well Construction Details: • *2” PVC pipe* • *Stick down = -0.50’* • *Well depth = 15.0’* • *Filter sand = 4.0’ – 15.0’* • *Bentonite seal = 3.0’ – 4.0’*

Monitoring Well Logs Pownal, Vermont: Beaver Wood Logged by OWM July 26, 27 2010 VHB PIONEER	
Monitoring Well ID	**Sampled Interval Log**
	• *Natural backfill = surface – 3.0* • *Water level (BTP) = 8.9'*
MW-4	5.0 – 7.0': Gray with some orange, damp, fine to coarse gravel from 5.0' to 5.2'. Gray silt from 5.2' to 6.7'
	10.0 – 12.0': No recovery, wet.
	15.0 – 17.0': Light brown, very orange at 15.3, saturated, silt with some medium gravel at 15.0' to 15.1'
	18.0' – 20.0':Gray at 18.0'-18.6', saturated, gray silt, some fine sand. Light brown at 18.6'-19.6' saturated, silt
	Well Construction Details: • *2" PVC pipe* • *Stick down = -0.52'* • *Well depth = 18.0'* • *Filter sand = 7.0'-18.0'* • *Bentonite seal = 6.0'-7.0'* • *Natural backfill = surface – 6.0'* • *Water level (BTP) = 10.9'*
MW-5	5.0 – 7.0': Light brown with some orange, moist, fine to medium sand, gravel at 5.0-5.2'
	10.0 – 12.0': Brown with some orange, saturated, medium to coarse gravel, trace sand, broken rock.
	15.0' – 17.0': Brown and gray, saturated, some fine gravel, trace sand, silt at 15.0' – 15.6'. Gray, saturated, silt at 15.6' – 16.4'.
	Well Construction Details: • *2" PVC pipe* • *Stick down = -0.25'* • *Well depth = 15.0'* • *Filter sand = 4.0 – 15.0'* • *Bentonite seal = 3.0 – 4.0'* • *Natural backfill = surface – 3.0'* • *Water level (BTP) = 8.6'*
MW-6	5.0' – 7.0': Light brown, some orange, damp, fine sand throughout, some coarse gravel at 5.0' – 5.2'.
	10.0' – 12.0': Light brown, saturated, fine sand to coarse gravel, some larger gravel. Fine sand from 10.0' – 10.2'.
	15.0' – 17.0': Brown, saturated, fine to medium sand, medium to coarse

Monitoring Well Logs Pownal, Vermont: Beaver Wood Logged by OWM July 26, 27 2010 VHB PIONEER	
Monitoring Well ID	**Sampled Interval Log**
	gravel. Fine to medium sand from 15.0' to 15.3'
	Well Construction Details: • *2" PVC pipe* • *Stick down = -0.18'* • *Well depth =15.0'* • *Filter sand = 4.0' – 15.0'* • *Bentonite seal = 3.0' – 4.0'* • *Natural backfill = surface – 3.0'* • *Water level (BTP) = 9.28*

SPECIALTY DRILLING & INVESTIGATION

P.O. BOX 4503
BURLINGTON, VT
05406-4503
T: 802-658-0820
F: 802-860-1014

BORING NUMBER: MW-1

Sheet 1 of 1

PROJECT NAME: S/VHB BEAVERWOOD

PROJECT LOCATION: POWNEL, VERMONT

SOIL BORING LOG

BORING LOCATION: NORTHEAST CORNER

DATE AND TIME STARTED: 7/26/10 @ 0930 — RIG HOURS METER START: 7756.6

FOREMAN: CHRIS ALDRICH — H & N STAFF: CHRIS ALDRICH & JOHN MCTERNAN

DATE AND TIME COMPLETED: 7/26/10 @ 1100 — RIG HOURS METER END: 7758.1

BORING METHOD: 4 1/4 HOLLOW STEM AUGER — 2 1/4 H S A — 6 1/4 H S A — WASH/SPIN and DRIVE — AIR HAMMER

SAMPLING METHOD: SPLIT SPOON — DIRECT PUSH — CUTTINGS — BACKHOE — HAND AUGER

SIZE: 24" — HAMMER: 140 LB. — FALL: 30"

NO.	REC. (IN.)	DEPTH (FT.)	BLOWS	SAMPLE DESCRIPTION	STRATA CHANGE	PID
1	12	5-7	15,19,15,15	SAND, GRAVEL.		
2	8	10-12	21,22,25,22	SATURATED SAND/GRAVEL.		
	18	15-17	11,10,11,13	AS ABOVE, GRAY SILT.		
				SET 2" PVC WELL TO 15'.		

WELL CONSTRUCTION DETAILS

PVC Screen: 2 in. diameter — Slot: 0.010 — Sections: 10' — Set from: 15 to 5

PVC Riser: 2 in. diameter — Sections: 4.5' — Set from: 5 to -5

Filter Sock: ______ — Stick up: -5"

Sand Pack: 15 to 4 — bags 6 — Cap ______

Bentonite Seal: 4 to 3 — bags 1/2 — Plug √

Grout seal: ______ to ______ — bags ______ — Gripper √

Well Finish: √ Flush ______ Guard — BTW ______ — Native Backfill: 3 to 0

SPECIALTY DRILLING & INVESTIGATION
P.O. BOX 4503
BURLINGTON, VT
05406-4503
T: 802-658-0820
F: 802-860-1014

BORING NUMBER: MW-2 Sheet 1 of 1

PROJECT NAME: S/VHB BEAVERWOOD

PROJECT LOCATION: POWNEL, VERMONT

SOIL BORING LOG

BORING LOCATION: MIDDLE EAST SIDE

DATE AND TIME STARTED: 7/26/10 @ 1125 RIG HOURS METER START: 7758.1

FOREMAN: CHRIS ALDRICH H & N STAFF: CHRIS ALDRICH & JOHN MCTERNAN

DATE AND TIME COMPLETED: 7/26/10 @ 1230 RIG HOURS METER END: 7759.4

BORING METHOD: **4 1/4 HOLLOW STEM AUGER** 2 1/4 H S A 6 1/4 H S A WASH/SPIN and DRIVE AIR HAMMER

SAMPLING METHOD: **SPLIT SPOON** DIRECT PUSH CUTTINGS BACKHOE HAND AUGER

SIZE: 24" HAMMER: 140 LB. FALL: 30"

NO.	REC. (IN.)	DEPTH (FT.)	BLOWS	SAMPLE DESCRIPTION	STRATA CHANGE	PID
1	18	5-7	4,5,5,7	MOIST SAND/GRAVEL.		
					8' WATER	
2	5	10-12	3,9,17,15	SATURATED SAND/GRAVEL.		
3	18	15-17	4,6,6,6	AS ABOVE, GRAY BROWN SILT @ 16+'.		
				SET 2" PVC WELL TO 15'.		

WELL CONSTRUCTION DETAILS

PVC Screen: 2 in. diameter Slot: 0.010 Sections: 10' Set from: 15 to 5

PVC Riser: 2 in. diameter Sections: 4.5' Set from: 5 to -4

Filter Sock: ____ Stick up: 4"

Sand Pack: 15 to 4 bags 5 Cap ____

Bentonite Seal: 4 to 3 bags 1/2 Plug √

Grout seal: ____ to ____ bags ____ Gripper √

Well Finish: √ Flush ____ Guard BTW ____ Native Backfill: 3 to 0

SPECIALTY DRILLING & INVESTIGATION
P.O. BOX 4503
BURLINGTON, VT
05406-4503
T: 802-658-0820
F: 802-860-1014

BORING NUMBER: MW-3 Sheet 1 of 1

PROJECT NAME: S/VHB BEAVERWOOD

PROJECT LOCATION: POWNEL, VERMONT

SOIL BORING LOG

BORING LOCATION: SOUTHEAST CORNER

DATE AND TIME STARTED: 7/26/10 @ 1245 RIG HOURS METER START: 7759.4

FOREMAN: CHRIS ALDRICH H & N STAFF: CHRIS ALDRICH & JOHN MCTERNAN

DATE AND TIME COMPLETED: 7/26/10 @ 1400 RIG HOURS METER END: 7760.9

BORING METHOD: **4 1/4 HOLLOW STEM AUGER** 2 1/4 H S A 6 1/4 H S A WASH/SPIN and DRIVE AIR HAMMER

SAMPLING METHOD: SPLIT SPOON DIRECT PUSH CUTTINGS BACKHOE HAND AUGER

SIZE: 24" HAMMER: 140 LB. FALL: 30"

NO.	REC. (IN.)	DEPTH (FT.)	BLOWS	SAMPLE DESCRIPTION	STRATA CHANGE	PID
1	15	5-7	12,12,13,25	MOSTLY BROWN SAND, SOME GRAVEL.		
2	0	10-12	7,11,2,4	NO RECOVERY, WET.		
3	14	15-17	2,2,9,7	BROWN, GRAY SILT.		
				SET 2" PVC WELL TO 15'.		

WELL CONSTRUCTION DETAILS

PVC Screen: 2 in. diameter		Slot: 0.010	Sections: 10'		Set from: 15 to 5
PVC Riser: 2 in. diameter			Sections: 4.5'		Set from: 5 to -4
Filter Sock:					Stick up: -3"
Sand Pack: 15	to 4	bags 5	Cap		
Bentonite Seal: 4	to 3	bags 1/2	Plug √		
Grout seal:	to	bags	Gripper √		
Well Finish: √	Flush	Guard	BTW		Native Backfill: 3 to 0

S:\VHB\Beaverwood\[Beaverwood Soil logs 7-26-10 Pownal.xls]MW-6

SPECIALTY DRILLING & INVESTIGATION
P.O. BOX 4503
BURLINGTON, VT
05406-4503
T: 802-658-0820
F: 802-860-1014

BORING NUMBER: MW-4 Sheet 1 of 1

PROJECT NAME: S/VHB BEAVERWOOD

PROJECT LOCATION: POWNEL, VERMONT

SOIL BORING LOG

BORING LOCATION: NORTHWEST CORNER

DATE AND TIME STARTED: 7/27/10 @ 0910 RIG HOURS METER START: 7764

FOREMAN: CHRIS ALDRICH H & N STAFF: CHRIS ALDRICH & JOHN MCTERNAN

DATE AND TIME COMPLETED: 7/27/10 @ 1040 RIG HOURS METER END: 7765.6

BORING METHOD: 4 1/4 HOLLOW STEM AUGER 2 1/4 H S A 6 1/4 H S A WASH/SPIN and DRIVE AIR HAMMER

SAMPLING METHOD: SPLIT SPOON DIRECT PUSH CUTTINGS BACKHOE HAND AUGER

SIZE: 24" HAMMER: 140 LB. FALL: 30"

NO.	REC. (IN.)	DEPTH (FT.)	BLOWS	SAMPLE DESCRIPTION	STRATA CHANGE	PID
1	19	5-7	3,2,3,6	2" GRAVEL @ 5', THEN VERY FINE SAND/GRAY SILT.		
2	0	10-12	2,1,2,3			
3	14	15-17	1,2,1,2	SATURATED VERY FINE SAND/GRAY SI LT, GRAVEL @ 14'.		
4	20	18-20	2,2,4,3	AS ABOVE.		
				SET 2" PVC WELL TO 18'.		

WELL CONSTRUCTION DETAILS

PVC Screen: 2 in. diameter Slot: 0.010 Sections: 10' Set from: 18 to 8

PVC Riser: 2 in. diameter Sections: 7.7' Set from: 8 to 0.3

Filter Sock: Stick up: -3"

Sand Pack: 18 to 7 bags 6 Cap

Bentonite Seal: 7 to 6 bags 1/2 Plug √

Grout seal: to bags Gripper √

Well Finish: √ Flush Guard BTW Native Backfill: 6 to 0

SPECIALTY DRILLING & INVESTIGATION
P.O. BOX 4503
BURLINGTON, VT
05406-4503
T: 802-658-0820
F: 802-860-1014

BORING NUMBER: MW-5 Sheet 1 of 1

PROJECT NAME: S/VHB BEAVERWOOD

PROJECT LOCATION: POWNEL, VERMONT

SOIL BORING LOG

BORING LOCATION: WEST SIDE MIDDLE

DATE AND TIME STARTED: 7/27/10 @ 0745 RIG HOURS METER START: 7726.7

FOREMAN: CHRIS ALDRICH H & N STAFF: CHRIS ALDRICH & JOHN MCTERNAN

DATE AND TIME COMPLETED: 7/27/10 @ 0900 RIG HOURS METER END: 7764

BORING METHOD: 4 1/4 HOLLOW STEM AUGER 2 1/4 H S A 6 1/4 H S A WASH/SPIN and DRIVE AIR HAMMER

SAMPLING METHOD: SPLIT SPOON DIRECT PUSH CUTTINGS BACKHOE HAND AUGER

SIZE: 24" HAMMER: 140 LB. FALL: 30"

NO.	REC. (IN.)	DEPTH (FT.)	BLOWS	SAMPLE DESCRIPTION	STRATA CHANGE	PID
1	18	5-7	6,7,7,23	MOIST BROWN SAND, GRAVEL ON TOP.		
2	10	10-12	10,15,10,18	SATURATED SAND/GRAVEL WITH SOME LARGE STONES.		
3	17	15-17	4,7,7,20	BROWN SAND TO 15 1/2' THEN GRAY SILT (ALL SATURATED).		
				SET 2" PVC WELL TO 15'.		

WELL CONSTRUCTION DETAILS

PVC Screen: 2 in. diameter Slot: 0.010 Sections: 10' Set from: 15 to 5

PVC Riser: 2 in. diameter Sections: 4.5' Set from: 5 to 0.3

Filter Sock: ______ Stick up: -3"

Sand Pack: 15 to 4 bags 5 Cap ______

Bentonite Seal: 4 to 3 bags 1/2 Plug √

Grout seal: ______ to ______ bags ______ Gripper √

Well Finish: √ Flush ______ Guard BTW ______ Native Backfill: 3 to 0

SPECIALTY DRILLING & INVESTIGATION

P.O. BOX 4503
BURLINGTON, VT
05406-4503
T: 802-658-0820
F: 802-860-1014

BORING NUMBER: MW-6 — Sheet 1 of 1

PROJECT NAME: S/VHB BEAVERWOOD

PROJECT LOCATION: POWNEL, VERMONT

SOIL BORING LOG

BORING LOCATION: SOUTHWEST CORNER

DATE AND TIME STARTED: 7/26/10 @ 1415 — RIG HOURS METER START: 7761

FOREMAN: CHRIS ALDRICH — H & N STAFF: CHRIS ALDRICH & JOHN MCTERNAN

DATE AND TIME COMPLETED: 7/26/10 @ 1530 — RIG HOURS METER END: 7762.4

BORING METHOD: 4 1/4 HOLLOW STEM AUGER — 2 1/4 H S A — 6 1/4 H S A — WASH/SPIN and DRIVE — AIR HAMMER

SAMPLING METHOD: SPLIT SPOON — DIRECT PUSH — CUTTINGS — BACKHOE — HAND AUGER

SIZE: 24" — HAMMER: 140 LB. — FALL: 30"

NO.	REC. (IN.)	DEPTH (FT.)	BLOWS	SAMPLE DESCRIPTION	STRATA CHANGE	PID
1	20	5-7	3,3,6,9	MOIST SILTY SAND, BROWN/GRAY.		
2	6	10-12	10,6,2,5	SAND/GRAVEL, SOME LARGE STONES.		
3	12	15-17	4,5,5,5	AS ABOVE.		
				SET 2" PVC WELL TO 15'.		

WELL CONSTRUCTION DETAILS

PVC Screen: 2 in. diameter — Slot: 0.010 — Sections: 10' — Set from: 15 to 5

PVC Riser: 2 in. diameter — Sections: 4.5' — Set from: 5 to 0.3

Filter Sock: ____ — Stick up: -3"

Sand Pack: 15 to 4 — bags 5 — Cap ____

Bentonite Seal: 4 to 3 — bags 1/2 — Plug √

Grout seal: ____ to ____ — bags ____ — Gripper √

Well Finish: √ Flush ____ Guard — BTW ____ — Native Backfill: 3 to 0

WELL LOG

WELL: TPW-1, Former location of UST #3B 2,000 gallon gasoline (LUST)
LOCATION: Green Mountain Race Track, Pownal, VT. - East of garage.
DRILLER: T.L. Boise Excavating, Inc.
HYDROGEOLOGIST: William Norland, Lincoln Applied Geology, Inc.
DATE: November 11, 1993

Soils Description: (**BG** = **Background** [0.2], **SL** = **Saturated Lamp** [>500], **ppm** = **Parts Per Million**)

Depth	Description	PID (ppm)
0 - 1'	Brown, dry, topsoil	BG
1 - 2.5'	Tan brown, dry, medium to coarse sand; some gravel	10 - 20
2.5 - 4'	Grey, dry, silt & fine sand; little clay, gasoline odor	10 - 22
4 - 5.5'	Tan brown, dry, medium to coarse sand; some fine sand	10 - 22
5.5 - 14.8'	Brown and grey, dry to wet, boulders & cobbles & gravel; some fine to coarse sand	3 - 8 (6') 10 - 18 (8') 240 (11') 50 - 60 (12.5')

Ground water encountered at 12.5 feet
Base of LUST at 8' depth

Well Construction:

Bottom of Boring: 14.8'
Bottom of Well: 14.8'
Well Screen: (3.3') 11.5 to 14.8'; 2" PVC hand slotted, Sch 40
Solid Riser: (11.5') 0 to 11.5'; 2" PVC, Sch 40
Sand Pack: None
Bentonite Seal: None
Backfill: (14.8') backfilled with excavated soils
Well Box: None

WELL LOG

WELL: MW-1, Upgradient well near corner of track kitchen bldg.
LOCATION: Green Mountain Race Track, Pownal, VT
DRILLER: Tri-State Drilling and Boring, Inc.
HYDROGEOLOGIST: William Norland, Lincoln Applied Geology, Inc.
DATE: March 28, 1994

Soils Description: (BG = Background [0.3], SL = Saturated Lamp [>500], ppm = Parts Per Million)

Depth	Description	PID (ppm)
0 - 0.25'	Asphalt pavement 3"	
0.25' - 2'	Dry to moist, tan, fine to medium sand, some gravel.	BG
2' - 4'	8" moist, tan, fine to medium sand; little gravel; 4" moist, tan silt; some very fine sand; fine sand	BG
4' - 6'	12" moist, tan, silt and fine sand; little very fine sand; rust staining minor 2" moist, tan brown, silt and fine sand; little fine to medium gravel	BG
6' - 8'	Dry, tan and buff, fine gravel; some fine to coarse sand; trace medium to coarse gravel. Very hard and 'boney'.	BG
8' - 9.5'	Dry, tan and brown, fine to medium gravel; some fine to coarse sand; trace coarse gravel. Coarse gravels.	BG
9.5' - 11.5'	Dry to moist, tan, fine to medium gravel; some fine to coarse sand; trace coarse gravel.	BG
11.5' - 13.5'	Wet, brown, fine to medium sand; some fine to medium gravel; trace coarse sand. Not much recovery - in water, saturated @ 11.4' (inside augers)	BG
13.5' - 15.5'	Wet, brownish grey, medium to coarse sand; some fine to medium gravel; little fine sand. No odors.	BG
15.5' - 17.5'	Wet, brownish grey, medium to coarse sand; some fine to medium gravel; little fine sand.	BG
17.5' - 19.5'	3" wet, brownish grey, medium to coarse sand; little fine sand; trace fine gravel. 9" wet, brown, fine sand; little silt; trace medium sand.	BG
19.5' - 21.5'	Wet, brown, fine to medium sand; some silt; trace coarse sand, fine gravel.	BG
21.5' - 23.5'	Wet, brown, fine to medium sand; some silt; trace coarse sand, fine gravel	BG
23.5' - 25.5'	Wet, brown, fine to medium sand; some coarse sand, little silt.	BG

Well Contruction:

Bottom of Boring: 25.5'
Bottom of Well: 25.5'
Well Screen: (20') 5.5' - 25.5' - 2" PVC, sch 40, 0.020" slot
Solid Riser: (5') 0.5' - 5.5' - 2" PVC, Sch 40
Sand Pack: (21.5') 4' - 25.5' - #1 sand
Bentonite Seal: (2') 2' - 4', holeplug and enviroplug
Backfill: (1.5') 0.5' - 2'
Well Box: Flush with grade

WELL LOG

WELL: MW-2, between LUST source area and GMRT pumping well (house) - edge (corner) of dog kennels
LOCATION: Green Mountain Race Track, Pownal, VT
DRILLER: Tri-State Drilling and Boring, Inc.
HYDROGEOLOGIST: William Norland, Lincoln Applied Geology, Inc.
DATE: March 28, 1994

Soils Description: (**BG = Background** [0.3], **SL = Saturated Lamp** [>500], **ppm = Parts Per Million**)

Depth	Description	PID (ppm)
0 - 0.25'	Asphalt pavement.	
0.25' - 0.5'	Gravel/Sand subbase (fill)	
0.5' - 4'	Moist, brown, fine to very fine sand and silt; trace fine gravel.	BG
4' - 6'	12" moist, brown to dark brown, very fine sand and silt; trace fine gravel 6" moist, tan, very fine sand and silt; trace roots	BG
9' - 11'	2" moist, brown, very fine sand and silt; little fine sand and fine gravel. 4" moist to dry, brown, medium to coarse sand; some fine to medium gravel; little fine sand	BG
14' - 15.5'	Wet, brown, fine to medium gravel; some medium to coarse sand; trace coarse gravel. Water approx. 12' inside augers.	BG
19' - 21'	Wet, brown, medium to coarse sand; little fine to medium gravel, fine sand. 3' of sands into augers, heaving.	BG
	Overdrill to 28' depth, install well.	

Well Contruction:

Bottom of Boring: 28'
Bottom of Well: 25.5'
Well Screen: (20') 5.5' - 25.5' - 2" PVC, sch 40, 0.020" slot.
Solid Riser: (5') 0.5' - 5.5' - 2" PVC, Sch 40
Sand Pack: (24') 4' - 28'
Bentonite Seal: (2') 2' - 4'
Backfill: (1.5') 0.5' - 2'
Well Box: Cemented flush with grade.

WELL LOG

WELL:	MW-3
LOCATION:	Green Mountain Race Track, Pownal, VT
DRILLER:	Tri-State Drilling and Boring, Inc.
HYDROGEOLOGIST:	William Norland, Lincoln Applied Geology, Inc.
DATE:	March 29, 1994

Soils Description: (BG = Background [0.3], SL = Saturated Lamp [>500], ppm = Parts Per Million)

Depth	Description	PID (ppm)
0 - 0.25'	Asphalt pavement	
0.25' - 1.25'	Sand and gravel fill	BG
2' - 4'	3" moist, brown, medium to coarse sand and fine to medium gravel 11" moist, dark brown, fine to very fine sand; some silt; trace roots 6" moist, tan, fine to very fine sand; some silt	BG
4' - 6'	Moist, brown and tan, silt and very fine sand; little fine sand 1" layer of fine sand; some very fine sand @ 8' depth; darker brown color	BG
6' - 8'	6" moist, brown, silt and very fine sand; little fine sand. 3" medium to coarse sand; some fine to medium gravel; little fine sand.	BG
8' - 10'	Moist, brown to olive, fine to coarse gravel; some coarse sand; little to trace medium sand	BG
10' - 12'	Wet - in water, brown, medium to coarse gravel; some coarse sand; little fine to medium sand. 'Boney' drilling.	BG
12' - 14'	6" wet, brown, medium to coarse gravel; some medium to coarse sand; little fine sand. 4" wet, tan upper, grey lower, silty clay; little fine gravel 1" fine to very fine sand; little silt.	BG
14' - 16'	Wet, brown, fine to medium sand; little silt; trace coarse sand. At 15" depth approx 1" thick tan, silty clay layer.	BG
16' - 18'	Wet, brown, fine to medium sand; some coarse sand; little silt	BG
18' - 20'	15" wet, brown, fine to medium sand; some coarse sand; little silt 9" wet, brown, very fine sand and silt; some fine sand.	BG
20' - 20.5'	Wet, brown, very fine sand and silt; little fine sand. Auger to 28', heaving sands.	BG
24' - 26'	Heaving sands of fine to medium sand; silt.	

Well Contruction:

Bottom of Boring:	28'
Bottom of Well:	25.5'
Well Screen:	(20') 5.5' - 25.5', 2" PVC, sch 40, 0.020" slot
Solid Riser:	(5') 0.5' - 5.5', 2" PVC, Sch 40
Sand Pack:	(26') 2' - 28'
Bentonite Seal:	(1') 1' - 2'
Backfill:	(0.5') 0.5' - 1'
Well Box:	Cemented flush with grade

WELL LOG

WELL:	MW-4, West of LUSTs beside GMRT roadway.
LOCATION:	Green Mountain Race Track, Pownal, VT
DRILLER:	Tri-State Drilling and Boring, Inc.
HYDROGEOLOGIST:	William Norland, Lincoln Applied Geology, Inc.
DATE:	March 29, 1994

Soils Description: **(BG = Background [0.3], SL = Saturated Lamp [>500], ppm = Parts Per Million)**

Depth	Description	PID (ppm)
0 - 0.25'	Asphalt pavement	
0.25' - 1.25'	Sand and gravel	BG
4' - 6'	3" moist, brown, very fine sand and silt 2" moist, tan, fine to medium sand; little coarse sand 7" moist, tan, very fine sand and silt 4" moist, tan, fine to medium sand; trace coarse sand At 6' depth - gravel and cobbles - very difficult drilling	BG
9' - 9.5'	No recovery - on boulder or cobble Drill to approx 10' - refusal on boulder. Remove augers, backup rig approx 6-7'. Drill to 5.5' depth - hit gravel and cobbles to 13'	
14' - 16'	Wet, brown, fine to medium sand; some silt	BG
	Heaving sands into augers, drill to 28' and install well.	

Well Contruction:

Bottom of Boring:	28'
Bottom of Well:	24.5'
Well Screen:	(20') 4.5' - 24.5', 2" PVC, sch 40, 0.020" slot
Solid Riser:	(4') 0.5' - 4.5', 2" PVC, Sch 40
Sand Pack:	(24.5') 3.5' - 28'
Bentonite Seal:	(2') 1.5' - 3.5'
Backfill:	(1') 0.5' - 1.5'
Well Box:	Cemented flush with grade

WELL LOG

WELL:	MW-5, At W. end of former 20K gal UST
LOCATION:	Green Mountain Race Track, Pownal, VT
DRILLER:	Tri-State Drilling and Boring, Inc.
HYDROGEOLOGIST:	William Norland and Rick Vandenberg, Lincoln Applied Geology, Inc.
DATE:	March 29 and 30, 1994

Soils Description: (BG = Background [0.3], SL = Saturated Lamp [>500], ppm = Parts Per Million)

Depth	Description	PID (ppm)
0	Unpaved grass area	
2' - 4'	10" moist, tan, very fine sand and silt; little fine sand; trace fine gravel 12" moist, grey, silt and very fine sand; little fine sand	BG
4' - 6'	Moist, grey, silt and very fine sand; trace fine sand (organics)	BG
6' - 8'	19" Moist, grey, silt and very fine sand; little to trace fine sand; trace roots Bottom 2" is coarser; more fine sand and medium sand (organics odor)	BG
8' - 10'	3" wet, grey to olive green, silt and fine sand; trace roots; clay 3" wet fine to coarse gravel; some silt; fine sand; trace medium to coarse sand	BG
10' - 12'	Wet, grey to olive green, fine to coarse gravel; some silt; fine sand; little medium to coarse sand	BG
12' - 14'	Grey silt and medium to coarse sand; some coarse gravel, very fine sand	BG
14' - 16'	Medium to fine sand; grey; some silt; trace coarse gravel, coarse sand. Very well sorted	BG
16' - 18'	Top 6" fine to very fine sand, grey; some silt, fine to medium gravel; bottom 9" silty fine sand; olive	BG
18' - 20'	Silty clay with trace of very fine sand, olive	BG
20' - 22'	Silty clay with alternating bands of fine sand, tan	BG
22' - 24'	Silty clay with alternating bands of fine sand, tan	BG
24' - 26'	Silty clay with alternating bands of tan sand; fine to medium; grey also	BG

Well Contruction:

Bottom of Boring:	26'
Bottom of Well:	25'
Well Screen:	(20') 5' - 25', 2" PVC, sch 40, 0.020" slot
Solid Riser:	(8') +3' - 5', 2" PVC, Sch 40.
Sand Pack:	(21') 4' - 25'
Bentonite Seal:	(2') 2' - 4'
Backfill:	(1.5') 0.5' - 2'
Well Box:	Stick up well guard

WELL LOG

WELL:	MW-6
LOCATION:	Green Mountain Race Track, Pownal, VT
DRILLER:	Tri-State Drilling and Boring, Inc.
HYDROGEOLOGIST:	Rick Vandenberg, Lincoln Applied Geology, Inc.
DATE:	March 30, 1994

Soils Description: (BG = Background [0.3], SL = Saturated Lamp [>500], ppm = Parts Per Million)

Depth	Description	PID (ppm)
0 - 4'	Tan to light brown; fine to very coarse sand, some fine to coarse gravel; trace cobble, silt.	BG
4' - 6'	Light brown; fine to very coarse sand; some fine to coarse gravel; trace silt.	BG
8' - 10'	Light brown; fine to very coarse sand; some fine to medium gravel; some cobble; some silt.	BG
14' - 16'	Light brown; sand, coarse to very coarse, some fine to medium sand; some gravel fine to medium; trace cobble	BG
16' - 18'	Grey; silty clay; some interbeds of tan fine sand.	BG

Well Contruction:

Bottom of Boring:	28'
Bottom of Well:	25'
Well Screen:	(20') 5' - 25', 2" PVC, sch 40, 0.020" slot
Solid Riser:	(8') +3' - 5', 2" PVC, Sch 40.
Sand Pack:	(21') 4' - 25'
Bentonite Seal:	(2') 2' - 4'
Backfill:	(1.5') 0.5' - 2'
Well Box:	Stick up well guard

Beaver Wood Energy, LLC. - Pownal, VT
Groundwater Withdrawal Evaluation
Groundwater Elevation Data

Well ID	Total Depth (feet BTC)	Ground Surface Elevation (feet)	Stickup (Feet)	Top-of-Casing Elevation (feet)	Measurement	8/3/2010
MW-1	14.55	542.04	-0.45	541.59	Water Level (Ft BTC)	6.63
					Water Level (Ft Below Grade)	7.08
					Water Elevation (ft)	534.96
MW-2	14.5	543.01	-0.55	542.46	Water Level (Ft BTC)	7.92
					Water Level (Ft Below Grade)	8.47
					Water Elevation (ft)	534.54
MW-3	14.5	542.48	-0.50	541.98	Water Level (Ft BTC)	9.17
					Water Level (Ft Below Grade)	9.67
					Water Elevation (ft)	532.81
MW-4	17.5	540.84	-0.52	540.32	Water Level (Ft BTC)	11.22
					Water Level (Ft Below Grade)	11.74
					Water Elevation (ft)	529.10
MW-5	14.8	541.31	-0.25	541.06	Water Level (Ft BTC)	8.97
					Water Level (Ft Below Grade)	9.22
					Water Elevation (ft)	532.09
MW-6	14.8	541.24	-0.18	541.06	Water Level (Ft BTC)	9.63
					Water Level (Ft Below Grade)	9.81
					Water Elevation (ft)	531.43
Hoosic River	--	--	--	540.95	Water Level (Ft Below RP)	12.64
					Water Level (Ft Below Grade)	--
					Water Elevation (ft)	528.31

Well elevations from survey by Bruno Associates of Woodstock, VT

River Water Level on 8/2/2010 = 528.31'

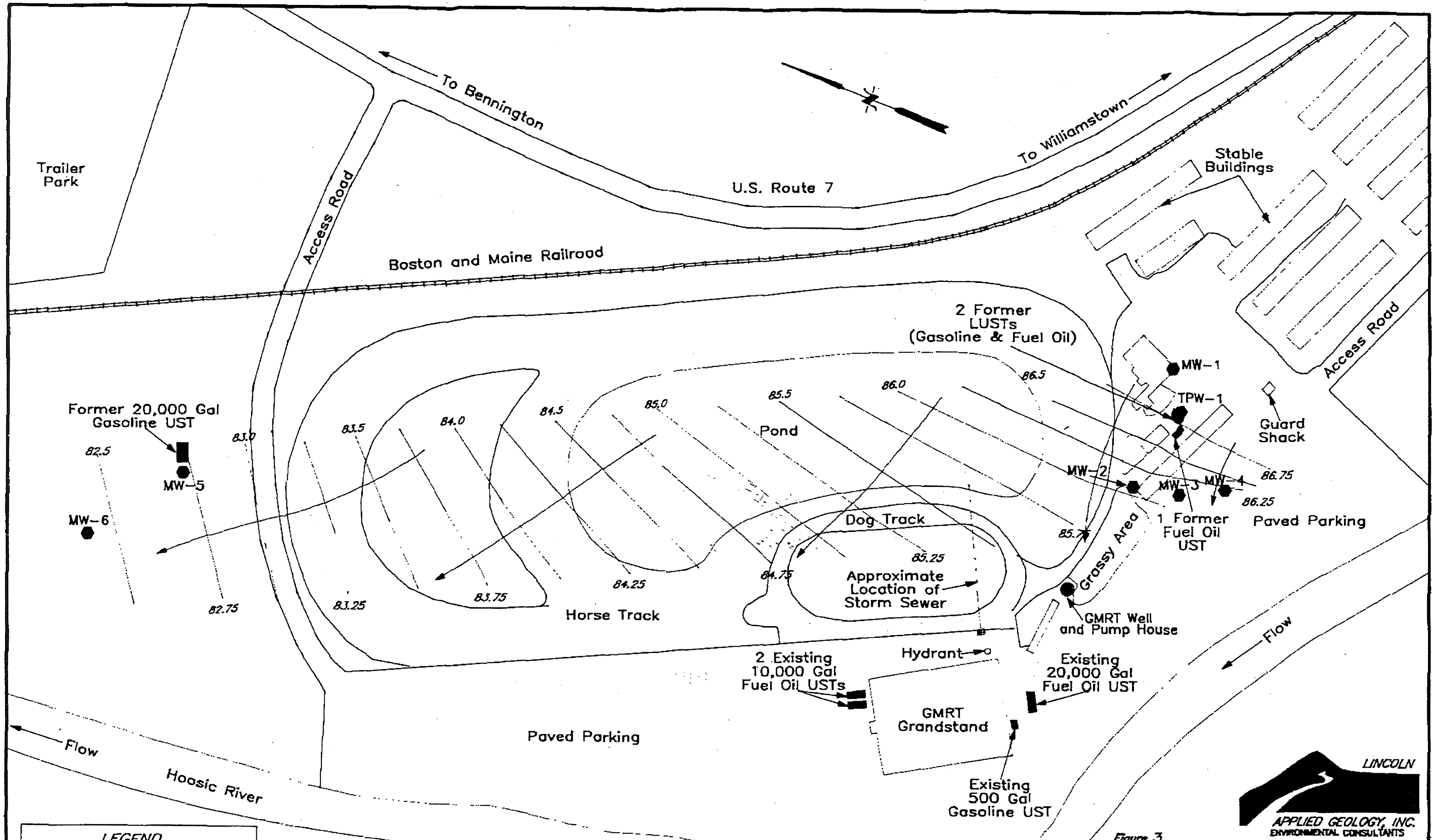
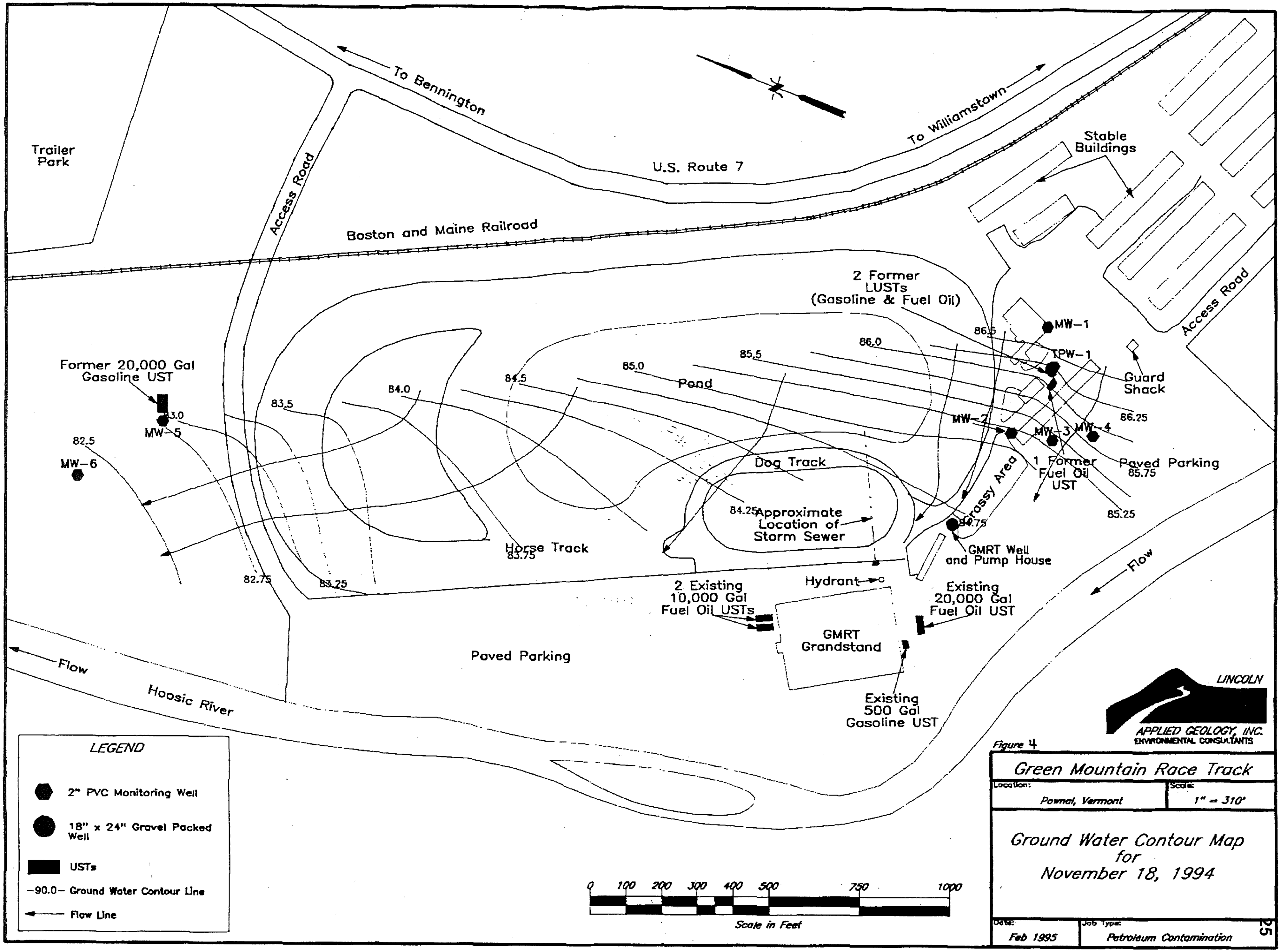


Figure 3

Green Mountain Race Track	
Location: Pownal, Vermont	Scale: 1" = 310'
Ground Water Contour Map for November 14, 1994	
Date: Feb 1995	Job Type: Petroleum Contamination


Trailer Park
Access Road
To Bennington
U.S. Route 7
To Williamstown
Boston and Maine Railroad
Stable Buildings
Access Road
2 Former LUSTs (Gasoline & Fuel Oil)
MW-1
TPW-1
Guard Shack
86.5
86.0
85.5
85.0
84.5
84.0
83.5
83.0
82.5
86.25
85.75
85.25
84.75
84.25
83.75
83.25
82.75
Pond
MW-2
MW-3
MW-4
Paved Parking
1 Former Fuel Oil UST
Grassy Area
Dog Track
Approximate Location of Storm Sewer
GMRT Well and Pump House
Former 20,000 Gal Gasoline UST
MW-5
MW-6
Horse Track
Hydrant
2 Existing 10,000 Gal Fuel Oil USTs
Existing 20,000 Gal Fuel Oil UST
GMRT Grandstand
Existing 500 Gal Gasoline UST
Flow
Paved Parking
Flow
Hoosic River
LEGEND
2" PVC Monitoring Well
18" x 24" Gravel Packed Well
USTs
-90.0- Ground Water Contour Line
Flow Line
0 100 200 300 400 500 750 1000
Scale in Feet
LINCOLN
APPLIED GEOLOGY, INC.
ENVIRONMENTAL CONSULTANTS
Figure 4
Green Mountain Race Track
Location: Pownal, Vermont
Scale: 1" = 310'
Ground Water Contour Map for November 18, 1994
Date: Feb 1995
Job Type: Petroleum Contamination
25

Beaver Wood Energy Pownal LLC.

Groundwater Flow Calculations

Unconfined Water Table

VHB 10/8/2010

1) Determine Groundwater Flow Rate in Unconfined Water Table (Sand and Gravel)

n (Porosity) = 0.39 (for Coarse Sand, see following page)
K (Permeability) = 18.2 ft/day (from onsite testing)
i (gradient) = 2.50% measured from groundwater contour map

$$V = \frac{(K)\,(i)}{n}$$

V (flow velocity) = 1.2 ft/day
D (Distance to River) = 400 feet along groundwater flowpath
T (Travel time to River) = 343 days

2) Determine Travel Time for Groundwater from Water Table to Reach the Bedrock Aquifer

$$V = \frac{(K)\,(i)}{n}$$

where:
V = groundwater velocity (ft/day, vertical infiltration)

K = hydraulic conductivity = 0.00066 ft/day for clay (textbook value, see 2nd following page)

i = hydraulic gradient = 100% for downward vertical flow

n = porosity = 42% (typical porosity for clay - see next page)

$$\mathbf{V = \frac{0.0007\ ft/day \times 100\%}{0.42} = 1.57E\text{-}03\ ft/day}$$

Tot = (D) / (V)

where:
Tot = time of travel (days)
D = Distance = 40 feet, thickness of clay layer (see Alta Gardens Well Log)
V = velocity = 1.57E-03 feet per day, from above

Tot = 2.55E+04 days
or **70 years**

Conclusion: It takes well over 2 years for groundwater to recharge the bedrock aquifer due to the thick layer of clay over the bedrock. Therefore there is no two-year travel zone for the bedrock aquifer.

rials are listed in Table 2.1. It should be recognized that porosities for a particular soil or rock can vary considerably from these values.

In sedimentary rocks subject to compaction, measurements show that porosity decreases with depth of burial.[26] Thus, a typical relation has the form

$$\alpha_z = \alpha_o e^{-az} \tag{2.4}$$

where α_z is the porosity at depth z, α_o is the porosity at the surface, a is a constant, and e is the base of Naperian logarithms.

Soil Classification. Unconsolidated geologic materials are normally classified according to their size and distribution. A commonly employed system based on particle, or grain, size is listed in Table 2.2. Evaluation of the distribution of sizes is accomplished by mechanical analysis. This involves sieving particles coarser than 0.05 mm and measuring rates of settlement for smaller particles in suspension. Results are plotted on a particle-size distribution graph such as that shown in Fig. 2.3. The percentage finer scale on the ordinate shows the percentage of material smaller than that of a given size particle on a dry-weight basis.

The effective particle size is the 10 percent finer than value (d_{10}). The distribution of particles is characterized by the *uniformity coefficient* U_c as

$$U_c = d_{60}/d_{10} \tag{2.5}$$

TABLE 2.1 Representative Values of Porosity (after Morris and Johnson[35])

Material	Porosity, Percent	Material	Porosity, Percent
Gravel, coarse	28[a]	Loess	49
Gravel, medium	32[a]	Peat	92
Gravel, fine	34[a]	Schist	38
Sand, coarse	39	Siltstone	35
Sand, medium	39	Claystone	43
Sand, fine	43	Shale	6
Silt	46	Till, predominantly silt	34
Clay	42	Till, predominantly sand	31
Sandstone, fine-grained	33	Tuff	41
Sandstone, medium-grained	37	Basalt	17
Limestone	30	Gabbro, weathered	43
Dolomite	26	Granite, weathered	45
Dune sand	45		

[a]These values are for repacked samples; all others are undisturbed.

For unconfined water table → (Sand, coarse)

for underlying Clay layer → (Clay)

From Todd, D.K., 1980. Groundwater Hydrology

Todd, DK, 1980
Groundwater Hydrology

TABLE 3.1 Representative Values of Hydraulic Conductivity (after Morris and Johnson[45])

Material	Hydraulic Conductivity, m/day	Type of Measurement[a]
Gravel, coarse	150	R
Gravel, medium	270	R
Gravel, fine	450	R
Sand, coarse	45	R
Sand, medium	12	R
Sand, fine	2.5	R
Silt	0.08	H
Clay	0.0002 x 3.3 ft/m = 0.00066 ft/day	H
Sandstone, fine-grained	0.2	V
Sandstone, medium-grained	3.1	V
Limestone	0.94	V
Dolomite	0.001	V
Dune sand	20	V
Loess	0.08	V
Peat	5.7	V
Schist	0.2	V
Slate	0.00008	V
Till, predominantly sand	0.49	R
Till, predominantly gravel	30	R
Tuff	0.2	V
Basalt	0.01	V
Gabbro, weathered	0.2	V
Granite, weathered	1.4	V

[a]H is horizontal hydraulic conductivity, R is a repacked sample, and V is vertical hydraulic conductivity.

mental work. Most permeability formulas have the general form

$$k = cd^2 \tag{3.15}$$

where c is a dimensionless coefficient, or

$$k = f_s f_\alpha d^2 \tag{3.16}$$

where f_s is a grain (or pore) shape factor, f_α is a porosity factor, and d is characteristic grain diameter.[17,37,43] Few formulas give reliable estimates of results because of the difficulty of including all possible variables in porous media. For an ideal medium, such as an assemblage of spheres of uniform diameter, hydraulic conductivity can be accurately evaluated from known porosity and packing conditions.

Because of the problems inherent in formulas, other techniques for determining hydraulic conductivity are preferable.

Well Details

Date Completed	11/01/1996
Date Received	12/30/1996
Driller	11 Ronald Dube O. E. Dube & Son Artesian Wells
Well Report Number	5243
Tag	81-002
Comments	SCREEN DETAIL: 62.5 ' - 65.5' .050 65.5 - 68.8 .030. NEAT CEMENT BENTONITE WAS USED TO SEAL CASING.
Town	Pownal
Map Cell	19B3
Tax Map	
E911 Address	
SubDivision	
Lot Number	
Owners First Name	
Owners Last Name	POWNAL FIRE DISTRICT #2
Purchaser First Name	
Purchaser Last Name	LINCOLN APPLIED GEOLOGY
Well Use	OTHER
Well Reason	New Supply
Drilling Method	Rotary (AP)
Well Depth	69.80 feet
Yield Gallons Per Minute	75.00
Yield Test Tested For Hours	0.00
Static Water Level	10.00 feet
Over Flowing	0
OverBurden Thickness	0 feet
Casing Length	65.30 feet
Casing Diameter	8.60 inches
Casing Length Below Land Surface	62.50 feet
Casing Length Exposed	0.00
Casing Material	Steel
Casing Weight	29.35 lbs/foot
Casing Finish	Above ground, finished
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	Neat Cement
Seal Type	
Diameter Drilled In	0.00 inches

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms

- Current Nationwide Threat Level: Yellow

Bedrock	
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	
Screen Material	
Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	
Yield Test Method	pumped
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ5243
Lat Degree	42
Lat Minutes	46
Lat Seconds	14.3520
Long Degree	73
Long Minutes	14
Long Seconds	32.8020
Location DeterminationMethod	screen digitized
Well Type	Gravel
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	N

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	1.00		D	LOAM
1.00	6.00		T	BROWN TILL
6.00	12.00	75	GT	BROWN TILL WITH ROCKS
12.00	62.00		CT	BLUE CLAY, TILL
62.00	70.00	75	G	GRAVEL, SOME TILL

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

Well Details

Date Completed	06/25/1975
Date Received	02/06/1980
Driller	29 David Kessler Tri State Water Service
Well Report Number	156
Tag	
Comments	
Town	Pownal
Map Cell	
Tax Map	
E911 Address	
SubDivision	
Lot Number	
Owners First Name	
Owners Last Name	ALTA TRAILER PARK
Purchaser First Name	
Purchaser Last Name	
Well Use	Trailer Park
Well Reason	
Drilling Method	Other
Well Depth	170.00 feet
Yield Gallons Per Minute	15.00
Yield Test Tested For Hours	0.00
Static Water Level	30.00 feet
Over Flowing	0
OverBurden Thickness	60 feet
Casing Length	61.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	0.00 feet
Casing Length Exposed	0.00
Casing Material	
Casing Weight	0.00 lbs/foot
Casing Finish	
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	
Screen Material	

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms
- Current Nationwide Threat Level: Yellow

Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	
Yield Test Method	Compressed air
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ156
Lat Degree	0
Lat Minutes	0
Lat Seconds	0.0000
Long Degree	0
Long Minutes	0
Long Seconds	0.0000
Location DeterminationMethod	
Well Type	
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	N

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	10.00		G	gravel
10.00	50.00		C	clay
50.00	60.00		G	gravel
60.00	170.00		R	shale quartz marble and granite

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

Well Details

Date Completed	03/15/1973
Date Received	04/13/1973
Driller	16 H Allen Follett A & W Artesian Well Co Inc
Well Report Number	73
Tag	
Comments	
Town	Pownal
Map Cell	19B3
Tax Map	
E911 Address	
SubDivision	
Lot Number	
Owners First Name	
Owners Last Name	NORTHERN TERMINAL INC.
Purchaser First Name	
Purchaser Last Name	
Well Use	Domestic
Well Reason	
Drilling Method	Rotary (AP)
Well Depth	245.00 feet
Yield Gallons Per Minute	2.00
Yield Test Tested For Hours	0.00
Static Water Level	20.00 feet
Over Flowing	0
OverBurden Thickness	9 feet
Casing Length	20.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	0.00 feet
Casing Length Exposed	0.00
Casing Material	
Casing Weight	0.00 lbs/foot
Casing Finish	
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms
- Current Nationwide Threat Level: Yellow

Screen Material	
Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	Drive shoe only
Yield Test Method	
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ73
Lat Degree	42
Lat Minutes	45
Lat Seconds	35.0281
Long Degree	73
Long Minutes	13
Long Seconds	39.5460
Location DeterminationMethod	screen digitized
Well Type	
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	N

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	9.00		C	clay
9.00	245.00		R	shale

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

Well Details

Date Completed	08/15/1978
Date Received	04/02/1979
Driller	16 H Allen Follett A & W Artesian Well Co Inc
Well Report Number	141
Tag	12171
Comments	
Town	Pownal
Map Cell	19B3
Tax Map	
E911 Address	
Subdivision	
Lot Number	
Owners First Name	
Owners Last Name	Maturski
Purchaser First Name	
Purchaser Last Name	
Well Use	Domestic
Well Reason	
Drilling Method	Rotary (AP)
Well Depth	230.00 feet
Yield Gallons Per Minute	2.00
Yield Test Tested For Hours	0.00
Static Water Level	30.00 feet
Over Flowing	0
Overburden Thickness	50 feet
Casing Length	60.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	0.00 feet
Casing Length Exposed	0.00
Casing Material	
Casing Weight	0.00 lbs/foot
Casing Finish	
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	
Screen Material	
Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	Drilled hole in bedr
Yield Test Method	
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ141
Lat Degree	42
Lat Minutes	45
Lat Seconds	9.0541
Long Degree	73
Long Minutes	14
Long Seconds	14.9040
Location DeterminationMethod	screen digitized
Well Type	
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms
- Current Nationwide Threat Level: Yellow

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Well Location Submitted As A Dot On A Map N

WellMainRecordNumber	StartingDepth	EndingDepth	WaterBearing	LithologyCode	LithologyDescription
45998	0.00	50.00		H	hardpan
45998	50.00	230.00		R	shale

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

www.VermontDrinkingWater.org
VT DEC Water Supply Division 103 South Main Street, Old Pantry Building Waterbury, VT 05671-0403
Telephone toll-free in VT: 800-823-6500 or call 802-241-3400 Fax: 802-241-3284

VERMONT.gov

Well Details

Date Completed	07/24/1979
Date Received	09/17/1979
Driller	16 H Allen Follett A & W Artesian Well Co Inc
Well Report Number	146
Tag	
Comments	
Town	Pownal
Map Cell	19B3
Tax Map	
E911 Address	
SubDivision	
Lot Number	
Owners First Name	DANIEL S.
Owners Last Name	HATCH
Purchaser First Name	
Purchaser Last Name	
Well Use	
Well Reason	
Drilling Method	
Well Depth	340.00 feet
Yield Gallons Per Minute	0.00
Yield Test Tested For Hours	0.00
Static Water Level	0.00 feet
Over Flowing	0
OverBurden Thickness	90 feet
Casing Length	100.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	0.00 feet
Casing Length Exposed	0.00
Casing Material	
Casing Weight	0.00 lbs/foot
Casing Finish	
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	
Screen Material	

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms

- Current Nationwide Threat Level: Yellow

Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	Drive shoe only
Yield Test Method	
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ146
Lat Degree	42
Lat Minutes	45
Lat Seconds	34.3801
Long Degree	73
Long Minutes	12
Long Seconds	31.8360
Location DeterminationMethod	screen digitized
Well Type	
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	N

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	90.00		H	hardpan and clay
90.00	340.00		R	rock

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

www.VermontDrinkingWater.org
VT DEC ■ Water Supply Division ■ 103 South Main Street, Old Pantry Building ■ Waterbury, VT 05671-0403
Telephone toll-free in VT: 800-823-6500 or call 802-241-3400 ■ Fax: 802-241-3284

Well Details

Date Completed	06/02/1975
Date Received	02/06/1980
Driller	29 David Kessler Tri State Water Service
Well Report Number	155
Tag	
Comments	
Town	Pownal
Map Cell	19B3
Tax Map	
E911 Address	
SubDivision	
Lot Number	
Owners First Name	BERTIL
Owners Last Name	OSCARSON
Purchaser First Name	
Purchaser Last Name	
Well Use	Domestic
Well Reason	
Drilling Method	Other
Well Depth	115.00 feet
Yield Gallons Per Minute	8.00
Yield Test Tested For Hours	0.00
Static Water Level	0.00 feet
Over Flowing	0
OverBurden Thickness	10 feet
Casing Length	16.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	0.00 feet
Casing Length Exposed	0.00
Casing Material	
Casing Weight	0.00 lbs/foot
Casing Finish	
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	
Screen Material	

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms
- Current Nationwide Threat Level: Yellow

Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	
Yield Test Method	Compressed air
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ155
Lat Degree	42
Lat Minutes	45
Lat Seconds	32.5440
Long Degree	73
Long Minutes	14
Long Seconds	32.6580
Location DeterminationMethod	screen digitized
Well Type	
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	N

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	10.00		D	soil
10.00	115.00		R	schist ledge

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

Well Details

Date Completed	09/18/1987
Date Received	12/28/1987
Driller	16 H Allen Follett A & W Artesian Well Co Inc
Well Report Number	234
Tag	
Comments	
Town	Pownal
Map Cell	20A1
Tax Map	
E911 Address	
SubDivision	
Lot Number	
Owners First Name	A.
Owners Last Name	Lussier
Purchaser First Name	
Purchaser Last Name	
Well Use	Domestic
Well Reason	New Supply
Drilling Method	Rotary (AP)
Well Depth	305.00 feet
Yield Gallons Per Minute	2.00
Yield Test Tested For Hours	0.00
Static Water Level	0.00 feet
Over Flowing	0
OverBurden Thickness	62 feet
Casing Length	102.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	0.00 feet
Casing Length Exposed	0.00
Casing Material	
Casing Weight	0.00 lbs/foot
Casing Finish	Above ground, finished
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	
Screen Material	

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms
- Current Nationwide Threat Level: Yellow

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Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	Drive shoe only
Yield Test Method	Compressed air
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ234
Lat Degree	42
Lat Minutes	44
Lat Seconds	49.0501
Long Degree	73
Long Minutes	14
Long Seconds	13.0920
Location DeterminationMethod	screen digitized
Well Type	
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	N

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	62.00		SI	sand and silt
62.00	305.00		R	granite

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

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Well Details

Date Completed	09/16/1987
Date Received	12/28/1987
Driller	16 H Allen Follett A & W Artesian Well Co Inc
Well Report Number	235
Tag	
Comments	
Town	Pownal
Map Cell	20A1
Tax Map	
E911 Address	
SubDivision	
Lot Number	
Owners First Name	Jon D.
Owners Last Name	Peaslee
Purchaser First Name	
Purchaser Last Name	
Well Use	Domestic
Well Reason	New Supply
Drilling Method	Rotary (AP)
Well Depth	505.00 feet
Yield Gallons Per Minute	0.00
Yield Test Tested For Hours	0.00
Static Water Level	0.00 feet
Over Flowing	0
OverBurden Thickness	97 feet
Casing Length	122.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	0.00 feet
Casing Length Exposed	0.00
Casing Material	
Casing Weight	0.00 lbs/foot
Casing Finish	Above ground, finished
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	
Screen Material	

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms
- Current Nationwide Threat Level: Yellow

Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	Drive shoe only
Yield Test Method	Compressed air
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ235
Lat Degree	42
Lat Minutes	44
Lat Seconds	47.4600
Long Degree	73
Long Minutes	13
Long Seconds	57.0000
Location DeterminationMethod	screen digitized
Well Type	
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	N

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	97.00		SI	sand, silt
97.00	505.00		R	granite

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

www.VermontDrinkingWater.org
VT DEC Water Supply Division 103 South Main Street, Old Pantry Building Waterbury, VT 05671-0403
Telephone toll-free in VT: 800-823-6500 or call 802-241-3400 Fax: 802-241-3284

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Well Details

Date Completed	04/25/1990
Date Received	05/24/1990
Driller	16 H Allen Follett A & W Artesian Well Co Inc
Well Report Number	270
Tag	22714
Comments	
Town	Pownal
Map Cell	19B3
Tax Map	
E911 Address	
SubDivision	
Lot Number	
Owners First Name	Leigh
Owners Last Name	Lopresti
Purchaser First Name	
Purchaser Last Name	
Well Use	Domestic
Well Reason	New Supply
Drilling Method	Rotary (AP)
Well Depth	500.00 feet
Yield Gallons Per Minute	0.00
Yield Test Tested For Hours	0.00
Static Water Level	6.00 feet
Over Flowing	0
OverBurden Thickness	20 feet
Casing Length	32.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	0.00 feet
Casing Length Exposed	0.00
Casing Material	
Casing Weight	0.00 lbs/foot
Casing Finish	Above ground, finished
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	
Screen Material	

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms
- Current Nationwide Threat Level: Yellow

Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	Drive shoe only
Yield Test Method	Compressed air
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ270
Lat Degree	42
Lat Minutes	45
Lat Seconds	24.5881
Long Degree	73
Long Minutes	14
Long Seconds	36.2520
Location DeterminationMethod	screen digitized
Well Type	
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	N

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	20.00		G	gravel
20.00	300.00		R	black slate
300.00	500.00		R	blue granite

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

www.VermontDrinkingWater.org
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Telephone toll-free in VT: 800-823-6500 or call 802-241-3400 ▪ Fax: 802-241-3284

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Well Details

Date Completed	03/01/1991
Date Received	03/18/1991
Driller	101 Thomas Hanson Hanson Well Drilling & Pump Co Inc
Well Report Number	288
Tag	2-022891
Comments	
Town	Pownal
Map Cell	19B3
Tax Map	
E911 Address	
Subdivision	
Lot Number	
Owners First Name	Pamela
Owners Last Name	Lyttle
Purchaser First Name	
Purchaser Last Name	
Well Use	Domestic
Well Reason	New Supply
Drilling Method	Rotary (AP)
Well Depth	482.00 feet
Yield Gallons Per Minute	4.00
Yield Test Tested For Hours	0.00
Static Water Level	100.00 feet
Over Flowing	0
Overburden Thickness	130 feet
Casing Length	140.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	0.00 feet
Casing Length Exposed	0.00
Casing Material	
Casing Weight	0.00 lbs/foot
Casing Finish	Above ground, finished
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	
Screen Material	
Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	Shoe & grout bottom
Yield Test Method	Compressed air
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ288
Lat Degree	42
Lat Minutes	45
Lat Seconds	12.7201
Long Degree	73
Long Minutes	13
Long Seconds	40.2660
Location DeterminationMethod	screen digitized
Well Type	
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms
- Current Nationwide Threat Level: Yellow

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Well Location Submitted As A Dot On A Map N

WellMainRecordNumber	StartingDepth	EndingDepth	WaterBearing	LithologyCode	LithologyDescription
46144	0.00	60.00		GS	sand and gravel
46144	60.00	130.00		C	hardpan and clay
46144	130.00	482.00		R	gray shale and limestone

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

www.VermontDrinkingWater.org
VT DEC Water Supply Division 103 South Main Street, Old Pantry Building Waterbury, VT 05671-0403
Telephone toll-free in VT: 800-823-6500 or call 802-241-3400 Fax: 802-241-3284

Well Details

Date Completed	05/04/1992
Date Received	06/16/1992
Driller	23 Clyde (Jack) Frost Frost Inc
Well Report Number	309
Tag	7-382
Comments	
Town	Pownal
Map Cell	19B3
Tax Map	
E911 Address	
SubDivision	
Lot Number	
Owners First Name	Mathew
Owners Last Name	Dodge
Purchaser First Name	
Purchaser Last Name	
Well Use	Domestic
Well Reason	New Supply
Drilling Method	Rotary (AP)
Well Depth	500.00 feet
Yield Gallons Per Minute	0.50
Yield Test Tested For Hours	0.00
Static Water Level	200.00 feet
Over Flowing	0
OverBurden Thickness	30 feet
Casing Length	50.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	0.00 feet
Casing Length Exposed	0.00
Casing Material	
Casing Weight	0.00 lbs/foot
Casing Finish	Above ground, finished
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	
Screen Material	

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms
- Current Nationwide Threat Level: Yellow

Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	Drive shoe only
Yield Test Method	Compressed air
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ309
Lat Degree	42
Lat Minutes	45
Lat Seconds	16.8720
Long Degree	73
Long Minutes	14
Long Seconds	44.5740
Location DeterminationMethod	screen digitized
Well Type	
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	N

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	30.00		GH	Brown gravel & clay
30.00	50.00		R	Black shale
50.00	500.00		R	Black shale - water

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http://www.anr.state.vt.us/site/html/maps.htm

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Well Details

Date Completed	07/29/1992
Date Received	08/10/1992
Driller	101 Thomas Hanson Hanson Well Drilling & Pump Co Inc
Well Report Number	313
Tag	101-2-72992
Comments	
Town	Pownal
Map Cell	19B3
Tax Map	
E911 Address	
SubDivision	
Lot Number	
Owners First Name	Michael
Owners Last Name	McKenna
Purchaser First Name	
Purchaser Last Name	
Well Use	Domestic
Well Reason	Replace existing supply
Drilling Method	Rotary (AP)
Well Depth	222.00 feet
Yield Gallons Per Minute	20.00
Yield Test Tested For Hours	0.00
Static Water Level	40.00 feet
Over Flowing	0
OverBurden Thickness	10 feet
Casing Length	22.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	0.00 feet
Casing Length Exposed	0.00
Casing Material	
Casing Weight	0.00 lbs/foot
Casing Finish	Above ground, finished
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms
- Current Nationwide Threat Level: Yellow

Screen Material	
Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	Shoe & grout entire
Yield Test Method	Compressed air
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ313
Lat Degree	42
Lat Minutes	45
Lat Seconds	37.3979
Long Degree	73
Long Minutes	13
Long Seconds	16.5540
Location DeterminationMethod	screen digitized
Well Type	
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	N

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	10.00		H	Hardpan
10.00	222.00		R	Gray & Black shale with seams of quartz, H2O

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

Well Details

Date Completed	06/27/1994
Date Received	07/11/1994
Driller	16 H Allen Follett A & W Artesian Well Co Inc
Well Report Number	363
Tag	1625160
Comments	
Town	Pownal
Map Cell	19B3
Tax Map	
E911 Address	
SubDivision	
Lot Number	
Owners First Name	Suzanne
Owners Last Name	Caraman
Purchaser First Name	
Purchaser Last Name	
Well Use	Domestic
Well Reason	Replace existing supply
Drilling Method	Rotary (AP)
Well Depth	500.00 feet
Yield Gallons Per Minute	0.00
Yield Test Tested For Hours	0.00
Static Water Level	100.00 feet
Over Flowing	0
OverBurden Thickness	16 feet
Casing Length	40.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	0.00 feet
Casing Length Exposed	0.00
Casing Material	
Casing Weight	0.00 lbs/foot
Casing Finish	Above ground, finished
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	
Screen Material	

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms

- Current Nationwide Threat Level: Yellow

Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	Drive shoe only
Yield Test Method	Compressed air
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ363
Lat Degree	42
Lat Minutes	45
Lat Seconds	41.5260
Long Degree	73
Long Minutes	14
Long Seconds	25.5120
Location DeterminationMethod	screen digitized
Well Type	
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	N

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	16.00		CS	clay sand
16.00	500.00		R	Bedrock (gray black shale)

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

www.VermontDrinkingWater.org
VT DEC ▪ Water Supply Division ▪ 103 South Main Street, Old Pantry Building ▪ Waterbury, VT 05671-0403
Telephone toll-free in VT: 800-823-6500 or call 802-241-3400 ▪ Fax: 802-241-3284

Well Details

Date Completed	01/20/1996
Date Received	03/04/1996
Driller	93 Clarence Gould Sr. Gould & Sons Well Drilling
Well Report Number	405
Tag	579
Comments	
Town	Pownal
Map Cell	20A1
Tax Map	
E911 Address	
SubDivision	
Lot Number	
Owners First Name	RALPH
Owners Last Name	WEST
Purchaser First Name	
Purchaser Last Name	
Well Use	Domestic
Well Reason	New Supply
Drilling Method	Rotary (AP)
Well Depth	625.00 feet
Yield Gallons Per Minute	5.00
Yield Test Tested For Hours	0.00
Static Water Level	16.00 feet
Over Flowing	0
OverBurden Thickness	109 feet
Casing Length	120.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	0.00 feet
Casing Length Exposed	0.00
Casing Material	
Casing Weight	0.00 lbs/foot
Casing Finish	Above ground, finished
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	
Screen Material	

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms
- Current Nationwide Threat Level: Yellow

Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	Drive shoe only
Yield Test Method	Compressed air
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ405
Lat Degree	42
Lat Minutes	44
Lat Seconds	51.9539
Long Degree	73
Long Minutes	14
Long Seconds	15.6360
Location DeterminationMethod	screen digitized
Well Type	
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	N

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	7.00		G	GRAVEL
8.00	108.00		O	HARDPAN & ROCKS
109.00	625.00		R	MOSTLY BLACK SLATE SPOTS OF GREEN

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

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Telephone toll-free in VT: 800-823-6500 or call 802-241-3400 ▪ Fax: 802-241-3284

Well Details

Date Completed	11/13/1997
Date Received	12/22/1997
Driller	16 H Allen Follett A & W Artesian Well Co Inc
Well Report Number	5101
Tag	37760
Comments	surged well - made 2 gpm
Town	Pownal
Map Cell	20A1
Tax Map	
E911 Address	
SubDivision	
Lot Number	
Owners First Name	George
Owners Last Name	Tedeschi
Purchaser First Name	
Purchaser Last Name	
Well Use	Domestic
Well Reason	Replace existing supply
Drilling Method	Rotary (AP)
Well Depth	600.00 feet
Yield Gallons Per Minute	0.15
Yield Test Tested For Hours	0.00
Static Water Level	400.00 feet
Over Flowing	0
OverBurden Thickness	5 feet
Casing Length	40.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	38.00 feet
Casing Length Exposed	0.00
Casing Material	Steel
Casing Weight	17.00 lbs/foot
Casing Finish	Above ground, finished
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	
Screen Material	

Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	Drive shoe only
Yield Test Method	Compressed air
Well Development	Other
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ5101
Lat Degree	42
Lat Minutes	44
Lat Seconds	52.2059
Long Degree	73
Long Minutes	14
Long Seconds	25.9440
Location DeterminationMethod	screen digitized
Well Type	
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	N

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	5.00		S	sand
5.00	600.00		R	blue/black shale

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

Well Details

Date Completed	08/18/1998
Date Received	09/04/1998
Driller	23 Clyde (Jack) Frost Frost Inc
Well Report Number	6783
Tag	7-1019
Comments	
Town	Pownal
Map Cell	20A1
Tax Map	
E911 Address	
SubDivision	
Lot Number	
Owners First Name	John
Owners Last Name	Bottessi
Purchaser First Name	
Purchaser Last Name	
Well Use	Domestic
Well Reason	Replace existing supply
Drilling Method	Rotary (AP)
Well Depth	500.00 feet
Yield Gallons Per Minute	0.75
Yield Test Tested For Hours	0.00
Static Water Level	300.00 feet
Over Flowing	0
OverBurden Thickness	90 feet
Casing Length	100.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	98.00 feet
Casing Length Exposed	0.00
Casing Material	Steel
Casing Weight	17.00 lbs/foot
Casing Finish	Above ground, finished
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms
- Current Nationwide Threat Level: Yellow

Screen Material	
Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	Drive shoe only
Yield Test Method	Compressed air
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ6783
Lat Degree	42
Lat Minutes	44
Lat Seconds	50.5140
Long Degree	73
Long Minutes	14
Long Seconds	0.8160
Location DeterminationMethod	screen digitized
Well Type	
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	N

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	20.00		G	fine gravel
20.00	90.00		C	clay
90.00	100.00		R	black shale
100.00	260.00	.75	R	black shale
260.00	500.00		R	black shale

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Well Details

Date Completed	05/29/2003
Date Received	07/17/2003
Driller	93 Clarence Gould Sr. Gould & Sons Well Drilling
Well Report Number	24722
Tag	24722
Comments	142' 4 gpm 168' 6 gpm 249 10 320 10
Town	Pownal
Map Cell	
Tax Map	
E911 Address	183 Oak Drive
SubDivision	
Lot Number	
Owners First Name	Robert
Owners Last Name	Galiese
Purchaser First Name	
Purchaser Last Name	
Well Use	Domestic
Well Reason	New Supply
Drilling Method	
Well Depth	320.00 feet
Yield Gallons Per Minute	10.00
Yield Test Tested For Hours	1.00
Static Water Level	5.00 feet
Over Flowing	0
OverBurden Thickness	10 feet
Casing Length	42.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	40.00 feet
Casing Length Exposed	2.00
Casing Material	Steel
Casing Weight	17.00 lbs/foot
Casing Finish	
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms
- Current Nationwide Threat Level: Yellow

Screen Material	
Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	Drive shoe only
Yield Test Method	
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ24722
Lat Degree	42
Lat Minutes	45
Lat Seconds	41.9039
Long Degree	73
Long Minutes	13
Long Seconds	42.7080
Location DeterminationMethod	Welldriller/Clarion
Well Type	Bedrock
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	6.00		D	sandy loam
6.00	10.00		H	hardpan
10.00	320.00		R	black/gray slate/shale rock

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

Well Details

Date Completed	08/03/2004
Date Received	08/24/2004
Driller	23 Clyde (Jack) Frost Frost Inc
Well Report Number	27757
Tag	27757
Comments	pump setting - 140'
Town	Pownal
Map Cell	
Tax Map	
E911 Address	7275 Route 7
SubDivision	
Lot Number	
Owners First Name	Joe
Owners Last Name	Tornabene
Purchaser First Name	
Purchaser Last Name	
Well Use	OTHER
Well Reason	Replace existing supply
Drilling Method	
Well Depth	280.00 feet
Yield Gallons Per Minute	40.00
Yield Test Tested For Hours	1.00
Static Water Level	15.00 feet
Over Flowing	0
OverBurden Thickness	39 feet
Casing Length	50.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	48.50 feet
Casing Length Exposed	1.50
Casing Material	Steel
Casing Weight	19.00 lbs/foot
Casing Finish	
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	Clay/Seal Bentonite
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	
Screen Material	

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms
- Current Nationwide Threat Level: Yellow

Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	Shoe & grout bottom
Yield Test Method	
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ27757
Lat Degree	42
Lat Minutes	45
Lat Seconds	15.9121
Long Degree	73
Long Minutes	13
Long Seconds	6.9960
Location DeterminationMethod	Welldriller/Clarion
Well Type	bedrock
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	39.00		ST	till, sand, rocks
39.00	50.00		R	black, gray shale
50.00	105.00		R	black, gray shale
105.00	280.00		R	gray shale
280.00	0.00			fractures - 105/160/250

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

Well Details

Date Completed	11/21/2007
Date Received	01/28/2008
Driller	101 Thomas Hanson Hanson Well Drilling & Pump Co Inc
Well Report Number	33815
Tag	33815
Comments	Casing material: black steel
Town	Pownal
Map Cell	
Tax Map	
E911 Address	B Hill Road & Oak Drive
SubDivision	
Lot Number	
Owners First Name	Jordan
Owners Last Name	Schell-Lambert
Purchaser First Name	
Purchaser Last Name	
Well Use	Domestic
Well Reason	New Supply
Drilling Method	
Well Depth	702.00 feet
Yield Gallons Per Minute	1.00
Yield Test Tested For Hours	4.00
Static Water Level	140.00 feet
Over Flowing	0
OverBurden Thickness	39 feet
Casing Length	50.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	48.00 feet
Casing Length Exposed	2.00
Casing Material	Steel
Casing Weight	19.00 lbs/foot
Casing Finish	
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	Clay/Seal Bentonite
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms
- Current Nationwide Threat Level: Yellow

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Screen Material	
Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	Drive shoe only
Yield Test Method	
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ33815
Lat Degree	42
Lat Minutes	45
Lat Seconds	30.3000
Long Degree	73
Long Minutes	13
Long Seconds	42.3600
Location DeterminationMethod	
Well Type	Bedrock
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	Y

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	39.00		C	brown clay
39.00	702.00		R	black shale

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

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Well Details

Date Completed	12/06/2007
Date Received	12/07/2007
Driller	212 David Parker Parker Water Well
Well Report Number	41372
Tag	41372
Comments	
Town	Pownal
Map Cell	
Tax Map	
E911 Address	1503 North West Hill Road
SubDivision	
Lot Number	
Owners First Name	Jon D.
Owners Last Name	Peaslee
Purchaser First Name	
Purchaser Last Name	
Well Use	Domestic
Well Reason	Replace existing supply
Drilling Method	
Well Depth	125.00 feet
Yield Gallons Per Minute	8.00
Yield Test Tested For Hours	2.00
Static Water Level	40.00 feet
Over Flowing	0
OverBurden Thickness	67 feet
Casing Length	88.00 feet
Casing Diameter	6.00 inches
Casing Length Below Land Surface	86.00 feet
Casing Length Exposed	2.00
Casing Material	Steel
Casing Weight	17.00 lbs/foot
Casing Finish	
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms
- Current Nationwide Threat Level: Yellow

Screen Material	
Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	Drive shoe only
Yield Test Method	
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ41372
Lat Degree	42
Lat Minutes	44
Lat Seconds	57.5000
Long Degree	73
Long Minutes	14
Long Seconds	1.5000
Location DeterminationMethod	
Well Type	Bedrock
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
0.00	67.00		C	
67.00	125.00		R	black shale with quartz soft
104.00	106.00			8 gpm

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

Well Details

Date Completed	05/01/2009
Date Received	05/29/2009
Driller	23 Clyde (Jack) Frost Frost Inc
Well Report Number	41414
Tag	41414
Comments	Pump set 480 drill 5.5 hole
Town	Pownal
Map Cell	
Tax Map	
E911 Address	91 Valley View Rd
SubDivision	Pownal View
Lot Number	
Owners First Name	Mark
Owners Last Name	Atherton
Purchaser First Name	
Purchaser Last Name	
Well Use	Domestic
Well Reason	Deepened existing well
Drilling Method	
Well Depth	500.00 feet
Yield Gallons Per Minute	1.25
Yield Test Tested For Hours	1.00
Static Water Level	85.00 feet
Over Flowing	0
OverBurden Thickness	115 feet
Casing Length	0.00 feet
Casing Diameter	0.00 inches
Casing Length Below Land Surface	0.00 feet
Casing Length Exposed	0.00
Casing Material	
Casing Weight	0.00 lbs/foot
Casing Finish	
Liner Length	0.00 feet
Liner Diameter	0.00 inches
Liner Material	
Liner Weight	0.00 lbs/foot
Grout Type	
Seal Type	
Diameter Drilled In Bedrock	0.00 inches
Depth Drilled in Bedrock	0.00 feet
Screen Make Type	

Quick Links

- List of Vermont Licensed Well Drillers
- Well Driller Licensing Rule PDF
- Well Driller License forms

- Current Nationwide Threat Level: Yellow

Screen Material	
Screen Length	0.00 feet
Screen Diameter	0.00 inches
Screen Slot Size	0.000 inches
Depth of Screen	0.00 feet
Gravel Size Type	
Casing Sealing Method	
Yield Test Method	
Well Development	
Not Steel Casing	0
Water Analysis	0
Well Screen	0
AW Partial	0
Unique GIS Name	PQ41414
Lat Degree	42
Lat Minutes	45
Lat Seconds	28.9000
Long Degree	73
Long Minutes	14
Long Seconds	35.0000
Location DeterminationMethod	
Well Type	Bedrock
Depth To Liner Top	0.00
Hydro Fractured	0
Hydro Fractured Resulting Flow	0.00
Well Location Submitted As A Dot On A Map	

Starting Depth	Ending Depth	Water Bearing	Lithology Code	Lithology Description
115.00	500.00		R	Black shale med

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.
http://www.anr.state.vt.us/site/html/maps.htm

www.VermontDrinkingWater.org
VT DEC ▪ Water Supply Division ▪ 103 South Main Street, Old Pantry Building ▪ Waterbury, VT 05671-0403
Telephone toll-free in VT: 800-823-6500 or call 802-241-3400 ▪ Fax: 802-241-3284

Beaver Wood Energy Pownal LLC.
Inventory of Area Water Supply Wells on File With VT DEC
All Wells Within 3,000 Feet of the Existing Gravel Well at the Green Mtn Race Track, and Within its Area of Influence
VHB 10/15/2010

Well Report #	Tag	Owner, First Name	Owner, Last Name	Date Completed	Well Depth (ft)	Yield (gpm)	Static Water Level (ft)	Over Burden (ft)	Casing Length (ft)	Casing Diameter (in)	Well Use	Well Reason	Over Flowing?	Well Type	Lithology
73			NORTHERN TERMINAL INC.	3/15/1973	245	2	20	9	20	6	Domestic		No	Bedrock	0-9: Clay; 9-245: Shale
141	12171		Maturski	8/15/1978	230	2	30	50	60	6	Domestic		No	Bedrock	0-50: Hardpan; 50-230: Shale
146	806102290	William	MOREY	10/22/1990	249	55		8	21	6	Domestic	New Supply	No	Bedrock	0-90: Hardpan and Clay; 90-340: rock
155		BERTIL	OSCARSON	6/2/1975	115	8		10	16	6	Domestic		No	Bedrock	0-10: Soil; 10-115: Schist Ledge
156		Alta Gardens	Mobile Home Park	6/25/1975	170	15	30	60	61	6	PCWS		no	Bedrock	0-10 Gravel; 10-50 clay; 50-60 gravel; 60-170 shale, quartz, marble, granite
234		A.	Lussier	9/18/1987	305	2		62	102	6	Domestic	New Supply	No	Bedrock	0-62: Sand and Silt; 62-305: Granite
235		Jon D.	Peaslee	9/16/1987	505	0.0		97	122	6	Domestic	New Supply	No	Bedrock	0-97: Sand, Silt; 97-505: Granite
270	22714	Leigh	Lopresti	4/25/1990	500	0.0	6	20	32	6	Domestic	New Supply	No	Bedrock	0-20: Gravel; 20-300: Black Slate; 300-500: Blue Granite
288	2-022891	Pamela	Lyttle	3/1/1991	482	4	100	130	140	6	Domestic	New Supply	No	Bedrock	0-60: Sand and Gravel; 60-130: Hardpan and Clay; 130-482: Gray Shale and Limestone
309	7-382	Mathew	Dodge	5/4/1992	500	0.5	200	30	50	6	Domestic	New Supply	0	Bedrock	0-30: Brown Gravel and Clay; 30-50: Black Shale; 50-500: Black Shale-Water
313	101-2-72992	Michael	McKenna	7/29/1992	222	20	40	10	22	6	Domestic	Replace existing supply	0	Bedrock	0-10: Hardpan; 10-222: Gray & Black Shale with seams of quartz, water
363	1625160	Suzanne	Caraman	6/27/1994	500	0.0	100	16	40	6	Domestic	Replace existing supply	0	Bedrock	0-16: Clay Sand; 16-500: Bedrock (Gray Black Shale)
405	579	RALPH	WEST	1/20/1996	625	5	16	109	120	6	Domestic	New Supply	No	Bedrock	0-7: Gravel; 8-108: Hardpan and Rocks; 109-625: Mostly Black Slate, some Spots of Green
5101	37760	George	Tedeschi	11/13/1997	600	2	400	5	40	6	Domestic	Replace existing supply	No	Bedrock	0-5: Sand; 5-600: Blue/Black Shale
6783	7-1019	John	Bottessi	8/18/1998	500	0.75	300	90	100	6	Domestic	Replace existing supply	No	Bedrock	0-20: Fine Gravel; 20-90: Clay; 90-500: Black Shale
24722	24722	Robert	Galiese	5/29/2003	320	10	5	10	42	6	Domestic	New Supply	No	Bedrock	0-6: Sandy Loam; 6-10: Hardpan; 10-320: Black/Gray Slate/Shale Rock
27757	27757	Joe	Tornabene	8/3/2004	280	40	15	39	50	6	OTHER	Replace existing supply	0	Bedrock	0-39: Till, Sand, Rocks; 39-105: Black, Gray Shale; 105-280: Gray Shale
33815	33815	Jordan	Schell-Lambert	11/21/2007	702	1	140	39	50	6	Domestic	New Supply	No	Bedrock	0-39: Brown Clay; 39-702: Black Shale
41372	41372	Jon D.	Peaslee	12/6/2007	125	8	40	67	88	6	Domestic	Replace existing supply	No	Bedrock	0-67: Clay; 67-125: Black Shale with Quartz Soft
41414	41414	Mark	Atherton	5/1/2009	500	1.25	85	115	0	0	Domestic	Deepened existing well	No	Bedrock	115-500: Black Shale med.
n					20	20	16	20	20						
Mean					384	8.8	95	49	59						
Median					401	2.0	40	39	50						
Minimum					115	0	5	5	0						
Maximum					702	55	400	130	140						

APPENDIX 3

LINCOLN
APPLIED GEOLOGY, INC.
ENVIRONMENTAL CONSULTANTS

February 20, 1995

Mr. James Meagher
Ruanaidh Realty Corporation
Yonkers and Central Avenue
Yonkers, New York 10704

RE: Summary Report of the Production Well Pump Test at the Green Mountain Race Track, Pownal, Vermont (VDEC Site #93-1511)

Dear Mr. Meagher:

Lincoln Applied Geology, Inc. (LAG) is pleased to submit the summary report of the 7-day 500 gallon per minute (gpm) pump test of the production well at the Green Mountain Race Track (GMRT) in Pownal, Vermont. The pump test was conducted in response to an August 1, 1994 letter request by Richard Spiese of the Vermont Department of Environmental Conservation (VDEC) following the discovery in November 1993 of both gasoline and fuel oil contamination of shallow soils and ground water from two former leaking underground storage tanks (LUSTs).

Results of the pump test indicate that the very limited dissolved petroleum contamination in the upper aquifer associated with the former LUSTs did not migrate into either the upper aquifer monitor wells or the lower aquifer GMRT well during the 7-day pump test. It is unlikely that long-term pumping of the GMRT well will cause the low level petroleum-related contamination to flow from the upper aquifer into the lower aquifer. Additionally, it was found that the well yield of the GMRT well has increased since its drilling and construction in 1962.

If you have any questions or comments regarding this report or other concerns at the GMRT site, please feel free to call me or John Amadon, Project Manager, at 802-453-4384.

Sincerely,

William D. Norland

William D. Norland
Hydrogeologist

Enclosures
cc: Richard Spiese

RD # 1 Box 710 • Bristol, Vermont 05443 • (802) 453-4384 • FAX (802) 453-5399

Green Mountain Race Track

7-Day Pump Test
of the
Production Well

February 20, 1995

Prepared by:

William D. Norland

William D. Norland
Hydrogeologist

Reviewed and Approved by:

Stephen Revell

Stephen Revell
Senior Hydrogeologist

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Environmental Consultants
RD # 1 Box 710 • Bristol, Vermont 05443 • (802) 453-4384 • FAX (802) 453-5399

Table of Contents

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Environmental Consultants
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A. **Introduction**

This summary report presents the results of petroleum contamination-related pump testing and water quality sampling of the production well at the Green Mountain Race Track (GMRT). The site is located on the west side of U.S. Route 7 which is shown on the General Location Map presented as **Figure 1**. This work was conducted in response to an August 1, 1994 letter request by Richard Spiese of the Vermont Department of Environmental Conservation (VDEC) following the discovery in November 1993 of both gasoline and fuel oil contamination of shallow soils and ground water from two former leaking underground storage tanks (LUSTs). Subsequent testing confirmed low level contamination in the upper aquifer. The two former LUSTs were located 500 feet east of the production well (GMRT well). The purpose of the pump test was to evaluate whether the petroleum contaminants would migrate toward the GMRT well under pumping conditions and cause adverse water quality impacts to the well.

During the pump test the GMRT well was pumped for 7 days at a constant discharge rate of about 500 gallons per minute (gpm) while ground water levels in the GMRT well and seven nearby observation wells were monitored both manually and using continuous water level recorders. Ground water quality samples for BTEX and MTBE analyses were collected from the GMRT well and all monitor wells before and at the end of the pumping test. Ground water samples were also obtained from the GMRT well during the pumping test period. The GMRT grandstand building, race track, pond, outbuildings, GMRT well, monitor wells, former LUST locations, and nearby Hoosic River are shown on the Detailed Site Map presented as **Figure 2**.

B. **GMRT Production Well**

The GMRT production well is a gravel packed well that is located in a concrete block pump house as shown on **Figure 2**. The well was drilled by R.E. Chapman Co. of Oakdale, Massachusetts between May 7 and 25, 1962. It is a 24" x 18" gravel packed well with 15 feet of 120 slot well screen. The well screen is positioned within a prolific gravel aquifer that exists from a depth of 41 feet to 67 feet. Overlying the gravel aquifer is a 11 foot thick confining layer (30' - 41') of clay and silt. Unconsolidated sediments overlying the clay and silt include 'hardpan and stone' from 12 feet to 30 feet and 'topsoil and gravel' from the surface to 12 feet. The driller's well log is included in **Appendix A**. A 40 HP electric turbine pump with the intake at a depth of 57 feet presently provides water from the well to an approximately 7,600 gallon capacity storage tank (6' diameter x 36' long).

After well construction, R.E. Chapman Co. performed a four day pump test on the well between May 21 and 24, 1962. For the first three days the well was pumped at 445 gallons per minute (gpm) and then the pumping rate was increased for one day to it's maximum rate of 520 gpm. During the last day of the test prior to pump shutdown, the maximum drawdown of the ground water level in the well was 46 feet. For comparison purposes, maximum drawdown of the ground water level in the well at the end of the recent seven day 500 gpm pump test was 29 feet. This indicates that the well yield has increased substantially due to continued water use developing the well since it's construction in 1962.

Prior to conducting the recent pump test, the original 40 HP electric motor and turbine pump had to be replaced with the spare 40 HP motor kept on-site. The original motor had 'burned out' and failed in July 1994. Following installation of the pump motor on November 11th, the 7 day pump test was performed from November 15 to 22, 1994.

C. Upper Aquifer Monitor Wells

Included in **Appendix A** are the Lincoln Applied Geology, Inc. (LAG) detailed well logs for one test pit well (TPW-1) installed at the former location of a 2,000 gallon gasoline UST, and the six monitor wells drilled and installed at other locations as part of the initial evaluation of the LUSTs. The locations are shown on **Figure 2**. All these monitor wells are screened within the upper aquifer only. Unconsolidated sediments encountered during well installation include dominantly sand and gravel, with occasional layers of silt and silty clay. In MW-5 and MW-6, a thick silty clay deposit was present from about 16 feet to the bottom of the boring. With the exception of TPW-1, monitor wells are constructed with about 5 feet of 2-inch PVC riser and 20 feet of 2-inch PVC screen with sand pack and bentonite seal as shown on the individual well logs included in **Appendix A**. Static ground water in the unconfined upper aquifer was present in the monitor wells at a depth of about 12 to 14 feet below grade during November 1994. The upper aquifer ground water gradient under non pumping conditions on November 14, 1994 was 0.003 feet/foot between MW-1 and MW-2 (0.84 feet water level decline over 295 feet distance). The ground water gradient after 7 days of pumping on November 22 had increased (doubled) to 0.006 feet/foot between the same wells (1.64 feet decline over 295 feet distance).

D. Pre-Test Monitoring and Water Quality Sampling

On November 14, 1994 depth to ground water measurements and headspace vapor assays by photoionization detector (PID) were collected from the seven monitor wells and the GMRT well. Ground water elevation data and PID assays are included in **Tables 1** and **2**, respectively. Water quality samples were then obtained from these wells following proper purging and sampling techniques. All samples were analyzed at the MicroAssays of Vermont laboratory for the petroleum constituents benzene, toluene, ethylbenzene, xylenes, and methyl-tert-butyl ether (BTEX and MTBE). Copies of the formal laboratory reports are presented in **Appendix B** and summarized in **Table 3**. Review of **Table 3** and **Appendix B** indicate that no quantifiable levels of

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BTEX and MTBE were detected in any of the wells except 83 parts per billion (ppb) BTEX in TPW-1. TPW-1 is located at the former location of the gasoline LUST, and the level of BTEX has declined slightly from 108 ppb on April 7, 1994. This is clear evidence that very little contaminant remains in the absolute source area.

E. **Constant Rate Pump Test and Aquifer Coefficients**

Continuous water level recorders were set up on the GMRT well, MW-1, MW-2, MW-3, and MW-4. Due to their great distance from the pumping well, MW-5 and MW-6 were monitored manually throughout the test. A 7 day constant rate pump test was initiated at 10:50 a.m. on November 15, 1994 and continued without interruption until 9:27 a.m. on November 22, 1994. Prior to conducting the test, static water levels were obtained in the six ground water monitor wells and the GMRT well. Water level and flow rate data collected prior to and during the pump test is included in **Appendix C**. Water pumped from the GMRT well was discharged through a fire hydrant and 2.5-inch diameter fire hose located near the southeast corner of the Grandstand building. A hand held hydrant pitot flow gauge was used to determine the pumping rate by measuring the water flow rate from the hose. Discharged water flowed a short distance across the paved ground surface where it entered a storm sewer catch basin and was conveyed via an underground pipe to the pond in the middle of the horse track. A target pumping rate of 500 gpm was set for the GMRT well. Pitot flow rate data yields a calculated average of 514 gpm throughout the pump test, for an estimated total pumped water discharge volume into the pond of 5.14 million gallons. On November 19th during the pump test period negligible rainfall (0.02 inches of precipitation) was recorded at the Pownal 1 NE station. The October and November 1994 precipitation data is shown on **Chart 1** and the tabulated data is included as **Appendix D**.

below clay layer - 41' bgs

The static water level in the GMRT well at the start of the test was 13.85 feet below the top of casing (TOC), and at the end of the test the pumping water level was 42.88 feet below TOC. The graphical results showing water level drawdown versus time since pumping began for the GMRT well and MW-2 are presented as **Charts 2** and **3**, respectively. **Chart 2** shows the immediate drawdown response in the GMRT well from pumping the lower confined gravel aquifer at a rate of 500 gpm. Within the first hour, adjustments to the pumping rate caused minor fluctuations in the drawdown. **Chart 4** shows a drawdown projection that indicates that total drawdown after + 180 days of continuous pumping at 500 gpm would be approximately 32 feet or 45.85 feet below the surface.

not really confined

Further evaluation of the lower gravel aquifer was conducted using data from a May 1962 pump test (445 gpm and 520 gpm discharge rates) performed by R.E. Chapman Co.. The pump test data is included as **Appendix E**. Water levels in former observation well OW-8 (screened within the lower gravel aquifer) were monitored during the 1962 pump test. This data is graphically presented as **Chart 5**.

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AQTESOLV ground water modeling software was used to analyze this data and obtain aquifer coefficients for transmissivity (T) and to estimate storativity (S). T for the lower confined gravel aquifer was calculated to be 15,360 ft^2/day, and S was calculated to be 1.0×10^{-12}. These values were obtained using the Papadopulos-Cooper method which was derived for confined aquifers. The value obtained for T appears to be within an acceptable range for gravel aquifers, but the extremely small S value suggests that the aquifer releases little or no water from storage during pumping. This may be an indicator that it's immediate recharge is significant from shallow aquifers and recharge boundaries (i.e. Hoosic River) and not from discharge from the bedrock aquifer. Storativity this low is usually not obtained in field situations. The drawdown information obtained from the upper aquifer monitor wells indicates that the confining layer does allow leaky recharge from above. We believe the S value is too low and not completely representative of the lower aquifer. The transimissivity coefficient is available for use for wellhead protection area definition and in dealing with any potential well interference problems, if encountered.

Chart 3 shows the delayed drawdown response of the upper unconfined aquifer at MW-2 to pumping the lower confined aquifer at 500 gpm. There was a 45 minute delay between when the pump test started and drawdown began at MW-2. The total drawdown in MW-2 at the end of the 7 day pump test was 1.43 feet. **Chart 6** was generated using the AQTESOLV ground water modeling software to analyze the data and T and S values for the unconfined upper aquifer. T is 22,580 ft^2/day, and S is 1.025×10^{-3}, both greater than the lower confined aquifer. This T and S were calculated using the Neuman method for unconfined aquifers. Again, we believe that the T value is representative and the S value is not particularly representative of unconfined aquifers. This may be a result of correcting the calculation to handle partially penetrating wells. When the GMRT well is pumping (screened in the lower aquifer) ground water from the upper unconfined aquifer is induced to flow downward through the 'leaky' clay and silt confining layer (aquitard) and into the permeable gravel aquifer.

Charts 7 and **8** show pump test drawdown effects in the upper aquifer for MW-3 and MW-4, respectively. Estimated delayed drawdowns for these wells following startup of the pump test are 20 minutes in MW-3 and 80 minutes in MW-4. Total induced drawdowns of 1.57 feet were recorded in MW-3 and 1.27 feet in MW-4 at the end of the pump test. These data delineate the partial areal extent impacted by the downward leaky condition existing between the upper and lower aquifers when the GMRT well is continually pumped at 500 gpm. This indicates that the confining unit or aquitard allows some level of downward leakage during pumping. These findings may have some significance because the former LUSTs were located within the upper aquifer.

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F. Ground Water Travel Times

The T values for the upper and lower aquifers calculated by the AQTESOLV ground water modeling software were used to determine the hydraulic conductivity (K) of the respective aquifers. The relationship $K = \frac{T}{b}$ was used to calculate the K values for the lower and upper aquifers, where b is the aquifer thickness in feet. The theoretical calculated K of the upper unconfined aquifer is 782 ft/day, and the calculated K of the lower confined aquifer is 591 ft/day. The K values were used to calculate ground water residence (or travel) times for the upper and lower aquifers. With porosities of both the upper and lower aquifer assumed to be 0.3, the ground water travel time between MW-1 and MW-2 (a distance of 295 feet) in the upper unconfined aquifer was calculated to be 0.13 days or 188 minutes under non-pumping (natural) conditions. When the GMRT is pumping at 500 gpm, the travel time decreases to 0.07 days or 96 minutes. Similarly, the ground water travel time over the same distance in the lower aquifer was calculated to be 0.05 days or 73 minutes under natural conditions, and decreased to 0.025 days or 37 minutes under 500 gpm pumping conditions. Although they can't be calculated from this test, travel times for the aquitard or confining unit are several order of magnitude greater than both the upper and lower aquifers.

G. Induced Drawdown Effects

Chart 9 is a distance-drawdown graph that illustrates the relationship between observed drawdown in shallow observation wells located at increasing distances from the GMRT pumping well. As the pumping well stresses and discharges water from the lower gravel aquifer, ground water in the upper unconfined aquifer is induced to flow downward through the sand and gravel aquifer and clay and silt aquitard, thereby recharging ground water to the lower aquifer. This movement of shallow ground water into the lower aquifer causes lowering of the shallow ground water surface, or induced drawdown in the upper aquifer.

The seven monitor wells installed by LAG all penetrate the upper aquifer. Wells closest to the pumping well (MW-2 and MW-3) experienced the greatest induced drawdown effects, while wells at increasingly greater distance from the GMRT well experienced smaller drawdown effects (TPW-1 and MW-1). A projection of the best fit line through the data points indicates that at a distance of 850 feet from the GMRT well, there will be no induced drawdown effects in the upper unconfined aquifer as a result of pumping at 500 gpm. Both wells MW-5 and MW-6 located 2,122 and 2,344 feet from the GMRT well, respectively, experienced no induced drawdown effects that could be positively attributed to the pump test.

Although we believe it is a minor concern (because of the lack of contaminant in the upper aquifer), the induced drawdown effects documented in the upper aquifer

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(during the seven day pumping test) will be cyclic when the GMRT well is utilized to supply water to the race track complex. This is because of water storage and the fact that a water supply production well typically pump about 12 hours per day. When the well is not in service water levels readily recover to static levels because of each aquifer's high transmissivity. The induced drawdown impacts to the upper aquifer will also recover during non pumping periods, with a small time lag. As a result, induced drawdown effects will not be continually present in the upper aquifer, thereby, limiting the downward flow characteristic that is present during pumping periods. Our overall opinion is that horizontal upgradient recharge associated with the lateral extent of the lower gravel aquifer is so significant that leakage through the silt/clay confining unit (with an estimated permeability of 10^{-2} to 10^{-6} ft/day) is not.

H. Ground Water Flow

Ground water level data collected under non-pumping conditions on November 14, 1994 and presented in **Table 1** was used to generate the ground water contour map included as **Figure 3**. The direction of ground water flow in the upper aquifer is toward the west and northwest. Data from November 18th during the third day of the pump test shows a similar west and northwest ground water flow direction in the upper aquifer as depicted in **Figure 4**. On the last day of the pump test, November 22nd, the ground water flow direction in the upper aquifer remains the same (although slightly deflected toward the GMRT well), with flow to the west and northwest toward the Hoosic River, as shown on **Figure 5**.

Shallow ground water from the upper aquifer in the vicinity of TPW-1 and the former LUST area flows toward the GMRT well under both non-pumping and pumping conditions. The locations of the remaining two 10,000 gallon and one 20,000 gallon fuel oil USTs and the 500 gallon gasoline UST are all in downgradient locations from the GMRT well as shown on **Figure 2**.

I. Water Quality Results During and After the Pump Test

Ground water quality samples were collected from the GMRT well during the pump test and analyzed for BTEX and MTBE. The first sample was collected on November 15, 1994 at 12:56 p.m. after pumping about 61,000 gallons; the second sample was collected on November 18th at 10:20 a.m. after pumping about 2,269,000 gallons; and the third sample was collected on November 21st at 11:40 a.m. after pumping about 4,486,000 gallons. All three ground water samples contained no detectable levels of BTEX and MTBE.

At the end of the seven day pump test on November 22, 1994, ground water quality samples were collected from the GMRT well and six of the seven monitor wells. A water sample could not be obtained from TPW-1 because induced drawdown effects

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caused by the GMRT well lowered the ground water level below the bottom of the well. All ground water samples collected contained no detectable levels of BTEX and MTBE. The laboratory results are summarized in **Table 3** and the laboratory reports are included in **Appendix C**.

Water quality sampling and ground water level data indicate that conducting a 500 gpm, 7 day pump test on the GMRT well and stressing the lower aquifer did not cause the low level dissolved BTEX and MTBE contaminants in the vicinity of the former LUSTs to migrate laterally into the downgradient monitor wells or both vertically and laterally into the lower aquifer at the GMRT well.

J. **Predicted GMRT Well Ground Water Capture Zones**

The AQTESOLV ground water modeling software-derived transmissivity coefficient (T) for the lower confined aquifer was used in the WHPA (Wellhead Protection Area) computer model to evaluate the configuration of lower aquifer ground water capture zones developed by the GMRT well under variable pumping scenarios. WHPA is a ground water model that utilizes aquifer parameters to model ground water flow and well capture zones. **Figure 6** shows the ground water capture zone after seven days of pumping the well at 500 gpm. The majority of the ground water supplying the well comes from around and immediately upgradient of the well. The flowlines shown approximate individual flowpaths taken by particles of water as they flow toward the pumping well. **Figure 7** shows the hypothetical 'steady state' ground water capture zone at 500 gpm. The western part of the capture zone has intersected the Hoosic River, which behaves as a positive recharge boundary. A portion of the Hoosic River surface water is induced to flow down into and recharge water to the lower aquifer and the GMRT well. The size of the capture zone has increased, but the majority of water supplying the well comes from upgradient or south of the well. To show the effect of pumping rate changes, lowering the long-term pumping rate to 250 gpm, results in the capture zone becoming smaller resulting in isolating it from the Hoosic River. Again, the majority of the ground water supplying the well flows from the upgradient area to the south.

The WHPA model calculates capture zones by assuming that the aquifer is homogeneous and isotropic. As a result, the true capture zones probably have somewhat different geometrics. The important information provided by the WHPA model is that the GMRT well derives water from directly upgradient and only after prolonged pumping may induce flow from the Hoosic River. Because the WHPA model is a 2 dimensional model it does not account for ground water flow from the upper aquifer. As a result, the 7 day capture zone calculated by WHPA does not include the regions of the upper aquifer where drawdown actually occurred. This is because the T value for the lower aquifer is high enough to adequately supply all the required yield from the source aquifer to the well. The real capture zone for the GMRT well should

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include the area where drawdown occurred in the upper aquifer monitor wells in recognition that it does supply some recharge to the well.

K. Conclusions

A 7-day pump test performed on the GMRT well at a 500 gpm discharge rate during the period November 15 - 22, 1994 has resulted in the following conclusions regarding the GMRT well yield, induced drawdown effects, upper unconfined and lower confined aquifers, ground water capture zones, confirmed dissolved petroleum contamination, and existing petroleum USTs:

1. The well yield of the GMRT gravel packed well in the lower confined aquifer has increased since its construction in 1962. The recent 500 gpm pump test caused drawdown in the well of 29.03 feet by the end of the 7-day test, whereas during the 1962 pump test at 445 gpm for 3 days and 520 gpm for 1 day caused drawdown in the well of 39.75 feet. A total drawdown of 32 feet was projected for the GMRT well after +180 days of continuous pumping at 500 gpm (**Chart 4**). The yield of this well appears more than sufficient to supply the water needs for the GMRT if and when it is put back into operation.,

2. The recent 500 gpm pump test caused induced drawdown effects in 5 of the 7 upper aquifer monitor wells. A distance-drawdown graph of this data (**Chart 9**) indicates that at the end of the 7-day pump test induced drawdown effects in the upper aquifer are limited to within 850 feet of the GMRT well.,

3. Transmissivity (T) and storage (S) coefficients of the upper aquifer calculated by the AQTESOLV ground water modeling software using data collected from the November 1994 pump test are 22,580 ft^2/day and 1.025 x 10^{-3}, respectively. T and S for the lower aquifer May 1962 pump test are 15,360 ft^2/day and 1.0 x 10^{-12}, respectively. These data were used in the WHPA ground water model to predict the configuration and extent of the ground water capture zones for the GMRT well under variable 'steady state' 250 gpm and 500 gpm pumping scenarios. The former LUSTs lie within the predicted 250 gpm and 500 gpm GMRT well ground water capture zones.,

4. The LUST-related contamination levels within the upper aquifer are low to non existent and of minor extent. Ground water quality data collected prior to, during, and after the recent 7-day 500 gpm pump test indicate that the low levels of dissolved BTEX contamination detected in TPW-1 (108 ppb in 4/94 and 83 ppb in 11/94) at the former gasoline and fuel oil

Lincoln Applied Geology, Inc.
Environmental Consultants
RD # 1 Box 710 • Bristol, Vermont 05443 • (802) 453-4384 • FAX (802) 453-5399

LUST locations did not migrate downgradient into MW-2, MW-3, MW-4, and/or the GMRT well under 500 gpm pumping conditions. It appears that the low level of BTEX contaminants remain in the source area. As ground water from the upper aquifer migrates from the source area, in the direction of the pumping well, the contaminants are adsorbed to soils, biodegraded by naturally occurring subsurface microorganisms, and diluted. The relative risk of these known contaminants migrating vertically and horizontally into the lower aquifer is considered to be low to non-existent., and

5. Presently three fuel oil USTs (two 10,000 gallon and one 20,000 gallon) and one gasoline UST (500 gallon) are located downgradient to the west and northwest of the GMRT well (**Figure 2**). The upper aquifer ground water flow direction and predicted ground water capture zones under GMRT well pumping conditions indicate that in the event of a petroleum release, it is extremely unlikely that the petroleum would impact the lower aquifer and GMRT well since the predicted ground water capture zones do not include the existing UST areas. Released petroleum product would migrate in multiple phases toward the Hoosic River to the west and northwest.

L. Recommendations

With regard to the conclusions presented above, the following recommendations are made:

1. Conduct semiannual ground water quality sampling of all on-site monitor wells and the GMRT well for BTEX and MTBE for the next year. If BTEX levels in TPW-1 continue to decline and no detectable levels of BTEX and MTBE are found in the other wells, then a "site management activity completed" (SMAC) designation will be recommended to the VDEC Hazardous Materials Management Division for the site.

2. The new owner(s) of the property should develop a Source Protection Plan (SPP) and Wellhead Protection Area (WHPA) for the GMRT well when the proposed future uses of the property are defined and approved.

3. The GMRT well should not be pumped at a rate which results in drawdown in the well below the bottom of the silty clay aquitard (confining layer) - i.e. 41 feet below the top of the well casing.

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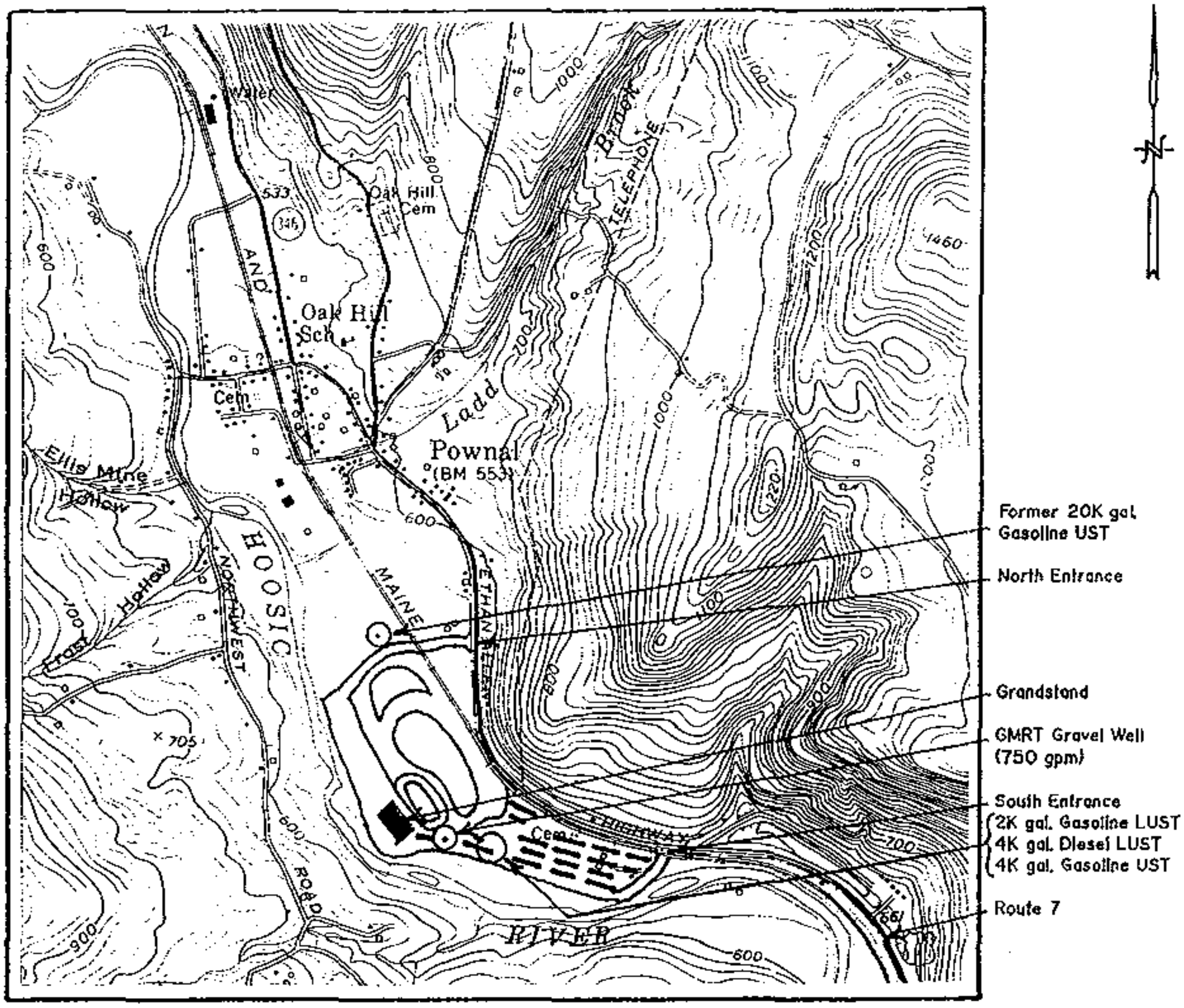
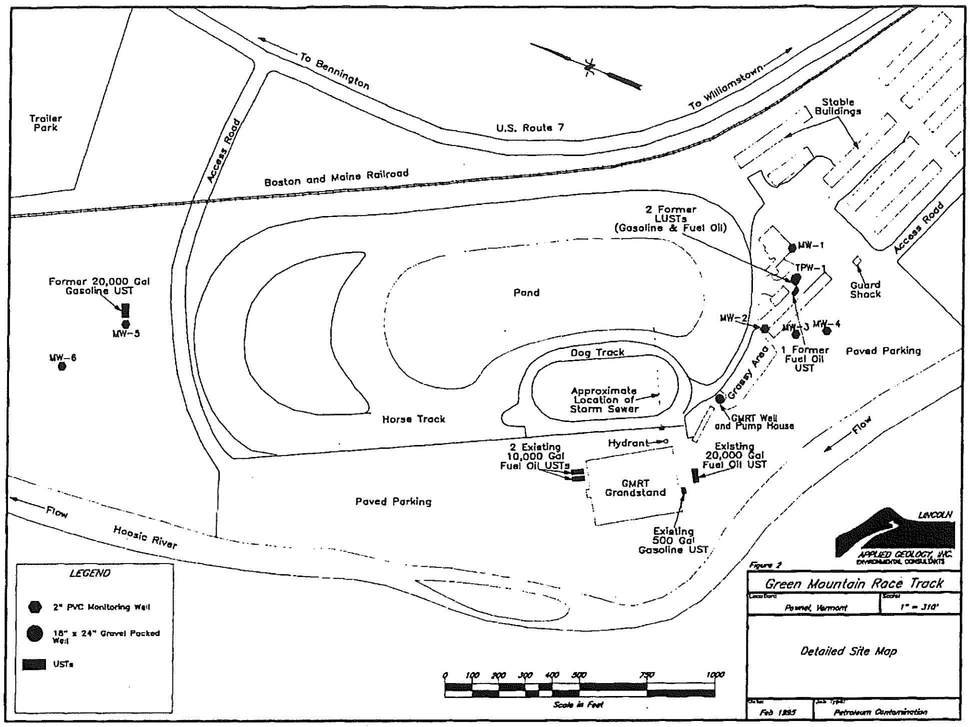
Environmental Consultants
RD # 1 Box 710 • Bristol, Vermont 05443 • (802) 453-4384 • FAX (802) 453-5399

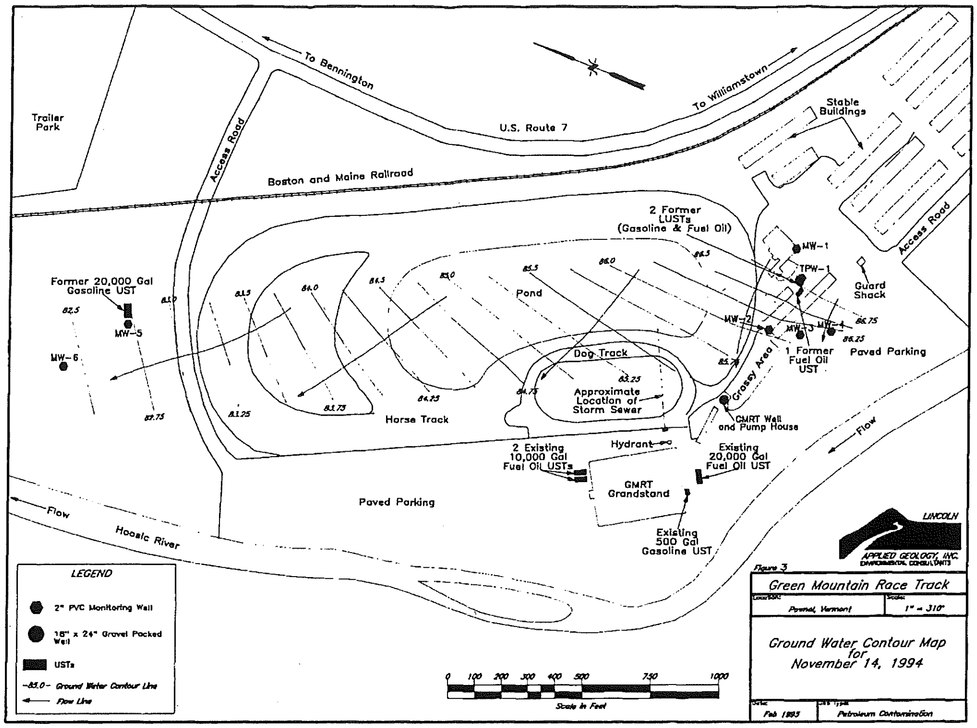
Green Mountain Race Track
GENERAL LOCATION MAP

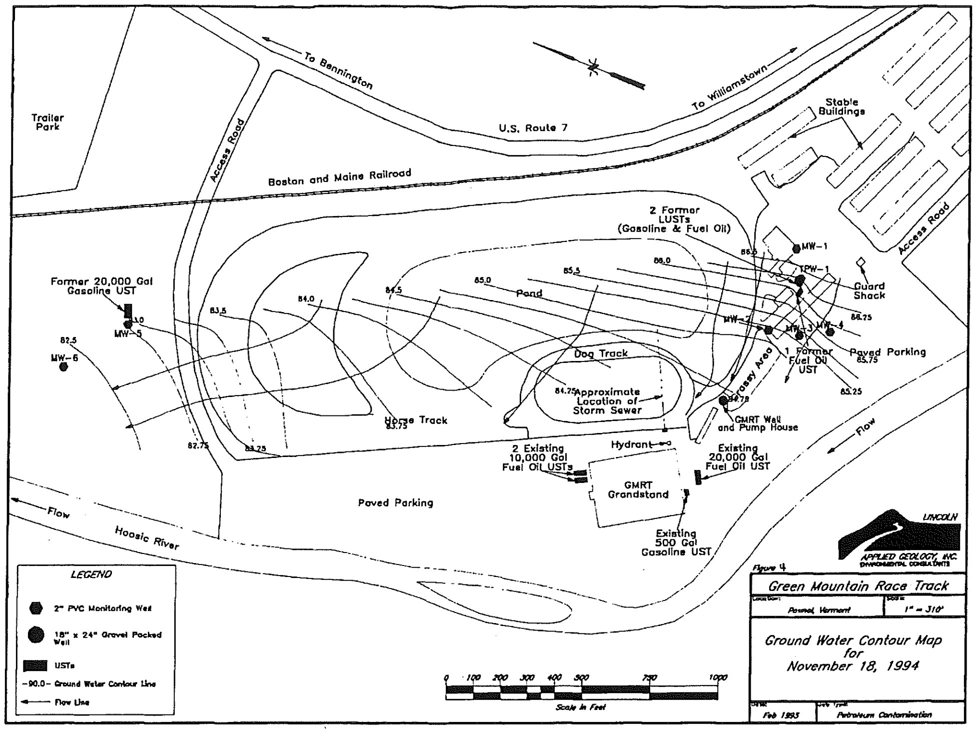


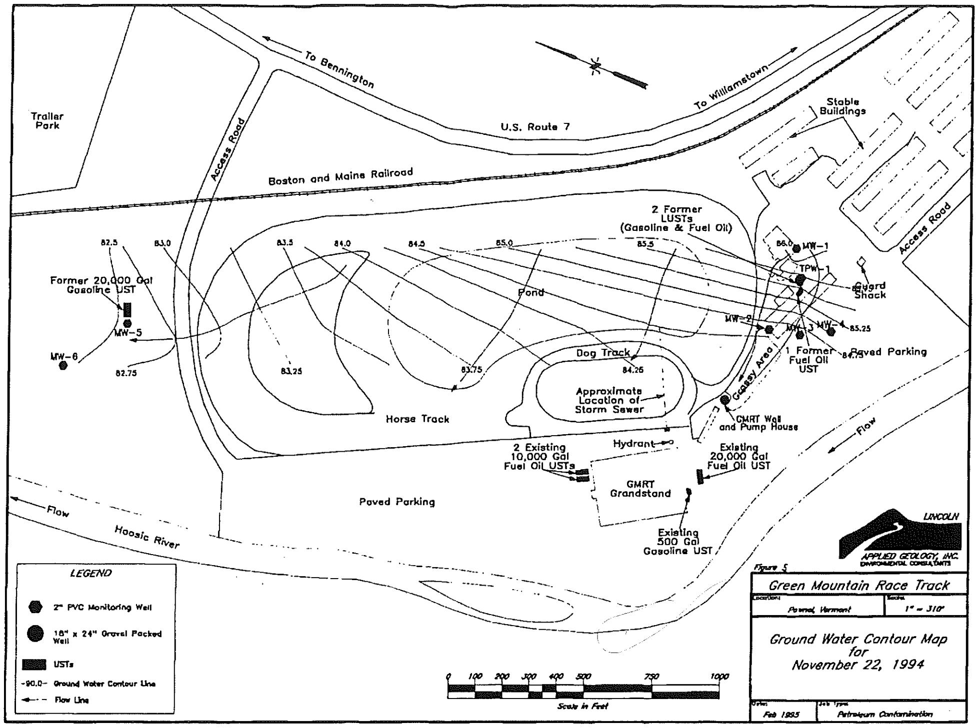
Source: **U.S.G.S. 7.5 min. Topo Series**
Pownal, VT Quad.

Scale: 1" = 2000'

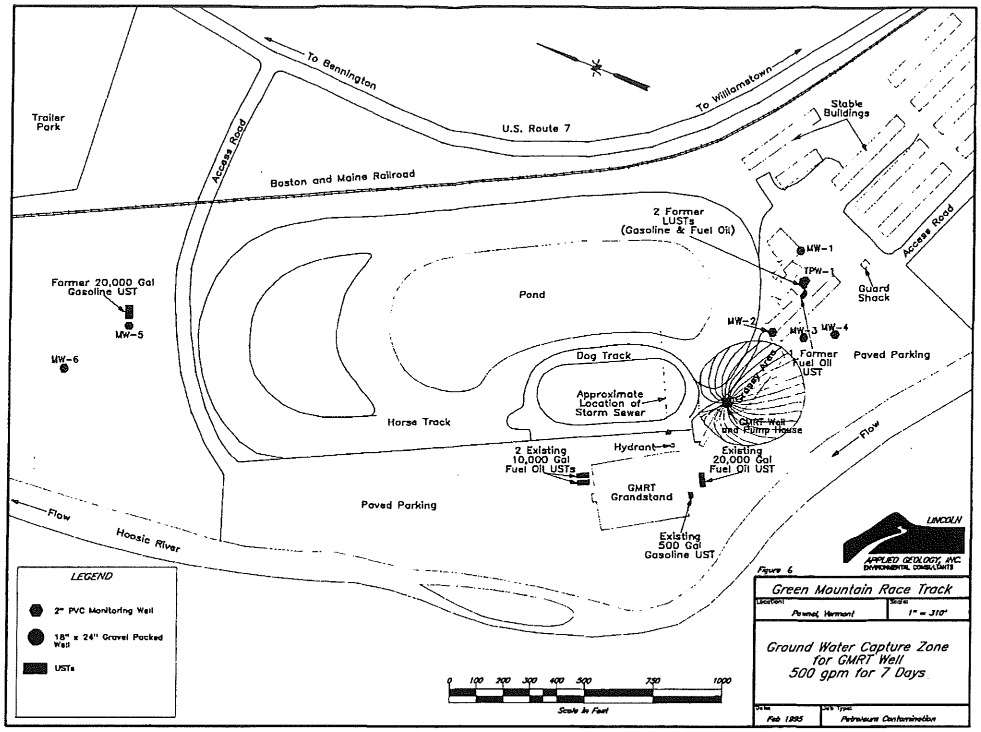

Trailer Park
To Bennington
U.S. Route 7
To Williamstown
Stable Buildings
Access Road
Boston and Maine Railroad
2 Former LUSTs (Gasoline & Fuel Oil)
MW-1
TPW-1
Guard Shack
Former 20,000 Gal Gasoline UST
MW-5
MW-6
Pond
MW-2
MW-3
MW-4
1 Former Fuel Oil UST
Paved Parking
Grassy Area
Dog Track
Approximate Location of Storm Sewer
Horse Track
GMRT Well and Pump House
Flow
Hydrant
2 Existing 10,000 Gal Fuel Oil USTs
Existing 20,000 Gal Fuel Oil UST
GMRT Grandstand
Paved Parking
Existing 500 Gal Gasoline UST
Flow
Hoosic River
LEGEND
2" PVC Monitoring Well
18" x 24" Gravel Packed Well
USTs
0 100 200 300 400 500 750 1000
Scale in Feet
LINCOLN APPLIED GEOLOGY, INC. ENVIRONMENTAL CONSULTANTS
Figure 2
Green Mountain Race Track
Pownal, Vermont
1" = 310'
Detailed Site Map
Feb 1995
Petroleum Contamination

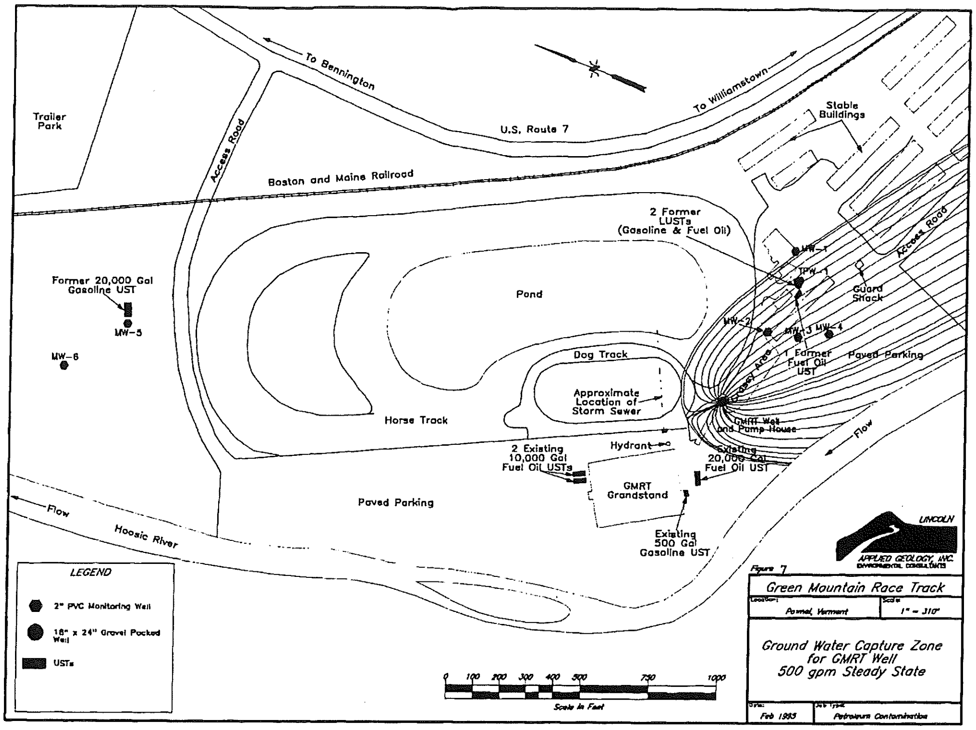

To Bennington
To Williamstown
U.S. Route 7
Trailer Park
Access Road
Boston and Maine Railroad
Stable Buildings
Access Road
2 Former LUSTs (Gasoline & Fuel Oil)
MW-1
TPW-1
Guard Shack
Former 20,000 Gal Gasoline UST
MW-5
MW-6
Pond
MW-2
MW-3
MW-4
1 Former Fuel Oil UST
Paved Parking
Grassy Area
Dog Track
Approximate Location of Storm Sewer
Horse Track
GMRT Well and Pump House
Hydrant
2 Existing 10,000 Gal Fuel Oil USTs
Existing 20,000 Gal Fuel Oil UST
GMRT Grandstand
Flow
Paved Parking
Flow
Hoosic River
Existing 500 Gal Gasoline UST
LEGEND
2" PVC Monitoring Well
18" x 24" Gravel Packed Well
USTs
Ground Water Contour Line
Flow Line
Scale in Feet
LINCOLN APPLIED GEOLOGY, INC.
ENVIRONMENTAL CONSULTANTS
Figure 3
Green Mountain Race Track
Pownal, Vermont
1" = 310'
Ground Water Contour Map for November 14, 1994
Feb 1995
Petroleum Contamination

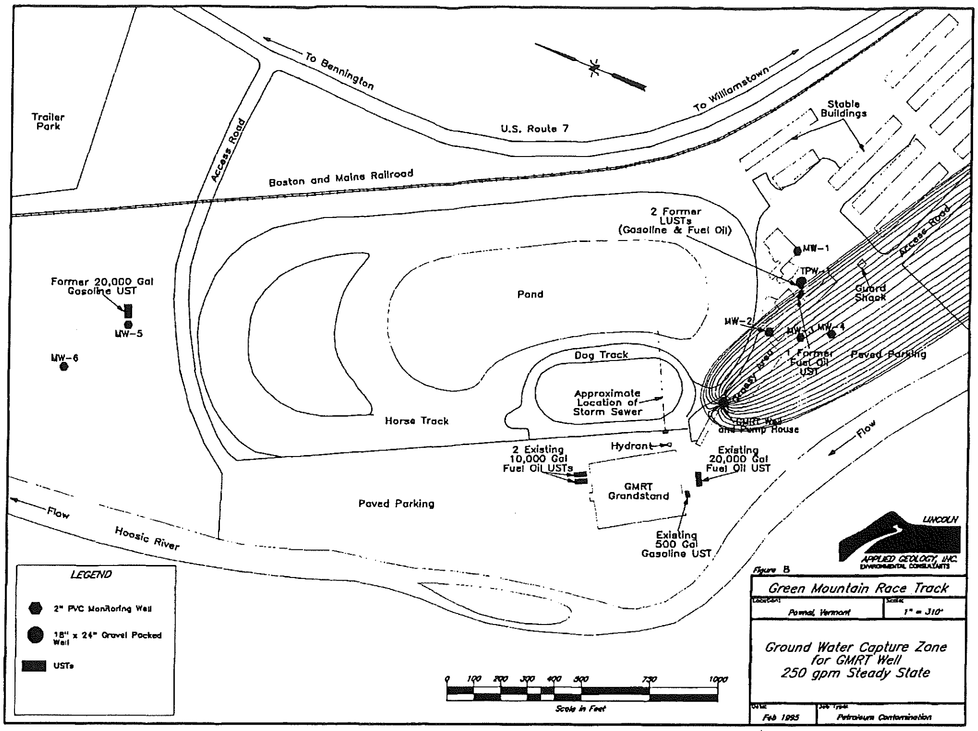

To Bennington
U.S. Route 7
To Williamstown
Stable Buildings
Trailer Park
Access Road
Boston and Maine Railroad
2 Former LUSTs (Gasoline & Fuel Oil)
MW-1
TPW-1
Guard Shack
Access Road
Former 20,000 Gal Gasoline UST
MW-5
MW-6
Pond
Dog Track
MW-2
MW-3
MW-4
1 Former Fuel Oil UST
Paved Parking
Approximate Location of Storm Sewer
Grassy Area
GMRT Well and Pump House
Horse Track
Hydrant
2 Existing 10,000 Gal Fuel Oil USTs
GMRT Grandstand
Existing 20,000 Gal Fuel Oil UST
Existing 500 Gal Gasoline UST
Paved Parking
Flow
Hoosic River
Flow
LEGEND
2" PVC Monitoring Well
18" x 24" Gravel Packed Well
USTs
-90.0- Ground Water Contour Line
Flow Line
0 100 200 300 400 500 750 1000
Scale in Feet
LINCOLN
APPLIED GEOLOGY, INC.
ENVIRONMENTAL CONSULTANTS
Figure 4
Green Mountain Race Track
Pownal, Vermont
1" = 310'
Ground Water Contour Map for November 18, 1994
Feb 1995
Petroleum Contamination



To Bennington
To Williamstown
Trailer Park
U.S. Route 7
Stable Buildings
Access Road
Boston and Maine Railroad
2 Former LUSTs (Gasoline & Fuel Oil)
Former 20,000 Gal Gasoline UST
MW-5
MW-6
Pond
MW-1
TPW-1
Guard Shack
MW-2
MW-3
MW-4
1 Former Fuel Oil UST
Paved Parking
Dog Track
Approximate Location of Storm Sewer
Horse Track
Grassy Area
GMRT Well and Pump House
Hydrant
2 Existing 10,000 Gal Fuel Oil USTs
Existing 20,000 Gal Fuel Oil UST
GMRT Grandstand
Existing 500 Gal Gasoline UST
Flow
Hoosic River
LEGEND
2" PVC Monitoring Well
18" x 24" Gravel Packed Well
USTs
-90.0- Ground Water Contour Line
Flow Line
Scale in Feet
LINCOLN APPLIED GEOLOGY, INC.
Figure 5
Green Mountain Race Track
Pownal, Vermont
1" = 310'
Ground Water Contour Map for November 22, 1994
Feb 1995
Petroleum Contamination


To Bennington
To Williamstown
U.S. Route 7
Trailer Park
Access Road
Boston and Maine Railroad
Stable Buildings
2 Former LUSTs (Gasoline & Fuel Oil)
MW-1
TPW-1
Guard Shack
Former 20,000 Gal Gasoline UST
MW-5
MW-6
Pond
MW-2
MW-3
MW-4
Former Fuel Oil UST
Paved Parking
Dog Track
Approximate Location of Storm Sewer
Horse Track
GMRT Well and Pump House
Hydrant
Flow
2 Existing 10,000 Gal Fuel Oil USTs
Existing 20,000 Gal Fuel Oil UST
GMRT Grandstand
Paved Parking
Flow
Hoosic River
Existing 500 Gal Gasoline UST
LEGEND
2" PVC Monitoring Well
18" x 24" Gravel Packed Well
USTs
0 100 200 300 400 500 750 1000
Scale in Feet
LINCOLN
APPLIED GEOLOGY, INC.
Figure 6
Green Mountain Race Track
Pownal, Vermont
1" = 310'
Ground Water Capture Zone for GMRT Well 500 gpm for 7 Days
Feb 1995
Petroleum Contamination


To Bennington
U.S. Route 7
To Williamstown
Trailer Park
Access Road
Boston and Maine Railroad
Stable Buildings
2 Former LUSTs (Gasoline & Fuel Oil)
MW-1
TPW-1
Guard Shack
Access Road
Former 20,000 Gal Gasoline UST
MW-5
MW-6
Pond
MW-2
MW-3
MW-4
1 Former Fuel Oil UST
Paved Parking
Dog Track
Approximate Location of Storm Sewer
Horse Track
GMRT Well and Pump House
Hydrant
2 Existing 10,000 Gal Fuel Oil USTs
Existing 20,000 Gal Fuel Oil UST
GMRT Grandstand
Paved Parking
Existing 500 Gal Gasoline UST
Flow
Flow
Hoosic River
LEGEND
2" PVC Monitoring Well
18" x 24" Gravel Packed Well
USTs
0 100 200 300 400 500 750 1000
Scale in Feet
LINCOLN
APPLIED GEOLOGY, INC.
ENVIRONMENTAL CONSULTANTS
Figure 7
Green Mountain Race Track
Location: Pownal, Vermont
Scale: 1" = 310'
Ground Water Capture Zone for GMRT Well 500 gpm Steady State
Date: Feb 1993
Job Type: Petroleum Contamination



Trailer Park
To Bennington
Access Road
U.S. Route 7
To Williamstown
Stable Buildings
Boston and Maine Railroad
2 Former LUSTs (Gasoline & Fuel Oil)
MW-1
TPW
Guard Shack
Access Road
Former 20,000 Gal Gasoline UST
MW-5
MW-6
Pond
MW-2
MW-4
1 Former Fuel Oil UST
Paved Parking
Dog Track
Approximate Location of Storm Sewer
Horse Track
GMRT Well and Pump House
Hydrant
2 Existing 10,000 Gal Fuel Oil USTs
Existing 20,000 Gal Fuel Oil UST
Flow
GMRT Grandstand
Paved Parking
Flow
Hoosic River
Existing 500 Gal Gasoline UST
LINCOLN APPLIED GEOLOGY, INC. ENVIRONMENTAL CONSULTANTS
LEGEND
2" PVC Monitoring Well
18" x 24" Gravel Packed Well
USTs
0 100 200 300 400 500 750 1000
Scale in Feet
Figure 8
Green Mountain Race Track
Pownal, Vermont
1" = 310'
Ground Water Capture Zone for GMRT Well 250 gpm Steady State
Feb 1995
Petroleum Contamination

Project: Green Mountain Race Track
Location: Pownal, Vermont

Table 1
VDEC Site # 93-1511
Sheet 1 of 2

Ground Water Elevation/Product Level (feet)

Data Point	TOC	4/7/94	9/6/94	11/14/94	11/15/94	11/16/94	11/17/94	11/18/94
MW-1	100.00	89.19	87.31	86.89	86.88			86.51
MW-2	99.93	88.58	86.39	86.05	86.03	85.46	85.15	84.95
MW-3	98.43	88.80	86.52	86.19	86.19	85.69	85.40	85.14
MW-4	98.29	89.08	86.74	86.43	86.43	86.16	85.85	85.66
MW-5	95.52	85.76	83.13	82.74	82.74	82.74	82.73	82.73
MW-6	94.27	85.25	82.68	82.37	82.36	82.37	82.35	82.35
TPW-1	98.55	88.24	86.11	85.69	85.66	85.56	85.36	85.24
GMRT Well	99.78		86.15	85.90	85.93	60.17	59.46	58.01

Notes:
1 - Elevation datum assumed
2 - Reference elevation is elevation of top of PVC well casing
Light Grey Cell = DRY
Dark Grey Cell = Inaccessible

Table 1
VDEC Site # 93-1511
Sheet 2 of 2

Project: Green Mountain Race Track
Location: Pownal, Vermont

Ground Water Elevation/Product Level (feet)

Data Point	TOC	11/19/94	11/20/94	11/21/94	11/22/94			
MW-1	100.00			86.28	86.24			
MW-2	99.93	84.82	84.75	84.62	84.60			
MW-3	98.43	84.94	84.82	84.71	84.62			
MW-4	98.29	85.46	85.34	85.22	85.16			
MW-5	95.52	82.73	82.73	82.73	82.73			
MW-6	94.27	82.35	82.35	82.35	82.34			
TPW-1	98.55	85.13	85.03	84.90				
GMRT Well	99.78	57.63	57.28	56.88	56.90			

Notes:
1 - Elevation datum assumed
2 - Reference elevation is elevation of top of PVC well casing
Light Grey Cell = DRY
Dark Grey Cell = Inaccessible

Table 2
VDEC Site # 93-1511
Sheet 1 of 1

Project: Green Mountain Race Track
Location: Pownal, Vermont

Photoionization Results (PID - ppm)

Data Point	4-7-94	11-14-94	11-21-94					
MW-1	0.2	BG	BG					
MW-2	0.9	0.2	BG					
MW-3	BG	0.2						
MW-4	0.2	0.2						
MW-5	BG	BG	BG					
MW-6	BG	BG	BG					
TPW-1	1.0	0.8	0.2					
GMRT Well		BG	BG					

Notes:
BG - Background
SL - Saturated Lamp

Table 3
VDEC Site # 93-1511

Project: Green Mountain Race Track
Location: Pownal, Vermont

Ground Water Quality Results (ppb)

Data Point	4-7-94	11-14-94	11-15-94	11-18-94	11-21-94	11-22-94
MW-1	1 <6	<5 <6				<5 <6
MW-2	1 <6	<5 <6				<5 <6
MW-3	<1 <6	<5 <6				<5 <6
MW-4	<1 <6	<5 <6				<5 <6
MW-5	<1 <6	<5 <6				<5 <6
MW-6	<1 <6	<5 <6				<5 <6
TPW-1	<1 108	<1 83				[illegible]
20K UST Pit						
GMRT Well		<5 <6	<5 <6	<5 <6	<5 <6	<5 <6

NOTES:
MTBE in upper right corner of cell
BTEX in lower left corner of cell
< - Contaminant not detected at specified detection limit

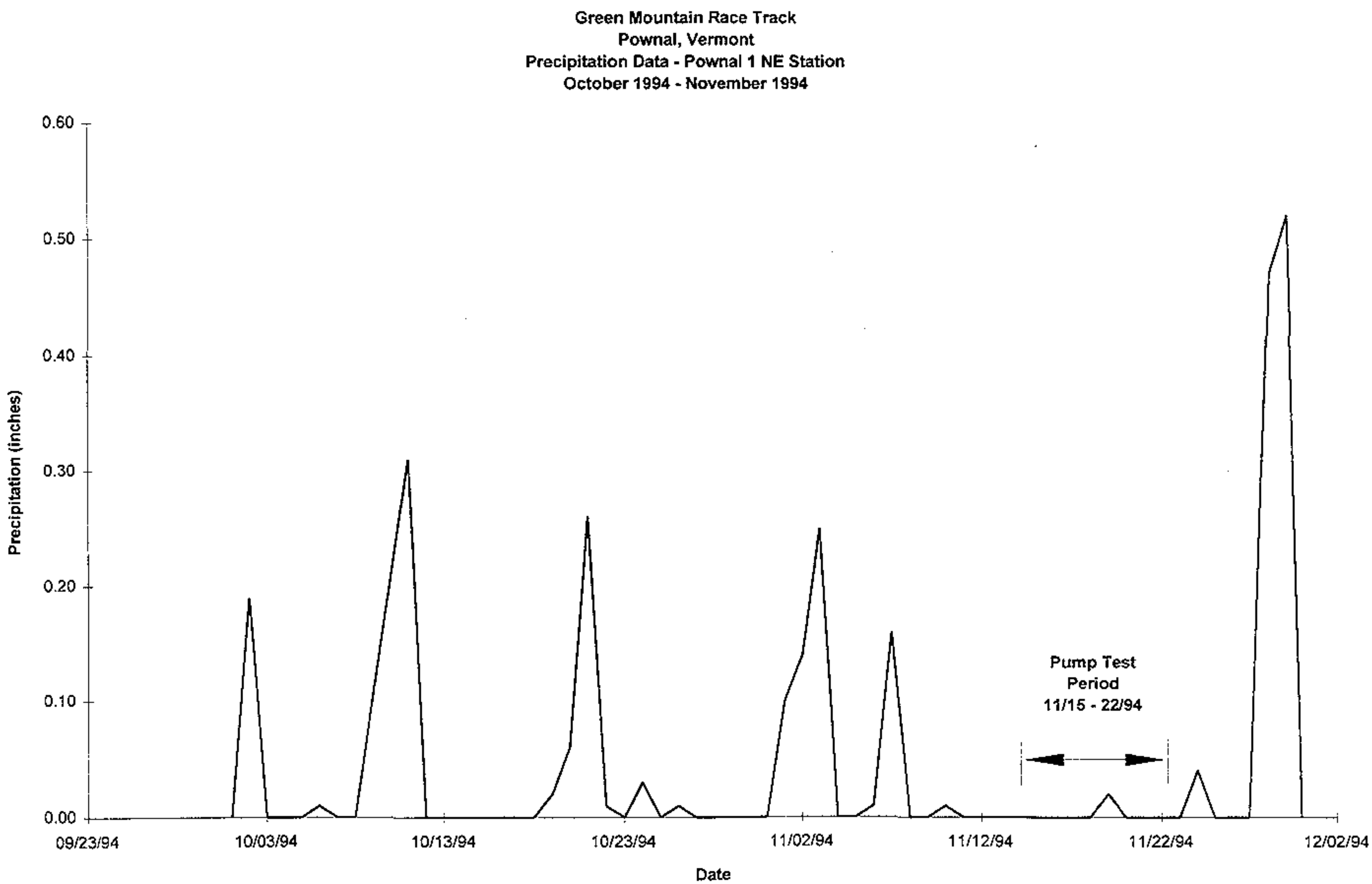

Green Mountain Race Track
Pownal, Vermont
Precipitation Data - Pownal 1 NE Station
October 1994 - November 1994
Precipitation (inches)
0.60
0.50
0.40
0.30
0.20
0.10
0.00
09/23/94
10/03/94
10/13/94
10/23/94
11/02/94
11/12/94
11/22/94
12/02/94
Date
Pump Test
Period
11/15 - 22/94

Chart 1

Chart 2

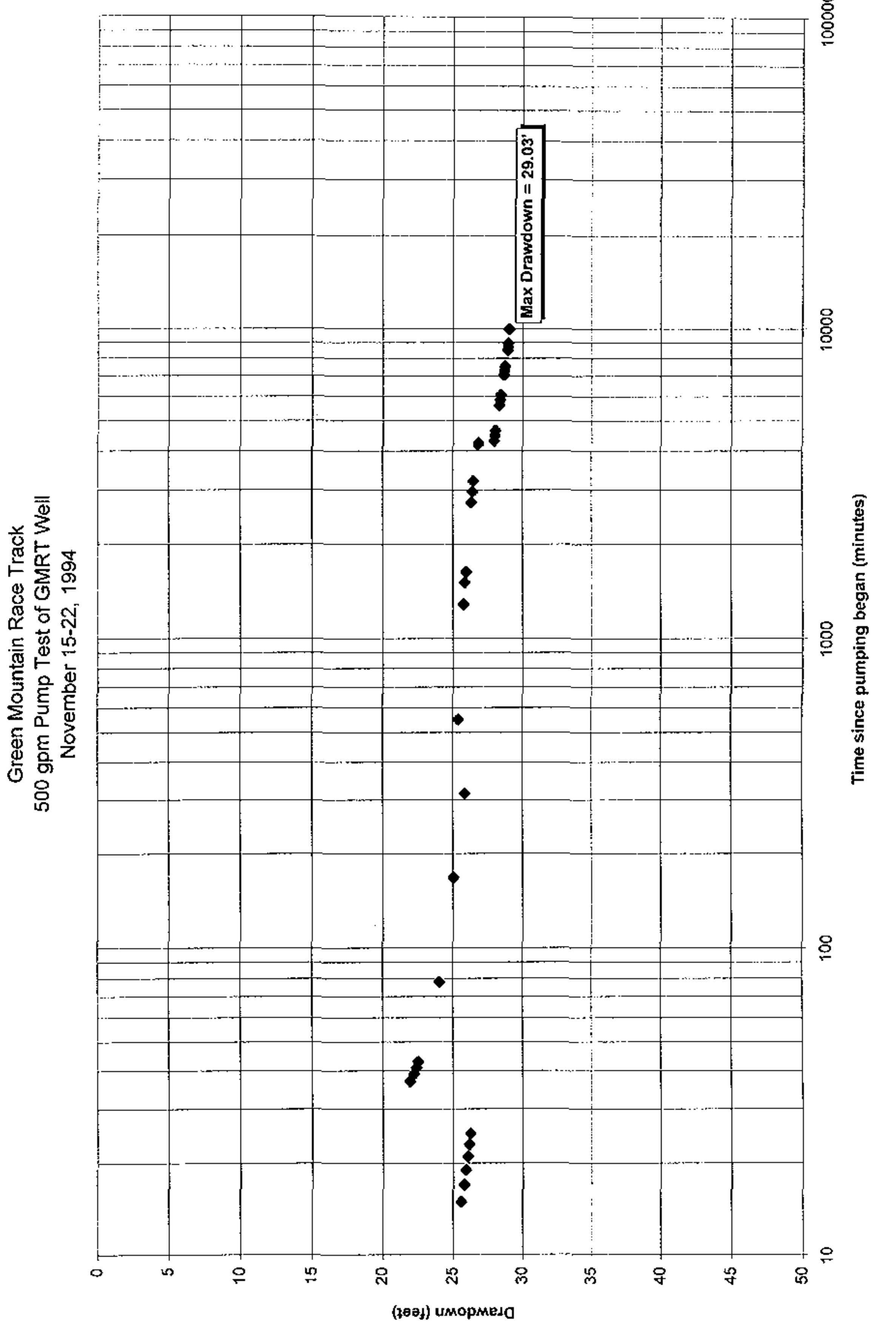

Green Mountain Race Track
500 gpm Pump Test of GMRT Well
November 15-22, 1994
Max Drawdown = 29.03'
Time since pumping began (minutes)
Drawdown (feet)
10
100
1000
10000
100000
0
5
10
15
20
25
30
35
40
45
50

Chart 3

Green Mountain Race Track
Drawdown in MW-2
November 15-22, 1994

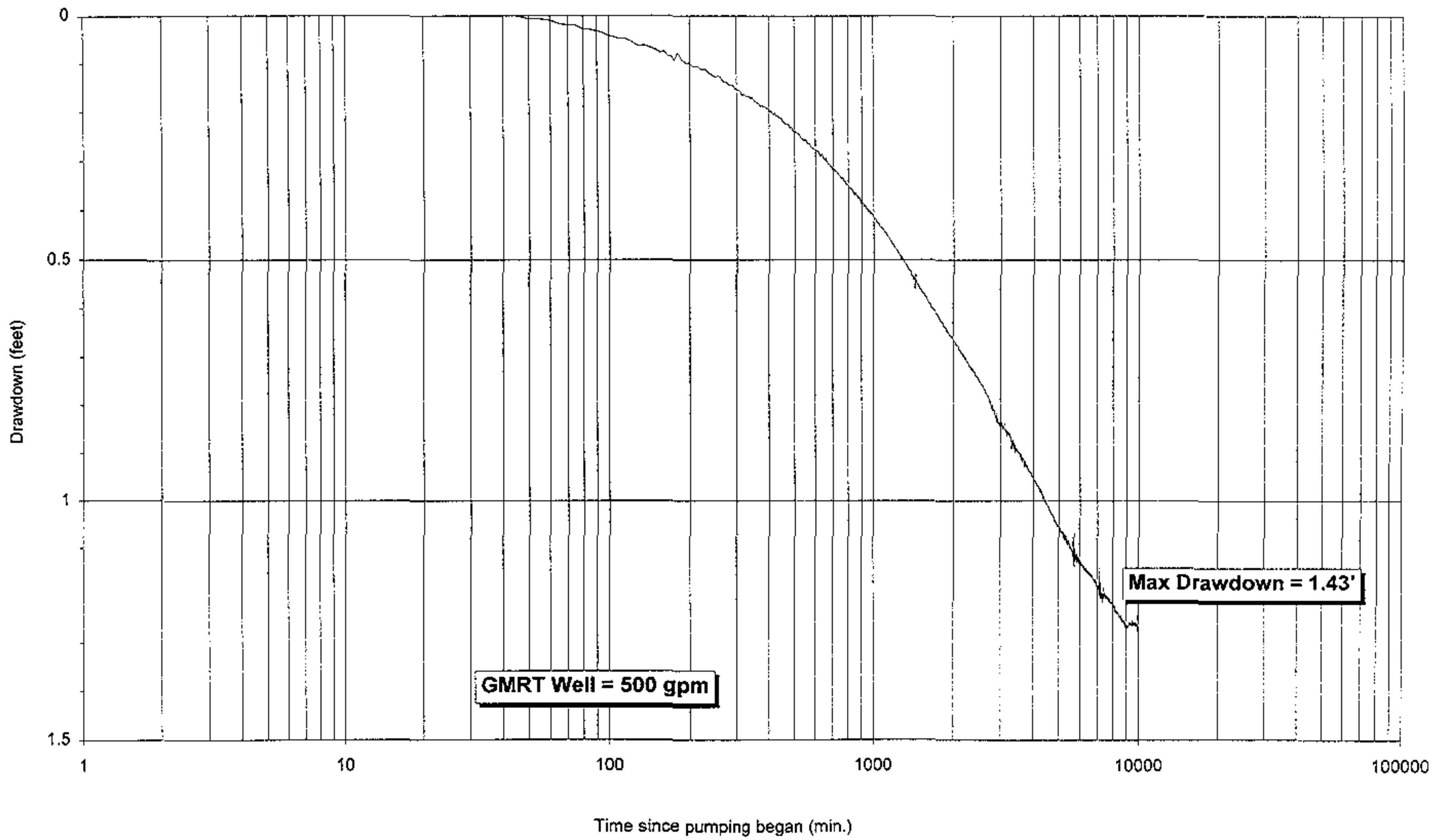
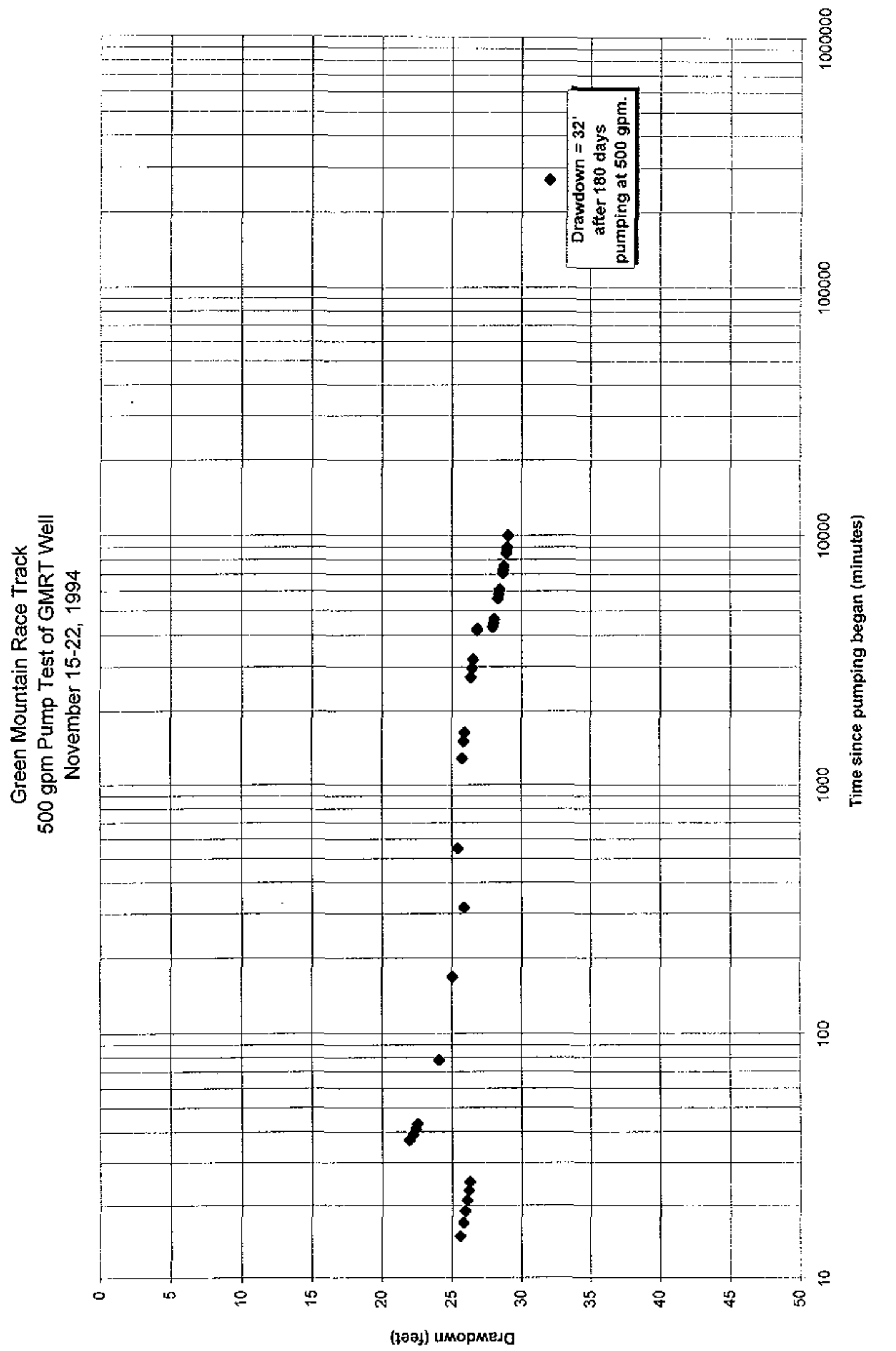
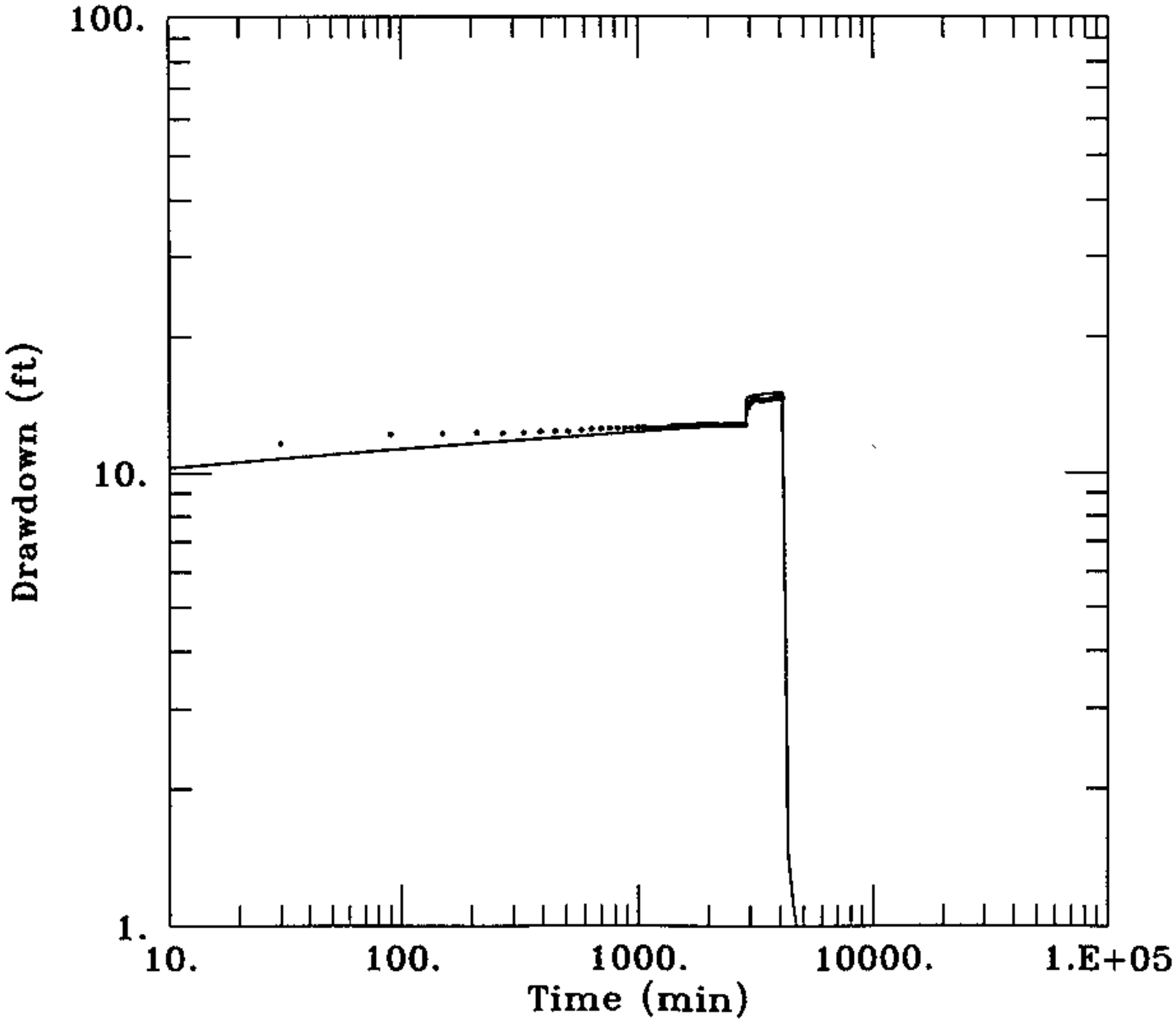


Chart 4


Green Mountain Race Track
500 gpm Pump Test of GMRT Well
November 15-22, 1994
Drawdown = 32' after 180 days pumping at 500 gpm.
Drawdown (feet)
0
5
10
15
20
25
30
35
40
45
50
Time since pumping began (minutes)
10
100
1000
10000
100000
1000000

Client: J. MEAGHER	Company: LINCOLN APPLIED GEOLOGY, INC.
Location: POWNAL, VT	Project: VDEC SITE #93-1511

GREEN MOUNTAIN RACE TRACK--LOWER AQUIFER



DATA SET:
GMRTOW8.DAT
02/08/95

AQUIFER MODEL:
Confined

SOLUTION METHOD:
Papadopulos-Cooper

PROJECT DATA:
test date: MAY 1962
test well: GMRT WELL
obs. well: OW-8

TEST DATA:
Q = 59.49 ft^3/min
r = 150. ft
r_c = 0.75 ft
r_w = 1. ft
b = 67. ft

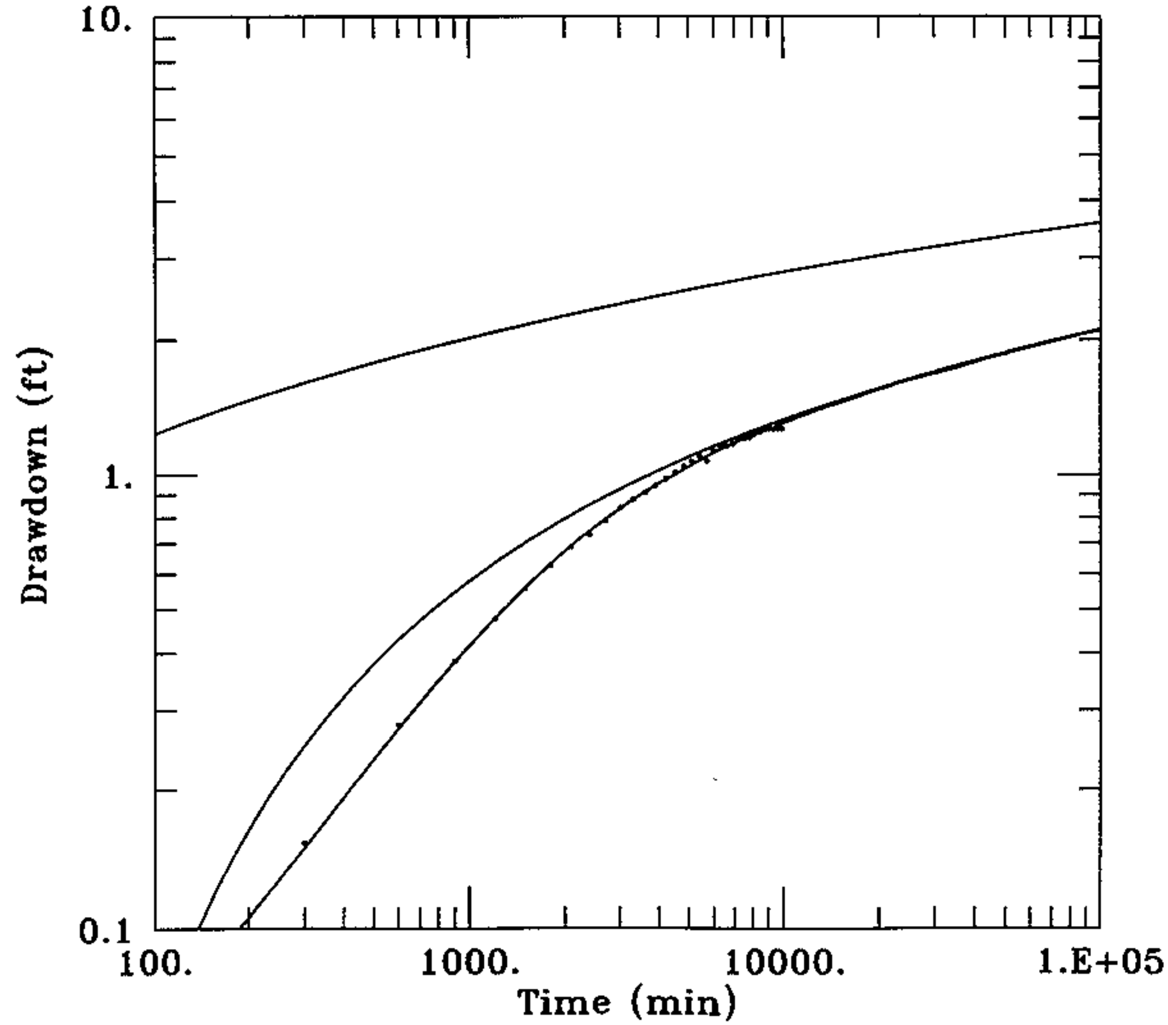
PARAMETER ESTIMATES:
T = 1.536E+04 ft^2/day
S = 1.E-12
a = 1.E-05

Chart 5

AQTESOLV

Client: **J. MEAGHER**	Company: **LINCOLN APPLIED GEOLOGY, INC.**
Location: **POWNAL, VERMONT**	Project: **VDEC SITE #93-1511**

GREEN MOUNTAIN RACE TRACK-UPPER AQUIFER



DATA SET:
MW-2(2).DAT
02/08/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Neuman (approx.)

PROJECT DATA:
test date: NOVEMBER 15-22, 1994
test well: GMRT WELL
obs. well: MW-2

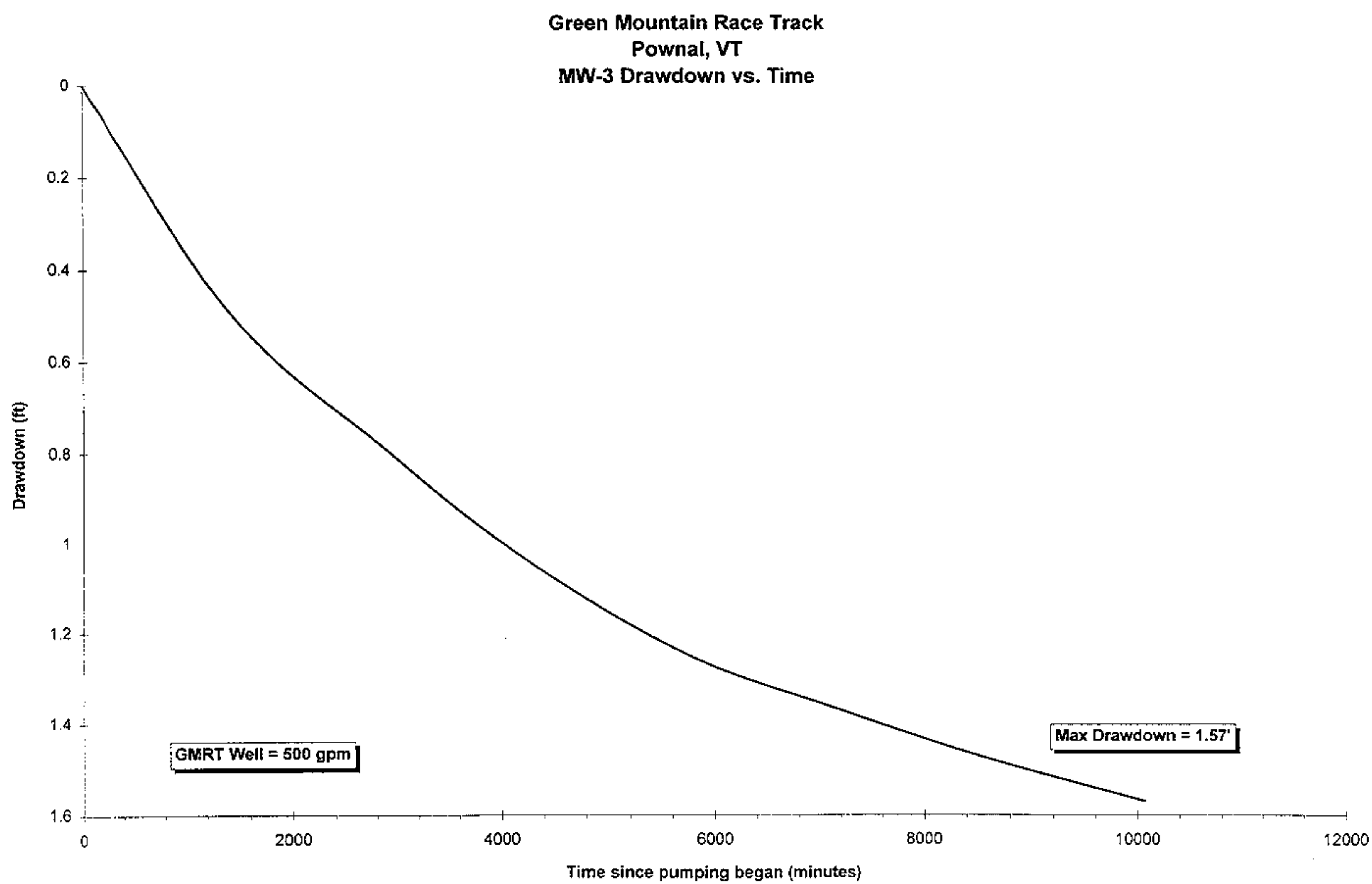
TEST DATA:
Q = 66.8 ft^3/min
r = 302. ft
r_c = 0.75 ft
r_w = 1. ft
b = 67. ft
Pumping Well Screen Depth:
top = 0. ft
bot. = 1. ft
Piezometer Depth:
top = 1. ft

PARAMETER ESTIMATES:
T = 2.258E+04 ft^2/day
S = 0.001025
Sy = 0.07864
β = 0.164

Chart 6

AQTESOLV

Chart 7


Green Mountain Race Track
Pownal, VT
MW-3 Drawdown vs. Time
Drawdown (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
GMRT Well = 500 gpm
Max Drawdown = 1.57'
0
2000
4000
6000
8000
10000
12000
Time since pumping began (minutes)

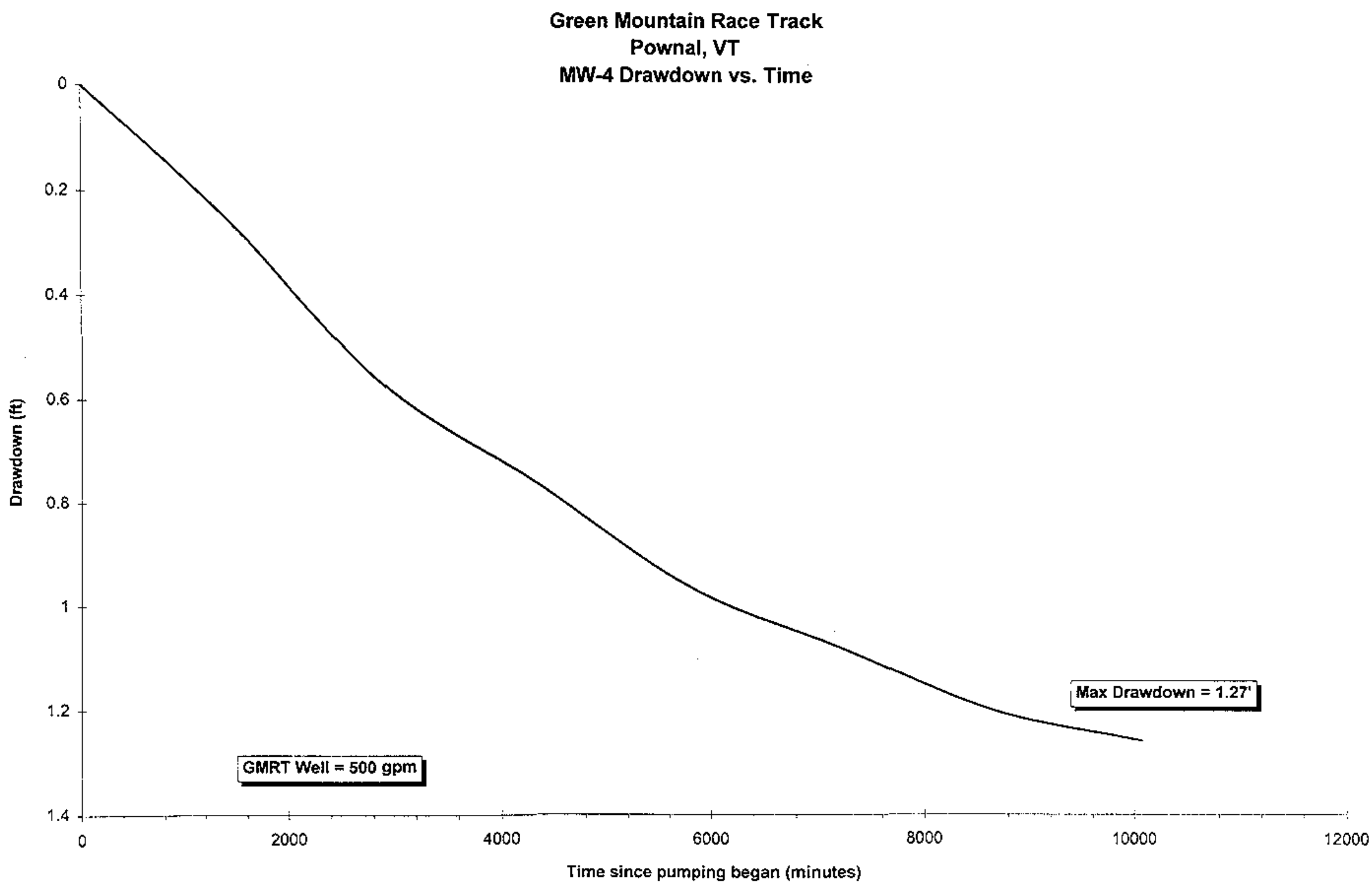

Green Mountain Race Track
Pownal, VT
MW-4 Drawdown vs. Time
Drawdown (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
0
2000
4000
6000
8000
10000
12000
Time since pumping began (minutes)
GMRT Well = 500 gpm
Max Drawdown = 1.27'

Chart 8

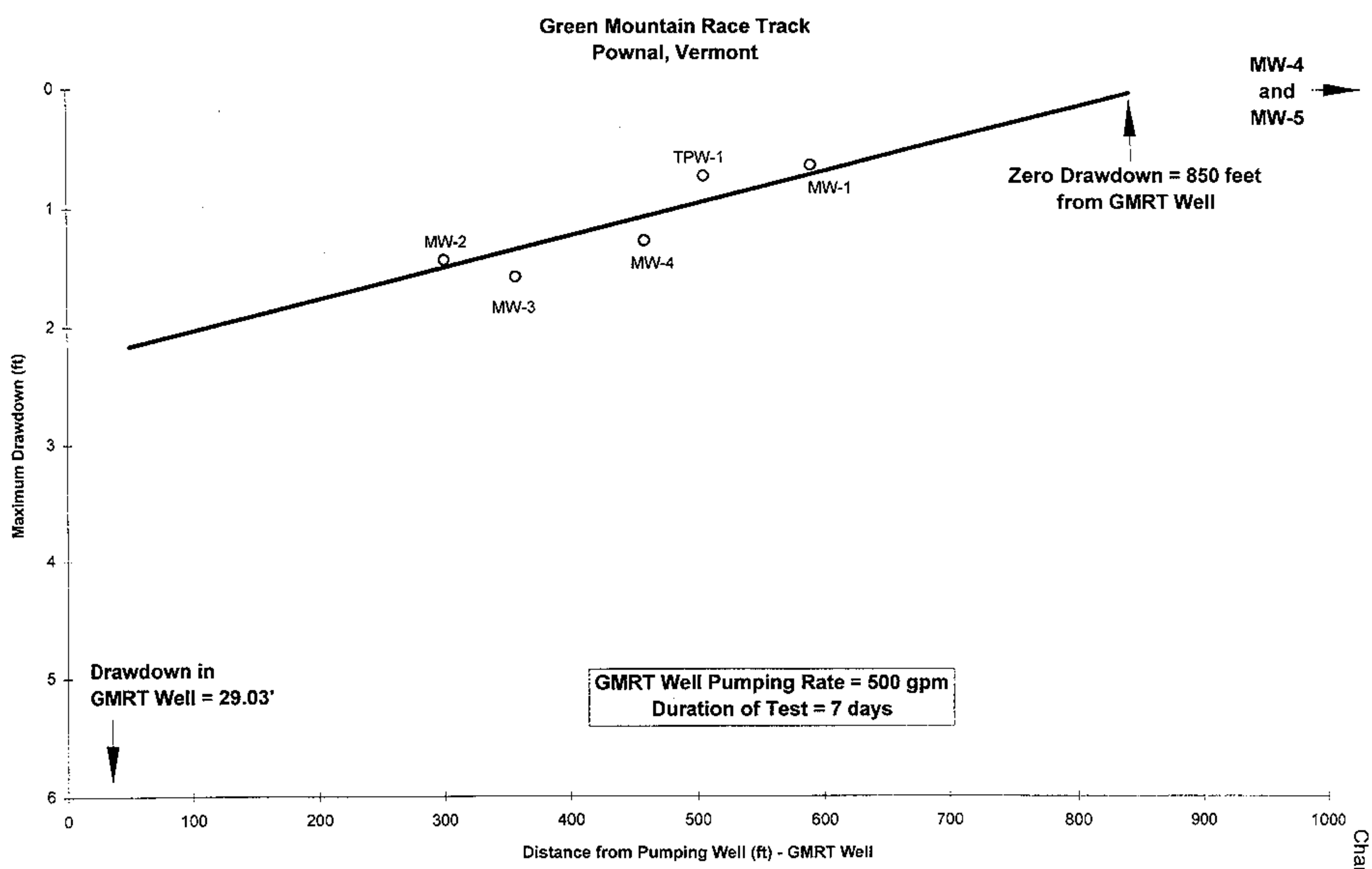

Green Mountain Race Track
Pownal, Vermont
MW-4
and
MW-5
Zero Drawdown = 850 feet
from GMRT Well
TPW-1
MW-1
MW-2
MW-3
MW-4
Drawdown in
GMRT Well = 29.03'
GMRT Well Pumping Rate = 500 gpm
Duration of Test = 7 days
Maximum Drawdown (ft)
0
1
2
3
4
5
6
0
100
200
300
400
500
600
700
800
900
1000
Distance from Pumping Well (ft) - GMRT Well

Chart 9

Appendix A

GMRT Well Log
and
Monitor Well Logs

R. E. CHAPMAN CO.
OAKDALE, MASS.

MAY 31 1962

Name of Driller Wm Cummings — Names of Helpers Fred Finlay

Job: Name & Location De Mattee Construction Pownal Vt Race Track

Date Started 5-7-62 — Date Finished 5-25-62 — Date Started — Date Finished

Hole No. 1 24" x 18" Gravel Packed Well — Hole No.

Depth From	Depth To	Classification of Material	
0'	12'	top soil + Gravel	Feet of Screen Exposed: 15'-0"
12'	30'	Hard Pan + Stone	Size of Screen & Slot: 18" Screen, 120 Slot
30'	41'	Clay + Silt	
41'	48'	Med. Gravel	Screen Left in: ✓
48'	57'	Med. Gravel	
57'	64'	Med. Gravel	Screen Pulled Out:
64'	67'	Sharp Light Gravel	
			Pipe Left in: ✓ 52'-0 18"
		Total depth of Well 67'-0"	
			Pipe Pulled Out:
			Remarks:

Depth From	Depth To	Classification of Material	
			Feet of Screen Exposed:
			Size of Screen & Slot:
			Screen Left in:
			Screen Pulled Out:
			Pipe Left in:
			Pipe Pulled Out:
			Remarks:

Pump Test on Hole No.

Date	Time	Dr. Down	G. P. M.	Static and Other Info.

Pump Test on Hole No.

Date	Time	Dr. Down	G. P. M.	Static and Other Info.

WELL LOG

WELL: TPW-1, Former location of UST #3B 2,000 gallon gasoline (LUST)
LOCATION: Green Mountain Race Track, Pownal, VT. - East of garage.
DRILLER: T.L. Boise Excavating, Inc.
HYDROGEOLOGIST: William Norland, Lincoln Applied Geology, Inc.
DATE: November 11, 1993

Soils Description: **(BG = Background** [0.2], **SL = Saturated Lamp** [>500], **ppm = Parts Per Million)**

Depth	Description	PID (ppm)
0 - 1'	Brown, dry, topsoil	BG
1 - 2.5'	Tan brown, dry, medium to coarse sand; some gravel	10 - 20
2.5 - 4'	Grey, dry, silt & fine sand; little clay, gasoline odor	10 - 22
4 - 5.5'	Tan brown, dry, medium to coarse sand; some fine sand	10 - 22
5.5 - 14.8'	Brown and grey, dry to wet, boulders & cobbles & gravel; some fine to coarse sand	3 - 8 (6') 10 - 18 (8') 240 (11') 50 - 60 (12.5')

Ground water encountered at 12.5 feet
Base of LUST at 8' depth

Well Construction:

Bottom of Boring: 14.8'
Bottom of Well: 14.8'
Well Screen: (3.3') 11.5 to 14.8'; 2" PVC hand slotted, Sch 40
Solid Riser: (11.5') 0 to 11.5'; 2" PVC, Sch 40
Sand Pack: None
Bentonite Seal: None
Backfill: (14.8') backfilled with excavated soils
Well Box: None

WELL LOG

WELL: MW-1, Upgradient well near corner of track kitchen bldg.
LOCATION: Green Mountain Race Track, Pownal, VT
DRILLER: Tri-State Drilling and Boring, Inc.
HYDROGEOLOGIST: William Norland, Lincoln Applied Geology, Inc.
DATE: March 28, 1994

Soils Description: (BG = Background [0.3], SL = Saturated Lamp [>500], ppm = Parts Per Million)

Depth	Description	PID (ppm)
0 - 0.25'	Asphalt pavement 3"	
0.25' - 2'	Dry to moist, tan, fine to medium sand, some gravel.	BG
2' - 4'	8" moist, tan, fine to medium sand; little gravel; 4" moist, tan silt; some very fine sand; fine sand	BG
4' - 6'	12" moist, tan, silt and fine sand; little very fine sand; rust staining minor 2" moist, tan brown, silt and fine sand; little fine to medium gravel	BG
6' - 8'	Dry, tan and buff, fine gravel; some fine to coarse sand; trace medium to coarse gravel. Very hard and 'boney'.	BG
8' - 9.5'	Dry, tan and brown, fine to medium gravel; some fine to coarse sand; trace coarse gravel. Coarse gravels.	BG
9.5' - 11.5'	Dry to moist, tan, fine to medium gravel; some fine to coarse sand; trace coarse gravel.	BG
11.5' - 13.5'	Wet, brown, fine to medium sand; some fine to medium gravel; trace coarse sand. Not much recovery - in water, saturated @ 11.4' (inside augers)	BG
13.5' - 15.5'	Wet, brownish grey, medium to coarse sand; some fine to medium gravel; little fine sand. No odors.	BG
15.5' - 17.5'	Wet, brownish grey, medium to coarse sand; some fine to medium gravel; little fine sand.	BG
17.5' - 19.5'	3" wet, brownish grey, medium to coarse sand; little fine sand; trace fine gravel. 9" wet, brown, fine sand; little silt; trace medium sand.	BG
19.5' - 21.5'	Wet, brown, fine to medium sand; some silt; trace coarse sand, fine gravel.	BG
21.5' - 23.5'	Wet, brown, fine to medium sand; some silt; trace coarse sand, fine gravel	BG
23.5' - 25.5'	Wet, brown, fine to medium sand; some coarse sand, little silt.	BG

Well Contruction:

Bottom of Boring: 25.5'
Bottom of Well: 25.5'
Well Screen: (20') 5.5' - 25.5' - 2" PVC, sch 40, 0.020" slot
Solid Riser: (5') 0.5' - 5.5' - 2" PVC, Sch 40
Sand Pack: (21.5') 4' - 25.5' - #1 sand
Bentonite Seal: (2') 2' - 4', holeplug and enviroplug
Backfill: (1.5') 0.5' - 2'
Well Box: Flush with grade

WELL LOG

WELL: MW-2, between LUST source area and GMRT pumping well (house) - edge (corner) of dog kennels
LOCATION: Green Mountain Race Track, Pownal, VT
DRILLER: Tri-State Drilling and Boring, Inc.
HYDROGEOLOGIST: William Norland, Lincoln Applied Geology, Inc.
DATE: March 28, 1994

Soils Description: (BG = Background [0.3], SL = Saturated Lamp [>500], ppm = Parts Per Million)

Depth	Description	PID (ppm)
0 - 0.25'	Asphalt pavement.	
0.25' - 0.5'	Gravel/Sand subbase (fill)	
0.5' - 4'	Moist, brown, fine to very fine sand and silt; trace fine gravel.	BG
4' - 6'	12" moist, brown to dark brown, very fine sand and silt; trace fine gravel 6" moist, tan, very fine sand and silt; trace roots	BG
9' - 11'	2" moist, brown, very fine sand and silt; little fine sand and fine gravel. 4" moist to dry, brown, medium to coarse sand; some fine to medium gravel; little fine sand	BG
14' - 15.5'	Wet, brown, fine to medium gravel; some medium to coarse sand; trace coarse gravel. Water approx. 12' inside augers.	BG
19' - 21'	Wet, brown, medium to coarse sand; little fine to medium gravel, fine sand. 3' of sands into augers, heaving.	BG
	Overdrill to 28' depth, install well.	

Well Contruction:

Bottom of Boring: 28'
Bottom of Well: 25.5'
Well Screen: (20') 5.5' - 25.5' - 2" PVC, sch 40, 0.020" slot.
Solid Riser: (5') 0.5' - 5.5' - 2" PVC, Sch 40
Sand Pack: (24') 4' - 28'
Bentonite Seal: (2') 2' - 4'
Backfill: (1.5') 0.5' - 2'
Well Box: Cemented flush with grade.

WELL LOG

WELL: MW-3
LOCATION: Green Mountain Race Track, Pownal, VT
DRILLER: Tri-State Drilling and Boring, Inc.
HYDROGEOLOGIST: William Norland, Lincoln Applied Geology, Inc.
DATE: March 29, 1994

Soils Description: (**BG** = **Background** [0.3], **SL** = **Saturated Lamp** [>500], **ppm** = **Parts Per Million**)

Depth	Description	PID (ppm)
0 - 0.25'	Asphalt pavement	
0.25' - 1.25'	Sand and gravel fill	BG
2' - 4'	3" moist, brown, medium to coarse sand and fine to medium gravel 11" moist, dark brown, fine to very fine sand; some silt; trace roots 6" moist, tan, fine to very fine sand; some silt	BG
4' - 6'	Moist, brown and tan, silt and very fine sand; little fine sand 1" layer of fine sand; some very fine sand @ 8' depth; darker brown color	BG
6' - 8'	6" moist, brown, silt and very fine sand; little fine sand. 3" medium to coarse sand; some fine to medium gravel; little fine sand.	BG
8' - 10'	Moist, brown to olive, fine to coarse gravel; some coarse sand; little to trace medium sand	BG
10' - 12'	Wet - in water, brown, medium to coarse gravel; some coarse sand; little fine to medium sand. 'Boney' drilling.	BG
12' - 14'	6" wet, brown, medium to coarse gravel; some medium to coarse sand; little fine sand. 4" wet, tan upper, grey lower, silty clay; little fine gravel 1" fine to very fine sand; little silt.	BG
14' - 16'	Wet, brown, fine to medium sand; little silt; trace coarse sand. At 15" depth approx 1" thick tan, silty clay layer.	BG
16' - 18'	Wet, brown, fine to medium sand; some coarse sand; little silt	BG
18' - 20'	15" wet, brown, fine to medium sand; some coarse sand; little silt 9" wet, brown, very fine sand and silt; some fine sand.	BG
20' - 20.5'	Wet, brown, very fine sand and silt; little fine sand. Auger to 28', heaving sands.	BG
24' - 26'	Heaving sands of fine to medium sand; silt.	

Well Contruction:

Bottom of Boring: 28'
Bottom of Well: 25.5'
Well Screen: (20') 5.5' - 25.5', 2" PVC, sch 40, 0.020" slot
Solid Riser: (5') 0.5' - 5.5', 2" PVC, Sch 40
Sand Pack: (26') 2' - 28'
Bentonite Seal: (1') 1' - 2'
Backfill: (0.5') 0.5' - 1'
Well Box: Cemented flush with grade

WELL LOG

WELL: MW-4, West of LUSTs beside GMRT roadway.
LOCATION: Green Mountain Race Track, Pownal, VT
DRILLER: Tri-State Drilling and Boring, Inc.
HYDROGEOLOGIST: William Norland, Lincoln Applied Geology, Inc.
DATE: March 29, 1994

Soils Description: **(BG = Background [0.3], SL = Saturated Lamp [>500], ppm = Parts Per Million)**

Depth	Description	PID (ppm)
0 - 0.25'	Asphalt pavement	
0.25' - 1.25'	Sand and gravel	BG
4' - 6'	3" moist, brown, very fine sand and silt 2" moist, tan, fine to medium sand; little coarse sand 7" moist, tan, very fine sand and silt 4" moist, tan, fine to medium sand; trace coarse sand At 6' depth - gravel and cobbles - very difficult drilling	BG
9' - 9.5'	No recovery - on boulder or cobble Drill to approx 10' - refusal on boulder. Remove augers, backup rig approx 6-7'. Drill to 5.5' depth - hit gravel and cobbles to 13'	
14' - 16'	Wet, brown, fine to medium sand; some silt	BG
	Heaving sands into augers, drill to 28' and install well.	

Well Contruction:

Bottom of Boring: 28'
Bottom of Well: 24.5'
Well Screen: (20') 4.5' - 24.5', 2" PVC, sch 40, 0.020" slot
Solid Riser: (4') 0.5' - 4.5', 2" PVC, Sch 40
Sand Pack: (24.5') 3.5' - 28'
Bentonite Seal: (2') 1.5' - 3.5'
Backfill: (1') 0.5' - 1.5'
Well Box: Cemented flush with grade

WELL LOG

WELL: MW-5, At W. end of former 20K gal UST
LOCATION: Green Mountain Race Track, Pownal, VT
DRILLER: Tri-State Drilling and Boring, Inc.
HYDROGEOLOGIST: William Norland and Rick Vandenberg, Lincoln Applied Geology, Inc.
DATE: March 29 and 30, 1994

Soils Description: (BG = Background [0.3], SL = Saturated Lamp [>500], ppm = Parts Per Million)

Depth	Description	PID (ppm)
0	Unpaved grass area	
2' - 4'	10" moist, tan, very fine sand and silt; little fine sand; trace fine gravel 12" moist, grey, silt and very fine sand; little fine sand	BG
4' - 6'	Moist, grey, silt and very fine sand; trace fine sand (organics)	BG
6' - 8'	19" Moist, grey, silt and very fine sand; little to trace fine sand; trace roots Bottom 2" is coarser; more fine sand and medium sand (organics odor)	BG
8' - 10'	3" wet, grey to olive green, silt and fine sand; trace roots; clay 3" wet fine to coarse gravel; some silt; fine sand; trace medium to coarse sand	BG
10' - 12'	Wet, grey to olive green, fine to coarse gravel; some silt; fine sand; little medium to coarse sand	BG
12' - 14'	Grey silt and medium to coarse sand; some coarse gravel, very fine sand	BG
14' - 16'	Medium to fine sand; grey; some silt; trace coarse gravel, coarse sand. Very well sorted	BG
16' - 18'	Top 6" fine to very fine sand, grey; some silt, fine to medium gravel; bottom 9" silty fine sand; olive	BG
18' - 20'	Silty clay with trace of very fine sand, olive	BG
20' - 22'	Silty clay with alternating bands of fine sand, tan	BG
22' - 24'	Silty clay with alternating bands of fine sand, tan	BG
24' - 26'	Silty clay with alternating bands of tan sand; fine to medium; grey also	BG

Well Contruction:

Bottom of Boring: 26'
Bottom of Well: 25'
Well Screen: (20') 5' - 25', 2" PVC, sch 40, 0.020" slot
Solid Riser: (8') +3' - 5', 2" PVC, Sch 40.
Sand Pack: (21') 4' - 25'
Bentonite Seal: (2') 2' - 4'
Backfill: (1.5') 0.5' - 2'
Well Box: Stick up well guard

WELL LOG

WELL: MW-6
LOCATION: Green Mountain Race Track, Pownal, VT
DRILLER: Tri-State Drilling and Boring, Inc.
HYDROGEOLOGIST: Rick Vandenberg, Lincoln Applied Geology, Inc.
DATE: March 30, 1994

Soils Description: (BG = Background [0.3], SL = Saturated Lamp [>500], ppm = Parts Per Million)

Depth	Description	PID (ppm)
0 - 4'	Tan to light brown; fine to very coarse sand, some fine to coarse gravel; trace cobble, silt.	BG
4' - 6'	Light brown; fine to very coarse sand; some fine to coarse gravel; trace silt.	BG
8' - 10'	Light brown; fine to very coarse sand; some fine to medium gravel; some cobble; some silt.	BG
14' - 16'	Light brown; sand, coarse to very coarse, some fine to medium sand; some gravel fine to medium; trace cobble	BG
16' - 18'	Grey; silty clay; some interbeds of tan fine sand.	BG

Well Contruction:

Bottom of Boring: 28'
Bottom of Well: 25'
Well Screen: (20') 5' - 25', 2" PVC, sch 40, 0.020" slot
Solid Riser: (8') +3' - 5', 2" PVC, Sch 40.
Sand Pack: (21') 4' - 25'
Bentonite Seal: (2') 2' - 4'
Backfill: (1.5') 0.5' - 2'
Well Box: Stick up well guard

Appendix B

Ground Water Quality Laboratory Reports

LABORATORY ANALYSIS

CLIENT NAME:	Lincoln Applied Geology	REF #:	10185
ADDRESS:	RD#1 Box 710 Bristol, VT 05443	PROJECT NO.:	not given
SAMPLE LOCATION:	Green Mountain Race Track	DATE OF SAMPLE:	11/14/94
SAMPLER:	James Robideau & Bill Norland	DATE OF RECEIPT:	11/14/94
		DATE OF ANALYSIS:	11/22,11/23/94
ATTENTION:	John Amadon/Bill Norland	DATE OF REPORT:	11/25/94

Pertaining to the analyses of specimens submitted under the accompanying chain of custody form, please note the following:

- Water samples submitted for VOC analysis were preserved with HCl. The trip blank was prepared by the client from reagent water supplied by the laboratory.
- Specimens were processed and examined according to the procedures outlined in the specified method.
- Holding times were honored.
- Instruments were appropriately tuned and calibrations were checked with the frequencies required in the specified method.
- Blank contamination was not observed at levels interfering with the analytical results.
- Continuing calibration standards were monitored at intervals indicated in the specified method. The resulting analytical precision and accuracy were determined to be within method QA/QC acceptance limits.
- The efficiency of analyte recovery for individual samples was monitored by the addition of surrogate analytes to all samples, standards, and blanks. Surrogate recoveries were found to be within laboratory QA/QC acceptance limits, unless noted otherwise.

Reviewed by:

Brendan McMahon, Ph.D.
Director, Chemical Services

LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mountain Race Track	MAV REF.#:	10,185
REPORT DATE:	November 25, 1994	STATION:	GMRT Well
DATE SAMPLED:	November 14, 1994	TIME SAMPLED:	13:44
DATE RECEIVED:	November 14, 1994	SAMPLER:	Robideau & Norland
ANALYSIS DATE:	November 23, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 98%

BPQL = Below Practical Quantitation Limit (PQL)

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LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mountain Race Track	MAV REF.#:	10,185
REPORT DATE:	November 25, 1994	STATION:	MW-1
DATE SAMPLED:	November 14, 1994	TIME SAMPLED:	12:00
DATE RECEIVED:	November 14, 1994	SAMPLER:	Robideau & Norland
ANALYSIS DATE:	November 22, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (μg/L)	Conc. (μg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 99%

BPQL = Below Practical Quantitation Limit (PQL)

LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mountain Race Track	MAV REF.#:	10,185
REPORT DATE:	November 25, 1994	STATION:	MW-2
DATE SAMPLED:	November 14, 1994	TIME SAMPLED:	13:24
DATE RECEIVED:	November 14, 1994	SAMPLER:	Robideau & Norland
ANALYSIS DATE:	November 22, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 101%

BPQL = Below Practical Quantitation Limit (PQL)

LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mountain Race Track	MAV REF.#:	10,185
REPORT DATE:	November 25, 1994	STATION:	MW-3
DATE SAMPLED:	November 14, 1994	TIME SAMPLED:	13:15
DATE RECEIVED:	November 14, 1994	SAMPLER:	Robideau & Norland
ANALYSIS DATE:	November 22, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 99%

BPQL = Below Practical Quantitation Limit (PQL)

LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mountain Race Track	MAV REF.#:	10,185
REPORT DATE:	November 25, 1994	STATION:	MW-4
DATE SAMPLED:	November 14, 1994	TIME SAMPLED:	12:30
DATE RECEIVED:	November 14, 1994	SAMPLER:	Robideau & Norland
ANALYSIS DATE:	November 22, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 98%

BPQL = Below Practical Quantitation Limit (PQL)

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LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mountain Race Track	MAV REF.#:	10,185
REPORT DATE:	November 25, 1994	STATION:	MW-5
DATE SAMPLED:	November 14, 1994	TIME SAMPLED:	12:40
DATE RECEIVED:	November 14, 1994	SAMPLER:	Robideau & Norland
ANALYSIS DATE:	November 23, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL)

LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mountain Race Track	MAV REF.#:	10,185
REPORT DATE:	November 25, 1994	STATION:	MW-6
DATE SAMPLED:	November 14, 1994	TIME SAMPLED:	13:02
DATE RECEIVED:	November 14, 1994	SAMPLER:	Robideau & Norland
ANALYSIS DATE:	November 22, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 99%

BPQL = Below Practical Quantitation Limit (PQL)

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LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mountain Race Track	MAV REF.#:	10,185
REPORT DATE:	November 25, 1994	STATION:	TPW-1
DATE SAMPLED:	November 14, 1994	TIME SAMPLED:	11:35
DATE RECEIVED:	November 14, 1994	SAMPLER:	Robideau & Norland
ANALYSIS DATE:	November 23, 1994	SAMPLE TYPE:	Water

prior to pump test

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	2
Ethylbenzene	1	3
Xylenes	3	77
MTBE	5	BPQL

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL)

LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mountain Race Track	MAV REF.#:	10,185
REPORT DATE:	November 25, 1994	STATION:	Trip Blank
DATE SAMPLED:	November 14, 1994	TIME SAMPLED:	07:12
DATE RECEIVED:	November 14, 1994	SAMPLER:	Robideau & Norland
ANALYSIS DATE:	November 23, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 97%

BPQL = Below Practical Quantitation Limit (PQL)

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CHAIN OF CUSTODY RECORD

MicroAssays of Vermont
RR# Box 5210 P.O. Box 189
Montpelier, VT 05602
Ph. (802)223-1468 Fax (802)223-8688

Page 1 of 1

MAV # 10185

CLIENT NAME: Lincoln Applied Geology
ADDRESS: RD1 Box 710 Bristol VT 05443
PROJECT NAME: Green Mtn Race Trac
PROJECT NUMBER:
PROJECT MANAGER: Bill N
SAMPLER: James N - Bill N

ANALYSIS REQUESTED: BTEX-MTBE

Sample Location	Date	Time	# of cont.	preserved	Sample Type	BTEX-MTBE		REMARKS:
Trip OK ND	11-14-94	7:12	2	HCL	40ml	✓	✓	
TPW-1 OK ND	11-14-94	11:35	2	HCL	40ml	✓	✓	Collected by Bill Norland
MW-1 OK ND	11-14-94	12:00	2	HCL	40ml	✓	✓	
MW-4 ND	11-14-94	12:30	2	HCL	40ml	✓	✓	
MW-5 ND	11-14-94	12:40	2	HCL	40ml	✓	✓	
MW-6 ND	11-14-94	1:02	2	HCL	40ml	✓	✓	
MW-3 ND	11-14-94	1:15	2	HCL	40ml	✓	✓	
MW-2 ND	11-14-94	1:24	2	HCL	40ml	✓	✓	
GMRT well ok	11-14-94	1:44	2	HCL	40ml	✓	✓	

Relinquished by:	Received by:	Date/Time	Relinquished by:	Received by:	Date/Time
James W. Noble / Bill Norland	Sara Holst	11/14/94 11:25am			

LABORATORY ANALYSIS

CLIENT NAME:	Lincoln Applied Geology	REF #:	10195
ADDRESS:	RD#1 Box 710 Bristol, VT 05443	PROJECT NO.:	not given
SAMPLE LOCATION:	Green Mountain Race Track	DATE OF SAMPLE:	11/15/94
SAMPLER:	Bill Norland	DATE OF RECEIPT:	11/16/94
		DATE OF ANALYSIS:	11/23/94
ATTENTION:	John Amadon/Bill Norland	DATE OF REPORT:	12/2/94

Pertaining to the analyses of specimens submitted under the accompanying chain of custody form, please note the following:

- Water samples submitted for VOC analysis were preserved with HCl.
- Specimens were processed and examined according to the procedures outlined in the specified method.
- Holding times were honored.
- Instruments were appropriately tuned and calibrations were checked with the frequencies required in the specified method.
- Blank contamination was not observed at levels interfering with the analytical results.
- Continuing calibration standards were monitored at intervals indicated in the specified method. The resulting analytical precision and accuracy were determined to be within method QA/QC acceptance limits.
- The efficiency of analyte recovery for individual samples was monitored by the addition of surrogate analytes to all samples, standards, and blanks. Surrogate recoveries were found to be within laboratory QA/QC acceptance limits, unless noted otherwise.

Reviewed by:

Brendan McMahon, Ph.D.
Director, Chemical Services

LINCOLN APPLIED G...

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LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mountain Race Track	MAV REF.#:	10,195
REPORT DATE:	December 2, 1994	STATION:	GMRT Well
DATE SAMPLED:	November 15, 1994	TIME SAMPLED:	12:56
DATE RECEIVED:	November 16, 1994	SAMPLER:	Bill Norland
ANALYSIS DATE:	November 23, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (μg/L)	Conc. (μg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 96%

BPQL = Below Practical Quantitation Limit (PQL)

LINCOLN APPLIED ...

CHAIN OF CUSTODY RECORD

MicroAssays of Vermont
RR#3 Box 5210 P.O. Box 189
Montpelier, VT 05602
Ph. (802)223-1468 Fax (802)223-8688

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MAV # 10195

LIENT NAME Lincoln Applied Geology, Inc.
DDRESS RD 1 Box 710 Bristol, VT 05443
ROJECT NAME Green Mountain Race Track
ROJECT NUMBER
ROJECT MANAGER
AMPLER Bill Norland

ANALYSIS REQUESTED

Sample Location	Date	Time	# of cont.	pres ervd	Sample Type	BTEX & MTBE												REMARKS:
GMRT well ok	11/15/94	1256	2	HCl	40ml VOA Water	X												

Relinquished by:	Received by:	Date/Time	Relinquished by:	Received by:	Date/Time
William Norland	L. Geary	11/16/94 2:45			

LINCOLN APPLIED GEO...

LABORATORY ANALYSIS

CLIENT NAME:	Lincoln Applied Geology	REF #:	10208
ADDRESS:	RD#1 Box 710 Bristol, VT 05443	PROJECT NO.:	not given
SAMPLE LOCATION:	Green Mountain Race Track	DATE OF SAMPLE:	11/18/94
SAMPLER:	Bill Norland	DATE OF RECEIPT:	11/18/94
		DATE OF ANALYSIS:	11/28/94
ATTENTION:	John Amadon/Bill Norland	DATE OF REPORT:	12/2/94

Pertaining to the analyses of specimens submitted under the accompanying chain of custody form, please note the following:

- Water samples submitted for VOC analysis were preserved with HCl.
- Specimens were processed and examined according to the procedures outlined in the specified method.
- Holding times were honored.
- Instruments were appropriately tuned and calibrations were checked with the frequencies required in the specified method.
- Blank contamination was not observed at levels interfering with the analytical results.
- Continuing calibration standards were monitored at intervals indicated in the specified method. The resulting analytical precision and accuracy were determined to be within method QA/QC acceptance limits.
- The efficiency of analyte recovery for individual samples was monitored by the addition of surrogate analytes to all samples, standards, and blanks. Surrogate recoveries were found to be within laboratory QA/QC acceptance limits, unless noted otherwise.

Reviewed by:

Brendan McMahon, Ph.D.
Director, Chemical Services

LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mountain Race Track	MAV REF.#:	10,208
REPORT DATE:	December 2, 1994	STATION:	GMRT Well
DATE SAMPLED:	November 18, 1994	TIME SAMPLED:	10:20
DATE RECEIVED:	November 18, 1994	SAMPLER:	Bill Norland
ANALYSIS DATE:	November 28, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (μg/L)	Conc. (μg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 98%

BPQL = Below Practical Quantitation Limit (PQL)

CHAIN OF CUSTODY RECORD

MicroAssays of Vermont

RR# Box 5210 P.O. Box 189
Montpelier, VT 05602
Ph. (802)223-1468 Fax (802)223-8688

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MAV # 10208

CLIENT NAME Lincoln Applied Geology, Inc.
ADDRESS RD 1 Box 710 Bristol, VT 05443
PROJECT NAME Green Mtn. Race Track
PROJECT NUMBER
PROJECT MANAGER Bill Norland
SAMPLER Bill Norland

Sample Location	Date	Time	# of cont.	pres ervd	Sample Type	ANALYSIS REQUESTED: BTEX & MTBE											REMARKS:
GMRT well	11/18/94	1020	2	HCl	40 ml VOA Water	✓											

Relinquished by:	Received by:	Date/Time	Relinquished by:	Received by:	Date/Time
William Norland	[signature]	17:30 11/18/94			

60

LINCOLN APPLIED ...

LABORATORY ANALYSIS

CLIENT NAME:	Lincoln Applied Geology	REF #:	10216
ADDRESS:	RD#1 Box 710 Bristol, VT 05443	PROJECT NO.:	not given
SAMPLE LOCATION:	Green Mountain Race Track	DATE OF SAMPLE:	11/21/94
SAMPLER:	James Robideau	DATE OF RECEIPT:	11/21/94
		DATE OF ANALYSIS:	11/23/94
ATTENTION:	John Amadon/Bill Norland	DATE OF REPORT:	12/2/94

Pertaining to the analyses of specimens submitted under the accompanying chain of custody form, please note the following:

- Water samples submitted for VOC analysis were preserved with HCl.
- Specimens were processed and examined according to the procedures outlined in the specified method.
- Holding times were honored.
- Instruments were appropriately tuned and calibrations were checked with the frequencies required in the specified method.
- Blank contamination was not observed at levels interfering with the analytical results.
- Continuing calibration standards were monitored at intervals indicated in the specified method. The resulting analytical precision and accuracy were determined to be within method QA/QC acceptance limits.
- The efficiency of analyte recovery for individual samples was monitored by the addition of surrogate analytes to all samples, standards, and blanks. Surrogate recoveries were found to be within laboratory QA/QC acceptance limits, unless noted otherwise.

Reviewed by:

Brendan McMahon, Ph.D.
Director, Chemical Services

LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mountain Race Track	MAV REF.#:	10,216
REPORT DATE:	December 2, 1994	STATION:	GMRT Well
DATE SAMPLED:	November 21, 1994	TIME SAMPLED:	11:40
DATE RECEIVED:	November 21, 1994	SAMPLER:	James Robideau
ANALYSIS DATE:	November 23, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 97%

BPQL = Below Practical Quantitation Limit (PQL)

CHAIN OF CUSTODY RECORD

MicroAssays of Vermont

RR# Box 5210 P.O. Box 189
Montpelier, VT 05602
Ph. (802)223-1468 Fax (802)223-8688

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MAV # 10216

CLIENT NAME: Lincoln Applied Geology
ADDRESS: RD1 Box 710 Bristol, VT 05443
PROJECT NAME: Green Mtn Race Track
PROJECT NUMBER:
PROJECT MANAGER: Bill
SAMPLER: James

ANALYSIS REQUESTED

Sample Location	Date	Time	# of cont.	pres ervd	Sample Type	BTEX-MTBE											REMARKS:
Green Mtn Racetrack Well OK	11-21-94	11:40	2	HCL	40ml	✓											

LINCOLN APPLIED

Relinquished by:	Received by:	Date/Time	Relinquished by:	Received by:	Date/Time
[signature]	[signature]	11/21/94 15:00			

LABORATORY ANALYSIS

LINCOLN APPLIED GEO...

CLIENT NAME:	Lincoln Applied Geology	REF #:	10227
ADDRESS:	RD#1 Box 710 Bristol, VT 05443	PROJECT NO.:	not given
SAMPLE LOCATION:	Green Mtn. Race Track	DATE OF SAMPLE:	11/22/94
SAMPLER:	James Robideau	DATE OF RECEIPT:	11/22/94
		DATE OF ANALYSIS:	12/05, 12/06/94
ATTENTION:	John Amadon/Bill Norland	DATE OF REPORT:	12/12/94

Pertaining to the analyses of specimens submitted under the accompanying chain of custody form, please note the following:

- Water samples submitted for VOC analysis were preserved with HCl. The trip blank was prepared by the client from reagent water supplied by the laboratory.
- Specimens were processed and examined according to the procedures outlined in the specified method.
- Holding times were honored.
- Instruments were appropriately tuned and calibrations were checked with the frequencies required in the specified method.
- Blank contamination was not observed at levels interfering with the analytical results.
- Continuing calibration standards were monitored at intervals indicated in the specified method. The resulting analytical precision and accuracy were determined to be within method QA/QC acceptance limits.
- The efficiency of analyte recovery for individual samples was monitored by the addition of surrogate analytes to all samples, standards, and blanks. Surrogate recoveries were found to be within laboratory QA/QC acceptance limits, unless noted otherwise.

Reviewed by:

Brendan McMahon, Ph.D.
Director, Chemical Services

LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mtn. Race Track	MAV REF.#:	10,227
REPORT DATE:	December 13, 1994	STATION:	Trip
DATE SAMPLED:	November 22, 1994	TIME SAMPLED:	05:30
DATE RECEIVED:	November 22, 1994	SAMPLER:	James Robideau
ANALYSIS DATE:	December 5, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL)

MICROASSAYS OF VERMONT INCORPORATED

LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mtn. Race Track	MAV REF.#:	10,227
REPORT DATE:	December 13, 1994	STATION:	Green Mtn. Race Track Well
DATE SAMPLED:	November 22, 1994	TIME SAMPLED:	09:10
DATE RECEIVED:	November 22, 1994	SAMPLER:	James Robideau
ANALYSIS DATE:	December 6, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL)

MICROASSAYS OF VERMONT INCORPORATED

LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mtn. Race Track	MAV REF.#:	10,227
REPORT DATE:	December 13, 1994	STATION:	MW-1
DATE SAMPLED:	November 22, 1994	TIME SAMPLED:	10:25
DATE RECEIVED:	November 22, 1994	SAMPLER:	James Robideau
ANALYSIS DATE:	December 6, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (μg/L)	Conc. (μg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 101%

BPQL = Below Practical Quantitation Limit (PQL)

LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mtn. Race Track	MAV REF.#:	10,227
REPORT DATE:	December 13, 1994	STATION:	MW-2
DATE SAMPLED:	November 22, 1994	TIME SAMPLED:	11:40
DATE RECEIVED:	November 22, 1994	SAMPLER:	James Robideau
ANALYSIS DATE:	December 6, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (μg/L)	Conc. (μg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL)

LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mtn. Race Track	MAV REF.#:	10,227
REPORT DATE:	December 13, 1994	STATION:	MW-3
DATE SAMPLED:	November 22, 1994	TIME SAMPLED:	11:30
DATE RECEIVED:	November 22, 1994	SAMPLER:	James Robideau
ANALYSIS DATE:	December 6, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL)

LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mtn. Race Track	MAV REF.#:	10,227
REPORT DATE:	December 13, 1994	STATION:	MW-4
DATE SAMPLED:	November 22, 1994	TIME SAMPLED:	10:47
DATE RECEIVED:	November 22, 1994	SAMPLER:	James Robideau
ANALYSIS DATE:	December 6, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 101%

BPQL = Below Practical Quantitation Limit (PQL)

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LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mtn. Race Track	MAV REF.#:	10,227
REPORT DATE:	December 13, 1994	STATION:	MW-5
DATE SAMPLED:	November 22, 1994	TIME SAMPLED:	11:00
DATE RECEIVED:	November 22, 1994	SAMPLER:	James Robideau
ANALYSIS DATE:	December 6, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (μg/L)	Conc. (μg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 101%

BPQL = Below Practical Quantitation Limit (PQL)

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LABORATORY REPORT

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Green Mtn. Race Track	MAV REF.#:	10,227
REPORT DATE:	December 13, 1994	STATION:	MW-6
DATE SAMPLED:	November 22, 1994	TIME SAMPLED:	11:21
DATE RECEIVED:	November 22, 1994	SAMPLER:	James Robideau
ANALYSIS DATE:	December 6, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	5	BPQL

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL)

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CHAIN OF CUSTODY RECORD

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RR# Box 5210 P.O. Box 189
Montpelier, VT 05602
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16V

Page 1 of 1

MAV # 10227

CLIENT NAME: Lincoln Applied Geology
ADDRESS: RD1 Box 710 Bristol VT 05443
PROJECT NAME: Green Mtn Race Track
PROJECT NUMBER:
PROJECT MANAGER: Bill Norland
SAMPLER: James R

Sample Location	Date	Time	# of cont.	preserv'd	Sample Type	BTEX - MTBE	ANALYSIS REQUESTED	REMARKS:
- Trip OK ND	11-22-94	5:30AM	2	HCL	40mill	✓	✓	
Green Mtn Race Track well OK ND	11-22-94	9:10AM	2	HCL	40mill	✓	✓	
- MW-1 OK ND	11-22-94	10:25AM	2	HCL	40mill	✓	✓	
- MW-4 OK ND	11-22-94	10:47	2	HCL	40mill	✓	✓	
- MW-5 OK ND	11-22-94	11:00	2	HCL	40mill	✓	✓	
- MW-6 OK ND	11-22-94	11:21	2	HCL	40mill	✓	✓	
- MW-3 OK ND	11-22-94	11:30	2	HCL	40mill	✓	✓	
- MW-2 OK ND	11-22-94	11:40	2	HCL	40mill	✓	✓	
TPW-1 Dry	11-22-94	No sample	~~2~~	~~HCL~~	~~40mill~~	~~✓~~		

Relinquished by:	Received by:	Date/Time	Relinquished by:	Received by:	Date/Time
[signature]	K. Gray	11/22/94 3:15			

Appendix C

November 1994

Pump Test Water Level
and
Flow Rate Data

AQUIFER TEST DATA

WELL OR HOLE GMRT Well
PAGE 1 OF 1

RECORDED BY / PERSONNEL: Bill Norland - LAG
LOCATION: Pownal, Vermont
PROJECT: Green Mountain Race Track

PUMP ON DATE 11/15/94 TIME 1050
PUMP OFF DATE 11/22/94 TIME 0927
DURATION OF AQUIFER TEST 7 days

HOW W.L.'s MEASURED Solinst W.L. Probe
DISTANCE FROM PUMPING WELL 0'
MEASURING POINT TOC
ELEVATION MEASURING POINT 99.78'

HOW Q MEASURED Pollard Pitot at Hose
DEPTH OF PUMP/AIRPIPE
TYPE OF TEST Constant Q ~500 gpm
PREVIOUS PUMPING

TIME t= ____ AT t'=0 | WATER LEVEL DATA SWL 13.85' | DISCHARGE DATA | COMMENTS

DATE	CLOCK TIME	PUMPING ELAPSED TIME t	RECOVERY ELAPSED TIME t'			READING feet below TOC	CORRECTION OR CONVERSION	WATER LEVEL	W.L. CHANGE s or s' S		READING Pitot (psi.)	RATE (GPM)(LPS) (GPM)		COMMENTS
11/15	0830					13.85			0			0		
↓	1040					13.85			0			0		Pump Started @ 1050
	1105	15				39.45			25.60		10	531		
	1107	17				39.62			25.77					
	1109	19				39.76			25.91					
	1111	21				39.90			26.05					
	1113	23				40.01			26.16					
	1115	25				40.10			26.25		8	475		Adjust Flow
	1127	37				35.77			21.92					
	1129	39				36.05			22.20					
	1131	41				36.25			22.40					
	1133	43				36.37			22.52					Adjust Flow
	1208	78				37.90			24.05		10	531		WQ Sample @ 1256
	1338	168				38.89			25.04					
↓	1606	316				39.70			25.85		10	531		
11/15	2000	550				39.26			25.41					
11/16	0817	1,287				39.61			25.76		10	531		
↓	1200	1,510				39.69			25.84		10	531		
11/16	1403	1,633				39.80			25.95		10	531		
11/17	0820	2,730				40.17			26.32		10	531		
↓	1212	2,962				40.26			26.41		10	531		
11/17	1610	3,200				40.32			26.47		10	531		
11/18	0836	4,186				40.64			26.79		10	531		
	0923	4,233				40.64			26.79		8	475		Adjust Flow
	1031	4,301				41.77			27.92		9	504		WQ Sample @ 1020
↓	1318	4,468				41.83			27.98		9	504		
11/18	1605	4,635				41.87			28.02		9	504		
11/19	0818	5,608				42.15			28.30		9	504		
↓	1202	5,832				42.22			28.37		9	504		
11/19	1607	6,077				42.27			28.42		9	504		
11/20	0823	7,053				42.50			28.65		9	504		
↓	1158	7,268				42.53			28.68		9	504		
11/20	1608	7,518				42.58			28.73		9	504		
11/21	0821	8,491				42.77			28.92		9	504		
	1140	8,690				42.80			28.95					WQ Sample @ 1140
	1610	8,960				42.81			28.96		9	504		
↓	0848	9,958				42.88			29.03					
11/21	0925	9,995				42.88			29.03		9	504		Pump Off @ 0927

AQUIFER TEST DATA

WELL OR HOLE MW-5
PAGE 1 OF 1

PUMP ON DATE 11/15/94 TIME 1050
PUMP OFF DATE 11/22/94 TIME 0927
DURATION OF AQUIFER TEST 7 days

HOW W.L.'s MEASURED Solinst W.L. probe
DISTANCE FROM PUMPING WELL 2,122'
MEASURING POINT TOC
ELEVATION MEASURING POINT 95.52'

HOW Q MEASURED Pollard Pitot at Hose
DEPTH OF PUMP/AIRPIPE
TYPE OF TEST Constant Q ~ 500 gpm
PREVIOUS PUMPING

TIME t = ___ AT t' = 0 — WATER LEVEL DATA SWL 12.78' — DISCHARGE DATA — COMMENTS

DATE	CLOCK TIME	PUMPING ELAPSED TIME t	RECOVERY ELAPSED TIME t'			READING feet below TOC	CORRECTION OR CONVERSION	WATER LEVEL	W.L. CHANGE s or s'		READING	RATE (GPM)(LPS)		COMMENTS
11/15	1018	0				12.78			0					GMRT Pump
↓	1216	86				12.78			0					Started @ 1050
11/15	1615	325				12.79			0.01					
11/16	0837	1307				12.78			0					
↓	1213	1523				12.79			0.01					
11/16	1620	1770				12.79			0.01					
11/17	0835	2745				12.79			0.01					
↓	1219	2969				12.79			0.01					
11/17	1617	3207				12.79			0.01					
11/18	0850	4200				12.79			0.01					
↓	1005	4275				12.79			0.01					
↓	1050	4320				12.79			0.01					
↓	1320	4470				12.79			0.01					
11/18	1615	4645				12.79			0.01					
11/19	0826	5616				12.79			0.01					
↓	1222	5852				12.79			0.01					
11/19	1620	6090				12.79			0.01					
11/20	0834	7064				12.79			0.01					
↓	1206	7276				12.79			0.01					
11/20	1620	7530				12.79			0.01					
11/21	0833	8503				12.79			0.01					
11/21	1621	8971				12.79			0.01					
11/22	0857	9967				12.80			0.02					GMRT Pump
														Off @ 0927

RECORDED BY
PERSONNEL
LOCATION
PROJECT

AQUIFER TEST DATA

WELL OR HOLE MW-6
PAGE 1 OF 1

PERSONNEL / RECORDED BY: Bill Norland - LAG
LOCATION: Pownal, Vermont
PROJECT: Green Mountain Race Track

PUMP ON DATE 11/15/94 TIME 1050
PUMP OFF DATE 11/22/94 TIME 0927
DURATION OF AQUIFER TEST 7 days

HOW W.L.'s MEASURED Solinst W.L. Probe
DISTANCE FROM PUMPING WELL 2,334'
MEASURING POINT TOC
ELEVATION MEASURING POINT 94.27

HOW Q MEASURED Pollard Pitot at Hose
DEPTH OF PUMP/AIRPIPE
TYPE OF TEST Constant Q ~ 500 gpm
PREVIOUS PUMPING

TIME t = ___ AT t' = 0 | WATER LEVEL DATA SWL 11.90' | DISCHARGE DATA | COMMENTS

DATE	CLOCK TIME	PUMPING ELAPSED TIME t	RECOVERY ELAPSED TIME t'			READING feet below TOC	CORRECTION OR CONVERSION	WATER LEVEL	W.L. CHANGE s or s' S		READING	RATE (GPM)(LPS)		COMMENTS
11/15	1021	0				11.90			0					GMRT Pump
↓	1219	89				11.91			0.01					Started @ 1050
11/15	1620	330				11.92			0.02					
11/16	0832	1302				11.90			0					
↓	1217	1,527				11.90			0					
11/16	1624	1,774				11.90			0					
11/17	0840	2,750				11.92			0.02					
↓	1222	2,972				11.92			0.02					
11/17	1621	3,211				11.92			0.02					
11/18	0854	4,204				11.92			0.02					
	1007	4,277				11.92			0.02					
	1054	4,324				11.92			0.02					
↓	1330	4,480				11.92			0.02					
11/18	1618	4,648				11.92			0.02					
11/19	0831	5,621				11.92			0.02					
↓	1226	5,856				11.92			0.02					
11/19	1624	6,094				11.92			0.02					
11/20	0840	7,070				11.92			0.02					
↓	1210	7,280				11.92			0.02					
11/20	1624	7,534				11.92			0.02					
11/21	0837	8,507				11.93			0.02					
11/21	1624	8,974				11.93			0.02					
11/22	0900	9,970				11.93			0.02					GMRT Pump
														Off @ 0927

AQUIFER TEST DATA

WELL OR HOLE TPW-1
PAGE 1 OF 1

PUMP ON DATE 11/15/94 TIME 1050
PUMP OFF DATE 11/22/94 TIME 0927
DURATION OF AQUIFER TEST 7 days

HOW W.L.'s MEASURED Solinst W.L. Probe
DISTANCE FROM PUMPING WELL 510'
MEASURING POINT TOC
ELEVATION MEASURING POINT 98.55'

HOW Q MEASURED Pollard Pitot at Hose
DEPTH OF PUMP/AIRPIPE
TYPE OF TEST Constant Q ~ 500 gpm
PREVIOUS PUMPING

PERSONNEL RECORDED BY Bill Norland - LAG

LOCATION Pownal, Vermont

PROJECT Green Mountain Race Track

TIME t= ___ AT t' = 0 | WATER LEVEL DATA SWL 12.89' | DISCHARGE DATA | COMMENTS

DATE	CLOCK TIME	PUMPING ELAPSED TIME t	RECOVERY ELAPSED TIME t'			READING feet below TOC	CORRECTION OR CONVERSION	WATER LEVEL	W.L. CHANGE s or s' S		READING	RATE (GPM)(LPS)		COMMENTS
11/15	1027	0				12.89			0					GMRT Pump
11/15	1610	190				12.90			0.01					Started @ 1050
11/16	0828	1,298				12.99			0.10					
↓	1207	1,517				13.00			0.11					
11/16	1608	1,628				13.02			0.13					
11/17	0828	2,738				13.14			0.25					
↓	1215	2,965				13.16			0.27					
11/17	1614	3,074				13.19			0.30					
11/18	0845	4,195				13.30			0.41					
↓	1007	4,277				13.31			0.42					
↓	1323	4,473				13.32			0.43					
11/18	1609	4,509				13.33			0.44					
11/19	0822	5,612				13.42			0.53					
↓	1206	5,836				13.44			0.55					
11/19	1612	5,952				13.46			0.57					
11/20	0830	7,060				13.52			0.63					
↓	1202	7,272				13.53			0.64					
11/20	1614	7,394				13.55			0.66					
11/21	0829	8,499				13.62			0.73					
↓	1203	8,713				DRY	(13.65)		DRY	(>0.76)				
11/21	1614	8,834				DRY	(13.65)		DRY	(>0.76)				
11/22	0920	9,990				DRY	(13.65)		DRY	(>0.76)				GMRT Pump
														Off @ 0927

Appendix D

October & November 1994 Precipitation Data

Pownal 1 NE Station

NORTHEAST
REGIONAL
CLIMATE
CENTER

1123 Bradfield Hall
Cornell University
Ithaca, NY 14853-1901

Phone: (607) 255-1751
Fax: (607) 255-2106

Internet mail: nrcc@cornell.edu

Date: December 2, 1994

To: Bill Norland
Lincoln Applied Geology
RD 1 Box 710
Bristol, VT 05443

From: Kathy Vreeland *Kathy Vreeland*

The enclosed information is being sent in response to your recent request for climate data. A bill is enclosed to cover the cost of these data. Please return the bottom portion of the bill with your payment. If you have any questions or need additional data, you can contact our office at the address or phone numbers listed above.

CLIMATE DATA FOR POWNAL 1 NE OCT 1994

DAY	MAX	MIN	AVG	HDD	CDD	GDD	PREC	SNOW	DEPTH
1	57	35	46	19	0	0	0.00	0.0	0
2	49	35	42	23	0	0	0.19	0.0	0
3	53	30	42	23	0	0	0.00	0.0	0
4	54	31	43	22	0	0	0.00	0.0	0
5	51	39	45	20	0	0	0.00	0.0	0
6	47	36	42	23	0	0	Tr	0.0	0
7	50	34	42	23	0	0	0.00	0.0	0
8	67	34	51	14	0	1	0.00	0.0	0
9	74	***S	***	***	***	***	*****S	0.0	0
10	***	***S	***	***	***	***	*****S	0.0	0
11	***	30	***	***	***	***	0.31A	0.0	0
12	50	26	38	27	0	0	0.00	0.0	0
13	59	26	43	22	0	0	0.00	0.0	0
14	64	30	47	18	0	0	0.00	0.0	0
15	56	32	44	21	0	0	0.00	0.0	0
16	57	28	43	22	0	0	0.00	0.0	0
17	57	30	44	21	0	0	0.00	0.0	0
18	61	32	47	18	0	0	0.00	0.0	0
19	62	36	49	16	0	0	0.02	0.0	0
20	64	47	56	9	0	6	0.06	0.0	0
21	64	49	57	8	0	7	0.26	0.0	0
22	61	46	54	11	0	4	Tr	0.0	0
23	62	39	51	14	0	1	0.00	0.0	0
24	62	39	51	14	0	1	0.03	0.0	0
25	62	41	52	13	0	2	0.00	0.0	0
26	58	31	45	20	0	0	Tr	0.0	0
27	51	31	41	24	0	0	0.00	0.0	0
28	51	32	42	23	0	0	0.00	0.0	0
29	58	33	46	19	0	0	0.00	0.0	0
30	62	41	52	13	0	2	0.00	0.0	0
31	65	45	55	10	0	5	0.00	0.0	0
SUM	1688	1018	---	510	0	29	0.87	0.0	---
AVG	58.2	35.1	46.7						

DAY	MAX	MIN	AVG	HDD	CDD	GDD	PREC	SNOW	DEPTH	
1	61	47	54	11	0	4	0.10	0.0	0	Prelim
2	64	39	52	13	0	2	0.14	0.0	0	Prelim
3	42	31	37	28	0	0	0.25	Tr	0	Prelim
4	58	31	45	20	0	0	0.00	0.0	0	Prelim
5	76	48	62	3	0	12	0.00	0.0	0	Prelim
6	74	48	61	4	0	11	Tr	0.0	0	Prelim
7	62	38	50	15	0	0	0.16	0.0	0	Prelim
8	50	35	43	22	0	0	0.00	0.0	0	Prelim
9	61	41	51	14	0	1	0.00	0.0	0	Prelim
10	54	37	46	19	0	0	Tr	0.0	0	Prelim
11	46	27	37	28	0	0	0.00	0.0	0	Prelim
12	40	23	32	33	0	0	0.00	0.0	0	Prelim
13	50	23	37	28	0	0	0.00	0.0	0	Prelim
14	51	41	46	19	0	0	0.00	0.0	0	Prelim
15	58	45	52	13	0	2	0.00	0.0	0	Prelim
16	58	33	46	19	0	0	0.00	0.0	0	Prelim
17	44	28	36	29	0	0	0.00	0.0	0	Prelim
18	56	27	42	23	0	0	0.00	0.0	0	Prelim
19	55	44	50	15	0	0	0.02	0.0	0	Prelim
20	51	33	42	23	0	0	0.00	0.0	0	Prelim
21	44	28	36	29	0	0	0.00	0.0	0	Prelim
22	***	***	***	***	***	***	*****	****	***	
23	46	28	37	28	0	0	0.00	0.0	0	Prelim
24	32	11	22	43	0	0	0.04	1.0	1	Prelim
25	37	11	24	41	0	0	0.00	0.0	Tr	Prelim
26	43	27	35	30	0	0	0.00	0.0	0	Prelim
27	35	10	23	42	0	0	0.00	0.0	0	Prelim
28	34	10	22	43	0	0	0.47	1.0	Tr	Prelim
29	57	33	45	20	0	0	0.52	0.0	0	Prelim
30	48	27	38	27	0	0	0.00	0.0	0	Prelim
SUM	1487	904	---	682	0	32	1.70	2.0	---	
AVG	51.3	31.2	41.2							

THESE DATA ARE PROVIDED BY THE NORTHEAST REGIONAL CLIMATE CENTER

Northeast Regional Climate Center Monthly Climate Data Reports

Each line on the printout contains climate data for one day. The columns of data are as follows:

DAY . . . . day of the month
MAX . . . . maximum temperature (degrees Fahrenheit)
MIN . . . . minimum temperature (degrees Fahrenheit)
AVG . . . . average temperature (average of MAX and MIN)
HDD . . . . heating degree days (base 65)
CDD . . . . cooling degree days (base 65)
GDD . . . . growing degree days (base 50)
PREC . . . . precipitation total (rain and/or liquid equivalent of snow - inches)
SNOW . . . daily snowfall (inches)
DEPTH . . . depth of snow on the ground at the time of observation

Special values:
T . . . . . indicates a "trace" (less than 0.01 inch of PREC; less than 0.1 inch of SNOW; less than 1 inch for DEPTH)
*** . . . . indicates missing data

All data for this location cover the 24 hour period ending at 7 Am on the date indicated.

Appendix E

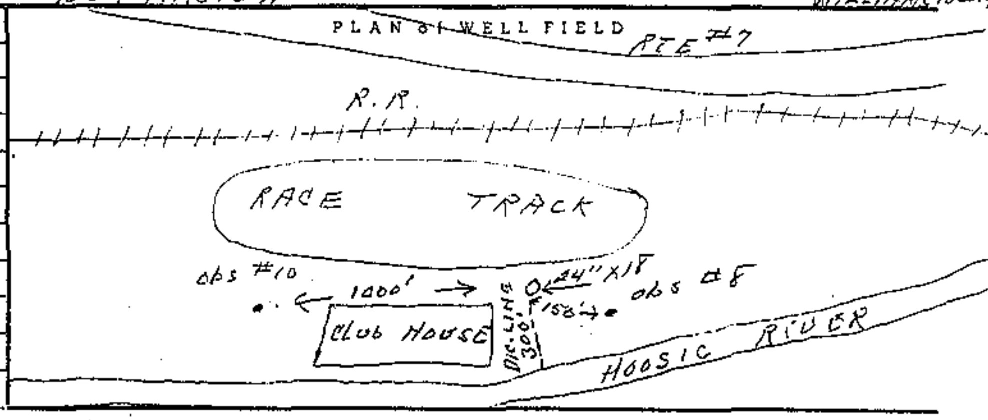
May 1962 Pump Test
Water Level Flow Rate Data

R. E. CHAPMAN CO. - LOG OF PUMP TEST

Customer: De Matteo Construction Co
Location: New Race Track
Town: Pownal   State: Vermont   Street: Rte #7
Owner of Property:
Date: 5-21-62
Operator: Wm Cummings

Pump Data
Size & Type of Pump: 5" Deep Well Turbine
Size & Length—Discharge Line: 100' x 4" 200' x 6"
Size Orifice Pipe: 6" in.
Size Orifice: 5" in.
Description of Well being pumped: 24" X 18" Gravel Packed Well
Length Dunker ___ in. (Do Not) Add To Readings
Length of Alt. Line from center of gauge: 50 Ft. 0" In.

PLAN OF WELL FIELD



READINGS—Measurements From Top of Casing

WELL		LARGE WELL No. 1		DIAM. 18"		LARGE WELL No.		DIAM.		Obs. Well No. 1 (A.G. 2")	Obs. Well No. 8 (3'-2")	Obs. Well No. 10 (4'-6")	Obs. Well No.	Obs. Well No.
Elevation—Top of Pipe Above Ground 0' 2"		Alt. Gauge Reading	Corresponding Water Level	Head-In Inches	G. P. M.	Alt. Gauge Reading	Corresponding Water Level	Head-In Inches	G. P. M.	6'-3½"	9'-8½"	11'-11"		
Date, Weather and Samples Taken	Time 9:00 A.M.	Static 6'-3"	Static 6'-3"			Static	Static							
5-21-62	11:30 A.M.	Started Pump Test		13"	445									
CLEAR + WARM	12:00 NOON	40'-0"	40'-0"	13"	445			#1 obs NOT WORKING			18'-6½"	12'-6"		
" "	1:00 P.M.	40'-0"	40'-0"	13"	445					— —	19'-1"	12'-11¾"		
	2:00 P.M.	40'-0"	40'-0"	13"	446						19'-1½"	13'-0½"		
" "	3:00 P.M.	40'-0"	40'-0"	13"	445						19'-2"	13'-1"		
	4:00 P.M.	40'-0"	40'-0"	13"	445					— —	19'-1½"	13'-0½"		
CLEAR + WARM	5:00 P.M.	40'-0"	40'-0"	13"	446						19'-2"	13'-1½"		
	6:00 P.M.	40'-0"	40'-0"	13"	446						19'-3"	13'-1¾"		
	7:00 P.M.	40'-0"	40'-0"	13"	445					— —	19'-3"	13'-2¼"		
" "	8:00 P.M.	40'-0"	40'-0"	13"	445						19'-3¼"	13'-2½"		
	9:00 P.M.	40'-0"	40'-0"	13"	445						19'-4"	13'-2¾"		
" "	10:00 P.M.	40'-0"	40'-0"	13"	445					— —	19'-5"	13'-3¼"		

SHEET #2

READINGS—Measurements From Top of Casing

WELL		LARGE WELL No. 1		DIAM. 18"		LARGE WELL No.		DIAM.		Obs. Well No. 1	Obs. Well No. 8	Obs. Well No. 10	Obs. Well No.	Obs. Well No.
Elevation—Top of Pipe Above Ground 6'-2"		Alt. Guage Reading	Corresponding Water Level	Head-In Inches	G. P. M.	Alt. Guage Reading	Corresponding Water Level	Head-In Inches	G. P. M.	6'-8 1/2"	9'-8 1/2"	11'-11"		
Date, Weather and Samples Taken	Time	Static 6'-3"	Static 6'-3"			Static	Static							
5-21-62	11:00 P.M.	40'-0"	40'-0"	13"	445			#1 NOT WORKING			19'-5 3/4"	13'-3 1/4"		
	12:00	40'-0"	40'-0"	13"	446					— —	19'-5 1/2"	13'-3 1/4"		
5-22-62	1:00 A.M.	40'-0"	40'-0"	13"	446					— —	19'-5 3/4"	13'-3 1/2"		
	2:00 A.M.	40'-0"	40'-0"	13"	445					— —	19'-5 3/4"	13'-3 1/2"		
	3:00 A.M.	40'-0"	40'-0"	13"	445					— —	19'-5 3/4"	13'-3 1/2"		
	4:00 A.M.	40'-0"	40'-0"	13"	445						19'-6"	13'-3 3/4"		
	5:00 A.M.	40'-0"	40'-0"	13"	445					— —	19'-6 1/4"	13'-4"		
	6:00 A.M.	40'-0"	40'-0"	13"	446						19'-5 1/2"	13'-3 3/4"		
	7:00 A.M.	40'-0"	40'-0"	13"	445					— —	19'-5 1/2"	13'-3 3/4"		
	1:00 A.M.	40'-0"	40'-0"	13"	445						19'-5 1/2"	13'-3 3/4"		
	9:00 A.M.	40'-0"	40'-0"	13"	445					— —	19'-5 3/4"	13'-3 3/4"		
	10:00 A.M.	40'-6"	40'-6"	13"	445						19'-6 1/2"	13'-4"		
	11:00 A.M.	40'-6"	40'-6"	13"	445					— —	19'-7"	13'-4 1/4"		
	12:00 NOON	40'-6"	40'-6"	13"	445						19'-7"	13'-4 1/4"		
	1:00 P.M.	40'-6"	40'-6"	13"	445					— —	19'-7 1/4"	13'-4 1/2"		
	2:00 P.M.	40'-6"	40'-6"	13"	445						19'-7 1/4"	13'-4 1/2"		
	3:00 P.M.	40'-6"	40'-6"	13"	445					— —	19'-7 1/2"	13'-4 1/2"		
	4:00 P.M.	40'-6"	40'-6"	13"	445						19'-7 1/2"	13'-4 1/2"		
	5:00 P.M.	40'-6"	40'-6"	13"	446					— —	19'-7 3/4"	13'-4 1/2"		
	6:00 P.M.	40'-6"	40'-6"	13"	445						19'-7 3/4"	13'-4 1/2"		
	7:00 P.M.	40'-6"	40'-6"	13"	446					— —	19'-7 3/4"	13'-4 3/4"		
	8:00 P.M.	40'-6"	40'-6"	13"	446						19'-7 3/4"	13'-5"		
	9:00 P.M.	40'-6"	40'-6"	13"	446					— —	19'-7 3/4"	13'-5 1/4"		
	10:00 P.M.	40'-6"	40'-6"	13"	446						19'-7 3/4"	13'-5 1/2"		
	11:00 P.M.	40'-6"	40'-6"	13"	446					— —	19'-7 3/4"	13'-5 1/2"		
	12:00	40'-6"	40'-6"	13"	446						19'-7 3/4"	13'-5 1/2"		
5-23-62	1:00 A.M.	40'-6"	40'-6"	13"	446					— —	19'-7 3/4"	13'-5 1/2"		

SHEET #3

MAY 31

READINGS—Measurements From Top of Casing

WELL		LARGE WELL No. 1		DIAM. 18"		LARGE WELL No.		DIAM.		Obs. Well No. 1	Obs. Well No. 8	Obs. Well No. 10	Obs. Well No.	Obs. Well No.
Elevation—Top of Pipe Above Ground		Alt. Guage Reading	Corresponding Water Level	Head-In Inches	G. P. M.	Alt. Guage Reading	Corresponding Water Level	Head-In Inches	G. P. M.	6'-3½"	9'-8½"	11'-11"		
Date, Weather and Samples Taken	Time	Static 6'-3"	Static 6'-3"			Static	Static							
5-23-62	2:00 A.M.	40'-6"	40'-6"	13"	445			#1	NOT WORKING	——	19'-7¾"	13'-5¾"		
	3:00 A.M.	40'-6"	40'-6"	13"	445						19'-7¾"	13'-5¾"		
	4:00 A.M.	40'-6"	40'-6"	13"	445					——	19'-7¾"	13'-5¾"		
	5:00 A.M.	40'-6"	40'-6"	13"	445						19'-8"	13'-5¾"		
	6:00 A.M.	40'-6"	40'-6"	13"	445					——	19'-8"	13'-5¾"		
	7:00 A.M.	40'-6"	40'-6"	13"	445						19'-8"	13'-5¾"		
	8:00 A.M.	40'-6"	40'-6"	13"	445						19'-8"	13'-5¾"		
State Sample	9:00 A.M.	40'-6"	40'-6"	13"	445						19'-8"	13'-5¾"		
taken 10:30 A.M.	10:00 A.M.	40'-6"	40'-6"	13"	445						19'-8"	13'-5¾"		
Chemical & Bacteria	11:00 A.M.	40'-6"	40'-6"	13"	445						19'-8"	13'-5¾"		
	11:10 A.M.	Shut down 10 Min. Check oil in Drive & Grease Same.												
	11:20 A.M.	Started pumping at max rate of Well. 520 G.P.M.												
	12:00 Noon	45'-6"	45'-6"	18"	520						20'-9½"	13'-3½"		
	1:00 P.M.	45'-6"	45'-6"	18"	520						21'-1½"	13'-7½"		
	2:00 P.M.	46'-0"	46'-0"	18"	520						21'-3"	13'-8"		
	3:00 P.M.	46'-0"	46'-0"	18"	520						21'-4"	13'-8½"		
	4:00 P.M.	46'-0"	46'-0"	18"	520						21'-4½"	13'-8¾"		
	5:00 P.M.	46'-0"	46'-0"	18"	520						21'-5½"	13'-9"		
	6:00 P.M.	46'-0"	46'-0"	18"	520						21'-4"	13'-9"		
	7:00 P.M.	46'-0"	46'-0"	18"	520						21'-4¼"	13'-9¼"		
	8:00 P.M.	46'-0"	46'-0"	18"	520						21'-4¼"	13'-9¼"		
	9:00 P.M.	46'-0"	46'-0"	18"	520						21'-4¼"	13'-9¼"		
	10:00 P.M.	46'-0"	46'-0"	18"	520						21'-4½"	13'-9½"		
	11:00 P.M.	46'-0"	46'-0"	18"	520						21'-4¾"	13'-9¾"		
	12:00	46'-0"	46'-0"	18"	520						21'-5"	13'-9¾"		
5-24-62	1:00 A.M.	46'-0"	46'-0"	18"	520						21'-5¼"	13'-10"		
	2:00 A.M.	46'-0"	46'-0	18"	520						21'-5¾"	13'-10"		

SHEET #4

READINGS—Measurements From Top of Casing

MAY 31 1962

WELL		LARGE WELL No. 1		DIAM. 18"		LARGE WELL No.		DIAM.		Obs. Well No. 1	Obs. Well No. 8	Obs. Well No. 10	Obs. Well No.	Obs. Well No.
Elevation—Top of Pipe Above Ground		Alt. Guage Reading	Corresponding Water Level	Head-In Inches	G. P. M.	Alt. Guage Reading	Corresponding Water Level	Head-In Inches	G. P. M.	6'-3½"	9'-8½"	11'-11"		
Date, Weather and Samples Taken	Time	Static 6'-3"	Static 6'-3"			Static	Static							
5-24-62	3:00 A.M.	46'-0"	46'-0"	18"	520		#1	NOT WORKING		- -	21'-6"	13'-10"		
	4:00 A.M.	46'-0"	46'-0"	18"	520						21'-6"	13'-10"		
	5:00 A.M.	46'-0"	46'-0"	18"	520					- -	21'-6"	13'-10"		
	6:00 A.M.	46'-0"	46'-0"	18"	520						21'-6"	13'-10"		
	7:00 A.M.	46'-0"	46'-0"	18"	520						21'-6"	13'-10"		
	7:10 A.M.	Shut	Pump Test off		Recovery	Readings	taken							
	8:00 A.M.	11'-0"	11'-0"	- -	- -						11'-3"	12'-11½"		
	9:00 A.M.	7'-8"	7'-8"	- -	- -						10'-11"	12'-10"		
	10:00 A.M.	Well	Capped.								10'-9"	12'-8"		
	11:00 A.M.										10'-8½"	12'-7"		
	12:00 NOON										10'-8¼"	12'-6"		
	1:00 P.M.										10'-8"	12'-5"		
	2:00 P.M.	Well	Capped.								10'-7¾"	12'-4"		

46'0"
6'3"
39'9"

VHB Computations

Project: Beaver Wood | Project #
Location: Pownal VT | Sheet of
Calculated by: MJP | Date: 10/5/2010
Checked by: LBS | Date: 10/5/10
Title: Well Yield Calculations

Calculate Safe Yield of Existing Gravel Well at Green Mtn Race Track:

Use test data from 1994 Lincoln Applied Geology Pump Test

- static level = 13.85' btc
- top of well screen = 52' bgs + 1.5' casing = 53.5' btc
- total available head = 53.5' − 13.85' = 39.65'

A) Specific Capacity Method, based on LAG data analysis
- 180-day projected drawdown = 32 ft (LAG report chart 4) @ 514 gpm
- specific capacity of well: 514 gpm ÷ 32 ft = 16.06 gpm/ft
- Safe yield = 39.65' TAH × 16.06 gpm/ft = 637 gpm − continuous 24/hr day withdrawal

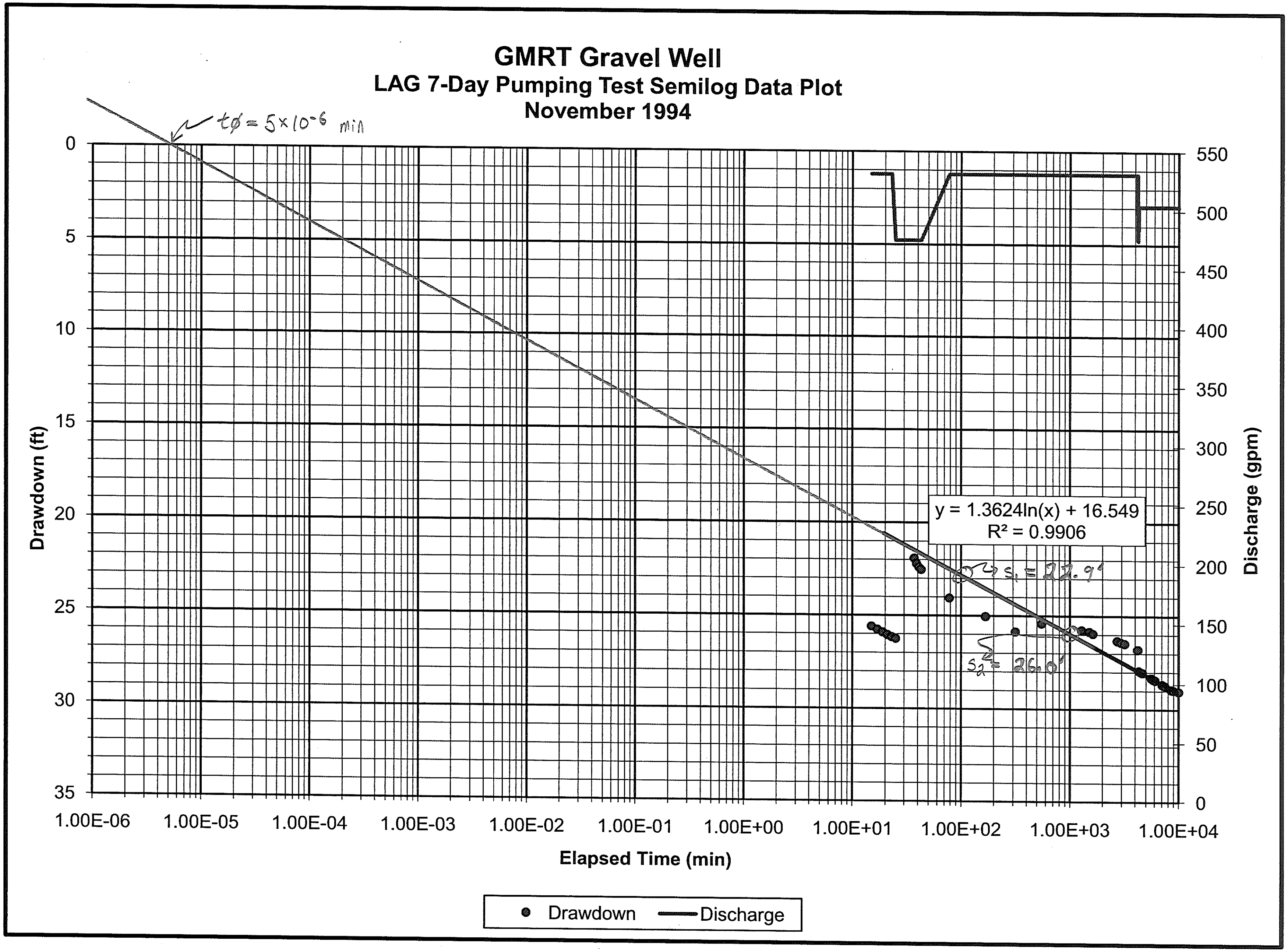
B) Cooper-Jacob Nonequilibrium Method, based on VHB analysis of LAG 1994 test data
- see following 3 pages for graphical analysis and calculations
- Safe yield = 614 gpm − 24 hr/day withdrawal

C) Average yield from two methods: (637 + 614) ÷ 2 = 625.5, round to 626 gpm

Vanasse Hangen Brustlin, Inc.

GMRT Gravel Packed Well
1994 Pump Test Data (from Lincoln Applied Geology)
Data Analysis by VHB, 2010

Date	Time	Elapsed Time (min)	Water Level (ft btp)	Drawdown (ft)	Discharge (gpm)	Cumulative gal	Notes
11/15/1994	8:30		13.85	0.00	--		background measurement
11/15/1994	10:40		13.85	0.00	--		background measurement
11/15/1994	10:50	0	13.85	0.00	--	0	Start Test
11/15/1994	11:05	15	39.45	25.60	531.0	7,965	
11/15/1994	11:07	17	39.62	25.77	531.0	9,027	
11/15/1994	11:09	19	39.76	25.91	531.0	10,089	
11/15/1994	11:11	21	39.90	26.05	531.0	11,151	
11/15/1994	11:13	23	40.01	26.16	531.0	12,213	
11/15/1994	11:15	25	40.10	26.25	475.0	13,163	decrease Q
11/15/1994	11:27	37	35.77	21.92	475.0	18,863	
11/15/1994	11:29	39	36.05	22.20	475.0	19,813	
11/15/1994	11:31	41	36.25	22.40	475.0	20,763	
11/15/1994	11:33	43	36.37	22.52	475.0	21,713	increased Q
11/15/1994	12:08	78	37.90	24.05	531.0	40,298	
11/15/1994	13:38	168	38.89	25.04	531.0	88,088	
11/15/1994	16:06	316	39.70	25.85	531.0	166,676	
11/15/1994	20:00	550	39.26	25.41	531.0	290,930	
11/16/1994	8:17	1,287	39.61	25.76	531.0	682,277	
11/16/1994	12:00	1,510	39.69	25.84	531.0	800,690	
11/16/1994	14:03	1,633	39.80	25.95	531.0	866,003	
11/17/1994	8:20	2,730	40.17	26.32	531.0	1,448,510	
11/17/1994	12:12	2,962	40.26	26.41	531.0	1,571,702	
11/17/1994	16:10	3,200	40.32	26.47	531.0	1,698,080	
11/18/1994	8:36	4,186	40.64	26.79	531.0	2,221,646	
11/18/1994	9:23	4,233	40.64	26.79	475.0	2,243,971	
11/18/1994	10:31	4,301	41.77	27.92	504.0	2,278,243	increased Q
11/18/1994	13:18	4,468	41.83	27.98	504.0	2,362,411	
11/18/1994	16:05	4,635	41.87	28.02	504.0	2,446,579	
11/19/1994	8:18	5,608	42.15	28.30	504.0	2,936,971	
11/19/1994	12:02	5,832	42.22	28.37	504.0	3,049,867	
11/19/1994	16:07	6,077	42.27	28.42	504.0	3,173,347	
11/20/1994	8:23	7,053	42.50	28.65	504.0	3,665,251	
11/20/1994	11:58	7,268	42.53	28.68	504.0	3,773,611	
11/20/1994	16:08	7,518	42.58	28.73	504.0	3,899,611	
11/21/1994	8:21	8,491	42.77	28.92	504.0	4,390,003	
11/21/1994	11:40	8,690	42.80	28.95	504.0	4,490,299	
11/21/1994	16:10	8,960	42.81	28.96	504.0	4,626,379	
11/22/1994	8:48	9,958	42.88	29.03	504.0	5,129,371	
11/22/1994	9:25	9,995	42.88	29.03	504.0	5,148,019	
				Ave. Q =	515.1	gpm	



F:\57407.00 Beaver Wood Pownal\Data\Groundwater\Potable\Production Well_1994.xls| SemilogPlot

10/5/2010

Vanasse Hangen Brustlin, Inc.

Safe Yield Calculations

Project / Well: **GMRT Well 1994 Test** **Cooper Jacob method, Drawdown Data**

- Method: Use Cooper-Jacob equation, measure T, r^2S from production well drawdown plot
- Solve for safe yield by trial-and-error to determine the highest yield (Q) that will not dewater TAH of the well.
- "Safe Yield" of the well is defined by the Vermont Water Supply Rules, §A-11.6.2.1 (4/2005) for a

Public Non-Transient Non-Community Source Well

Design conditions: 180 days of continuous pumping (Ave. Day Demand)

1) Determine Total Available Head:

hydraulic base:	53.5	Ft BTC, top of wellscreen (18-inch casing stickup)
- static level:	13.85	Ft BTC, from November 1994
= TAH	39.65	Feet
- Interference:	0.00	Feet
= TAH:	39.65	Feet

2) Determine Aquifer Coefficients:

A) From Drawdown plot, late drawdown/steady-state conditions

$T = 2.3Q / (4)(\pi)(\Delta s)$

where:

Q= 515 gpm, or 99,156 ft^3/day

Δ s = 26.0' - 22.9' = 3.1 Feet

T = 5,854 ft^2/day

$r^2S = (2.25)(T)(t0)$

where:

T = 5,854 ft^2/day

t_0 = 5.00E-06 minutes

or t_0 = 3.47E-09 days

r^2S = 4.57E-05 ft^2

3) Determine Safe Yield:

Solve for maximum Q which results in no more than 39.65 feet of drawdown,
using Cooper Jacob method:

$$sw = \frac{(2.3)(Q)}{(4)(\Pi)(T)} \times \log \frac{(2.25)(T)(180)}{r^2S}$$

where:

Q = ft^3/day

T = ft^2/day = 5,854

r^2S = ft^2 = 4.57E-05

Trial - and - Error Results:

Q (ft^3/day)	Sw (ft)	Q (gpm)	Q (gpd)
115,508	38.7	600	864,000
116,471	39.0	605	871,200
117,433	39.3	610	878,400
118,203	**39.6**	**614**	**884,160**
118,396	~~39.7~~	615	885,600
119,358	~~40.0~~	620	892,800
120,321	~~40.3~~	625	900,000
121,283	~~40.6~~	630	907,200
122,246	~~41.0~~	635	914,400
123,209	~~41.3~~	640	921,600

4) Check Accuracy of Cooper-Jacob Calculation: Compare predicted drawdown to actual test data.

Pump Test Q = 515.1 gpm, or 99156 Ft3/day

Pump Test duration = 7 days, or 167 hours

Test-end drawdown = 29.03 Feet

Calculated end of test drawdown (ft) = 28.83

Accuracy = 99.3% OK

Alta Gardens Estates MHP (WSID 5628)
Delineated Source Protection Area

Prepared By:

Agency of Natural Resources
Department of Environmental Conservation
Water Supply Division

April 2002

Alta Gardens Water System, WSID 5628
Draft

Purpose
The federal Safe Drinking Water Act requires all states to establish a Source Protection Area program. This federal requirement is supported by two State statutes, Public Water Supply and Groundwater Protection, Chapters 56 and 48 of Title 10 respectively. These state statutes require the adoption of rules for the protection of public water source protection areas. In turn, the rules establish a program containing procedures to determine the public water source protection area. The rule relevant to this goal are the Water Supply Rule.

The purpose of delineating a Source Protection Area (SPA) is to determine the recharge area which supplies water to a public water source. The recharge area or SPA for a groundwater source is defined by the nature of subsurface flow and that induced by pumping.

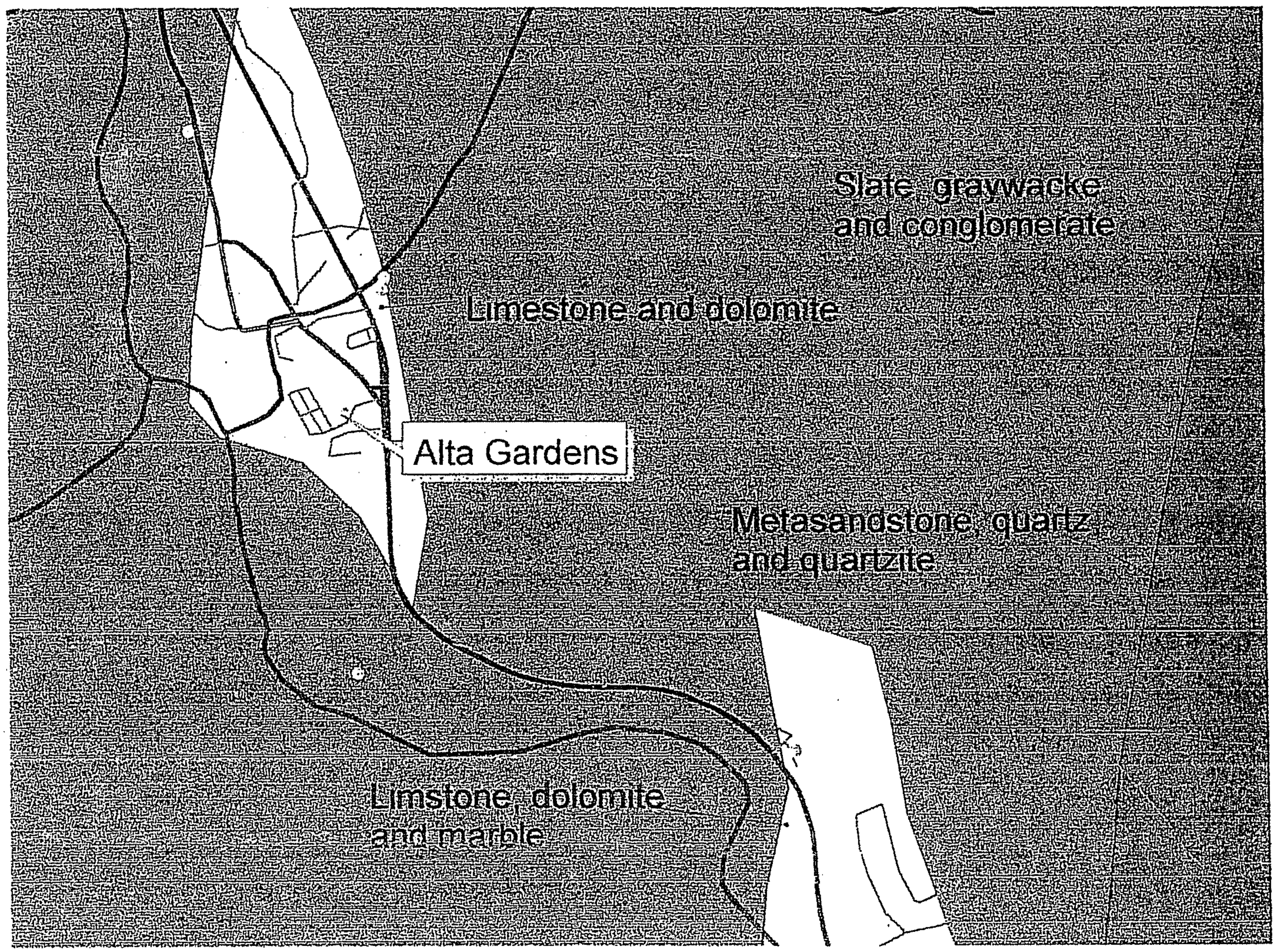
Within the SPA land uses and naturally occurring materials may render the public water source vulnerable to contamination. While naturally occurring contaminants are most often controlled through treatment, land uses are managed by a Source Protection Plan (SPP). A SPP is a document that in part identifies management techniques to control land uses within the SPA that may threaten the water source.

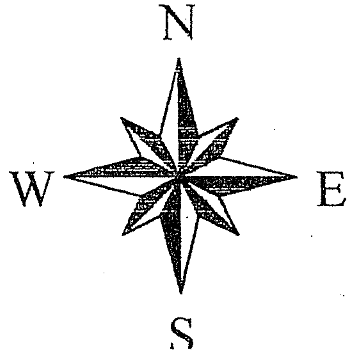
The SPA for the Alta Gardens Water System consisted of a three thousand foot radius surrounding the well source. This type of SPA gives little consideration to the hydrogeology or groundwater flow of the area. To delineate a more appropriate SPA for this water system existing information regarding the groundwater flow in the area was examined. This information included a review of existing geologic literature, the well completion reports within the area, an assessment of aerial photographs, orthophotos, and topographic maps. A field investigation was also conducted.

Location
The Alta Gardens Water System is located in the southern extremity of Pownal Village just west of the Hoosic River. It is located southwest of state route 7. The well serving the water system is on the southeast corner of the Mobile Home Park. Topographic features of the area are found on the United States Geological Survey's Pownal, VT. Quadrangle.

Geology
Bedrock
The water system is in the Taconic Mountains geomorphic region and along side the Hoosic River valley. The wells drilled to bedrock encounter a comparitively less resistant slate and phyllite with quartz. According to well completion reports (attached) the depth to bedrock varies from the surface to over 100 feet deep. However, all well locations within the area of the water system have not been field located and may be only considered approximate. The bedrock is highly metamorphosed, that is, pressure, temperature, and chemical processes were responsible for its development. Those wells with large yields in the area are probably highly fractured. Fracturing of the slate is highly probable.

Bedrock Types Nearby the Alta Gardens Water System





Surficial Geology

The unconsolidated sediments described in well completion reports are predominately sand with gravel and underlying clay. The thickness of these uncosolidated sediments range from 0ft. to 100 ft. The sand and gravel thicknesses is variable. Along the Hoosic River the valley floor is composed of silts and clay. Near Ladd Brook within the flood plain of the Hoosic River gravel deposits can be 30 ft. deep.

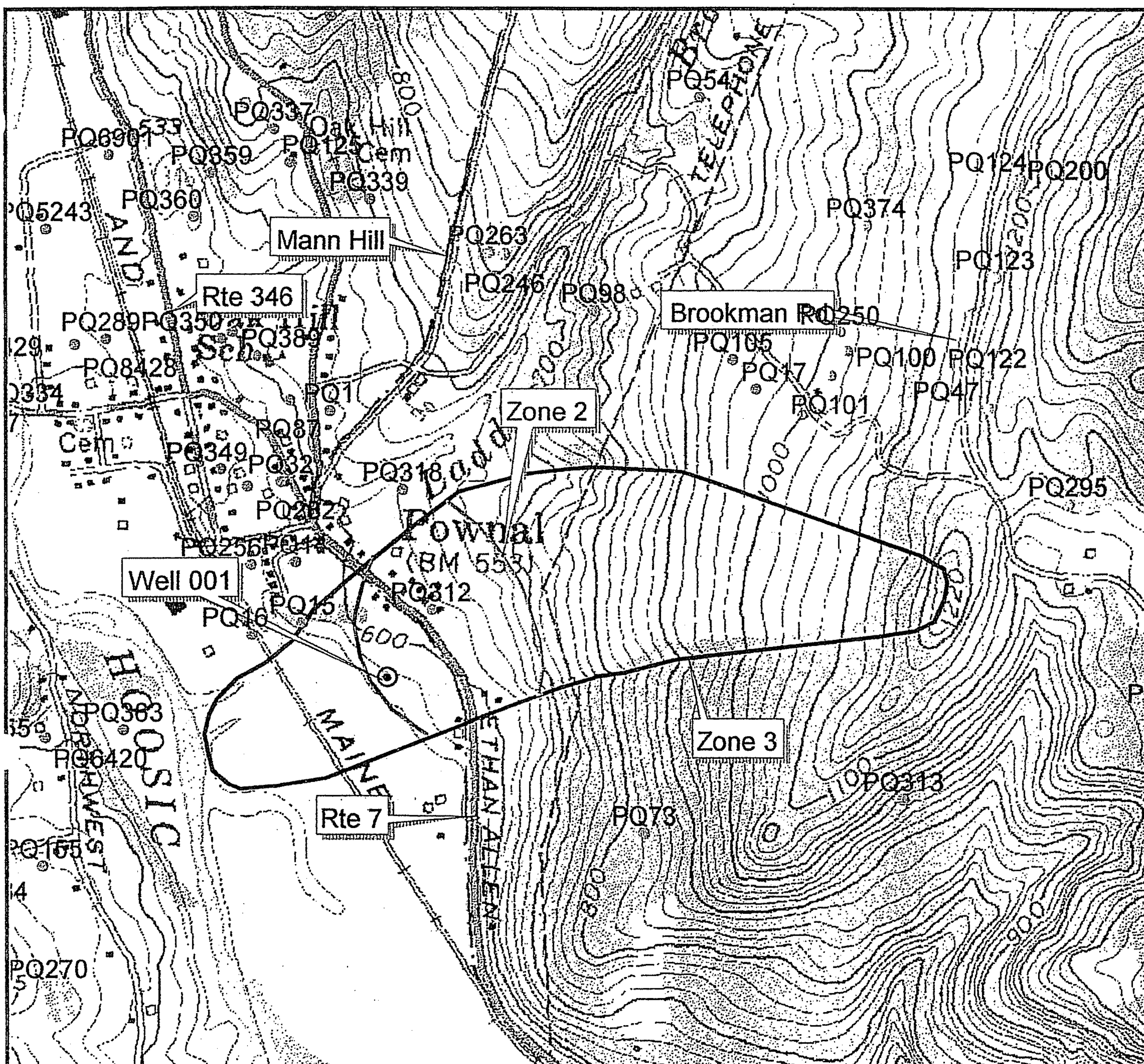
Of the 12 well completion reports referenced in the area 9 describe clay or harpan overlying bedrock. Similar to the sand, the clay can be quite thick. In one instance the clay is over 80 ft. thick but averages some 20 to 30 feet in thickness. Gravel deposits may underlie the clay and occurs directly over bedrock. Where clay is absent, the sand, gravel, or till overlies the bedrock below.

Well Number	Well Yield	Depth to Bedrock	Well Depth
1	1 GPM	26 FEET	500 FEET
14	3	12	155
15	2	4	245
16	0	12	455
32	1	10	200
73	2	9	245
156	15	60	170
256	15	gravel & clay	117
282	30	99	200
318	2	10	502
324	30	75	100
349	15	60	125

SPA Delineation

The area defined by outer most boundary of the SPA is referred to as Zone III. Zone III is the area of recharge to the source where possible impacts from potential sources of contamination may occur. This area may also be thought of as the area supplying recharge to the public source simply by natural groundwater flow.

Groundwater flow generally mimics the lay of the land, therefore, the outer boundary of the SPA was based in part on the topography of the area. As expected, this common characteristic appears to be reflected in the static water level reported for the well at Alta Gardens and the water level within the Hoosic River. For instance, the Alta Garden's well is at a topographic



Nearby Private Wells
Pownal, Vermont

Well #1

Zone 3

Zone 2

Private Wells

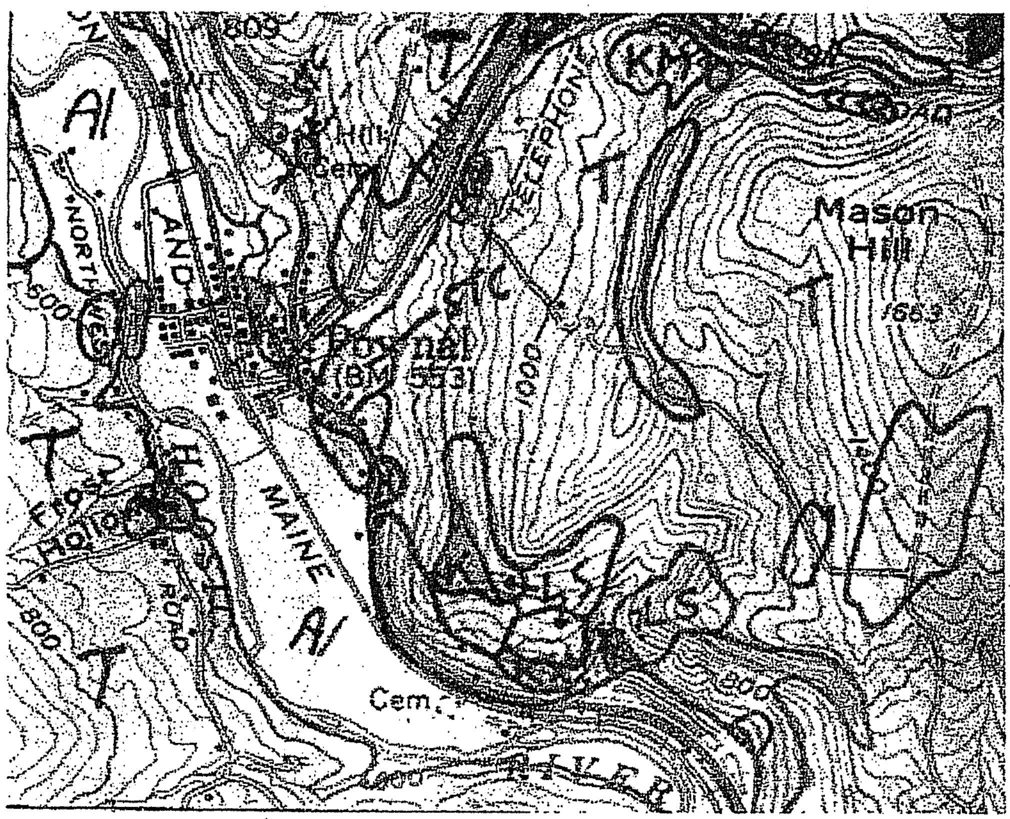
700 0 700 1400 Feet

Scale 1:12,000

N
W E
S

Date Prepared: 4/22/02

Surficial Geology Nearby the Alta Gardens Water System



Legend

AL	Alluvium
T	Till
STC	Silty Clay
LS	Lake Sand
K	Kame
KM	Kame Moriane

elevation of about 580 ft. with a static water level of approximately 30 ft. below ground surface. The water level in the well is about 550 feet above sea level and the Hoosic River levels is estimated at 520 ft. Groundwater flow is therefore, from the well to the river.

Applying the above concept indicates that groundwater flow is topographically upgradient from the Alta Gardens's well. The height of land within the proposed SPA is1200 ft. as estimated from the topographic map. The well has an elevation of about 580 ft., as mentioned. A difference of 620 ft. between the well and the height of land was calculated. The distance between the height of land and the well is about 4000 ft. Dividing the difference in elevation between the two features by the distance between gives a hydraulic gradient of 0.16 or otherwise known as the slope of the groundwater.

The hydraulic conductivity of the aquifer is similar to permeability. It is the ability of the aquifer to transmit water to the well. There is no aquifer test for the Alta Garden's well which could provide site specific information. However, estimates for similar rock types provide a hydraulic conductivity of 1 squared ft./day. The well encounters a wide variety of sediments including sand, gravel, clay, and afterwards slate. It is estimated that the hydraulic conductivity represents this range of lithology or rock types. The well is 170 feet deep with 60 feet of well casing. This leaves 110 ft. of rock or slate exposed within the well.

The well pumps a maximum of 10800 gallons per day as reported by the operator of the water system. This amount translates to 1444 cubic feet of water per day. Given this discharge and combining the above parameters into the Uniform Flow equation, the width of the SPA can be calculated.

The Uniform Flow Equation is: **Y = Q/Kbi** where: Y is the width of the SPA
Q is the maximum pumped from the well
K is the Hydraulic Conductivity
b is the exposed aquifer
i is the hydraulic gradient

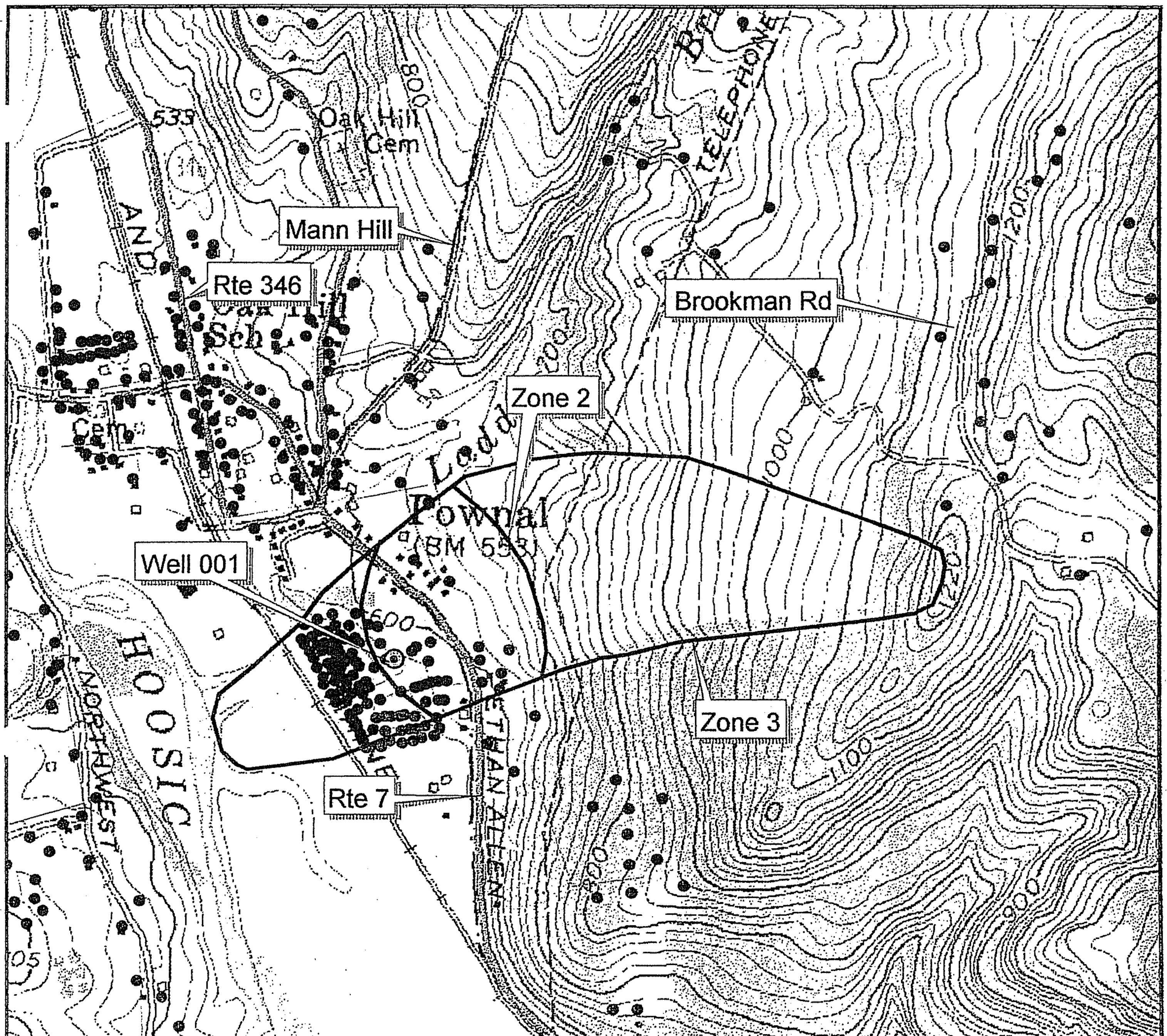
or Y = 1444/(1)(110)(0.16) = 800 ft.

The above calculation defines the lateral extent of Zone III.

The inner boundary of the SPA defines an area referred to as Zone II. Zone II is an area where there will be probable impacts from potential source of contamination. This area may also be thought of as the recharge area which is impacted by the pumping of the well.

Zone II was calculated using the second portion of the Uniform Flow Equation. This equation also considers the pumping rate of a well, the hydraulic conductivity (permeability) of the geologic character of the area, and the slope or hydraulic gradient of the groundwater.

This second portion of the Uniform Flow Equation defines the downgradient affects of pumping



Alta Gardens Estates MHP (WSID 5628)
Source Protection Area
Pownal, Vermont

Zone2.shp
Newspas.shp
Minrds
Source
Esite

800 0 800 1600 Feet

Scale 1:12,000

N S W E

Date Prepared: 04/19/02

the well and can be calculated by:

$$X = Q/2 \prod Kbi$$

or $X = 1444/ (2) (\prod) (1) (110)(0.16) = 200$ ft. where: $\prod$ is pi

Another equation can be used to define the upgradient extent of Zone II. This equation is base on the velocity of groundwater flow. It uses the hydraulic gradient of the aquifer, the hydraulic conductivity, and the porosity of the aquifer. The porosity is defined as the amount of void space within aquifer and is used to estimate the amount of water within the aquifer. Porosity can be thought of as a percentage and is estimated as 0.1. In addition, the equation takes into account the life expectancy of bacteria which has been determined to be two years. This period is important since it represent the time bacteria would have to migrate with the groundwater to adversely impact the well. Bacteria associated with groundwater flow beyond this area would have died off causing no adverse impact. The equation is:

$$V= Ki/p$$ where: **V** is groundwater flow velocity
p is porosity

or $V=1(0.16)/0.1 = 1.6$ft./day

The velocity of the groundwater flow is1.6 ft./day. Within a two year period groundwater would have traveled about 1170 feet. The udgradient extent of Zone II is approximately 1170 feet which coincides with the aerial extent of the sand and gravel deposits found in the area.

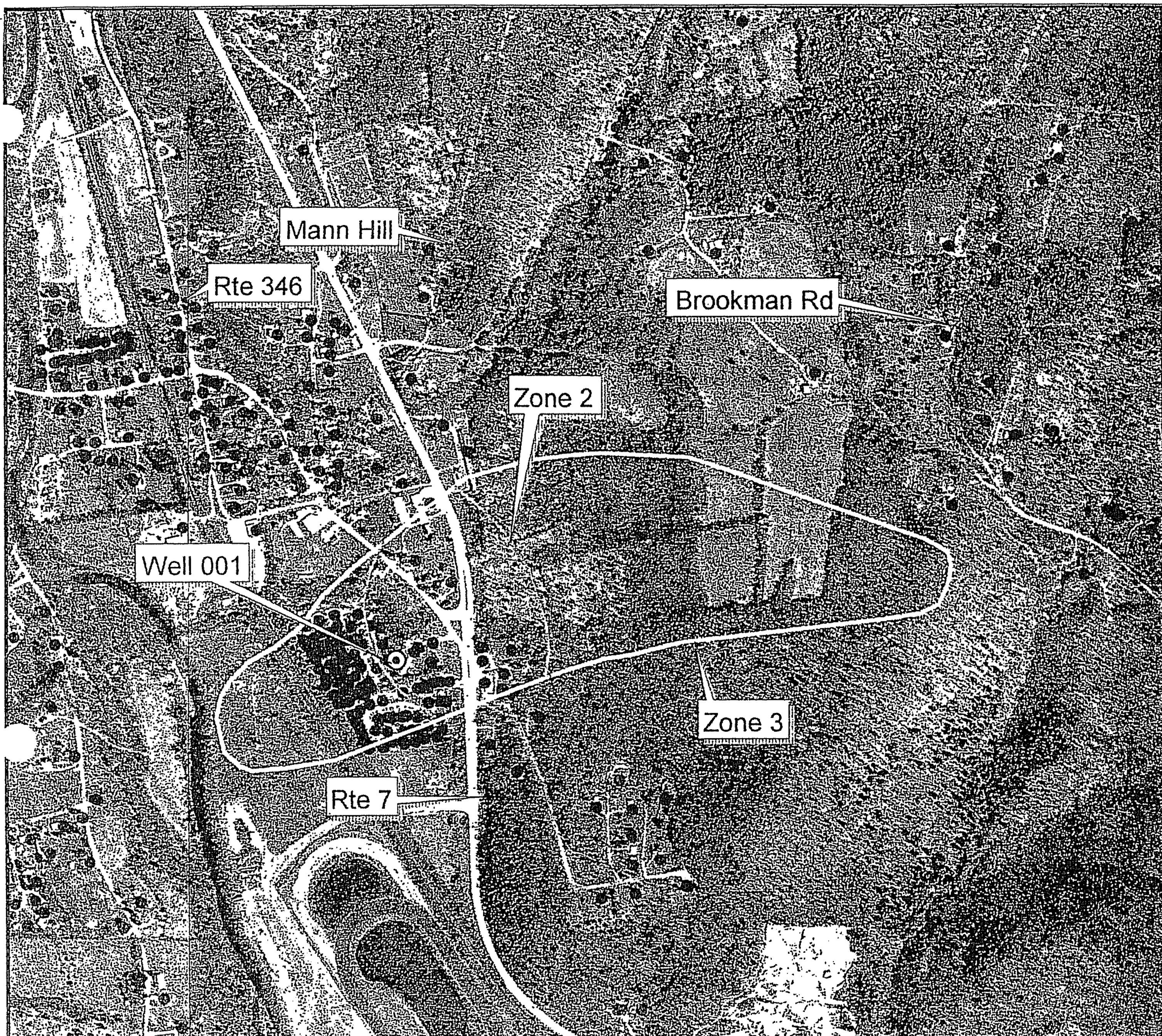
The equation given above provide approximations of groundwater flow both natural and that induced from pumping. The calculations have been used in conjunction with the geology of the area to delineation the Source Protection Area for the Alta Gardens Water System in Pownal, Vt.

References:

David DeSimone and David Dethier, 1988. Surficial Geology of the Pownal and North Pownal 1:24,000 Quadrangles, Vermont

Pownal Quadrangle VT. USGS Topographic Map,1954

Well Completion Reports Nearby the Alta Gardens Water System



Alta Gardens Estates MHP (WSID 5628)
Source Protection Area
Pownal, Vermont

Zone2.shp
Newspas.shp
Minrds
Source
Esite

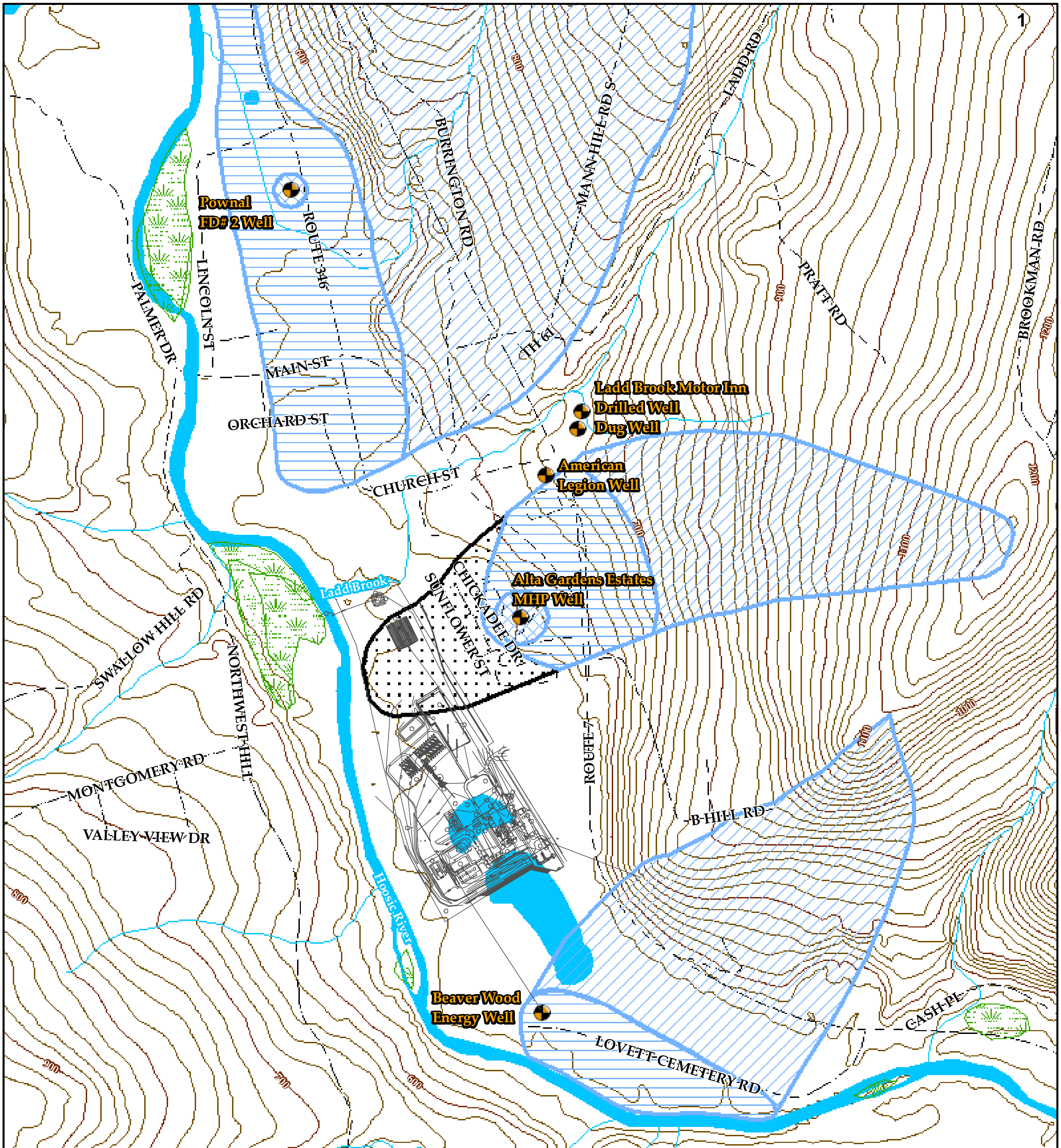
800 0 800 1600 Feet

Scale 1:12,000

N
W E
S

Date Prepared: 04/19/02

APPENDIX 4



Legend

- Public Water Source
- WHPA - Zone 1
- Well's Area of Influence
- WHPA Zone 3: Recharge Area
- WHPA - Zone 3
- Significant Wetlands
- Streams (VHD)
- Waterbody (VHD)
- Roads
- Contour - 20 ft
- Contour - 100 ft

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Beaver Wood Energy Pownal, LLC.
Groundwater Withdrawal Evaluation
Regional Hydrogeology Map

October 12, 2010

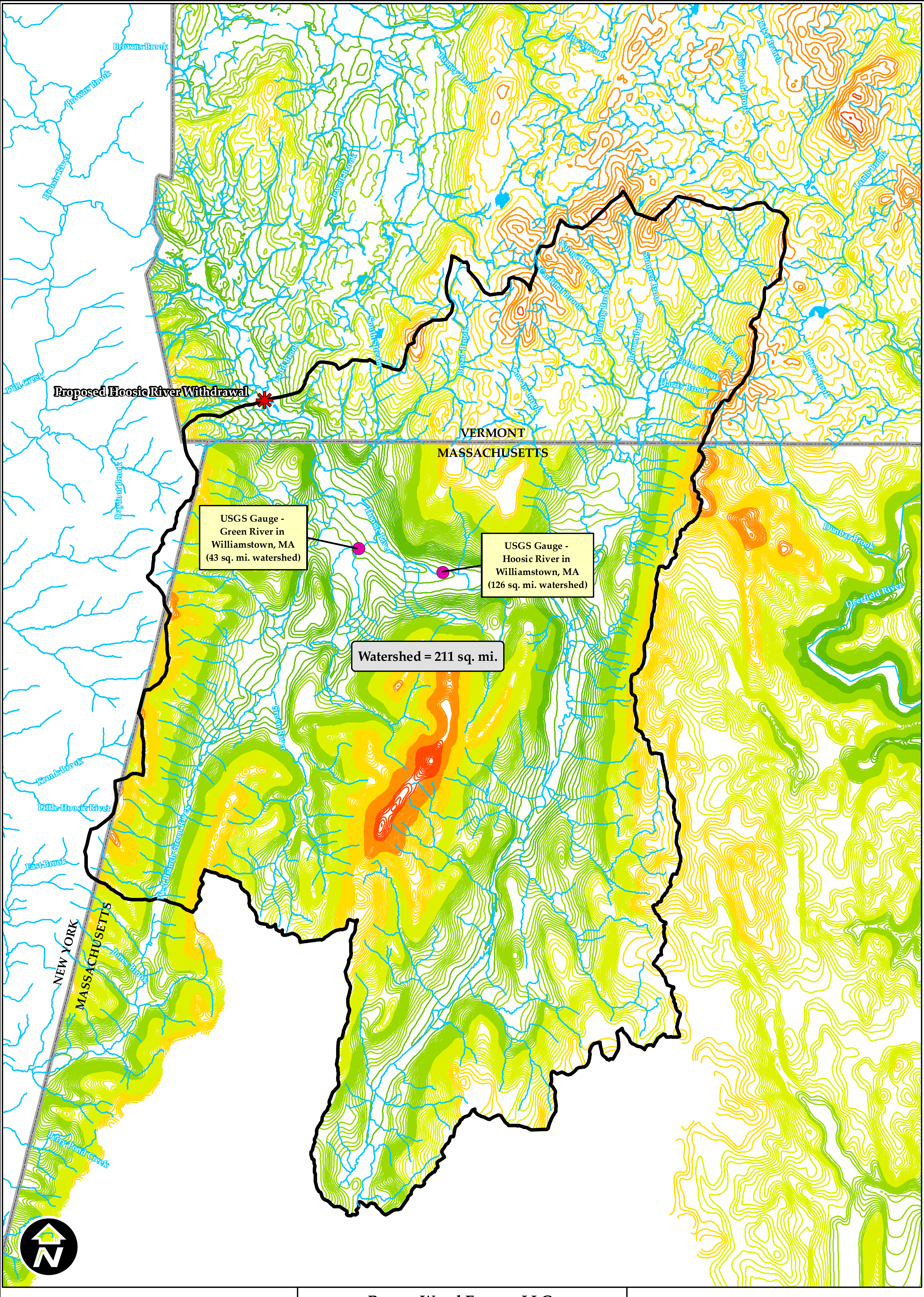
1,000 500 0 1,000 Feet

Prepared by: MJS/LBS

Sources: Streams and Waterbodies from Vt. Hydrography dataset and VCGI (2008); Public Water Sources and Wellhead Protection Areas from VTANR (2010); Roads obtained from VTrans (2008); Source Site Plan provided by Bruno Associates (9/2/2010); Topographic contours, Area of Influence and Additional Recharge Area by VHB (2010). Significant wetlands from VSWI, VDEC (2010).

N W E S

VHB *Vanasse Hangen Brustlin, Inc.*



Beaver Wood Energy, LLC.
Pownal, Vermont
Proposed Hoosic River Withdrawal Location and Watershed

June 21, 2010

Prepared by: LBS

57407.00\GIS\Project\watershed_hoosic.mxd

Sources: Watershed boundary and river withdrawal digitized by VHBP (2010); USGS gauge provided by the USGS, digitized by VHBP (2010); Streams and waterbodies provided by Vt. Hydrography dataset and VCGI (2008); State boundary provided by VCGI (2006); Contours generated by VHBP using DEM (2006/2010) and from MassGIS database (2003).

VHB PIONEER
7056 US Route 7, PO Box 120
North Ferrisburgh, VT 05473
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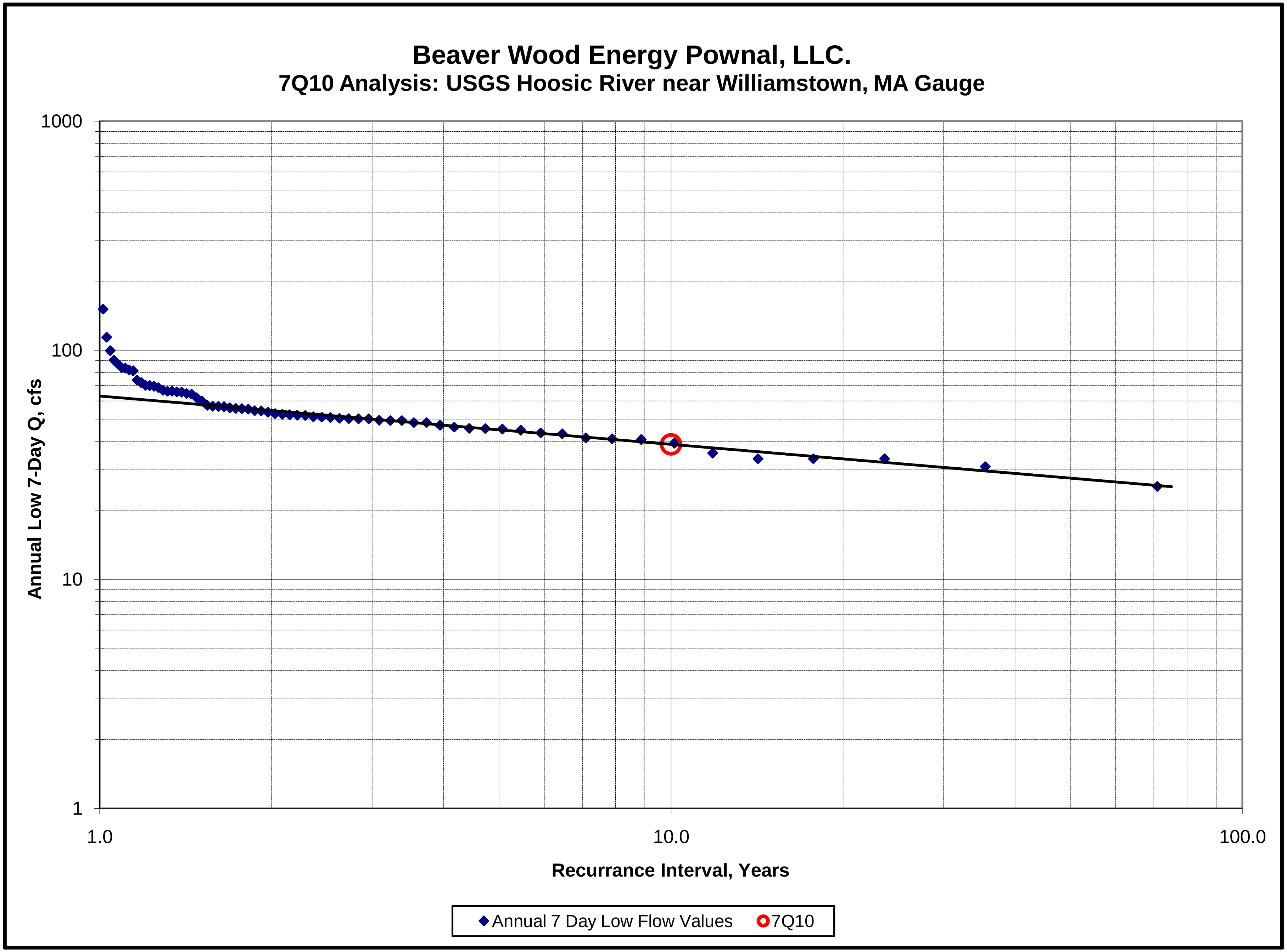
www.vhb.com

Beaver Wood Energy Pownal, LLC.
Hoosic River 7Q10 Analysis
Based on USGS Station #0133250 (Hoosic River near Williamstown, MA)

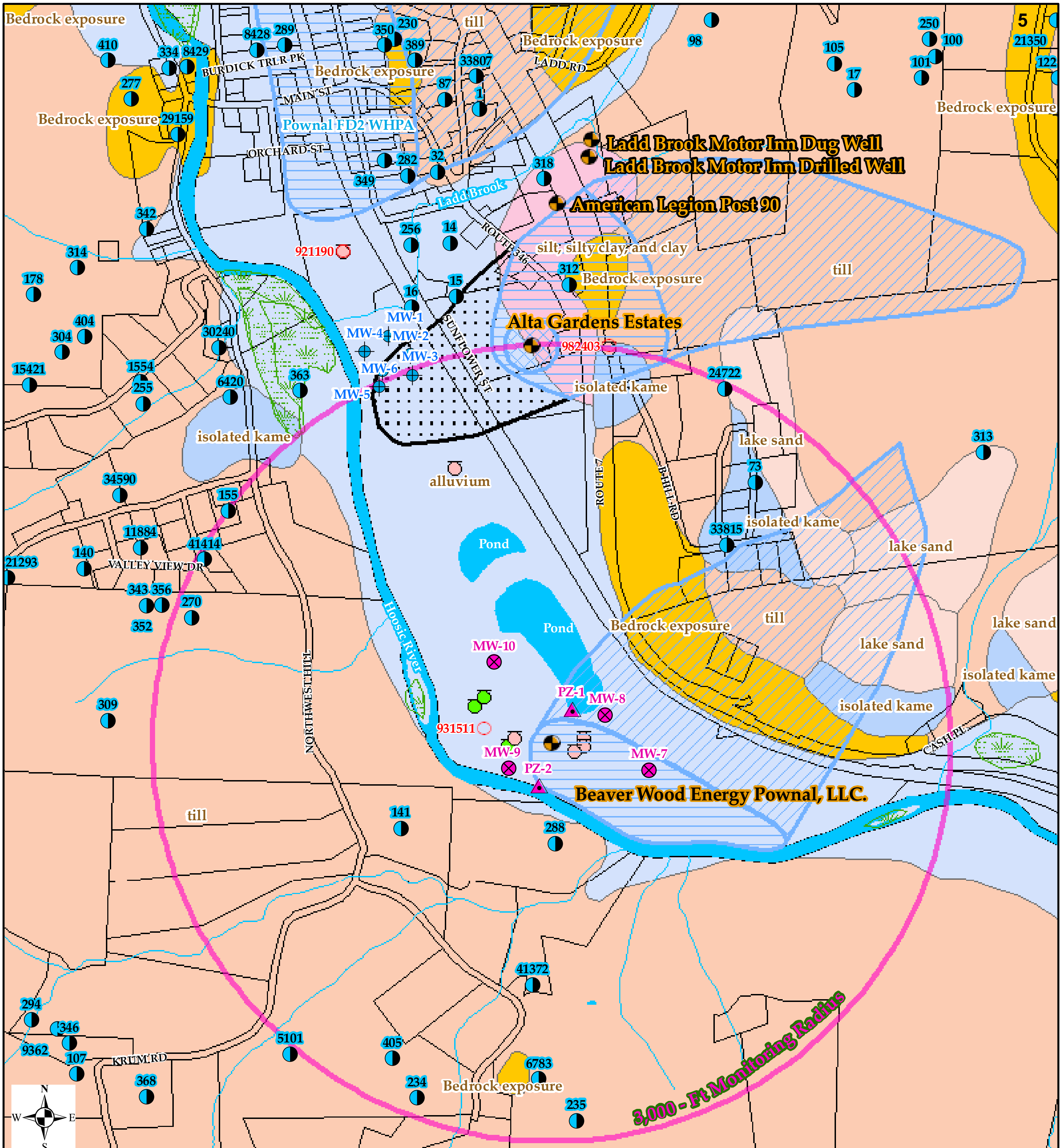
USGS Flow Data from Hoosic River near Williamstown, MA Gauge			
Water Year (ending in Sept)	**Annual Low 7-Day Q (cfs)**	**Rank**	**Recurrance Interval (years)**
1980	25.4	1	71.0
1968	31.0	2	35.5
1964	33.6	3	23.7
1965	33.6	4	17.8
1981	33.6	5	14.2
1983	35.6	6	11.8
1963	39.3	7	10.1
1995	40.7	8	8.9
2002	41.0	9	7.9
1962	41.4	10	7.1
1999	43.1	11	6.5
1982	43.6	12	5.9
1984	44.7	13	5.5
1949	45.3	14	5.1
2005	45.4	15	4.7
1955	45.6	16	4.4
1979	46.1	17	4.2
1944	47.0	18	3.9
1953	48.3	19	3.7
1956	48.3	20	3.6
1948	49.3	21	3.4
1969	49.3	22	3.2
1959	49.4	23	3.1
1958	50.1	24	3.0
1998	50.1	25	2.8
1957	50.3	26	2.7
1987	50.4	27	2.6
1997	50.9	28	2.5
1954	51.0	29	2.4
1985	51.1	30	2.4
1993	51.9	31	2.3
2008	52.0	32	2.2
1990	52.3	33	2.2
2001	52.4	34	2.1
1996	52.9	35	2.0
1991	53.6	36	2.0
1960	54.3	37	1.9
1966	54.4	38	1.9
1992	55.3	39	1.8
1941	55.6	40	1.8
1971	55.7	41	1.7
2007	56.0	42	1.7
1978	56.7	43	1.7
1994	56.9	44	1.6
1988	57.0	45	1.6
1940	57.4	46	1.5
1942	59.9	47	1.5
1974	62.0	48	1.5
1947	64.3	49	1.4
1950	64.7	50	1.4
1973	65.6	51	1.4
1961	65.7	52	1.4
1943	66.1	53	1.3
1952	66.1	54	1.3
1970	66.9	55	1.3
1972	68.6	56	1.3
1951	69.6	57	1.2
2006	70.0	58	1.2
1946	70.3	59	1.2
2003	72.1	60	1.2
1967	74.0	61	1.2
1989	81.3	62	1.1
1977	82.0	63	1.1
1976	83.6	64	1.1
2000	84.1	65	1.1
1945	87.1	66	1.1
1986	90.4	67	1.1
2009	99.6	68	1.0
2004	113.9	69	1.0
1975	151.0	70	1.0
7Q10	**38.8**	cfs, at USGS Hoosic River gauge near Williamstown, MA (watershed area = 126 square miles)	

NOTE: "7Q10" is the drought flow equal to the **lowest average flow for 7 consecutive days with a 10% chance of occurring in any year** (that is, with a ten-year return period). It is the flow rate at which Vermont Water Quality Standards are applied.

Adjust the 7Q10 at the USGS gauge, to the watershed area at the project site:		
Watershed area at USGS gauge:	126	square miles
Unitized 7Q10 :	0.31	csm (cfs per square mile of watershed)
Watershed area at project site:	211	sq.mi.
Ratio of watershed areas:	1.67	
Pro-rated 7Q10 at project site:	**65.0**	**cfs** (= 7Q10 at USGS gauge x Ratio)
***de minimus* at project site:**	**3.25**	**cfs** (= 5% of prorated 7Q10 at project site)
or, *de minimus* at project site:	**1,458**	**gallons per minute**



Beaver Wood Energy Pownal, LLC.
7Q10 Analysis: USGS Hoosic River near Williamstown, MA Gauge
1000
100
10
1
Annual Low 7-Day Q, cfs
1.0
10.0
100.0
Recurrance Interval, Years
Annual 7 Day Low Flow Values
7Q10



Legend

- Public Water Source
- Private Wells (Approx Location)

Monitoring Well

- Existing
- Proposed
- Proposed Piezometer
- Streams (VHD)
- Waterbody (VHD)
- WHPA Zone 1
- WHPA Zone 2
- WHPA Zone 3: Recharge Area
- WHPA Zone 3

Hazardous Waste Sites

- Closed
- Active

USTs

- Existing
- Pulled
- Significant Wetlands

Surficial Geology

- Alluvium
- Isolated Kame
- Lake Sand
- Silt, Silty Clay, Clay
- Till
- Bedrock Exposure
- Parcel Boundaries
- Roads

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Beaver Wood Energy Pownal, LLC.
3000-Foot Monitoring Radius
Well Testing & Water Resources Map

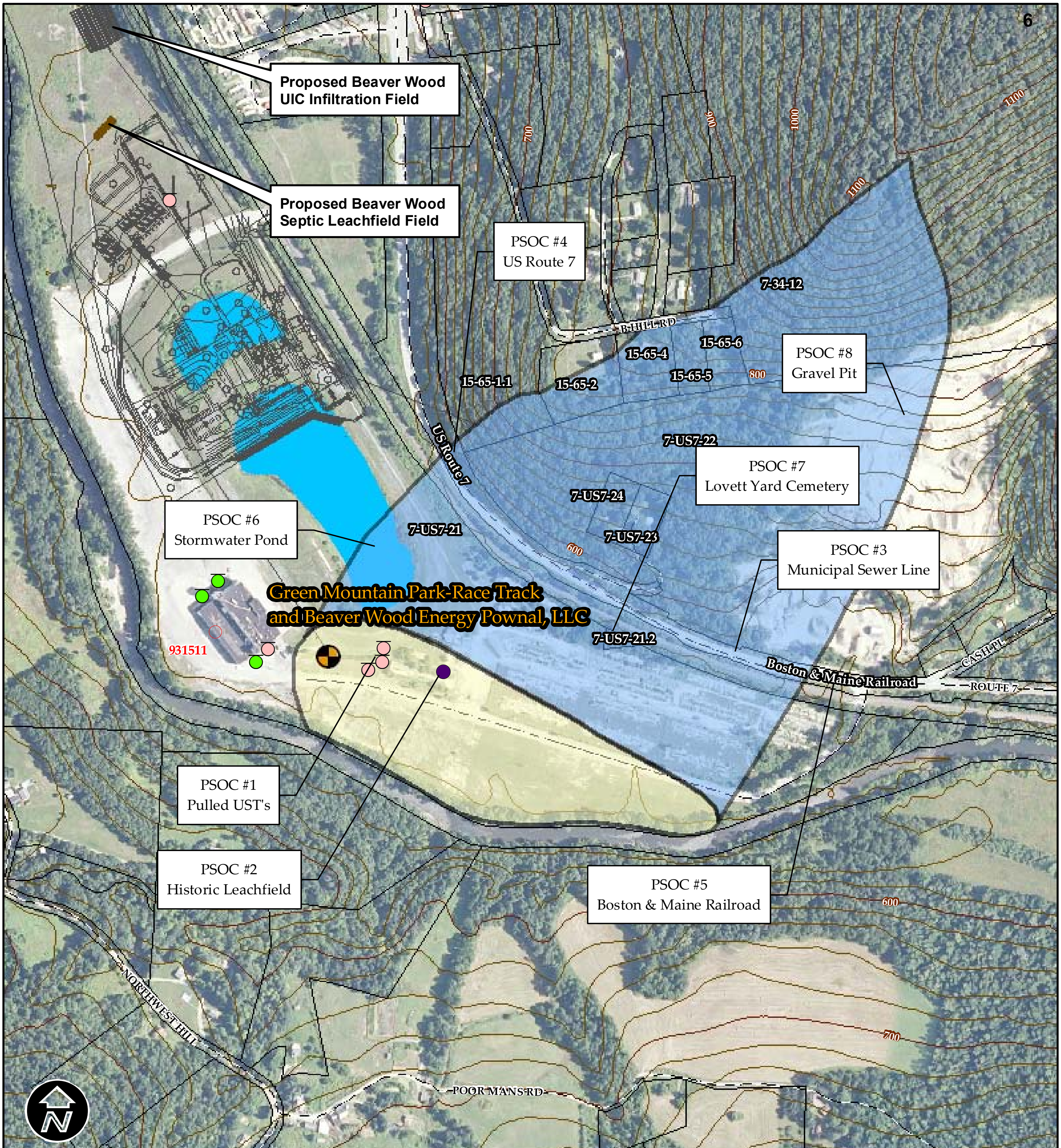
October 11, 2010

1,000 500 0 1,000 Feet

Prepared by: OWM/MJS

Sources: Background - Streams and Waterbodies from Vt. Hydrography Dataset and VCGI (2008); Public and Private Wells and WHPAs from VTANR (2010); Monitoring Wells by VHB (2010); Investigation Area delineated by VHB (2010); Underground Storage Tanks from VTANR (2006); Hazardous Waste Sites from VTANR (2009). Surficial Geology from Vt. Geologic Survey (2008). Parcel Boundaries from Bennington County Regional Planning Commission (2006); Roads from VTrans (2008); Significant Wetlands from VT ANR and VHB (2010).

Vanasse Hangen Brustlin, Inc.



Legend

- Public Water Source
- Wellhead Protection Area-Zone 2
- Wellhead Protection Area - Zone 3
- Existing Underground Store Tank
- Pulled Underground Storage Tank (PSOC #1)
- Historic Leachfield (PSOC #2)
- Roads (PSOC #4)
- Ponds (PSOC #5)
- Parcel Boundaries
- Contour - 20 ft
- Contour - 100 ft
- Closed Hazardous Waste Site
- Active Hazardous Waste Site
- Proposed Site Plan

Beaver Wood Energy Pownal, LLC.
Pownal, Vermont
Potential Sources of Contamination Map

October 4, 2010

600 300 0 600 Feet

Sources: Background -USDA NAIP Orthophoto-Bennington (2009); Public Water Sources from VTANR (2010); Parcel Boundaries obtained from Bennington County Regional Planning Commission (2006); Roads obtained from VTrans (2008); Wellhead Protection Area delineated by VHB (2010); Ponds obtained from VT Hydrography dataset and VCGI (2008); Source Site Plan provided by Bruno Associates (9/6/2010); Historical Leachfield by VHB from interview (2010); Underground Storage Tanks obtained from VTANR (2006); Hazardous Waste Sites from VTANR (2009). Contours from VHB (2010).

VHB Vanasse Hangen Brustlin, Inc.

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Prepared by: MJS/LBS

Beaver Wood Energy Pownal, LLC.: Source Protection Plan
NTNC Water System (WSID # 2585) - PSOC Inventory
October 4, 2010

List of Potential Sources of Contaminations (PSOC)			
PSOC #	**Description**	**Comments**	**Risk Level**
1	Green Mountain Race Track Underground Storage Tanks	• Removed November 10-11, 1993, no VOCs detected in groundwater water quality test, **Owner:** Progress Partners, Ltd., **Site:** Lovett Cemetery Rd. Pownal, VT 05261	Low
2	Green Mountain Race Track Historic Leachfield	• Non-operational, low nitrate levels detected in groundwater water quality test, **Owner:** Progress Partners, Ltd., **Site:** Lovett Cemetery Rd. Pownal, VT 05261	Low
3	Municipal Sewer Line	• **Owner:** Town of Pownal **Site:** Adjacent to Route 7 Pownal, VT 05261,	Low
4	US Route 7	• **Owner**: Vermont AOT, **Site**: US Route 7 Pownal, VT 05261	Low
5	Railroad	• **Owner**: Pan Am Southern, LLC., **Site**: Boston & Maine Railroad Pownal, VT 05261	Low
6	Green Mountain Race Track Stormwater Pond	• Non-operational, **Owner:** Progress Partners, Ltd., **Site**: Green Mountain Race Track	Low
7	Lovett Yard Cemetery	• **Owner:** Town of Pownal **Site:** Route 7 Pownal, VT 05261	Low
8	Gravel Pit	• Gravel extraction completed above water table, **Owner:** Steven M. Hart **Site:** Route 7 Pownal, VT 05261	Low

Beaver Wood Energy Pownal LLC.
Groundwater Withdrawal Testing: Existing Gravel Well at the Green Mtn Race Track
All Known Wells and Monitoring Locations Within 3,000 Feet of the Project Well, and Within its Area of Influence
VHB 10/15/2010

Well ID	Parcel #	Site Address	Owner	Mailing Address				Well Type[1]	Well Tag	Well Rpt#	Well Total Depth, Ft BGS	Static Level, Ft BTC	Hyd. Base [2] Ft BGS	TAH [3] Feet	Demand gpd	Demand gpm	Yield (GPM) Driller's	Yield (GPM) Permit [4]	Distance, Ft from BWE Well
Canto Well	7-9-31	1125 Northwest Hill Road	Louis Canto	1125 Northwest Hill Road	Pownal	VT	05261-9448	BR	12171	141	230	30.0	230 TD	200	420	0.3	2	1	1300
Lyttle Well	7-9-32	1151 Northwest Hill Road	Pamela Lyttle	1151 Northwest Hill Road	Pownal	VT	05261-9448	BR	2-022891	288	482	100.0	482 TD	382	420	0.3	4	2	1500
	7-9-33	1149 Northwest Hill Road	Susan Burgess	1149 Northwest Hill Road	Pownal	VT	05261-9448												
	7-9-34	1331 Northwest Hill Road	Jamyn Burgess	1331 Northwest Hill Road	Pownal	VT	05261-9447												
Lubeck Well	7-9-37	1374 Northwest Hill Road	Karin Lubeck	1374 Northwest Hill Road	Pownal	VT	05261-9439	BR	579	405	625	16.0	625 TD	609	420	0.3	5	2.5	2660
	7-9-38	1427 Northwest Hill Road	Ryan Bottesi	1427 Northwest Hill Road	Pownal	VT	05261-9446												
Peaslee Well	7-9-39	1503 Northwest Hill Road	Deanna Peaslee	1503 Northwest Hill Road	Pownal	VT	05261-9445	BR	41372	41372	125	40.0	104 WBF	64	420	0.3	8	4	1840
Porter Well	7-9-40	24 Poor Mans Road	Shelley Porter	24 Poor Mans Road	Pownal	VT	05261-9473	BR	7-1019	6783	500	TBD	260 WBF	TBD	420	0.3	0.75	0.4	2540
	7-9-45	1546 Northwest Hill Road	Wilfred Labonte	1546 Northwest Hill Road	Pownal	VT	05261-9441												
Sedlock Well	7-9-46	1633 Northwest Hill Road	Timothy Sedlock	1633 Northwest Hill Road	Pownal	VT	05261-9444	BR	--	235	505	TBD	505 TD	TBD	420	0.3	0	0.00	2860
Smithers Well	7-9-47	1744 Northwest Hill Road	Rosamond Smithers	1744 Northwest Hill Road	Pownal	VT	05261-9442	BR	--	234	305	TBD	305 TD	TBD	420	0.3	2	1	2860
Nicholas Well	6-9-26	824 Northwest Hill Road	Deborah Nicholas	PO Box 178	Pownal	VT	05261-0178	BR	7-382	309	500	200.0	500 TD	300	420	0.3	0.5	0.25	3350
	6-9-29	1104 Northwest Hill Road	Kenneth Held	1104 Northwest Hill Road	Pownal	VT	05261-9438												
Alta Gardens MHP	15-346-1	Post Drive	Alta Gardens Estates	101 Tremont Street	Barre	VT	05641-3507	BR	--	156	170	30.0	170 TD	140	3,596	7.5	15	15	3000
	15-346-2	41 Post Drive	Walter Adams	PO Box 62	Pownal	VT	05261-0062												
	15-346-2.1	61 Post Drive	Stacey Adams	PO Box 534	Pownal	VT	05261-0534												
	15-42-1	31 Montgomery Road	Richard Dorman	31 Montgomery Road	Pownal	VT	05261-9458												
Burlak Well	15-42-2	63 Montgomery Road	Linda Burlak	63 Montgomery Road	Pownal	VT	05261-9458	BR	--	155	115	TBD	115 TD	TBD	420	0.3	8	4	2990
	15-42-3	79 Montgomery Road	Barbara Harwood	79 Montgomery Road	Pownal	VT	05261-9458												
	15-63-2	67 Valley View Drive	Cheryl Palmer	67 Valley View Drive	Pownal	VT	05261-9464												
Atherton Well	15-63-3	91 Valley View Drive	Mark Atherton	91 Valley View Drive	Pownal	VT	05621-9464	BR	41414	41414	500	85.0	500 TD	415	420	0.3	1.25	0.63	2940
	15-63-5	101 Valley View Drive	Robert Wilcox	101 Valley View Drive	Pownal	VT	05261-9463												
Beals Well	15-63-6	105 Valley View Drive	Harry Beals, Jr.	105 Valley View Drive	Pownal	VT	05261-9463	BR	22714	270	500	6.0	500 TD	494	420	0.3	0	0.00	2850
	15-65-1	87 B Hill Road	Bishop Gary	PO Box 58	Pownal	VT	05261-0058												
	15-65-1.1	96 B Hill Road	Michael Morneault	PO Box 275	Pownal	VT	05261-0275												
	15-65-10	50 Oak Drive	David Hall	PO Box 244	Pownal	VT	05261-0244												
	15-65-11	86 Oak Drive	Andrew Dequasie	PO Box 211	Pownal	VT	05261-0211												
	15-65-12	83 Oak Drive	Brian Barcomb	PO Box 336	Pownal	VT	05261-0336												
	15-65-13	90 Oak Drive	James Carey	PO Box 7	Pownal	VT	05261-0007												
Gallese Well	15-65-14	183 Oak Drive	Robert Gallese	PO Box 402	Pownal	VT	05261-0402	BR	24722	24722	320	5.0	249 WBF	244	420	0.3	10	5.0	2970
	15-65-2	320 B Hill Road	Robert Clermont	320 B Hill Road	Pownal	VT	05261												
	15-65-2.1	B Hill Road	Marjorie Hurley	457 Middle Pownal Road	Pownal	VT	05261												
	15-65-3	369 B Hill Road	John Werner	PO Box 28	Pownal	VT	05261-0028												
Hall Well	15-65-4	364 B Hill Road	Jean Hall	PO Box 144	Pownal	VT	05261-0144	BR	33815	33815	702	140.0	702 TD	562	420	0.3	1	0.5	1980
	15-65-6	382 B Hill Road	George Klemm	111 North Street	Williamstown	VT	01267-2042												
	15-65-7	377 B Hill Road	James Cirillo	PO Box 47	Pownal	VT	05261-0047												
Holovach Well	15-65-8	379 B Hill Road	John Holovach	PO Box 15	Pownal	VT	05261-0015	BR	--	73	245	20.0	245 TD	225	420	0.3	2	1.0	2500
Pollert Well	15-9-19	498 Northest Hill Road	Terry Pollert	498 Northwest Hill Road	Pownal	VT	05261-9435	BR	1625160	363	500	100.0	500 TD	400	420	0.3	0	0.00	3240
	15-9-20	555 Northwest Hill Road	Janet Schutzman	555 Northwest Hill Road	Pownal	VT	05261-9451												
	15-9-21	598 Northwest Hill Road	Norman Chaffee	598 Northwest Hill Road	Pownal	VT	05261-9436												
	15-9-23	652 Northwest Hill Road	Bert Atherton	652 Northwest Hill Road	Pownal	VT	05261-9453												
	15-9-24	719 Montgomery Road	Irving Tanzman	719 Northwest Hill Road	Pownal	VT	05261-9450												
	15-US7-25	6275 Route 7	Keith Pedercini	PO Box 167	Pownal	VT	05261-0167												
	15-US7-26	6213 Route 7	Gary Jelley	PO Box 176	North Pownal	VT	05260-0176												
	15-US7-27	23 B Hill Road	Ronald George	PO Box 98	North Pownal	VT	05260-0098												
	15-US7-29	6185 Route 7	James Winchester	PO Box 22	Pownal	VT	05261-0022												
	15-US7-30	Route 7	Millard Mobile Home Park, LLC.	34 Ashland Street	North Adams	MA	01247												
	6-44-3	180 Krum Road	Michael Hartman	180 Krum Road	Pownal	VT	05261-9461												
	6-44-4	242 Krum Road	Mark Miller	242 Krum Road	Pownal	VT	05261-9461												
Strong Well	7-34-12	1000 Brookman Road	William Strong	Mason Hill Mgt c/o WM Strong 477	New York	NY	10022-6803	BR	101-2-7299	313	222	40.0	222 TD	182	420	0.3	20	10.0	3940
Maret Well	7-44-1	57 Krum Road	Gregory Maret	57 Krum Road	Pownal	VT	05261-9467	BR	37760	5101	600	400.0	600 TD	200	420	0.3	2	1	3060
Tornabene Well	7-US7-17	7275 US Route 7	Janet Tornabene	7275 Route 7	Pownal	VT	05261-9494	BR	27757	27757	280	15.0	140 P	125	420	0.3	40	20.0	3950
	7-US7-18	21 Cash Place	Cherie Smith	21 Cash Place	Pownal	VT	05261-9214												
	7-US7-19	79 Cash Place	Russell Pembroke	PO Box 330	Pownal	VT	05261-0330												
	7-US7-22	Route 7	Stephen Hart	24 Walnut Steet	Williamstown	MA	01267-2266												
	7-US7-23	141 Purcell Road	Michelyne Pinard	141 Purcell Road	Pownal	VT	05261												
	7-US7-24	136 Purcell Road	Robert Sweet	136 Purcell Dugway	Pownal	VT	05261												

Beaver Wood Energy Pownal LLC.
Groundwater Withdrawal Testing: Existing Gravel Well at the Green Mtn Race Track
All Known Wells and Monitoring Locations Within 3,000 Feet of the Project Well, and Within its Area of Influence
VHB 10/15/2010

Well ID	Parcel #	Site Address	Owner	Mailing Address				Well	Well	Well	Well Total	Static Level,	Hyd. Base [2]	TAH [3]	Demand		Yield (GPM)		Distance, Ft
								Type[1]	Tag	Rpt#	Depth, Ft BGS	Ft BTC	Ft BGS	Feet	gpd	gpm	Driller's	Permit [4]	from BWE Well
no well ? (undeveloped)	6-9-30	Northwest Hill Road	Deborah Nicholas	PO Box 178	Pownal	VT	05261-0178												
no well ? (undeveloped)	7-9-42	625 Poor Mans Road	Howard Maturski	625 Poor Mans Road	Pownal	VT	05261-9472												
no well ? (undeveloped)	6-9-28	Northwest Hill Road	David Walsh	136 C Shore Road	Peabody	MA	01960-3062												
no well ? (undeveloped)	15-65-5	B Hill Road	Anthony Iannuccillo	5 Wood Dale Road	Ballston Lake	NY	12019-9359												
no well ? (undeveloped)	15-65-9	B Hill Road	Vincent Freccia, Jr.	11 Westwood Place	Stamford	VT	06902-1419												
no well ? (undeveloped)	7-9-42.1	Northwest Hill Road	Harry Beals, Jr.	105 Valley View Drive	Pownal	VT	05261-9463												
Project Well	7-US7-21	Route 7	Progress Partners, Ltd.	158 Westmoreland Ave	White Plains	NY	10606												
no well ? (undeveloped)	7-US7-21.1	Route 7	John & Heather Tietgens	473 Main Steet	Stamford	VT	05352												
no well (cemetery)	7-US7-21.2	Route 7	Town of Pownal	467 Center Street	Pownal	VT	05261												
MW-1								SW	--	--	14.1	6.6	14.1 TD	7.0	0	0	--	--	3290
MW-2								SW	--	--	14.0	7.9	14.0 TD	5.5	0	0	--	--	3120
MW-3								SW	--	--	14.0	9.2	14.0 TD	4.3	0	0	--	--	2950
MW-4								SW	--	--	17.0	11.2	17.0 TD	5.2	0	0	--	--	3260
MW-5								SW	--	--	14.6	9.0	14.6 TD	5.3	0	0	--	--	3070
MW-6								SW	--	--	14.6	9.6	14.6 TD	4.8	0	0	--	--	2970
MW-7	7-US7-21.1 (BWE)	Lovett Cemetery Road	Progress Partners, Ltd. and Beaver Wood Energy Pownal, LLC.	158 Westmoreland Ave	White Plains	NY	10606	SW	--	--	-- (proposed)	--	--	--	0	0	--	--	760
MW-8								SW	--	--	-- (proposed)	--	--	--	0	0	--	--	460
MW-9								SW	--	--	-- (proposed)	--	--	--	0	0	--	--	380
MW-10								SW	--	--	-- (proposed)	--	--	--	0	0	--	--	750
PZ-1S								SW	--	--	-- (proposed)	--	--	--	0	0	--	--	280
PZ-1D								SW	--	--	-- (proposed)	--	--	--	0	0	--	--	280
PZ-2S								SW	--	--	-- (proposed)	--	--	--	0	0	--	--	350
PZ-2D								SW	--	--	-- (proposed)	--	--	--	0	0	--	--	350

Notes:
-- not applicable
TBD = To Be Determined (not known, no available information, to be measured during Source Testing)
[1] Well Types: BR = Bedrock, GPW = Gravel-Packed Well, GW = Gravel Well, SW = Shallow Well, SP = Spring
[2] Hydraulic Base Notes: TD = Total Depth, P = pump setting, WBF = Water-Bearing Fracture
[3] Total Available Head
[4] YIELD shown is 1/2 the drillers yield for wells which have not had a pump test.

Vanasse Hangen Brustlin, Inc.

October 16, 2010

Mr. Well Owner
123 Main St.
Pownal, VT 05261

Parcel Number: x-x-x

RE: Beaver Wood Energy Pownal LLC
Testing of Water Supply Well

Dear _________:

Beaver Wood Energy Pownal LLC is developing a water source to provide a backup source of water for the proposed biomass energy project at the former Green Mountain Race Track site in Pownal, VT. A pumping test will be conducted by Vanasse Hangen Brustlin, Inc. (VHB) in the winter of 2010-2011 on the existing well at the race track, to determine the long-term well yield in accordance with State of Vermont regulations.

Vermont regulations require us to monitor existing water supplies in the vicinity of the Beaver Wood Energy Well. This monitoring will determine if the pumping of the well affects the water level in neighboring water supplies. Please refer to the enclosed letter from the State of Vermont Water Supply Division explaining the testing procedure.

Through a recent search of public records, we have determined that you own property within the 3,000-foot monitoring radius. If your water source is present within this radius, you would be eligible to have your well monitored, and therefore we have enclosed a monitoring permission form/questionnaire. The information from the questionnaire will be used in the evaluation of any impacts related to the proposed wells. Please fill out the questionnaire thoroughly, and return it in the enclosed postage paid envelope by the close of business on_________2010. Responses may also be faxed to our office at 802-425-7799.

Please clearly indicate in Part II of the form if a water supply source exists on your property and, if so, if we have your permission to monitor the water level in your well during our testing of Wells A and B. If a well exists on your property, there may be a silver tag attached to the well with a metal band. This tag displays the Vermont Well Tag number, and this number should be recorded in Part III of the questionnaire under "Well/Spring Details". It is very important that we have the numbers from the well tag.

If you allow VHB to monitor your water source during the upcoming test, we would open your well and install a sanitized length of polyethylene tubing (sounding tube), which would enable measurement of the water level in the well during the test. Please note that if your wellhead is buried, it would be your responsibility to locate and uncover it; after the test it would be your responsibility to re-cover your buried wellhead. Occasionally, in some older wells, the installation of the sounding tube can dislodge sediment and rust from inside the well, temporarily discoloring your water. This situation is harmless and can be solved simply by running a hose onto the ground for a few hours, to flush the water clean.

The water level in your well would be measured using an automatic datalogger to be placed in the sounding tube. Additionally, field technicians would visit the well daily to check the water levels. Currently, we anticipate that the monitoring would occur over a two week period beginning in _________2011. Following the completion of all water level monitoring, the probe tube would be removed (if requested) and the well cap resealed. At your discretion, disinfection of the water source with chlorine would be performed. Also, if requested, you would be provided with the data collected at your well.

Should you have any questions on the enclosed material, please do not hesitate to contact me. Thank you for your attention to this matter.

Sincerely,

Owen McEnroe
Environmental Scientist
Enclosures

Vanasse Hangen Brustlin, Inc.

7056 US Route 7, PO Box 120 | North Ferrisburgh VT, 05473| (802) 425-7788 | Fax (802) 425-7799

WATER SUPPLY QUESTIONNAIRE:
Beaver Wood Energy Pownal, LLC Well Pump Test

FOR OFFICE USE ONLY:
Date Rec'd _______

I. OWNER INFORMATION and SIGNATURE

Street Address of the Property

____

____

Owner's Name and Address — Telephone & Email:

_____________________________ _______________work

_____________________________ _______________home

_____________________________ _______________VT (if out of state)

_____________________________ _________________________Email

If rented: Tenants name __________________________________ phone ______________

Signature: _______________________________________ I give permission to Vanasse Hangen Brustlin, Inc.(VHB) to monitor my water source and I agree to the Water Source Monitoring Terms and Conditions (below).

Date:____________________________________

II. WELL INFORMATION

1. Does your property have its own on-site water supply? ____ yes ____ no
2. IF NO: How does your house get water? Check one:
   _____ Shared well (shared with ____)
   _____ Town water ______ public community water supply
   _____ Other, Describe: ____

IF TOWN OR PUBLIC WATER SUPPLY, WE NEED NO FURTHER INFORMATION. THANK YOU.

3. If you have on-site or shared water supply: What type of well or spring do you have? Check one:
   _____ drilled well (sometimes called "artesian")
   _____ shallow well point (sometimes called "sand point", usually 2 to 4 inches in diameter)
   _____ shallow dug well (usually 2 or 3 feet in diameter)
   _____ spring

IF INSIDE TEST RADIUS, WOULD YOU LIKE YOUR WATER SOURCE TO BE MONITORED DURING TESTING OF THE BEAVER WOOD ENERGY WELL? In order to complete this monitoring it will be necessary to install a sanitized sounding tube in the well bore for the duration of the well testing (check one)___yes ___no ____not in test radius

After the end of the test, do you want the sounding tube to remain in the well?______

After the end of the test, do you want your well chlorinated?__________

After the end of the test, do you want us to mail you the test results?______

Every well/spring owner should complete the following questionnaire, even if you are not giving us permission to monitor your well or spring (please go to next page):

III. WELL/SPRING DETAILS:
Please fill in as much as you can. Just leave blank what you don't know.

1. Year drilled ______
2. Driller ___________________________________
3. *Owner's name when well was drilled* ____
4. *Vermont Well Number:* _______________ (usually stamped on metal plate attached somewhere to the well casing; some wells in Vermont do not have numbers stamped on them)
5. Bottom of well is drilled into (check one): _____ bedrock; ____ sand/gravel; _____ don't know
6. Depth of well/spring: ______ (feet).
7. Driller's estimated yield: ___________ (gallons per minute)
8. Depth the driller hit water ______ (feet).
9. Static Water level ____________(feet).
10. Depth to the pump _____ ft.
11. Type of pump: _____ submersible (pump is in the well)
    _____ jet pump (pump is in basement)
    _____ other. Describe: ____________________________________
    _____ don't know

12. Plumber who has worked on well/plumbing most recently:
    Name: ____________________________ Type of Work done: _____________________
    Address: ____
    ____

13. Is there a water softener on the system? _____ yes _____ no
    Is there a water filter on the system? _____ yes _____ no
    If yes, what does it filter? ____
    when installed? ____

14. Have you had any <u>quality or quantity problems?</u>
    <u>water quality:</u> _____ yes _____ no
    when: __________________________
    what problem: __________________
    ____
    <u>water quantity:</u> _____ yes _____ no
    when: _______________________________
    what problem: _________________________
    ____

15. Have you had a water quality analysis done on your well?
    _____ yes _____ no
    If yes, when ____________; for what parameters? ________________________________
    results: ____

IV. WELL/SPRING LOCATION:

Top of the well (check all that apply):

_____ Sticks up above ground.
_____ In the basement.
_____ Buried. If buried, how deep? _____(feet). Is it buried in anything? __________________

<u>Note that it is the well owner's responsibility to locate, dig-up, and re-bury any buried wellhead or spring at owner's cost.</u>

On the aerial photo that is included, please indicate where your well is located. Also feel free to provide a sketch map, showing house, garage, driveway, road, your well/spring, and anything else to help us to find it (indicate distances to the well/spring from corner of house or other features).

V. WATER DEMAND:

Water supply serves (check one):

RESIDENTIAL

_____ one house only

_____ two or more houses/apartments/condominiums

NON RESIDENTIAL

_____ hotel _____ restaurant _____ store/office/business

_____ other, describe: ____

GO TO APPROPRIATE SECTION BELOW.

RESIDENTIAL:

Number of bedrooms in house __________ Number of occupants _______________

Other large water uses (livestock, pool)? Describe __________________________________

____

HOTEL

State-calculated water demand: _______ gal/day ___________ don't know

If State Water/Wastewater permit, permit number __________________ year _______________

Number of bedrooms _________ _____ singles _____ doubles

Manager's apt? _____ yes _____ no ______ number of bedrooms

Other amenities that use water (e.g. pool)? Describe ___________________________

RESTAURANT

State-calculated water demand: _______ gal/day ___________ don't know

If State Water/Wastewater permit, permit number __________________ year ___________

Number of seats: for meals __________ for bar __________

Meals served per day (check one): _____ 2 _____ 3

STORE/OFFICE/BUSINESS

State-calculated water demand: _______ gal/day ___________ don't know

If State Water/Wastewater permit, permit number __________________ year ________________

Maximum number of full-time employees in store at one time: _____________________

OTHER

Estimate your water use: _____________ gal/day or __________________ gal/min

Describe your establishment:

____

____

Water Source Monitoring Terms and Conditions:

Vanasse Hangen Brustlin, Inc. (VHB) or its subcontractor will instrument water sources, with a sounding tube, for monitoring and will monitor water levels, in accordance with the water source owner's written instructions on the permission form. Reasonable precautions will be taken to safeguard the water source from damage and contamination in accordance with normal standard of care for the water well industry.

Occasionally, in certain wells, the installation of the sounding tube can dislodge sediment and rust from inside the well, temporarily discoloring the water. This situation can generally be resolved by running water from an outdoor spigot and garden hose onto the ground for a few hours, to flush the water clean. For wells that have water filters, this dislodged sediment can clog the filter, causing an apparent water outage, which typically can be resolved by removing the filter cartridge and flushing the well until the water is clean, then replacing the cartridge.

VHB shall not be liable for any alleged damage or inconvenience due to existing conditions or operations of any well, pump, spring, water line, or other component of a water source, provided that VHB conducts its monitoring in accordance with the water source owner's written instructions on the permission form, or for any inconvenience due to decreased water flow or pressure during or following the testing.

At the request of the water source owner, VHB will discontinue monitoring and remove its equipment at any time.

State of Vermont

AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation

Water Supply Division
The Old Pantry Building
103 South Main Street
Waterbury, VT 05671-0403
www.vermontdrinkingwater.org

[PHONE] (802) 241-3400
[FAX] (802) 241-3284

Dear Water Source Owner:

The Water Supply Division is currently reviewing an application for a proposed Public Water Supply well. An important aspect of this review is to determine what impact this proposed public water supply well will have on the yield of nearby private and public water supply source (i.e. drilled wells, dug wells, or springs).

To make this assessment, the applicant has applied to conduct a pump test on the proposed public water supply well. During a pump test, the proposed well is pumped at a steady rate for up to five days (less for smaller projects). The water level in neighboring sources is measured during the test to record changes caused by the pump tested well. If this proposed water supply well is predicted to reduce the yield of your water supply below expected demand for your home or business, then a source interference problem exists and the well will not be permitted. The applicant will have to resolve all interference problems before the source could be permitted.

The applicant is required to contact you and others in the area to make arrangements to monitor your source(s) while the pump test is performed on the proposed well. **We recommend that you allow the applicant to monitor your source during the pump test. This is the best way to determine what impact, if any, the proposed new well will have on your water supply source.** If you choose to deny access to your source for monitoring during this test, then the interference affects on your water supply will have to be estimated.

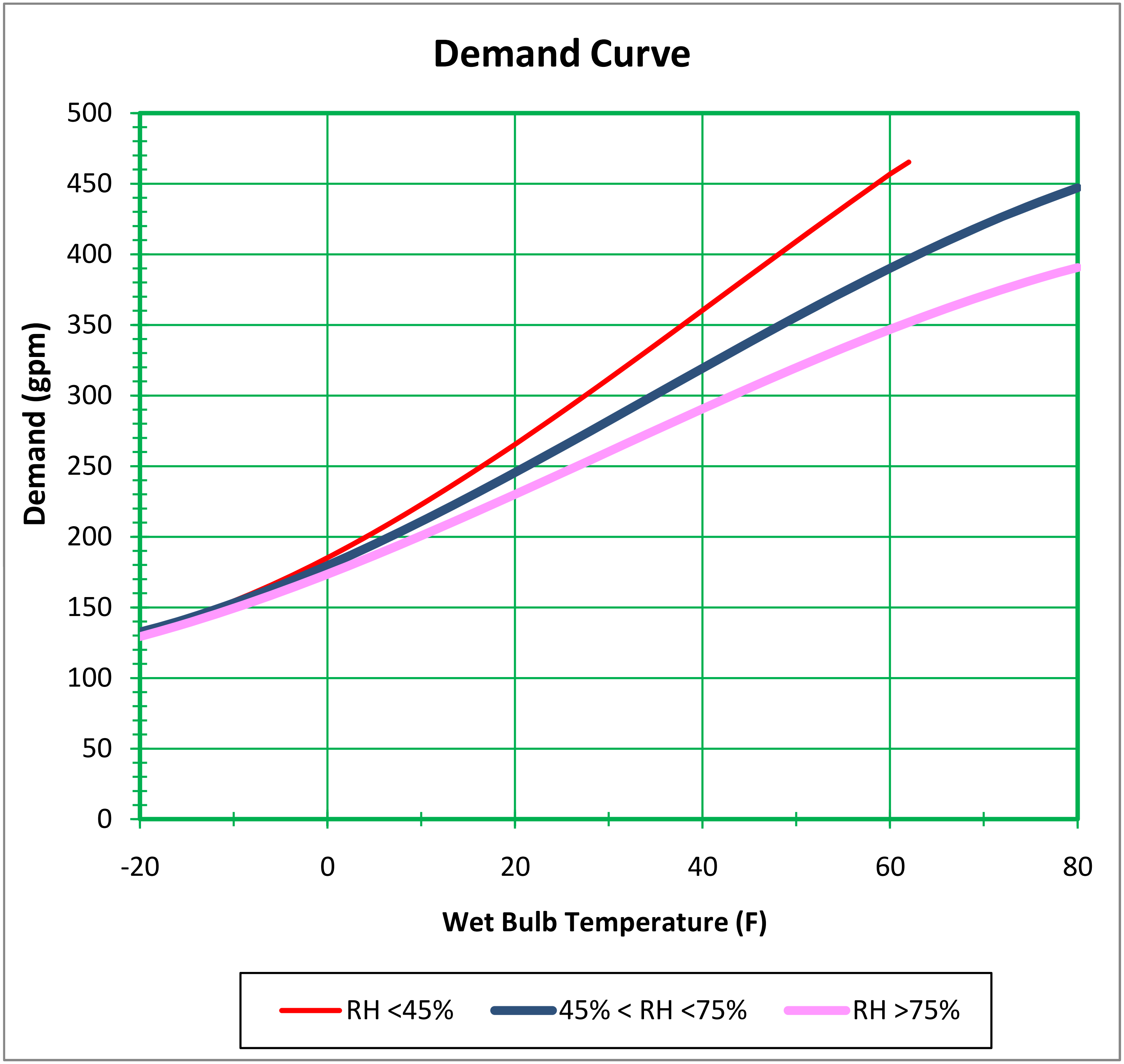
If you have any questions, please call the Water Supply Division of the Vermont Department of Environmental Conservation at (802) 241-3400 or toll free in Vermont at 1-800-823-6500.

APPENDIX 5

Beaver Wood Energy Pownal LLC - Water Needs & Availability Analysis
Streamflow and Storage Mass Hydrograph Analysis
Model revised 9/22/2010 by VHB Pioneer
Demand Basis

REVISED FOR WET BULB TEMPS BASED ON 9/14/2010 BECHTEL WATER BALANCE

Wet Bulb (F)	RH <45%	45% < RH <75%	RH >75%
-20	132	133	129
-18	136	136	133
-16	140	140	137
-14	144	144	141
-12	149	148	145
-10	154	153	149
-8	160	158	154
-6	166	163	159
-4	172	168	163
-2	178	174	168
0	185	180	173
2	192	186	179
4	199	192	184
6	207	198	190
8	215	204	195
10	223	211	201
12	231	218	206
14	239	224	212
16	248	231	218
18	257	238	224
20	265	245	230
22	275	253	236
24	284	260	242
26	293	267	248
28	302	275	254
30	312	282	260
32	321	290	266
34	331	297	272
36	341	304	279
38	351	312	285
40	360	319	291
42	370	327	296
44	380	334	302
46	390	341	308
48	399	349	314
50	409	356	320
52	419	363	325
54	428	370	331
56	438	377	336
58	447	383	342
60	457	390	347
62	465	397	352
64		403	357
66		409	362
68		415	366
70		421	371
72		427	375
74		432	379
76		437	383
78		442	387
80		447	391


Demand Curve
Demand (gpm)
500
450
400
350
300
250
200
150
100
50
0
-20
0
20
40
60
80
Wet Bulb Temperature (F)
RH <45%
45% < RH <75%
RH >75%

Beaver Wood Energy Pownal LLC - Water Needs & Availability Study

Streamflow, Groundwater, and Storage Mass Hydrograph Analysis

Model Output Summary

	Scenario	Maximum Pumping Rates (gal/min)		Results for Average Year (n=63)														Overall: Percent of all years that demand is fully met
				Plant Demand	Plant Consumption								Source Production		Storage Pond			
				Total	% of	Total	River		Well		Storage Pond		River Total	Well Total	Starting Volume	Minimum Volume		
		River	Well	Mgal	Demand	Mgal	Mgal	%	Mgal	%	Mgal	%	Mgal	Mgal	(Mgal)	(Mgal)		
1	Max 465.2 gpm demand, river intake with 0.7 csm ABF limit. No well. No storage.	1,458	0	174	78%	136	136	100%	0.0	0%	0.0	0%	136	0	0	0		3%
2	Max 465.2 gpm demand, river intake with no flow limit. No well. No storage.	1,458	0	174	100%	174	174	100%	0.0	0%	0.0	0%	174	0	0	0		100%
3	Max 465.2 gpm demand, river intake with 0.7 csm ABF limit. No well. 12 Mgal storage (existing pond).	1,458	0	174	93%	162	136	84%	0.0	0%	25.9	16%	162	0	7	2		33%
4	Max 465.2 gpm demand, river intake with 0.7 csm ABF limit. No well. 83.4 Mgal storage (as needed to meet demand).	1,458	0	174	100%	174	136	78%	0.0	0%	37.6	22%	174	0	71	59		100%
5	Max 465.2 gpm demand, river intake with 0.7 csm ABF limit. 500 gpm well. No storage.	1,458	500	174	100%	174	136	78%	37.6	22%	0.0	0%	136	38	0	0		100%
6	Max 465.2 gpm demand, river intake with 0.7 csm ABF limit. 39 gpm well. No storage.	1,458	39	174	81%	140	136	97%	4.0	3%	0.0	0%	136	4	0	0		3%
7	Max 465.2 gpm demand, river intake with 0.7 csm ABF limit. 39 gpm well. 12 Mgal storage (existing pond).	1,458	39	174	95%	165	136	82%	4.0	3%	24.5	15%	160	5	8	2		40%
8	Max 465.2 gpm demand, river intake with 0.7 csm ABF limit. 39 gpm well. 73 Mgal storage (as needed to meet demand).	1,458	39	174	100%	174	136	78%	4.0	2%	33.7	19%	169	5	63	53		100%

Beaver Wood Energy Pownal LLC - Water Needs & Availability Study

Streamflow, Groundwater, and Storage Mass Hydrograph Analysis

Model Output

Scenario: 1

Source	Max Pump Rate (gpm)		Minimum Downstream Flow (csm)
Hoosic River:	1,458		0.70
Well:	0		NA
Storage	Volume (Mgal)		
Pond:	0		
Plant	gpm	MGD	
Average Demand:	321.6	0.46	
Peak Demand:	465.2	0.67	

Output For Scenario 1

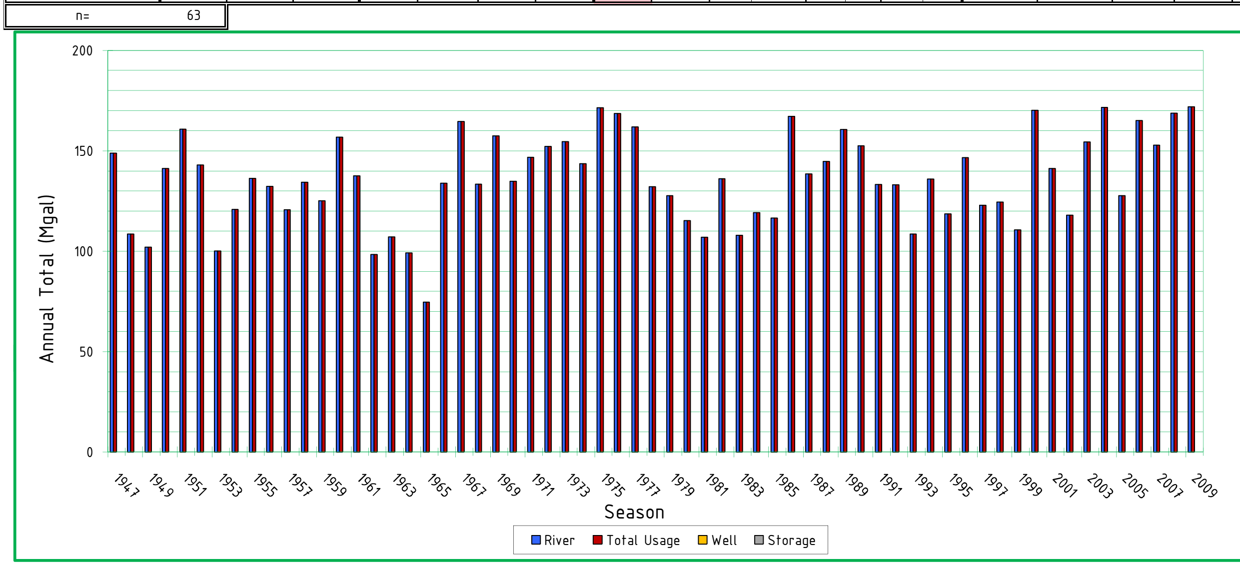
Water Year	Wet Bulb Temperatures			Plant Demand				Plant Consumption								Source Production		Storage Pond			
	Min	Mean	Max	Min	Mean	Max	Total	% of Demand	Total	River		Well		Storage Pond		River Total	Well Total	Starting Volume	Minimum Volume	Complete Refill Date	River Flow Exceedence (Percentile)
	F	F	F	MGD	MGD	MGD	Mgal		Mgal	Mgal	%	Mgal	%	Mgal	%	Mgal	Mgal	(Mgal)	(Mgal)		
1947	4.7	44.6	76.6	0.28	0.47	0.64	172	87%	149	149	100%	0.0	0%	0.0	0%	149	0	0	0	Oct 01	31%
1948	-12.5	42.3	77.5	0.21	0.47	0.64	171	64%	109	109	100%	0.0	0%	0.0	0%	109	0	0	0	Oct 01	86%
1949	3.8	46.2	75.8	0.27	0.49	0.64	178	57%	102	102	100%	0.0	0%	0.0	0%	102	0	0	0	Oct 01	92%
1950	-6.8	43.5	72.7	0.24	0.47	0.64	171	83%	141	141	100%	0.0	0%	0.0	0%	141	0	0	0	Oct 01	41%
1951	-2.0	44.8	72.4	0.24	0.47	0.64	173	93%	161	161	100%	0.0	0%	0.0	0%	161	0	0	0	Oct 01	17%
1952	-6.9	44.4	77.6	0.23	0.48	0.64	174	82%	143	143	100%	0.0	0%	0.0	0%	143	0	0	0	Oct 01	39%
1953	3.6	45.3	75.9	0.29	0.48	0.64	177	57%	100	100	100%	0.0	0%	0.0	0%	100	0	0	0	Oct 01	94%
1954	-2.9	44.4	74.6	0.24	0.48	0.64	174	69%	121	121	100%	0.0	0%	0.0	0%	121	0	0	0	Oct 01	72%
1955	-8.1	45.4	77.4	0.23	0.48	0.64	175	78%	136	136	100%	0.0	0%	0.0	0%	136	0	0	0	Oct 01	47%
1956	-9.0	42.3	73.5	0.22	0.46	0.64	169	78%	132	132	100%	0.0	0%	0.0	0%	132	0	0	0	Oct 01	61%
1957	-13.5	44.2	75.6	0.20	0.48	0.64	176	68%	121	121	100%	0.0	0%	0.0	0%	121	0	0	0	Oct 01	73%
1958	-5.2	44.2	74.4	0.23	0.48	0.64	174	77%	134	134	100%	0.0	0%	0.0	0%	134	0	0	0	Oct 01	53%
1959	-1.9	44.0	77.5	0.26	0.48	0.64	174	72%	125	125	100%	0.0	0%	0.0	0%	125	0	0	0	Oct 01	67%
1960	5.0	44.7	72.4	0.27	0.47	0.64	173	91%	157	157	100%	0.0	0%	0.0	0%	157	0	0	0	Oct 01	22%
1961	-7.6	43.9	75.8	0.23	0.47	0.64	171	80%	138	138	100%	0.0	0%	0.0	0%	138	0	0	0	Oct 01	45%
1962	-4.9	43.8	73.3	0.24	0.48	0.64	176	56%	98	98	100%	0.0	0%	0.0	0%	98	0	0	0	Oct 01	97%
1963	-11.2	41.8	75.6	0.22	0.47	0.64	172	62%	107	107	100%	0.0	0%	0.0	0%	107	0	0	0	Oct 01	89%
1964	-2.0	43.8	75.3	0.24	0.49	0.64	179	55%	99	99	100%	0.0	0%	0.0	0%	99	0	0	0	Oct 01	95%
1965	12.7	44.3	68.8	0.30	0.48	0.60	177	42%	75	75	100%	0.0	0%	0.0	0%	75	0	0	0	Oct 01	98%
1966	18.0	44.3	68.8	0.33	0.48	0.60	176	76%	134	134	100%	0.0	0%	0.0	0%	134	0	0	0	Oct 01	55%
1967	18.0	44.3	68.8	0.33	0.48	0.60	176	94%	165	165	100%	0.0	0%	0.0	0%	165	0	0	0	Oct 01	14%
1968	-16.1	43.5	76.9	0.20	0.48	0.64	176	76%	133	133	100%	0.0	0%	0.0	0%	133	0	0	0	Oct 01	56%
1969	-6.6	44.0	68.8	0.23	0.48	0.60	176	90%	157	157	100%	0.0	0%	0.0	0%	157	0	0	0	Oct 01	20%
1970	18.0	44.3	68.8	0.33	0.48	0.60	176	77%	135	135	100%	0.0	0%	0.0	0%	135	0	0	0	Oct 01	52%
1971	18.0	44.3	68.8	0.33	0.48	0.60	176	83%	147	147	100%	0.0	0%	0.0	0%	147	0	0	0	Oct 01	33%
1972	18.0	44.3	68.8	0.33	0.48	0.60	176	87%	152	152	100%	0.0	0%	0.0	0%	152	0	0	0	Oct 01	30%
1973	-3.5	45.1	74.1	0.24	0.47	0.64	173	89%	155	155	100%	0.0	0%	0.0	0%	155	0	0	0	Oct 01	23%
1974	-10.8	43.0	73.2	0.22	0.46	0.64	169	85%	144	144	100%	0.0	0%	0.0	0%	144	0	0	0	Oct 01	38%
1975	-0.9	43.4	76.8	0.25	0.47	0.64	171	100%	171	171	100%	0.0	0%	0.0	0%	171	0	0	0	Oct 01	5%
1976	-12.2	44.5	73.8	0.21	0.47	0.64	172	98%	169	169	100%	0.0	0%	0.0	0%	169	0	0	0	Oct 01	9%
1977	-1.6	42.9	77.3	0.26	0.47	0.64	171	95%	162	162	100%	0.0	0%	0.0	0%	162	0	0	0	Oct 01	16%
1978	-2.2	42.6	75.0	0.25	0.46	0.64	168	78%	132	132	100%	0.0	0%	0.0	0%	132	0	0	0	Oct 01	63%
1979	-10.4	43.5	75.6	0.22	0.47	0.64	171	75%	128	128	100%	0.0	0%	0.0	0%	128	0	0	0	Oct 01	64%
1980	0.3	44.1	75.9	0.26	0.48	0.64	177	65%	115	115	100%	0.0	0%	0.0	0%	115	0	0	0	Oct 01	81%
1981	-9.5	42.2	76.9	0.22	0.47	0.64	172	62%	107	107	100%	0.0	0%	0.0	0%	107	0	0	0	Oct 01	91%
1982	-6.9	41.3	77.9	0.23	0.47	0.64	170	80%	136	136	100%	0.0	0%	0.0	0%	136	0	0	0	Oct 01	48%
1983	-4.5	45.9	77.3	0.25	0.47	0.64	173	62%	108	108	100%	0.0	0%	0.0	0%	108	0	0	0	Oct 01	88%
1984	-8.9	43.8	75.1	0.22	0.46	0.64	168	71%	119	119	100%	0.0	0%	0.0	0%	119	0	0	0	Oct 01	75%
1985	1.5	45.1	76.3	0.26	0.48	0.64	174	67%	116	116	100%	0.0	0%	0.0	0%	116	0	0	0	Oct 01	80%
1986	-1.0	44.8	77.4	0.25	0.47	0.64	171	97%	167	167	100%	0.0	0%	0.0	0%	167	0	0	0	Oct 01	11%
1987	-4.7	45.0	76.5	0.24	0.47	0.64	172	80%	139	139	100%	0.0	0%	0.0	0%	139	0	0	0	Oct 01	44%
1988	-5.0	44.3	79.1	0.24	0.48	0.64	174	83%	145	145	100%	0.0	0%	0.0	0%	145	0	0	0	Oct 01	36%
1989	-4.6	44.0	76.0	0.23	0.47	0.64	172	94%	161	161	100%	0.0	0%	0.0	0%	161	0	0	0	Oct 01	19%
1990	-3.8	44.3	73.1	0.24	0.48	0.64	174	88%	153	153	100%	0.0	0%	0.0	0%	153	0	0	0	Oct 01	28%
1991	0.0	46.3	75.8	0.26	0.49	0.64	180	74%	133	133	100%	0.0	0%	0.0	0%	133	0	0	0	Oct 01	58%
1992	4.7	43.9	73.2	0.27	0.47	0.64	173	77%	133	133	100%	0.0	0%	0.0	0%	133	0	0	0	Oct 01	59%
1993	-6.7	43.9	78.4	0.23	0.47	0.64	172	63%	109	109	100%	0.0	0%	0.0	0%	109	0	0	0	Oct 01	84%
1994	-14.9	42.7	77.0	0.20	0.47	0.64	171	80%	136	136	100%	0.0	0%	0.0	0%	136	0	0	0	Oct 01	50%
1995	-4.9	45.6	77.3	0.24	0.49	0.64	178	67%	119	119	100%	0.0	0%	0.0	0%	119	0	0	0	Oct 01	77%
1996	-9.2	43.6	72.7	0.22	0.46	0.64	169	87%	147	147	100%	0.0	0%	0.0	0%	147	0	0	0	Oct 01	34%
1997	-1.9	44.2	76.6	0.25	0.47	0.64	172	72%	123	123	100%	0.0	0%	0.0	0%	123	0	0	0	Oct 01	70%
1998	3.5	46.5	74.4	0.26	0.48	0.64	174	72%	125	125	100%	0.0	0%	0.0	0%	125	0	0	0	Oct 01	69%
1999	-7.1	45.8	79.8	0.22	0.49	0.64	177	62%	111	111	100%	0.0	0%	0.0	0%	111	0	0	0	Oct 01	83%
2000	-6.5	45.0	73.6	0.23	0.47	0.64	172	99%	170	170	100%	0.0	0%	0.0	0%	170	0	0	0	Oct 01	6%
2001	7.6	44.1	78.0	0.30	0.48	0.64	174	81%	141	141	100%	0.0	0%	0.0	0%	141	0	0	0	Oct 01	42%
2002	14.6	47.0	77.5	0.31	0.50	0.64	181	65%	118	118	100%	0.0	0%	0.0	0%	118	0	0	0	Oct 01	78%
2003	-6.6	43.4	74.9	0.24	0.47	0.64	170	91%	154	154	100%	0.0	0%	0.0	0%	154	0	0	0	Oct 01	25%

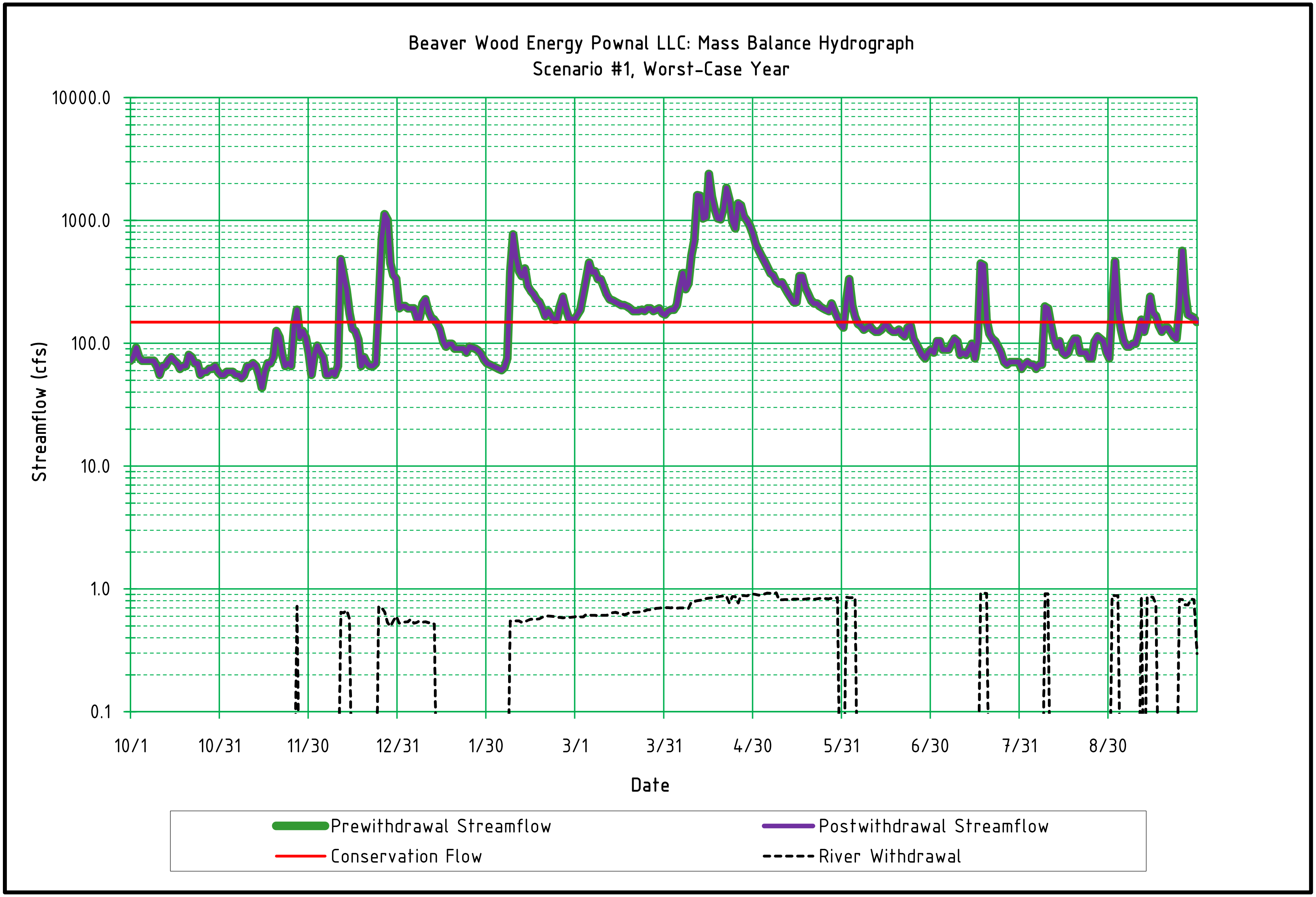
Scenario: 1

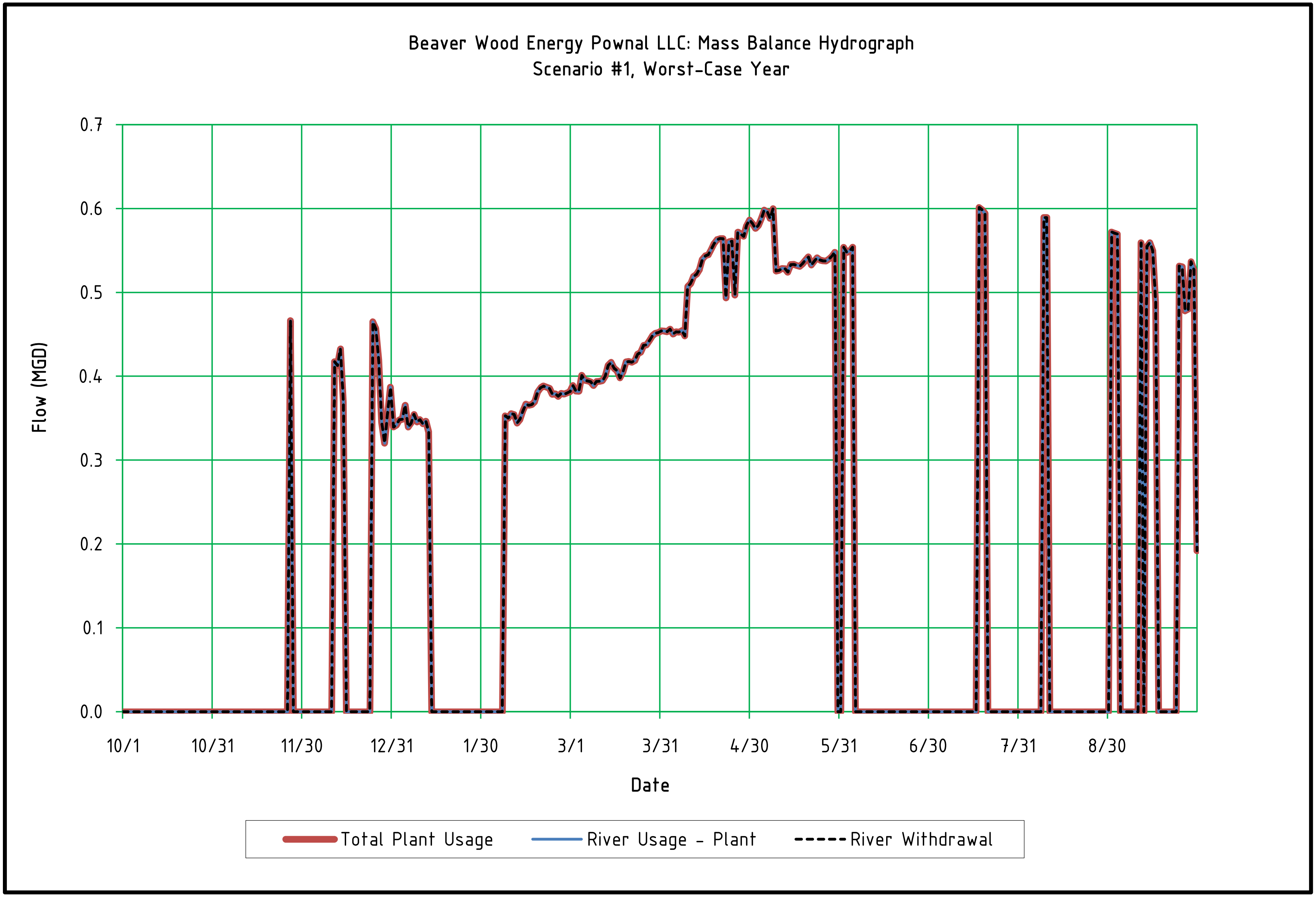
Source	Max Pump Rate (gpm)		Minimum Downstream Flow (csm)
Hoosic River:	1,458		0.70
Well:	0		NA
Storage	Volume (Mgal)		
Pond:	0		
Plant	gpm	MGD	
Average Demand:	321.6	0.46	
Peak Demand:	465.2	0.67	

Output For Scenario 1

Water Year	Wet Bulb Temperatures Min F	Mean F	Max F	Plant Demand Min MGD	Mean MGD	Max MGD	Total Mgal	Plant Consumption % of Demand	Total Mgal	River Mgal	River %	Well Mgal	Well %	Storage Pond Mgal	Storage Pond %	Source Production River Total Mgal	Well Total Mgal	Storage Pond Starting Volume (Mgal)	Minimum Volume (Mgal)	Complete Refill Date	River Flow Exceedence (Percentile)
2004	-8.7	44.6	74.4	0.23	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	0	0	Oct 01	3%
2005	-7.2	45.0	76.1	0.22	0.48	0.64	174	73%	128	128	100%	0.0	0%	0.0	0%	128	0	0	0	Oct 01	66%
2006	5.7	45.9	77.8	0.28	0.49	0.64	177	93%	165	165	100%	0.0	0%	0.0	0%	165	0	0	0	Oct 01	13%
2007	0.1	44.7	76.5	0.26	0.49	0.64	177	86%	153	153	100%	0.0	0%	0.0	0%	153	0	0	0	Oct 01	27%
2008	0.5	45.4	77.6	0.26	0.49	0.64	177	95%	169	169	100%	0.0	0%	0.0	0%	169	0	0	0	Oct 01	8%
2009	0.3	43.6	74.5	0.26	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	0	0	Oct 01	2%
Average	-2.0	44.3	75.0	0.25	0.48	0.64	174	78%	136	136	100%	0.0	0%	0.0	0%	136	0	0	0	Oct 01	--
Minimum	-16.1	41.3	68.8	0.20	0.46	0.60	168	42%	75	75	100%	0.0	0%	0.0	0%	75	0	0	0	Oct 01	--
Maximum	18.0	47.0	79.8	0.33	0.50	0.64	181	100%	172	172	100%	0.0	0%	0.0	0%	172	0	0	0	Oct 01	--
Worst-Case Year 1965	12.7	44.3	68.8	0.30	0.48	0.60	177	42%	75	75	100%	0.0	0%	0.0	0%	74.7	0.0	0	0	Oct 01	98%
n=	63																				




Beaver Wood Energy Pownal LLC: Mass Balance Hydrograph
Scenario #1, Worst-Case Year
Streamflow (cfs)
10000.0
1000.0
100.0
10.0
1.0
0.1
10/1
10/31
11/30
12/31
1/30
3/1
3/31
4/30
5/31
6/30
7/31
8/30
Date
Prewithdrawal Streamflow
Postwithdrawal Streamflow
Conservation Flow
River Withdrawal



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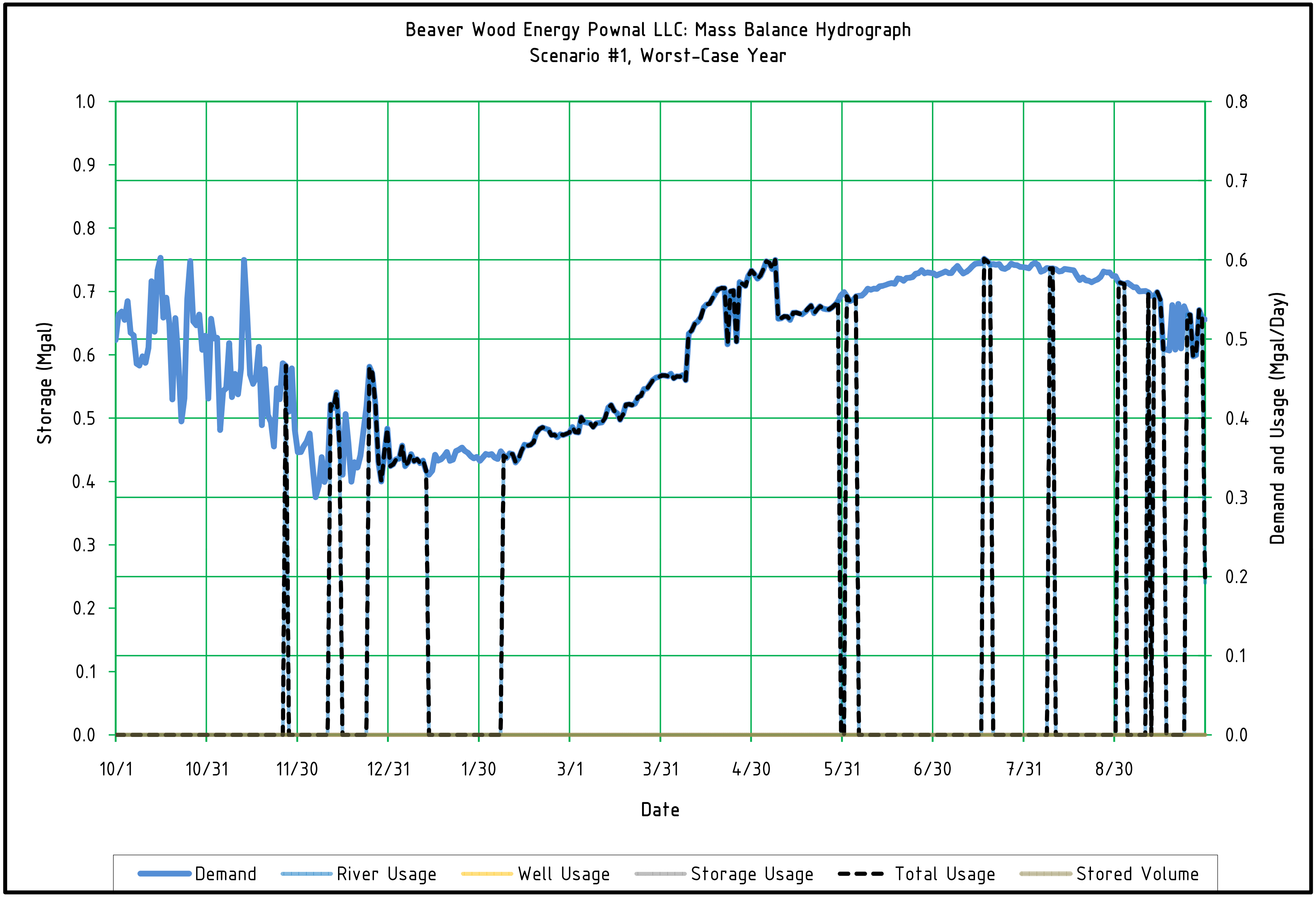

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Beaver Wood Energy Pownal LLC - Water Needs & Availability Study

Streamflow, Groundwater, and Storage Mass Hydrograph Analysis

Model Output

Scenario: 2

Source	Max Pump Rate (gpm)		Minimum Downstream Flow (csm)
Hoosic River:	1,458		0.00
Well:	0		NA
Storage	Volume (Mgal)		
Pond:	0		
Plant	gpm	MGD	
Average Demand:	321.6	0.46	
Peak Demand:	465.2	0.67	

Output For Scenario 2

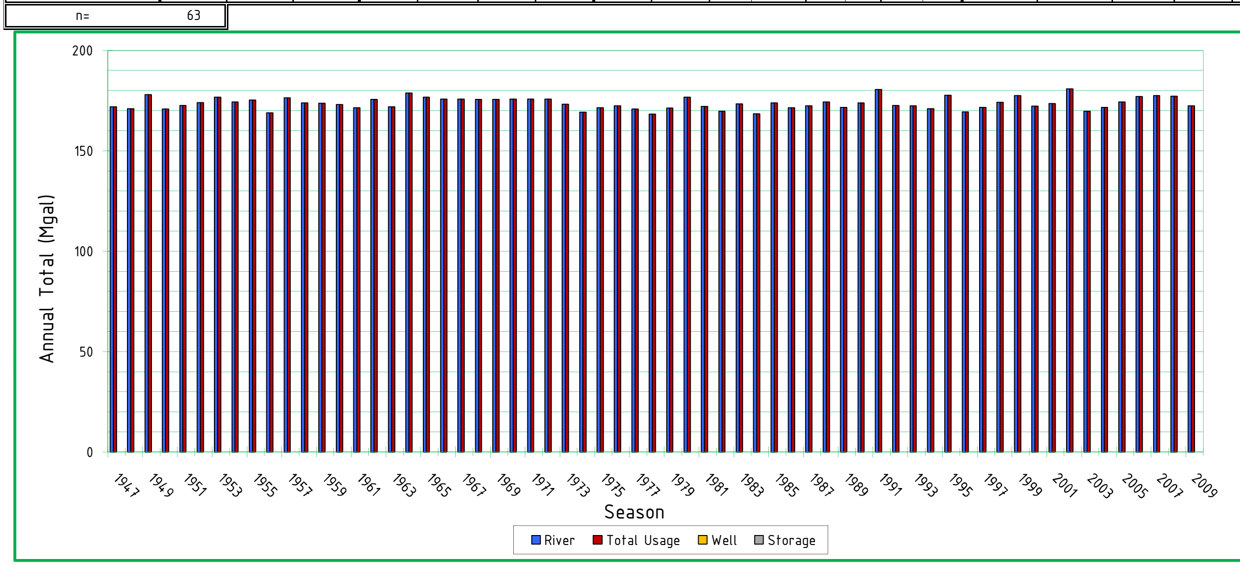
Water Year	Wet Bulb Temperatures			Plant Demand				Plant Consumption								Source Production		Storage Pond			
	Min	Mean	Max	Min	Mean	Max	Total	% of Demand	Total	River		Well		Storage Pond		River Total	Well Total	Starting Volume	Minimum Volume	Complete Refill Date	River Flow Exceedence
	F	F	F	MGD	MGD	MGD	Mgal		Mgal	Mgal	%	Mgal	%	Mgal	%	Mgal	Mgal	(Mgal)	(Mgal)		(Percentile)
1947	4.7	44.6	76.6	0.28	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	0	0	Oct 01	70%
1948	-12.5	42.3	77.5	0.21	0.47	0.64	171	100%	171	171	100%	0.0	0%	0.0	0%	171	0	0	0	Oct 01	84%
1949	3.8	46.2	75.8	0.27	0.49	0.64	178	100%	178	178	100%	0.0	0%	0.0	0%	178	0	0	0	Oct 01	6%
1950	-6.8	43.5	72.7	0.24	0.47	0.64	171	100%	171	171	100%	0.0	0%	0.0	0%	171	0	0	0	Oct 01	86%
1951	-2.0	44.8	72.4	0.24	0.47	0.64	173	100%	173	173	100%	0.0	0%	0.0	0%	173	0	0	0	Oct 01	56%
1952	-6.9	44.4	77.6	0.23	0.48	0.64	174	100%	174	174	100%	0.0	0%	0.0	0%	174	0	0	0	Oct 01	42%
1953	3.6	45.3	75.9	0.29	0.48	0.64	177	100%	177	177	100%	0.0	0%	0.0	0%	177	0	0	0	Oct 01	19%
1954	-2.9	44.4	74.6	0.24	0.48	0.64	174	100%	174	174	100%	0.0	0%	0.0	0%	174	0	0	0	Oct 01	38%
1955	-8.1	45.4	77.4	0.23	0.48	0.64	175	100%	175	175	100%	0.0	0%	0.0	0%	175	0	0	0	Oct 01	34%
1956	-9.0	42.3	73.5	0.22	0.46	0.64	169	100%	169	169	100%	0.0	0%	0.0	0%	169	0	0	0	Oct 01	95%
1957	-13.5	44.2	75.6	0.20	0.48	0.64	176	100%	176	176	100%	0.0	0%	0.0	0%	176	0	0	0	Oct 01	20%
1958	-5.2	44.2	74.4	0.23	0.48	0.64	174	100%	174	174	100%	0.0	0%	0.0	0%	174	0	0	0	Oct 01	47%
1959	-1.9	44.0	77.5	0.26	0.48	0.64	174	100%	174	174	100%	0.0	0%	0.0	0%	174	0	0	0	Oct 01	48%
1960	5.0	44.7	72.4	0.27	0.47	0.64	173	100%	173	173	100%	0.0	0%	0.0	0%	173	0	0	0	Oct 01	55%
1961	-7.6	43.9	75.8	0.23	0.47	0.64	171	100%	171	171	100%	0.0	0%	0.0	0%	171	0	0	0	Oct 01	78%
1962	-4.9	43.8	73.3	0.24	0.48	0.64	176	100%	176	176	100%	0.0	0%	0.0	0%	176	0	0	0	Oct 01	30%
1963	-11.2	41.8	75.6	0.22	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	0	0	Oct 01	69%
1964	-2.0	43.8	75.3	0.24	0.49	0.64	179	100%	179	179	100%	0.0	0%	0.0	0%	179	0	0	0	Oct 01	5%
1965	12.7	44.3	68.8	0.30	0.48	0.60	177	100%	177	177	100%	0.0	0%	0.0	0%	177	0	0	0	Oct 01	17%
1966	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	176	100%	0.0	0%	0.0	0%	176	0	0	0	Oct 01	22%
1967	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	176	100%	0.0	0%	0.0	0%	176	0	0	0	Oct 01	22%
1968	-16.1	43.5	76.9	0.20	0.48	0.64	176	100%	176	176	100%	0.0	0%	0.0	0%	176	0	0	0	Oct 01	31%
1969	-6.6	44.0	68.8	0.23	0.48	0.60	176	100%	176	176	100%	0.0	0%	0.0	0%	176	0	0	0	Oct 01	33%
1970	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	176	100%	0.0	0%	0.0	0%	176	0	0	0	Oct 01	22%
1971	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	176	100%	0.0	0%	0.0	0%	176	0	0	0	Oct 01	22%
1972	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	176	100%	0.0	0%	0.0	0%	176	0	0	0	Oct 01	22%
1973	-3.5	45.1	74.1	0.24	0.47	0.64	173	100%	173	173	100%	0.0	0%	0.0	0%	173	0	0	0	Oct 01	53%
1974	-10.8	43.0	73.2	0.22	0.46	0.64	169	100%	169	169	100%	0.0	0%	0.0	0%	169	0	0	0	Oct 01	94%
1975	-0.9	43.4	76.8	0.25	0.47	0.64	171	100%	171	171	100%	0.0	0%	0.0	0%	171	0	0	0	Oct 01	80%
1976	-12.2	44.5	73.8	0.21	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	0	0	Oct 01	63%
1977	-1.6	42.9	77.3	0.26	0.47	0.64	171	100%	171	171	100%	0.0	0%	0.0	0%	171	0	0	0	Oct 01	88%
1978	-2.2	42.6	75.0	0.25	0.46	0.64	168	100%	168	168	100%	0.0	0%	0.0	0%	168	0	0	0	Oct 01	98%
1979	-10.4	43.5	75.6	0.22	0.47	0.64	171	100%	171	171	100%	0.0	0%	0.0	0%	171	0	0	0	Oct 01	81%
1980	0.3	44.1	75.9	0.26	0.48	0.64	177	100%	177	177	100%	0.0	0%	0.0	0%	177	0	0	0	Oct 01	16%
1981	-9.5	42.2	76.9	0.22	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	0	0	Oct 01	67%
1982	-6.9	41.3	77.9	0.23	0.47	0.64	170	100%	170	170	100%	0.0	0%	0.0	0%	170	0	0	0	Oct 01	89%
1983	-4.5	45.9	77.3	0.25	0.47	0.64	173	100%	173	173	100%	0.0	0%	0.0	0%	173	0	0	0	Oct 01	52%
1984	-8.9	43.8	75.1	0.22	0.46	0.64	168	100%	168	168	100%	0.0	0%	0.0	0%	168	0	0	0	Oct 01	97%
1985	1.5	45.1	76.3	0.26	0.48	0.64	174	100%	174	174	100%	0.0	0%	0.0	0%	174	0	0	0	Oct 01	45%
1986	-1.0	44.8	77.4	0.25	0.47	0.64	171	100%	171	171	100%	0.0	0%	0.0	0%	171	0	0	0	Oct 01	77%
1987	-4.7	45.0	76.5	0.24	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	0	0	Oct 01	61%
1988	-5.0	44.3	79.1	0.24	0.48	0.64	174	100%	174	174	100%	0.0	0%	0.0	0%	174	0	0	0	Oct 01	39%
1989	-4.6	44.0	76.0	0.23	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	0	0	Oct 01	73%
1990	-3.8	44.3	73.1	0.24	0.48	0.64	174	100%	174	174	100%	0.0	0%	0.0	0%	174	0	0	0	Oct 01	44%
1991	0.0	46.3	75.8	0.26	0.49	0.64	180	100%	180	180	100%	0.0	0%	0.0	0%	180	0	0	0	Oct 01	3%
1992	4.7	43.9	73.2	0.27	0.47	0.64	173	100%	173	173	100%	0.0	0%	0.0	0%	173	0	0	0	Oct 01	58%
1993	-6.7	43.9	78.4	0.23	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	0	0	Oct 01	59%
1994	-14.9	42.7	77.0	0.20	0.47	0.64	171	100%	171	171	100%	0.0	0%	0.0	0%	171	0	0	0	Oct 01	83%
1995	-4.9	45.6	77.3	0.24	0.49	0.64	178	100%	178	178	100%	0.0	0%	0.0	0%	178	0	0	0	Oct 01	8%
1996	-9.2	43.6	72.7	0.22	0.46	0.64	169	100%	169	169	100%	0.0	0%	0.0	0%	169	0	0	0	Oct 01	92%
1997	-1.9	44.2	76.6	0.25	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	0	0	Oct 01	75%
1998	3.5	46.5	74.4	0.26	0.48	0.64	174	100%	174	174	100%	0.0	0%	0.0	0%	174	0	0	0	Oct 01	41%
1999	-7.1	45.8	79.8	0.22	0.49	0.64	177	100%	177	177	100%	0.0	0%	0.0	0%	177	0	0	0	Oct 01	9%
2000	-6.5	45.0	73.6	0.23	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	0	0	Oct 01	66%
2001	7.6	44.1	78.0	0.30	0.48	0.64	174	100%	174	174	100%	0.0	0%	0.0	0%	174	0	0	0	Oct 01	50%
2002	14.6	47.0	77.5	0.31	0.50	0.64	181	100%	181	181	100%	0.0	0%	0.0	0%	181	0	0	0	Oct 01	2%
2003	-6.6	43.4	74.9	0.24	0.47	0.64	170	100%	170	170	100%	0.0	0%	0.0	0%	170	0	0	0	Oct 01	91%

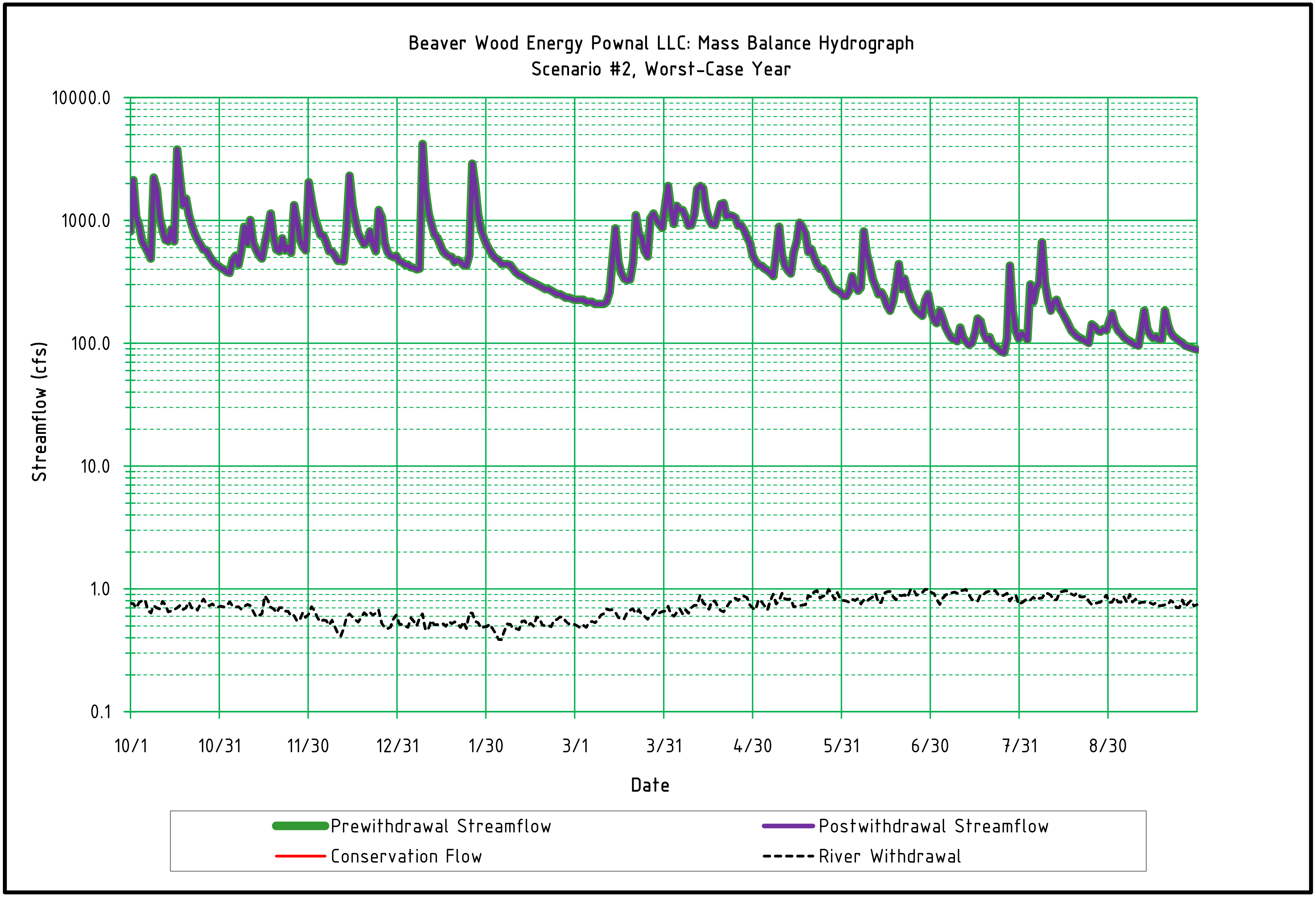
Scenario: 2

Source	Max Pump Rate (gpm)		Minimum Downstream Flow (csm)
Hoosic River:	1,458		0.00
Well:	0		NA
Storage	Volume (Mgal)		
Pond:	0		
Plant	gpm	MGD	
Average Demand:	321.6	0.46	
Peak Demand:	465.2	0.67	

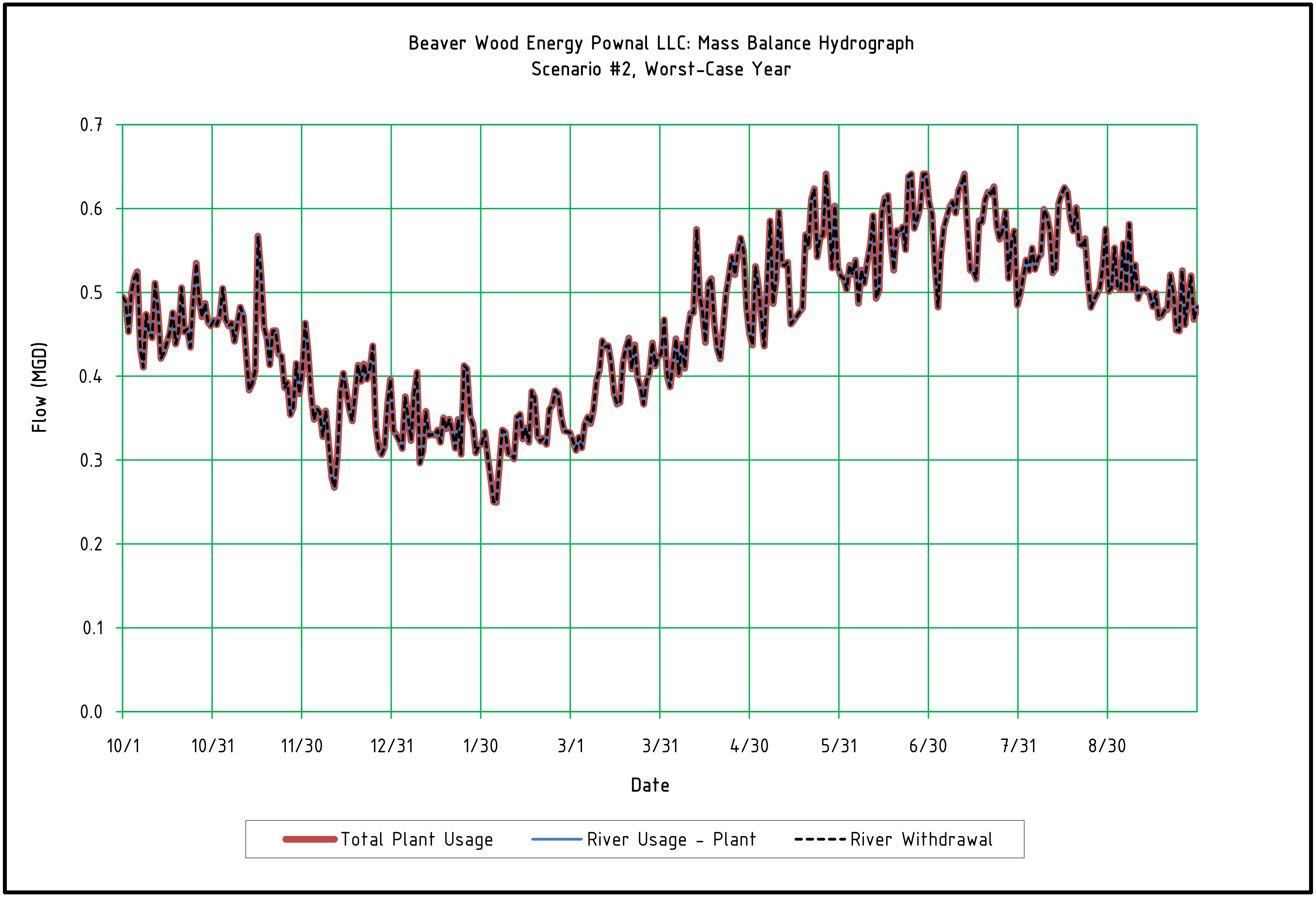
Output For Scenario 2

Water Year	Wet Bulb Temperatures			Plant Demand				Plant Consumption								Source Production		Storage Pond			
	Min	Mean	Max	Min	Mean	Max	Total	% of Demand	Total	River		Well		Storage Pond		River Total	Well Total	Starting Volume	Minimum Volume	Complete Refill	River Flow Exceedence
	F	F	F	MGD	MGD	MGD	Mgal		Mgal	Mgal	%	Mgal	%	Mgal	%	Mgal	Mgal	(Mgal)	(Mgal)	Date	(Percentile)
2004	-8.7	44.6	74.4	0.23	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	0	0	Oct 01	72%
2005	-7.2	45.0	76.1	0.22	0.48	0.64	174	100%	174	174	100%	0.0	0%	0.0	0%	174	0	0	0	Oct 01	36%
2006	5.7	45.9	77.8	0.28	0.49	0.64	177	100%	177	177	100%	0.0	0%	0.0	0%	177	0	0	0	Oct 01	14%
2007	0.1	44.7	76.5	0.26	0.49	0.64	177	100%	177	177	100%	0.0	0%	0.0	0%	177	0	0	0	Oct 01	11%
2008	0.5	45.4	77.6	0.26	0.49	0.64	177	100%	177	177	100%	0.0	0%	0.0	0%	177	0	0	0	Oct 01	13%
2009	0.3	43.6	74.5	0.26	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	0	0	Oct 01	64%
Average	-2.0	44.3	75.0	0.25	0.48	0.64	174	100%	174	174	100%	0.0	0%	0.0	0%	174	0	0	0	Oct 01	--
Minimum	-16.1	41.3	68.8	0.20	0.46	0.60	168	100%	168	168	100%	0.0	0%	0.0	0%	168	0	0	0	Oct 01	--
Maximum	18.0	47.0	79.8	0.33	0.50	0.64	181	100%	181	181	100%	0.0	0%	0.0	0%	181	0	0	0	Oct 01	--
Worst-Case Year 1978	-2.2	42.6	75.0	0.25	0.46	0.64	168	100%	168	168	100%	0.0	0%	0.0	0%	168.3	0.0	0	0	Oct 01	98%
n=	63																				

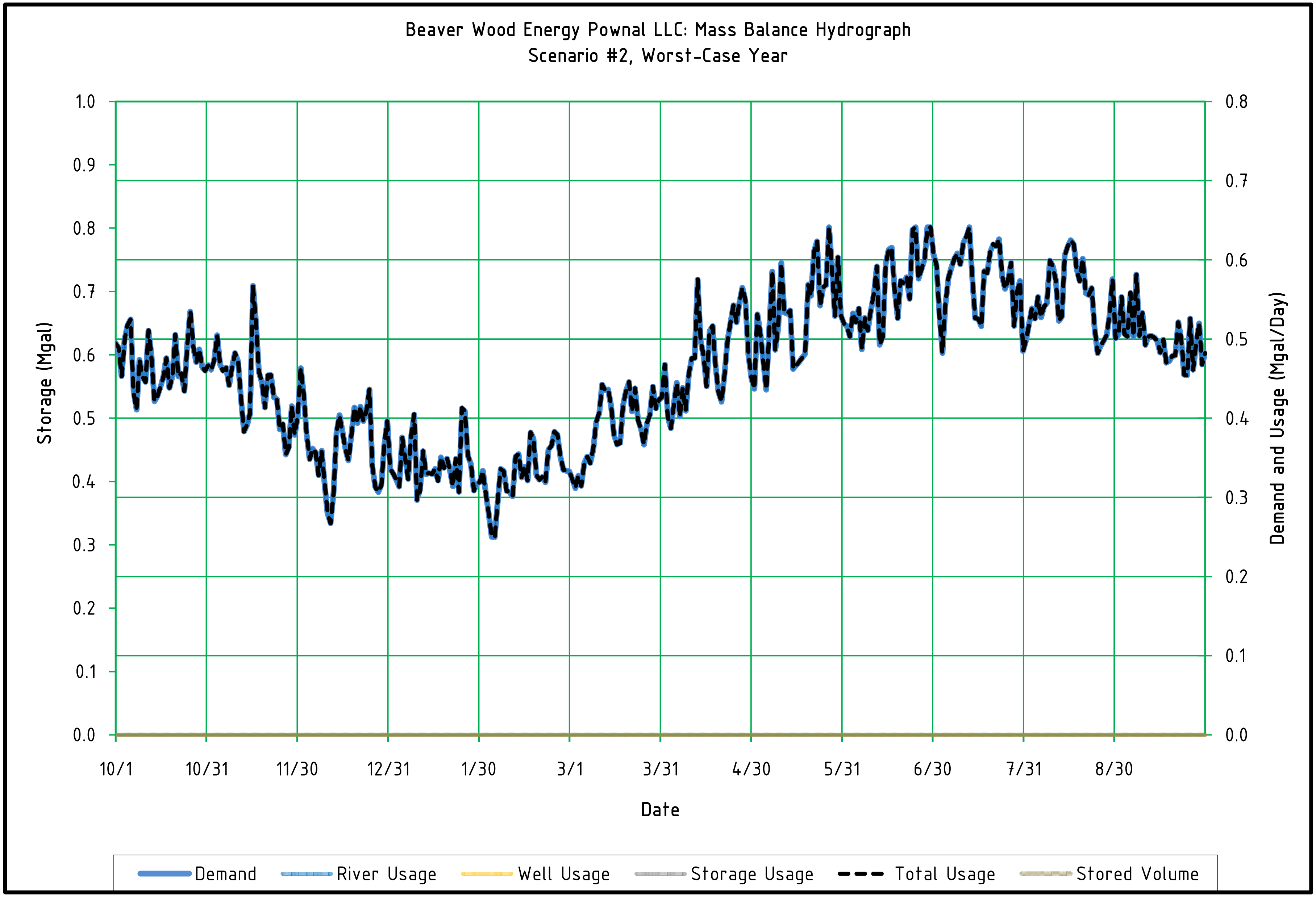




Beaver Wood Energy Pownal LLC: Mass Balance Hydrograph
Scenario #2, Worst-Case Year
Streamflow (cfs)
10000.0
1000.0
100.0
10.0
1.0
0.1
10/1
10/31
11/30
12/31
1/30
3/1
3/31
4/30
5/31
6/30
7/31
8/30
Date
Prewithdrawal Streamflow
Postwithdrawal Streamflow
Conservation Flow
River Withdrawal



F:\57407.00 Beaver Wood Pownal\Data\Hoosic_River\intake_design\MBH_09-22-2010.xlsm, Graph2, 10/12/2010



F:\57407.00 Beaver Wood Pownal\Data\Hoosic_River\intake_design\MBH_09-22-2010.xlsm, Graph3, 10/12/2010

Beaver Wood Energy Pownal LLC - Water Needs & Availability Study

Streamflow, Groundwater, and Storage Mass Hydrograph Analysis

Model Output

Scenario: 3

Source	Max Pump Rate (gpm)		Minimum Downstream Flow (csm)
Hoosic River:	1,458		0.70
Well:	0		NA
Storage	Volume (Mgal)		
Pond:	12		
Plant	gpm	MGD	
Average Demand:	321.6	0.46	
Peak Demand:	465.2	0.67	

Output For Scenario 3

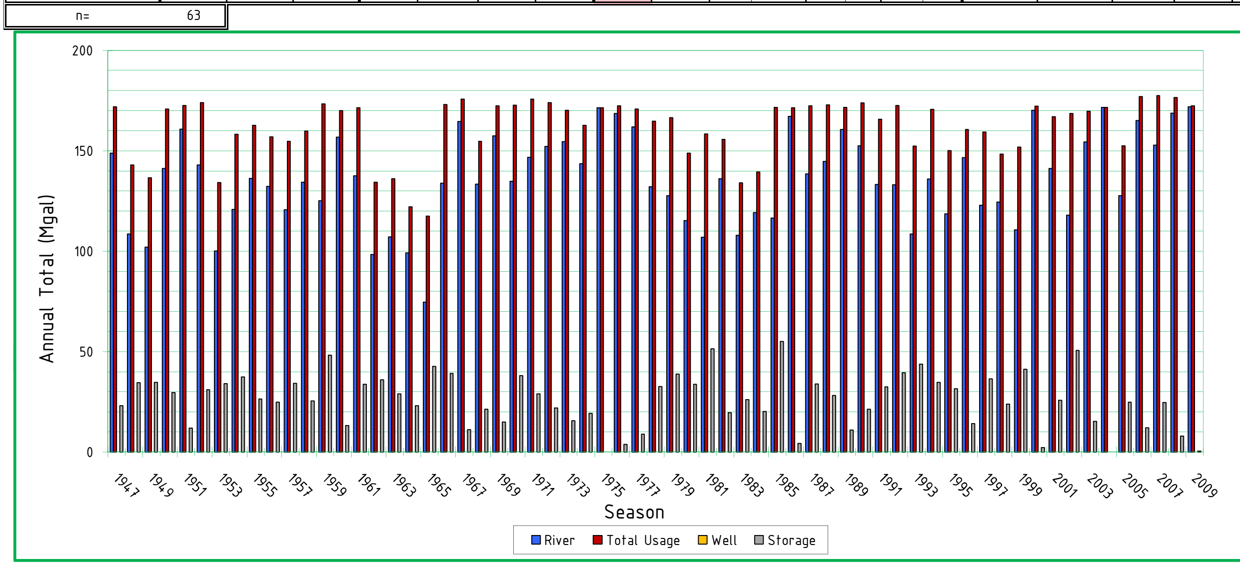
Water Year	Wet Bulb Temperatures			Plant Demand				Plant Consumption								Source Production		Storage Pond			
	Min	Mean	Max	Min	Mean	Max	Total	% of	Total	River		Well		Storage Pond		River Total	Well Total	Starting Volume	Minimum Volume	Complete Refill	River Flow Exceedence
	F	F	F	MGD	MGD	MGD	Mgal	Demand	Mgal	Mgal	%	Mgal	%	Mgal	%	Mgal	Mgal	(Mgal)	(Mgal)	Date	(Percentile)
1947	4.7	44.6	76.6	0.28	0.47	0.64	172	100%	172	149	87%	0.0	0%	23.0	13%	162	0	0	3	Sep 04	31%
1948	-12.5	42.3	77.5	0.21	0.47	0.64	171	84%	143	109	76%	0.0	0%	34.5	24%	140	0	3	0	Sep 30	86%
1949	3.8	46.2	75.8	0.27	0.49	0.64	178	77%	137	102	75%	0.0	0%	34.6	25%	145	0	0	0	Oct 01	92%
1950	-6.8	43.5	72.7	0.24	0.47	0.64	171	100%	171	141	83%	0.0	0%	29.6	17%	171	0	9	5	Sep 30	41%
1951	-2.0	44.8	72.4	0.24	0.47	0.64	173	100%	173	161	93%	0.0	0%	11.9	7%	176	0	9	4	Sep 30	17%
1952	-6.9	44.4	77.6	0.23	0.48	0.64	174	100%	174	143	82%	0.0	0%	31.0	18%	167	0	12	5	Sep 05	39%
1953	3.6	45.3	75.9	0.29	0.48	0.64	177	76%	134	100	75%	0.0	0%	34.1	25%	129	0	5	0	Sep 30	94%
1954	-2.9	44.4	74.6	0.24	0.48	0.64	174	91%	158	121	76%	0.0	0%	37.3	24%	170	0	0	0	Oct 01	72%
1955	-8.1	45.4	77.4	0.23	0.48	0.64	175	93%	163	136	84%	0.0	0%	26.4	16%	163	0	12	0	Sep 26	47%
1956	-9.0	42.3	73.5	0.22	0.46	0.64	169	93%	157	132	84%	0.0	0%	24.8	16%	157	0	12	0	Sep 23	61%
1957	-13.5	44.2	75.6	0.20	0.48	0.64	176	88%	155	121	78%	0.0	0%	34.2	22%	143	0	12	0	Jul 05	73%
1958	-5.2	44.2	74.4	0.23	0.48	0.64	174	92%	160	134	84%	0.0	0%	25.5	16%	172	0	0	0	Sep 30	53%
1959	-1.9	44.0	77.5	0.26	0.48	0.64	174	100%	173	125	72%	0.0	0%	48.2	28%	161	0	12	0	Sep 03	67%
1960	5.0	44.7	72.4	0.27	0.47	0.64	173	98%	170	157	92%	0.0	0%	13.2	8%	182	0	0	0	Sep 30	22%
1961	-7.6	43.9	75.8	0.23	0.47	0.64	171	100%	171	138	80%	0.0	0%	33.8	20%	166	0	12	0	Sep 05	45%
1962	-4.9	43.8	73.3	0.24	0.48	0.64	176	77%	134	98	73%	0.0	0%	36.0	27%	131	0	6	0	Sep 30	97%
1963	-11.2	41.8	75.6	0.22	0.47	0.64	172	79%	136	107	79%	0.0	0%	29.0	21%	137	0	3	0	Sep 30	89%
1964	-2.0	43.8	75.3	0.24	0.49	0.64	179	68%	122	99	81%	0.0	0%	23.0	19%	119	0	3	0	Sep 30	95%
1965	12.7	44.3	68.8	0.30	0.48	0.60	177	66%	117	75	64%	0.0	0%	42.7	36%	129	0	0	0	Oct 01	98%
1966	18.0	44.3	68.8	0.33	0.48	0.60	176	98%	173	134	77%	0.0	0%	39.2	23%	169	0	12	0	Sep 30	55%
1967	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	165	94%	0.0	0%	11.1	6%	175	0	7	3	Sep 30	14%
1968	-16.1	43.5	76.9	0.20	0.48	0.64	176	88%	155	133	86%	0.0	0%	21.4	14%	148	0	7	0	Sep 30	56%
1969	-6.6	44.0	68.8	0.23	0.48	0.60	176	98%	172	157	91%	0.0	0%	14.9	9%	179	0	0	0	Sep 30	20%
1970	18.0	44.3	68.8	0.33	0.48	0.60	176	98%	173	135	78%	0.0	0%	38.0	22%	178	0	6	0	Sep 30	52%
1971	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	147	83%	0.0	0%	29.0	17%	176	0	12	3	Sep 12	33%
1972	18.0	44.3	68.8	0.33	0.48	0.60	176	99%	174	152	87%	0.0	0%	21.9	13%	162	0	12	0	Oct 01	30%
1973	-3.5	45.1	74.1	0.24	0.47	0.64	173	98%	170	155	91%	0.0	0%	15.6	9%	176	0	0	0	Sep 30	23%
1974	-10.8	43.0	73.2	0.22	0.46	0.64	169	96%	163	144	88%	0.0	0%	19.2	12%	169	0	5	0	Sep 30	38%
1975	-0.9	43.4	76.8	0.25	0.47	0.64	171	100%	171	171	100%	0.0	0%	0.0	0%	171	0	12	12	Oct 01	5%
1976	-12.2	44.5	73.8	0.21	0.47	0.64	172	100%	172	169	98%	0.0	0%	3.8	2%	172	0	12	10	Sep 26	9%
1977	-1.6	42.9	77.3	0.26	0.47	0.64	171	100%	171	162	95%	0.0	0%	8.8	5%	171	0	12	9	Sep 13	16%
1978	-2.2	42.6	75.0	0.25	0.46	0.64	168	98%	165	132	80%	0.0	0%	32.6	20%	153	0	12	0	Aug 09	63%
1979	-10.4	43.5	75.6	0.22	0.47	0.64	171	97%	166	128	77%	0.0	0%	38.8	23%	178	0	0	0	Oct 01	64%
1980	0.3	44.1	75.9	0.26	0.48	0.64	177	84%	149	115	77%	0.0	0%	33.7	23%	137	0	12	0	Jul 12	81%
1981	-9.5	42.2	76.9	0.22	0.47	0.64	172	92%	158	107	68%	0.0	0%	51.4	32%	170	0	0	0	Oct 01	91%
1982	-6.9	41.3	77.9	0.23	0.47	0.64	170	92%	156	136	87%	0.0	0%	19.5	13%	144	0	12	0	Jul 29	48%
1983	-4.5	45.9	77.3	0.25	0.47	0.64	173	77%	134	108	81%	0.0	0%	26.1	19%	134	0	0	0	Oct 01	88%
1984	-8.9	43.8	75.1	0.22	0.46	0.64	168	83%	139	119	85%	0.0	0%	20.2	15%	139	0	0	0	Oct 01	75%
1985	1.5	45.1	76.3	0.26	0.48	0.64	174	99%	172	116	68%	0.0	0%	55.1	32%	180	0	0	0	Sep 30	80%
1986	-1.0	44.8	77.4	0.25	0.47	0.64	171	100%	171	167	97%	0.0	0%	4.3	3%	175	0	9	10	Sep 30	11%
1987	-4.7	45.0	76.5	0.24	0.47	0.64	172	100%	172	139	80%	0.0	0%	33.9	20%	172	0	12	0	Sep 16	44%
1988	-5.0	44.3	79.1	0.24	0.48	0.64	174	99%	173	145	84%	0.0	0%	28.2	16%	171	0	12	0	Sep 18	36%
1989	-4.6	44.0	76.0	0.23	0.47	0.64	172	100%	172	161	94%	0.0	0%	11.0	6%	173	0	11	7	Sep 30	19%
1990	-3.8	44.3	73.1	0.24	0.48	0.64	174	100%	174	153	88%	0.0	0%	21.3	12%	173	0	12	1	Sep 27	28%
1991	0.0	46.3	75.8	0.26	0.49	0.64	180	92%	166	133	80%	0.0	0%	32.5	20%	167	0	11	0	Sep 30	58%
1992	4.7	43.9	73.2	0.27	0.47	0.64	173	100%	173	133	77%	0.0	0%	39.4	23%	165	0	12	2	Aug 20	59%
1993	-6.7	43.9	78.4	0.23	0.47	0.64	172	88%	152	109	71%	0.0	0%	43.8	29%	160	0	5	0	Sep 30	84%
1994	-14.9	42.7	77.0	0.20	0.47	0.64	171	100%	171	136	80%	0.0	0%	34.7	20%	167	0	12	0	Aug 19	50%
1995	-4.9	45.6	77.3	0.24	0.49	0.64	178	84%	150	119	79%	0.0	0%	31.5	21%	142	0	9	0	Sep 30	77%
1996	-9.2	43.6	72.7	0.22	0.46	0.64	169	95%	161	147	91%	0.0	0%	14.1	9%	173	0	0	0	Oct 01	34%
1997	-1.9	44.2	76.6	0.25	0.47	0.64	172	93%	159	123	77%	0.0	0%	36.5	23%	149	0	12	0	Jul 08	70%
1998	3.5	46.5	74.4	0.26	0.48	0.64	174	85%	148	125	84%	0.0	0%	23.8	16%	147	0	2	0	Sep 30	69%
1999	-7.1	45.8	79.8	0.22	0.49	0.64	177	86%	152	111	73%	0.0	0%	41.3	27%	164	0	0	0	Oct 01	83%
2000	-6.5	45.0	73.6	0.23	0.47	0.64	172	100%	172	170	99%	0.0	0%	2.2	1%	172	0	12	10	Feb 14	6%
2001	7.6	44.1	78.0	0.30	0.48	0.64	174	96%	167	141	85%	0.0	0%	25.8	15%	166	0	12	0	Sep 29	42%
2002	14.6	47.0	77.5	0.31	0.50	0.64	181	93%	169	118	70%	0.0	0%	50.6	30%	165	0	11	0	Sep 30	78%
2003	-6.6	43.4	74.9	0.24	0.47	0.64	170	100%	170	154	91%	0.0	0%	15.3	9%	174	0	8	6	Sep 30	25%

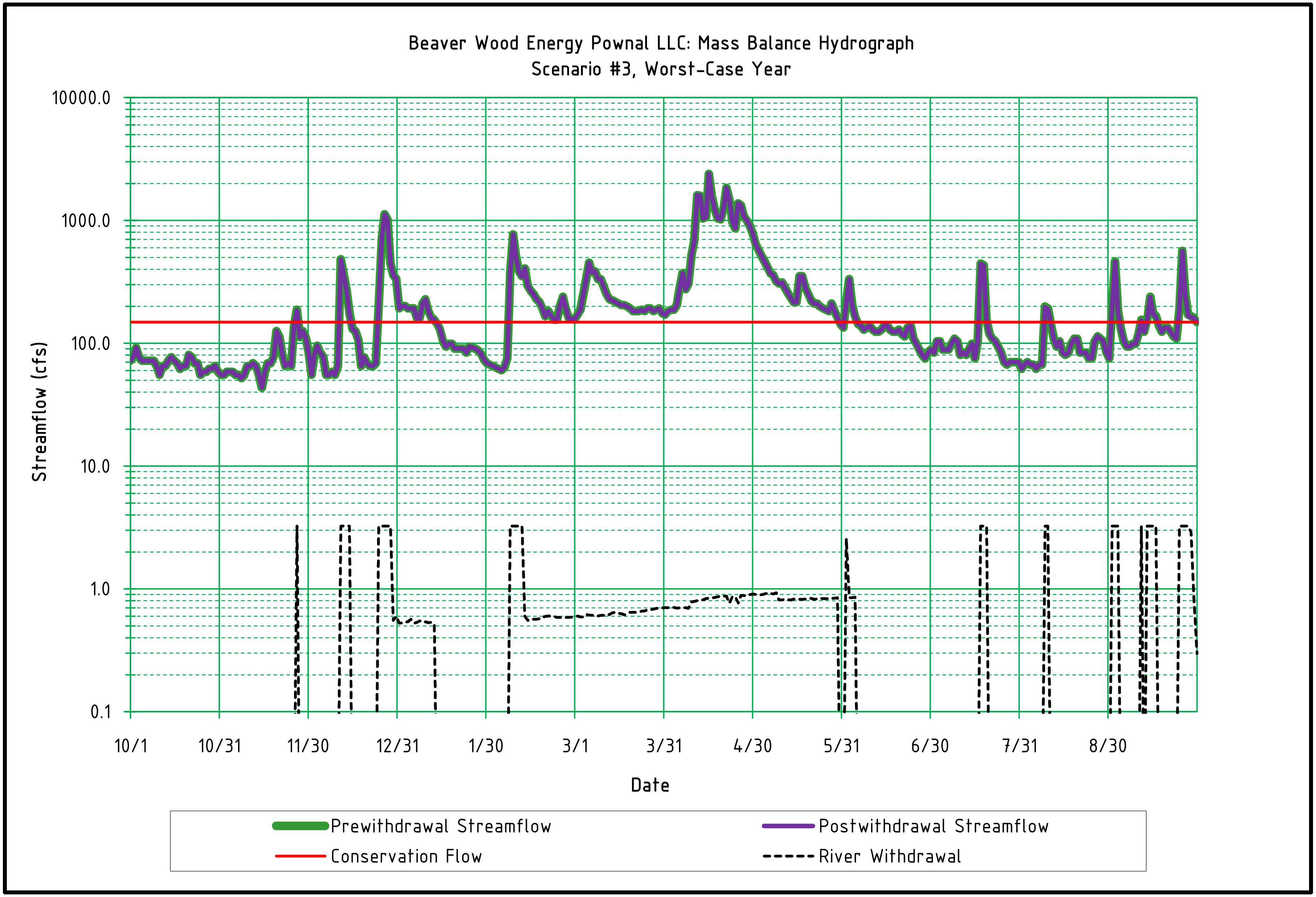
Scenario: 3

Source	Max Pump Rate (gpm)		Minimum Downstream Flow (csm)
Hoosic River:	1,458		0.70
Well:	0		NA
Storage	Volume (Mgal)		
Pond:	12		
Plant	gpm	MGD	
Average Demand:	321.6	0.46	
Peak Demand:	465.2	0.67	

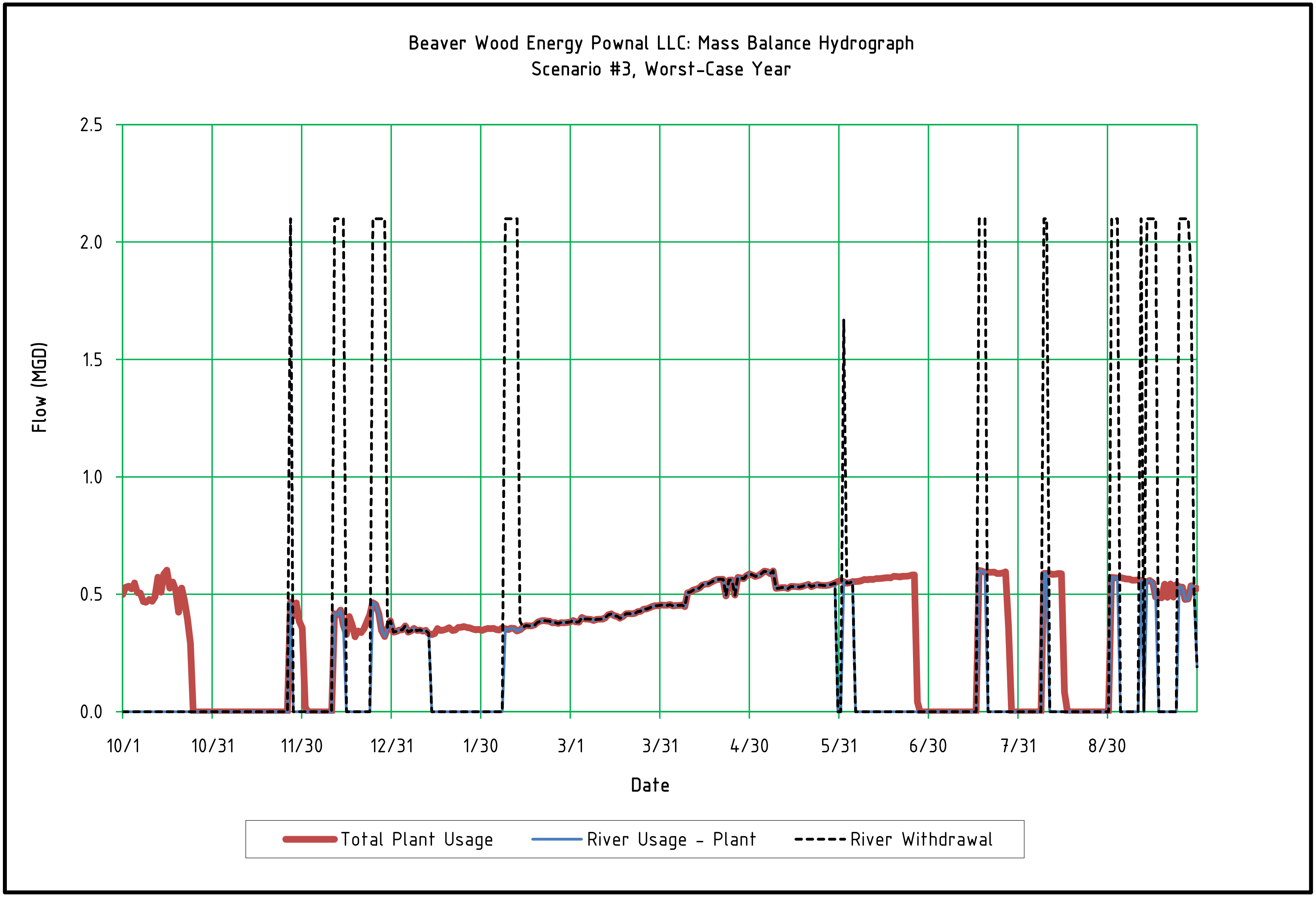
Output For Scenario 3

Water Year	Wet Bulb Temperatures			Plant Demand				Plant Consumption								Source Production		Storage Pond			
	Min	Mean	Max	Min	Mean	Max	Total	% of	Total	River		Well		Storage Pond		River Total	Well Total	Starting Volume	Minimum Volume	Complete Refill	River Flow Exceedence
	F	F	F	MGD	MGD	MGD	Mgal	Demand	Mgal	Mgal	%	Mgal	%	Mgal	%	Mgal	Mgal	(Mgal)	(Mgal)	Date	(Percentile)
2004	-8.7	44.6	74.4	0.23	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	12	12	Oct 01	3%
2005	-7.2	45.0	76.1	0.22	0.48	0.64	174	87%	152	128	84%	0.0	0%	24.8	16%	147	0	12	0	Jul 18	66%
2006	5.7	45.9	77.8	0.28	0.49	0.64	177	100%	177	165	93%	0.0	0%	12.0	7%	183	0	6	3	Sep 30	13%
2007	0.1	44.7	76.5	0.26	0.49	0.64	177	100%	177	153	86%	0.0	0%	24.7	14%	170	0	12	4	Sep 13	27%
2008	0.5	45.4	77.6	0.26	0.49	0.64	177	100%	177	169	96%	0.0	0%	7.9	4%	184	0	4	0	Sep 30	8%
2009	0.3	43.6	74.5	0.26	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.5	0%	172	0	12	12	Sep 27	2%
Average	-2.0	44.3	75.0	0.25	0.48	0.64	174	93%	162	136	84%	0.0	0%	25.9	16%	162	0	7	2	Jul 07	--
Minimum	-16.1	41.3	68.8	0.20	0.46	0.60	168	66%	117	75	64%	0.0	0%	0.0	0%	119	0	0	0	Oct 01	--
Maximum	18.0	47.0	79.8	0.33	0.50	0.64	181	100%	177	172	100%	0.0	0%	55.1	36%	184	0	12	12	Sep 30	--
Worst-Case Year 1965	12.7	44.3	68.8	0.30	0.48	0.60	177	66%	117	75	64%	0.0	0%	42.7	36%	129.1	0.0	0	0	Oct 01	98%
n=	63																				



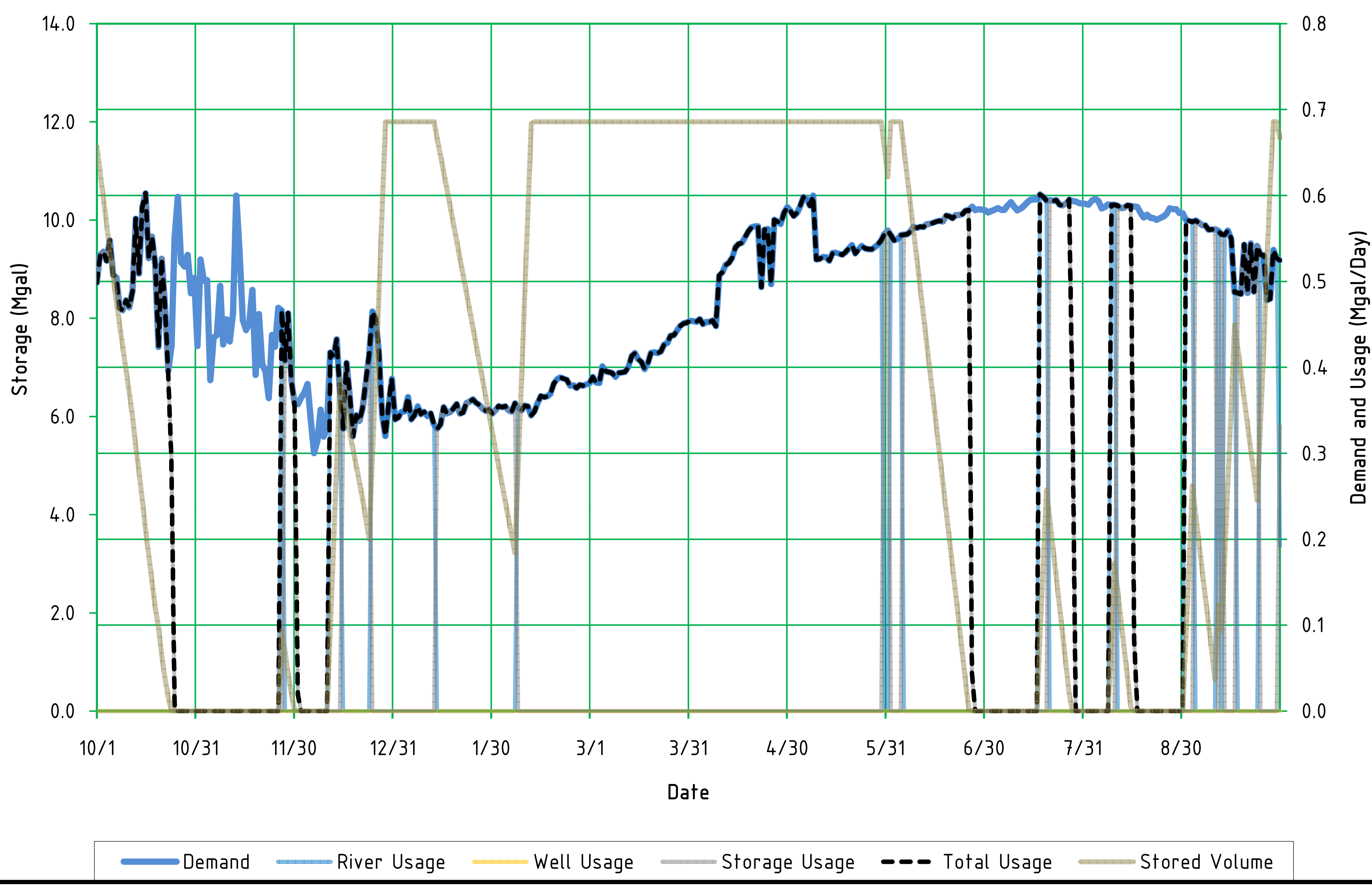


Beaver Wood Energy Pownal LLC: Mass Balance Hydrograph
Scenario #3, Worst-Case Year
10000.0
1000.0
100.0
10.0
1.0
0.1
Streamflow (cfs)
10/1
10/31
11/30
12/31
1/30
3/1
3/31
4/30
5/31
6/30
7/31
8/30
Date
Prewithdrawal Streamflow
Postwithdrawal Streamflow
Conservation Flow
River Withdrawal



F:\57407.00 Beaver Wood Pownal\Data\Hoosic_River\intake_design\MBH_09-22-2010.xlsm, Graph2, 10/12/2010

Beaver Wood Energy Pownal LLC: Mass Balance Hydrograph
Scenario #3, Worst-Case Year



F:\57407.00 Beaver Wood Pownal\Data\Hoosic_River\intake_design\MBH_09-22-2010.xlsm, Graph3, 10/12/2010

Beaver Wood Energy Pownal LLC - Water Needs & Availability Study

Streamflow, Groundwater, and Storage Mass Hydrograph Analysis

Model Output

Scenario: 4

Source	Max Pump Rate (gpm)		Minimum Downstream Flow (csm)
Hoosic River:	1,458		0.70
Well:	0		NA
Storage	Volume (Mgal)		
Pond:	84		
Plant	gpm	MGD	
Average Demand:	321.6	0.46	
Peak Demand:	465.2	0.67	

Output For Scenario 4

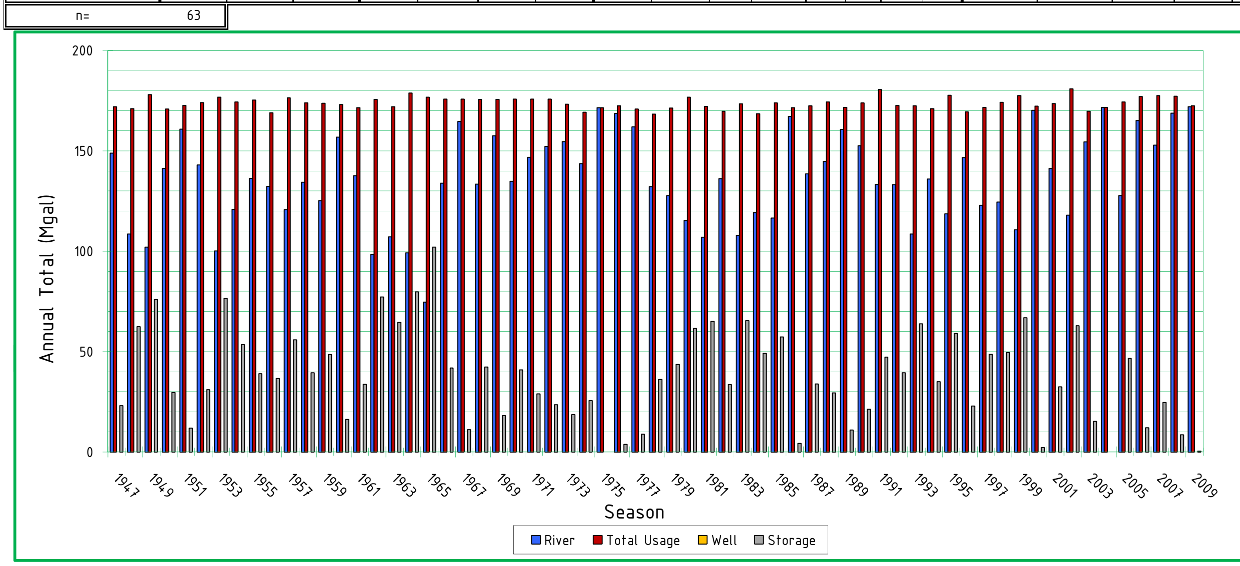
Water Year	Wet Bulb Temperatures Min F	Wet Bulb Temperatures Mean F	Wet Bulb Temperatures Max F	Plant Demand Min MGD	Plant Demand Mean MGD	Plant Demand Max MGD	Plant Demand Total Mgal	Plant Consumption % of Demand	Plant Consumption Total Mgal	River Mgal	River %	Well Mgal	Well %	Storage Pond Mgal	Storage Pond %	Source Production River Total Mgal	Source Production Well Total Mgal	Storage Pond Starting Volume (Mgal)	Storage Pond Minimum Volume (Mgal)	Complete Refill Date	River Flow Exceedence (Percentile)
1947	4.7	44.6	76.6	0.28	0.47	0.64	172	100%	172	149	87%	0.0	0%	23.0	13%	162	0	0	75	Sep 04	31%
1948	-12.5	42.3	77.5	0.21	0.47	0.64	171	100%	171	109	64%	0.0	0%	62.4	36%	153	0	75	57	Sep 30	86%
1949	3.8	46.2	75.8	0.27	0.49	0.64	178	100%	178	102	57%	0.0	0%	76.0	43%	177	0	57	41	Sep 30	92%
1950	-6.8	43.5	72.7	0.24	0.47	0.64	171	100%	171	141	83%	0.0	0%	29.6	17%	196	0	56	52	Sep 30	41%
1951	-2.0	44.8	72.4	0.24	0.47	0.64	173	100%	173	161	93%	0.0	0%	11.9	7%	176	0	81	76	Sep 30	17%
1952	-6.9	44.4	77.6	0.23	0.48	0.64	174	100%	174	143	82%	0.0	0%	31.0	18%	167	0	84	77	Sep 05	39%
1953	3.6	45.3	75.9	0.29	0.48	0.64	177	100%	177	100	57%	0.0	0%	76.5	43%	140	0	77	41	Sep 30	94%
1954	-2.9	44.4	74.6	0.24	0.48	0.64	174	100%	174	121	69%	0.0	0%	53.5	31%	217	0	41	27	Sep 30	72%
1955	-8.1	45.4	77.4	0.23	0.48	0.64	175	100%	175	136	78%	0.0	0%	39.0	22%	175	0	84	59	Sep 26	47%
1956	-9.0	42.3	73.5	0.22	0.46	0.64	169	100%	169	132	78%	0.0	0%	36.7	22%	169	0	84	60	Sep 30	61%
1957	-13.5	44.2	75.6	0.20	0.48	0.64	176	100%	176	121	68%	0.0	0%	55.9	32%	143	0	84	50	Jul 05	73%
1958	-5.2	44.2	74.4	0.23	0.48	0.64	174	100%	174	134	77%	0.0	0%	39.5	23%	207	0	50	36	Sep 30	53%
1959	-1.9	44.0	77.5	0.26	0.48	0.64	174	100%	174	125	72%	0.0	0%	48.5	28%	161	0	84	72	Sep 03	67%
1960	5.0	44.7	72.4	0.27	0.47	0.64	173	100%	173	157	91%	0.0	0%	16.2	9%	185	0	72	69	Sep 30	22%
1961	-7.6	43.9	75.8	0.23	0.47	0.64	171	100%	171	138	80%	0.0	0%	33.8	20%	166	0	84	72	Sep 05	45%
1962	-4.9	43.8	73.3	0.24	0.48	0.64	176	100%	176	98	56%	0.0	0%	77.2	44%	138	0	78	38	Sep 30	97%
1963	-11.2	41.8	75.6	0.22	0.47	0.64	172	100%	172	107	62%	0.0	0%	64.7	38%	171	0	41	36	Sep 30	89%
1964	-2.0	43.8	75.3	0.24	0.49	0.64	179	100%	179	99	55%	0.0	0%	79.7	45%	171	0	40	20	Sep 30	95%
1965	12.7	44.3	68.8	0.30	0.48	0.60	177	100%	177	75	42%	0.0	0%	102.0	58%	202	0	32	1	Sep 30	98%
1966	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	134	76%	0.0	0%	41.9	24%	195	0	57	59	Sep 30	55%
1967	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	165	94%	0.0	0%	11.1	6%	177	0	77	75	Sep 30	14%
1968	-16.1	43.5	76.9	0.20	0.48	0.64	176	100%	176	133	76%	0.0	0%	42.3	24%	148	0	79	51	Sep 30	56%
1969	-6.6	44.0	68.8	0.23	0.48	0.60	176	100%	176	157	90%	0.0	0%	18.1	10%	203	0	51	48	Sep 30	20%
1970	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	135	77%	0.0	0%	40.9	23%	181	0	78	69	Sep 30	52%
1971	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	147	83%	0.0	0%	29.0	17%	176	0	84	75	Sep 12	33%
1972	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	152	87%	0.0	0%	23.6	13%	162	0	84	70	Oct 01	30%
1973	-3.5	45.1	74.1	0.24	0.47	0.64	173	100%	173	155	89%	0.0	0%	18.6	11%	180	0	70	67	Sep 30	23%
1974	-10.8	43.0	73.2	0.22	0.46	0.64	169	100%	169	144	85%	0.0	0%	25.6	15%	176	0	77	66	Sep 30	38%
1975	-0.9	43.4	76.8	0.25	0.47	0.64	171	100%	171	171	100%	0.0	0%	0.0	0%	171	0	84	84	Oct 01	5%
1976	-12.2	44.5	73.8	0.21	0.47	0.64	172	100%	172	169	98%	0.0	0%	3.8	2%	172	0	84	82	Sep 26	9%
1977	-1.6	42.9	77.3	0.26	0.47	0.64	171	100%	171	162	95%	0.0	0%	8.8	5%	171	0	84	81	Sep 13	16%
1978	-2.2	42.6	75.0	0.25	0.46	0.64	168	100%	168	132	78%	0.0	0%	36.2	22%	153	0	84	68	Aug 09	63%
1979	-10.4	43.5	75.6	0.22	0.47	0.64	171	100%	171	128	75%	0.0	0%	43.6	25%	187	0	68	66	Sep 30	64%
1980	0.3	44.1	75.9	0.26	0.48	0.64	177	100%	177	115	65%	0.0	0%	61.5	35%	137	0	84	44	Jul 12	81%
1981	-9.5	42.2	76.9	0.22	0.47	0.64	172	100%	172	107	62%	0.0	0%	65.1	38%	209	0	44	35	Sep 30	91%
1982	-6.9	41.3	77.9	0.23	0.47	0.64	170	100%	170	136	80%	0.0	0%	33.6	20%	147	0	81	58	Sep 30	48%
1983	-4.5	45.9	77.3	0.25	0.47	0.64	173	100%	173	108	62%	0.0	0%	65.4	38%	163	0	58	43	Sep 30	88%
1984	-8.9	43.8	75.1	0.22	0.46	0.64	168	100%	168	119	71%	0.0	0%	49.2	29%	179	0	48	33	Sep 30	75%
1985	1.5	45.1	76.3	0.26	0.48	0.64	174	100%	174	116	67%	0.0	0%	57.3	33%	197	0	58	56	Sep 30	80%
1986	-1.0	44.8	77.4	0.25	0.47	0.64	171	100%	171	167	97%	0.0	0%	4.3	3%	175	0	81	82	Sep 30	11%
1987	-4.7	45.0	76.5	0.24	0.47	0.64	172	100%	172	139	80%	0.0	0%	33.9	20%	172	0	84	72	Sep 16	44%
1988	-5.0	44.3	79.1	0.24	0.48	0.64	174	100%	174	145	83%	0.0	0%	29.5	17%	173	0	84	71	Sep 18	36%
1989	-4.6	44.0	76.0	0.23	0.47	0.64	172	100%	172	161	94%	0.0	0%	11.0	6%	173	0	83	79	Sep 30	19%
1990	-3.8	44.3	73.1	0.24	0.48	0.64	174	100%	174	153	88%	0.0	0%	21.3	12%	173	0	84	73	Sep 27	28%
1991	0.0	46.3	75.8	0.26	0.49	0.64	180	100%	180	133	74%	0.0	0%	47.2	26%	176	0	83	57	Sep 30	58%
1992	4.7	43.9	73.2	0.27	0.47	0.64	173	100%	173	133	77%	0.0	0%	39.4	23%	171	0	78	74	Sep 30	59%
1993	-6.7	43.9	78.4	0.23	0.47	0.64	172	100%	172	109	63%	0.0	0%	63.9	37%	161	0	77	52	Sep 30	84%
1994	-14.9	42.7	77.0	0.20	0.47	0.64	171	100%	171	136	80%	0.0	0%	35.0	20%	186	0	65	67	Sep 30	50%
1995	-4.9	45.6	77.3	0.24	0.49	0.64	178	100%	178	119	67%	0.0	0%	59.1	33%	142	0	80	44	Sep 30	77%
1996	-9.2	43.6	72.7	0.22	0.46	0.64	169	100%	169	147	87%	0.0	0%	22.9	13%	209	0	44	42	Sep 30	34%
1997	-1.9	44.2	76.6	0.25	0.47	0.64	172	100%	172	123	72%	0.0	0%	48.7	28%	149	0	84	60	Jul 08	70%
1998	3.5	46.5	74.4	0.26	0.48	0.64	174	100%	174	125	72%	0.0	0%	49.6	28%	161	0	61	48	Sep 30	69%
1999	-7.1	45.8	79.8	0.22	0.49	0.64	177	100%	177	111	62%	0.0	0%	66.9	38%	203	0	48	45	Sep 30	83%
2000	-6.5	45.0	73.6	0.23	0.47	0.64	172	100%	172	170	99%	0.0	0%	2.2	1%	182	0	74	76	Sep 30	6%
2001	7.6	44.1	78.0	0.30	0.48	0.64	174	100%	174	141	81%	0.0	0%	32.4	19%	167	0	84	65	Jul 28	42%
2002	14.6	47.0	77.5	0.31	0.50	0.64	181	100%	181	118	65%	0.0	0%	62.9	35%	172	0	77	60	Sep 30	78%
2003	-6.6	43.4	74.9	0.24	0.47	0.64	170	100%	170	154	91%	0.0	0%	15.3	9%	186	0	68	68	Sep 30	25%

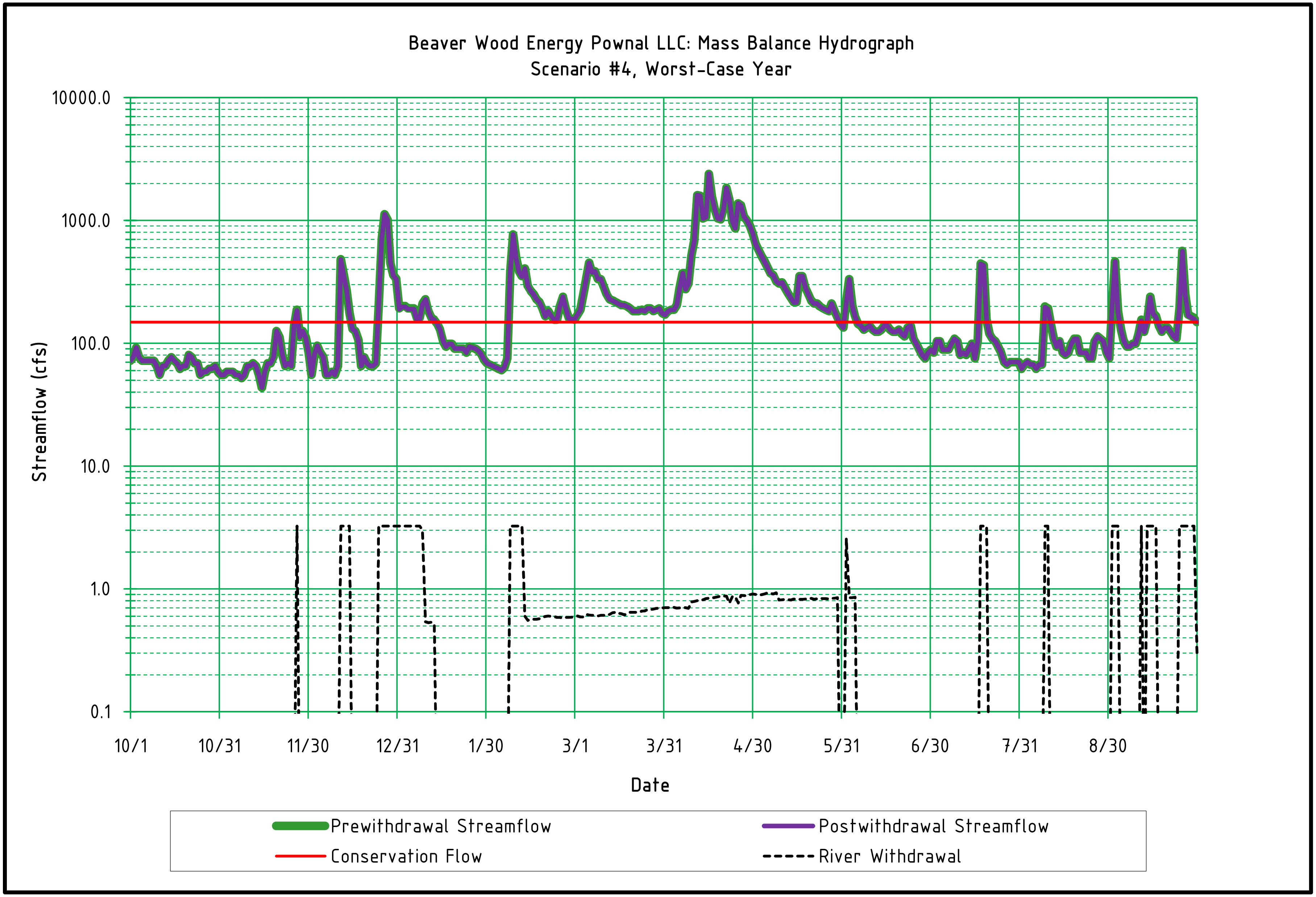
Scenario: 4

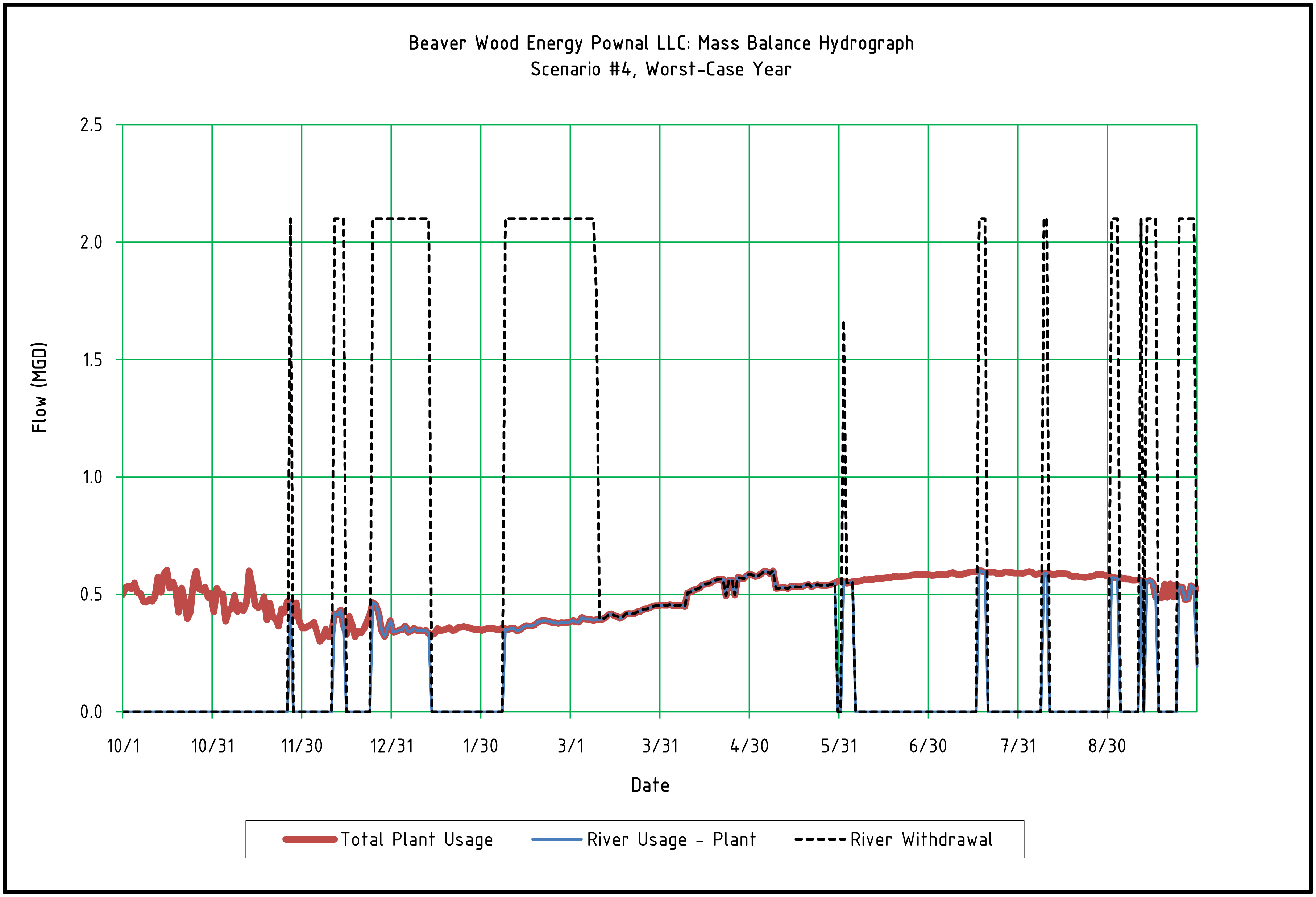
Source	Max Pump Rate (gpm)		Minimum Downstream Flow (csm)
Hoosic River:	1,458		0.70
Well:	0		NA
Storage	Volume (Mgal)		
Pond:	84		
Plant	gpm	MGD	
Average Demand:	321.6	0.46	
Peak Demand:	465.2	0.67	

Output For Scenario 4

Water Year	Wet Bulb Temperatures			Plant Demand				Plant Consumption								Source Production		Storage Pond			
	Min	Mean	Max	Min	Mean	Max	Total	% of	Total	River		Well		Storage Pond		River Total	Well Total	Starting Volume	Minimum Volume	Complete Refill	River Flow Exceedence
	F	F	F	MGD	MGD	MGD	Mgal	Demand	Mgal	Mgal	%	Mgal	%	Mgal	%	Mgal	Mgal	(Mgal)	(Mgal)	Date	(Percentile)
2004	-8.7	44.6	74.4	0.23	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	84	84	Oct 01	3%
2005	-7.2	45.0	76.1	0.22	0.48	0.64	174	100%	174	128	73%	0.0	0%	46.7	27%	147	0	84	50	Jul 18	66%
2006	5.7	45.9	77.8	0.28	0.49	0.64	177	100%	177	165	93%	0.0	0%	12.0	7%	205	0	56	53	Sep 30	13%
2007	0.1	44.7	76.5	0.26	0.49	0.64	177	100%	177	153	86%	0.0	0%	24.7	14%	170	0	84	76	Sep 13	27%
2008	0.5	45.4	77.6	0.26	0.49	0.64	177	100%	177	169	95%	0.0	0%	8.6	5%	185	0	76	71	Sep 30	8%
2009	0.3	43.6	74.5	0.26	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.5	0%	172	0	84	84	Sep 27	2%
Average	-2.0	44.3	75.0	0.25	0.48	0.64	174	100%	174	136	78%	0.0	0%	37.6	22%	174	0	71	59	Sep 02	--
Minimum	-16.1	41.3	68.8	0.20	0.46	0.60	168	100%	168	75	42%	0.0	0%	0.0	0%	137	0	0	1	Oct 01	--
Maximum	18.0	47.0	79.8	0.33	0.50	0.64	181	100%	181	172	100%	0.0	0%	102.0	58%	217	0	84	84	Sep 30	--
Worst-Case Year 1965	12.7	44.3	68.8	0.30	0.48	0.60	177	100%	177	75	42%	0.0	0%	102.0	58%	202.2	0.0	32	1	Sep 30	98%
n=	63																				




Beaver Wood Energy Pownal LLC: Mass Balance Hydrograph
Scenario #4, Worst-Case Year
Streamflow (cfs)
10000.0
1000.0
100.0
10.0
1.0
0.1
10/1
10/31
11/30
12/31
1/30
3/1
3/31
4/30
5/31
6/30
7/31
8/30
Date
Prewithdrawal Streamflow
Postwithdrawal Streamflow
Conservation Flow
River Withdrawal



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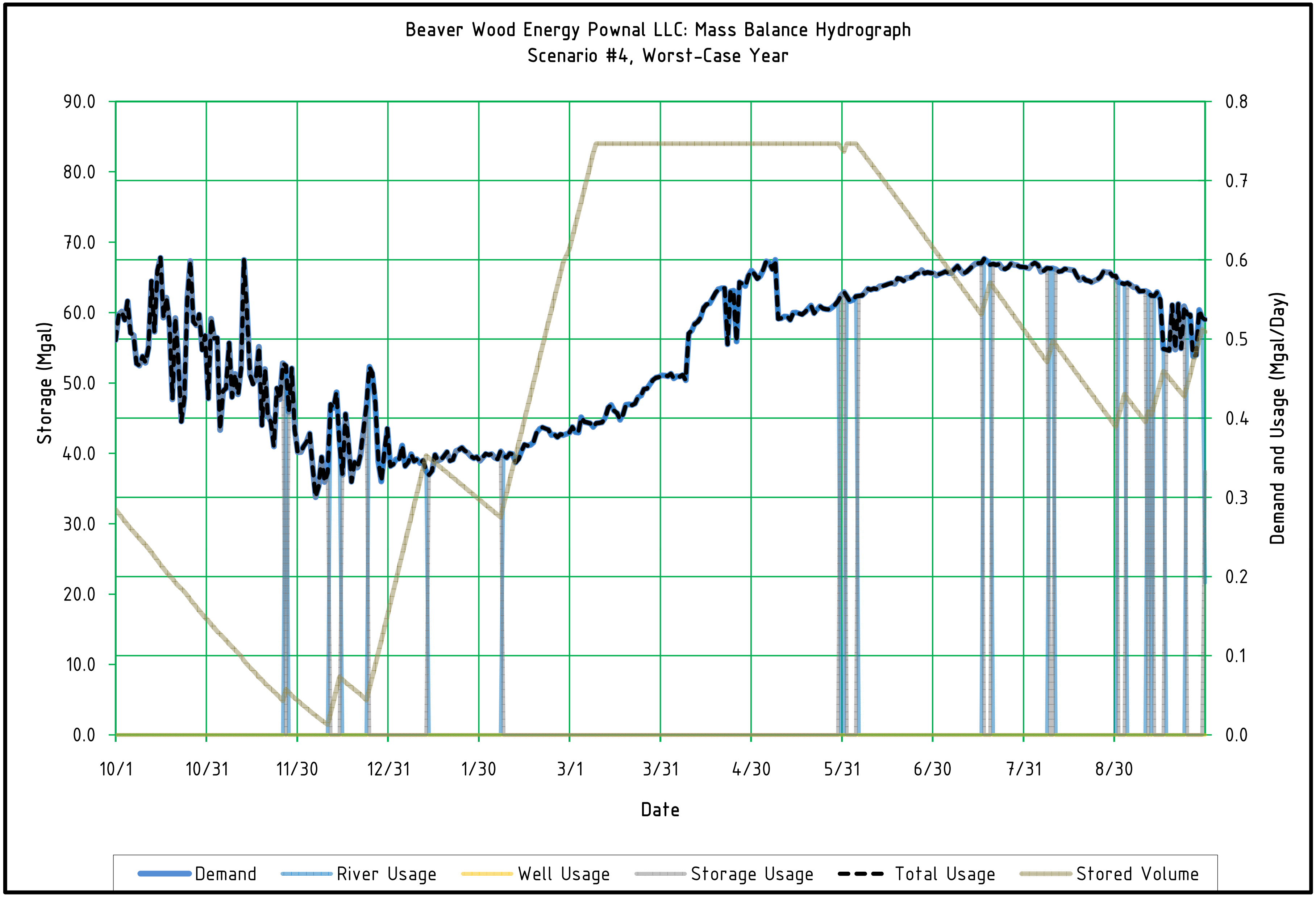

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Beaver Wood Energy Pownal LLC - Water Needs & Availability Study
Streamflow, Groundwater, and Storage Mass Hydrograph Analysis

Model Output

Scenario: 5

Source	Max Pump Rate (gpm)		Minimum Downstream Flow (csm)
Hoosic River:	1,458		0.70
Well:	500		NA
Storage	Volume (Mgal)		
Pond:	0		
Plant	gpm	MGD	
Average Demand:	321.6	0.46	
Peak Demand:	465.2	0.67	

Output For Scenario 5

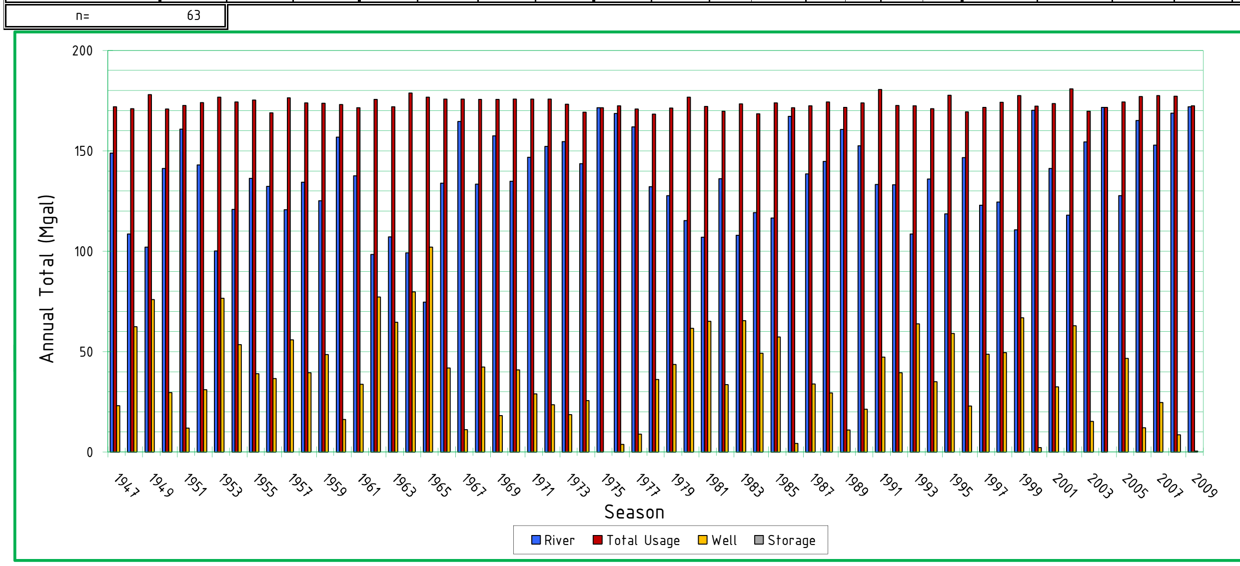
Water Year	Wet Bulb Temperatures Min	Mean	Max	Plant Demand Min	Mean	Max	Total	Plant Consumption % of Demand	Total	River		Well		Storage Pond		Source Production River Total	Well Total	Storage Pond Starting Volume	Minimum Volume	Complete Refill Date	River Flow Exceedence
	F	F	F	MGD	MGD	MGD	Mgal		Mgal	Mgal	%	Mgal	%	Mgal	%	Mgal	Mgal	(Mgal)	(Mgal)		(Percentile)
1947	4.7	44.6	76.6	0.28	0.47	0.64	172	100%	172	149	87%	23.0	13%	0.0	0%	149	23	0	0	Oct 01	31%
1948	-12.5	42.3	77.5	0.21	0.47	0.64	171	100%	171	109	64%	62.4	36%	0.0	0%	109	62	0	0	Oct 01	86%
1949	3.8	46.2	75.8	0.27	0.49	0.64	178	100%	178	102	57%	76.0	43%	0.0	0%	102	76	0	0	Oct 01	92%
1950	-6.8	43.5	72.7	0.24	0.47	0.64	171	100%	171	141	83%	29.6	17%	0.0	0%	141	30	0	0	Oct 01	41%
1951	-2.0	44.8	72.4	0.24	0.47	0.64	173	100%	173	161	93%	11.9	7%	0.0	0%	161	12	0	0	Oct 01	17%
1952	-6.9	44.4	77.6	0.23	0.48	0.64	174	100%	174	143	82%	31.0	18%	0.0	0%	143	31	0	0	Oct 01	39%
1953	3.6	45.3	75.9	0.29	0.48	0.64	177	100%	177	100	57%	76.5	43%	0.0	0%	100	77	0	0	Oct 01	94%
1954	-2.9	44.4	74.6	0.24	0.48	0.64	174	100%	174	121	69%	53.5	31%	0.0	0%	121	53	0	0	Oct 01	72%
1955	-8.1	45.4	77.4	0.23	0.48	0.64	175	100%	175	136	78%	39.0	22%	0.0	0%	136	39	0	0	Oct 01	47%
1956	-9.0	42.3	73.5	0.22	0.46	0.64	169	100%	169	132	78%	36.7	22%	0.0	0%	132	37	0	0	Oct 01	61%
1957	-13.5	44.2	75.6	0.20	0.48	0.64	176	100%	176	121	68%	55.9	32%	0.0	0%	121	56	0	0	Oct 01	73%
1958	-5.2	44.2	74.4	0.23	0.48	0.64	174	100%	174	134	77%	39.5	23%	0.0	0%	134	39	0	0	Oct 01	53%
1959	-1.9	44.0	77.5	0.26	0.48	0.64	174	100%	174	125	72%	48.5	28%	0.0	0%	125	48	0	0	Oct 01	67%
1960	5.0	44.7	72.4	0.27	0.47	0.64	173	100%	173	157	91%	16.2	9%	0.0	0%	157	16	0	0	Oct 01	22%
1961	-7.6	43.9	75.8	0.23	0.47	0.64	171	100%	171	138	80%	33.8	20%	0.0	0%	138	34	0	0	Oct 01	45%
1962	-4.9	43.8	73.3	0.24	0.48	0.64	176	100%	176	98	56%	77.2	44%	0.0	0%	98	77	0	0	Oct 01	97%
1963	-11.2	41.8	75.6	0.22	0.47	0.64	172	100%	172	107	62%	64.7	38%	0.0	0%	107	65	0	0	Oct 01	89%
1964	-2.0	43.8	75.3	0.24	0.49	0.64	179	100%	179	99	55%	79.7	45%	0.0	0%	99	80	0	0	Oct 01	95%
1965	12.7	44.3	68.8	0.30	0.48	0.60	177	100%	177	75	42%	102.0	58%	0.0	0%	75	102	0	0	Oct 01	98%
1966	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	134	76%	41.9	24%	0.0	0%	134	42	0	0	Oct 01	55%
1967	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	165	94%	11.1	6%	0.0	0%	165	11	0	0	Oct 01	14%
1968	-16.1	43.5	76.9	0.20	0.48	0.64	176	100%	176	133	76%	42.3	24%	0.0	0%	133	42	0	0	Oct 01	56%
1969	-6.6	44.0	68.8	0.23	0.48	0.60	176	100%	176	157	90%	18.1	10%	0.0	0%	157	18	0	0	Oct 01	20%
1970	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	135	77%	40.9	23%	0.0	0%	135	41	0	0	Oct 01	52%
1971	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	147	83%	29.0	17%	0.0	0%	147	29	0	0	Oct 01	33%
1972	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	152	87%	23.6	13%	0.0	0%	152	24	0	0	Oct 01	30%
1973	-3.5	45.1	74.1	0.24	0.47	0.64	173	100%	173	155	89%	18.6	11%	0.0	0%	155	19	0	0	Oct 01	23%
1974	-10.8	43.0	73.2	0.22	0.46	0.64	169	100%	169	144	85%	25.6	15%	0.0	0%	144	26	0	0	Oct 01	38%
1975	-0.9	43.4	76.8	0.25	0.47	0.64	171	100%	171	171	100%	0.0	0%	0.0	0%	171	0	0	0	Oct 01	5%
1976	-12.2	44.5	73.8	0.21	0.47	0.64	172	100%	172	169	98%	3.8	2%	0.0	0%	169	4	0	0	Oct 01	9%
1977	-1.6	42.9	77.3	0.26	0.47	0.64	171	100%	171	162	95%	8.8	5%	0.0	0%	162	9	0	0	Oct 01	16%
1978	-2.2	42.6	75.0	0.25	0.46	0.64	168	100%	168	132	78%	36.2	22%	0.0	0%	132	36	0	0	Oct 01	63%
1979	-10.4	43.5	75.6	0.22	0.47	0.64	171	100%	171	128	75%	43.6	25%	0.0	0%	128	44	0	0	Oct 01	64%
1980	0.3	44.1	75.9	0.26	0.48	0.64	177	100%	177	115	65%	61.5	35%	0.0	0%	115	62	0	0	Oct 01	81%
1981	-9.5	42.2	76.9	0.22	0.47	0.64	172	100%	172	107	62%	65.1	38%	0.0	0%	107	65	0	0	Oct 01	91%
1982	-6.9	41.3	77.9	0.23	0.47	0.64	170	100%	170	136	80%	33.6	20%	0.0	0%	136	34	0	0	Oct 01	48%
1983	-4.5	45.9	77.3	0.25	0.47	0.64	173	100%	173	108	62%	65.4	38%	0.0	0%	108	65	0	0	Oct 01	88%
1984	-8.9	43.8	75.1	0.22	0.46	0.64	168	100%	168	119	71%	49.2	29%	0.0	0%	119	49	0	0	Oct 01	75%
1985	1.5	45.1	76.3	0.26	0.48	0.64	174	100%	174	116	67%	57.3	33%	0.0	0%	116	57	0	0	Oct 01	80%
1986	-1.0	44.8	77.4	0.25	0.47	0.64	171	100%	171	167	97%	4.3	3%	0.0	0%	167	4	0	0	Oct 01	11%
1987	-4.7	45.0	76.5	0.24	0.47	0.64	172	100%	172	139	80%	33.9	20%	0.0	0%	139	34	0	0	Oct 01	44%
1988	-5.0	44.3	79.1	0.24	0.48	0.64	174	100%	174	145	83%	29.5	17%	0.0	0%	145	29	0	0	Oct 01	36%
1989	-4.6	44.0	76.0	0.23	0.47	0.64	172	100%	172	161	94%	11.0	6%	0.0	0%	161	11	0	0	Oct 01	19%
1990	-3.8	44.3	73.1	0.24	0.48	0.64	174	100%	174	153	88%	21.3	12%	0.0	0%	153	21	0	0	Oct 01	28%
1991	0.0	46.3	75.8	0.26	0.49	0.64	180	100%	180	133	74%	47.2	26%	0.0	0%	133	47	0	0	Oct 01	58%
1992	4.7	43.9	73.2	0.27	0.47	0.64	173	100%	173	133	77%	39.4	23%	0.0	0%	133	39	0	0	Oct 01	59%
1993	-6.7	43.9	78.4	0.23	0.47	0.64	172	100%	172	109	63%	63.9	37%	0.0	0%	109	64	0	0	Oct 01	84%
1994	-14.9	42.7	77.0	0.20	0.47	0.64	171	100%	171	136	80%	35.0	20%	0.0	0%	136	35	0	0	Oct 01	50%
1995	-4.9	45.6	77.3	0.24	0.49	0.64	178	100%	178	119	67%	59.1	33%	0.0	0%	119	59	0	0	Oct 01	77%
1996	-9.2	43.6	72.7	0.22	0.46	0.64	169	100%	169	147	87%	22.9	13%	0.0	0%	147	23	0	0	Oct 01	34%
1997	-1.9	44.2	76.6	0.25	0.47	0.64	172	100%	172	123	72%	48.7	28%	0.0	0%	123	49	0	0	Oct 01	70%
1998	3.5	46.5	74.4	0.26	0.48	0.64	174	100%	174	125	72%	49.6	28%	0.0	0%	125	50	0	0	Oct 01	69%
1999	-7.1	45.8	79.8	0.22	0.49	0.64	177	100%	177	111	62%	66.9	38%	0.0	0%	111	67	0	0	Oct 01	83%
2000	-6.5	45.0	73.6	0.23	0.47	0.64	172	100%	172	170	99%	2.2	1%	0.0	0%	170	2	0	0	Oct 01	6%
2001	7.6	44.1	78.0	0.30	0.48	0.64	174	100%	174	141	81%	32.4	19%	0.0	0%	141	32	0	0	Oct 01	42%
2002	14.6	47.0	77.5	0.31	0.50	0.64	181	100%	181	118	65%	62.9	35%	0.0	0%	118	63	0	0	Oct 01	78%
2003	-6.6	43.4	74.9	0.24	0.47	0.64	170	100%	170	154	91%	15.3	9%	0.0	0%	154	15	0	0	Oct 01	25%

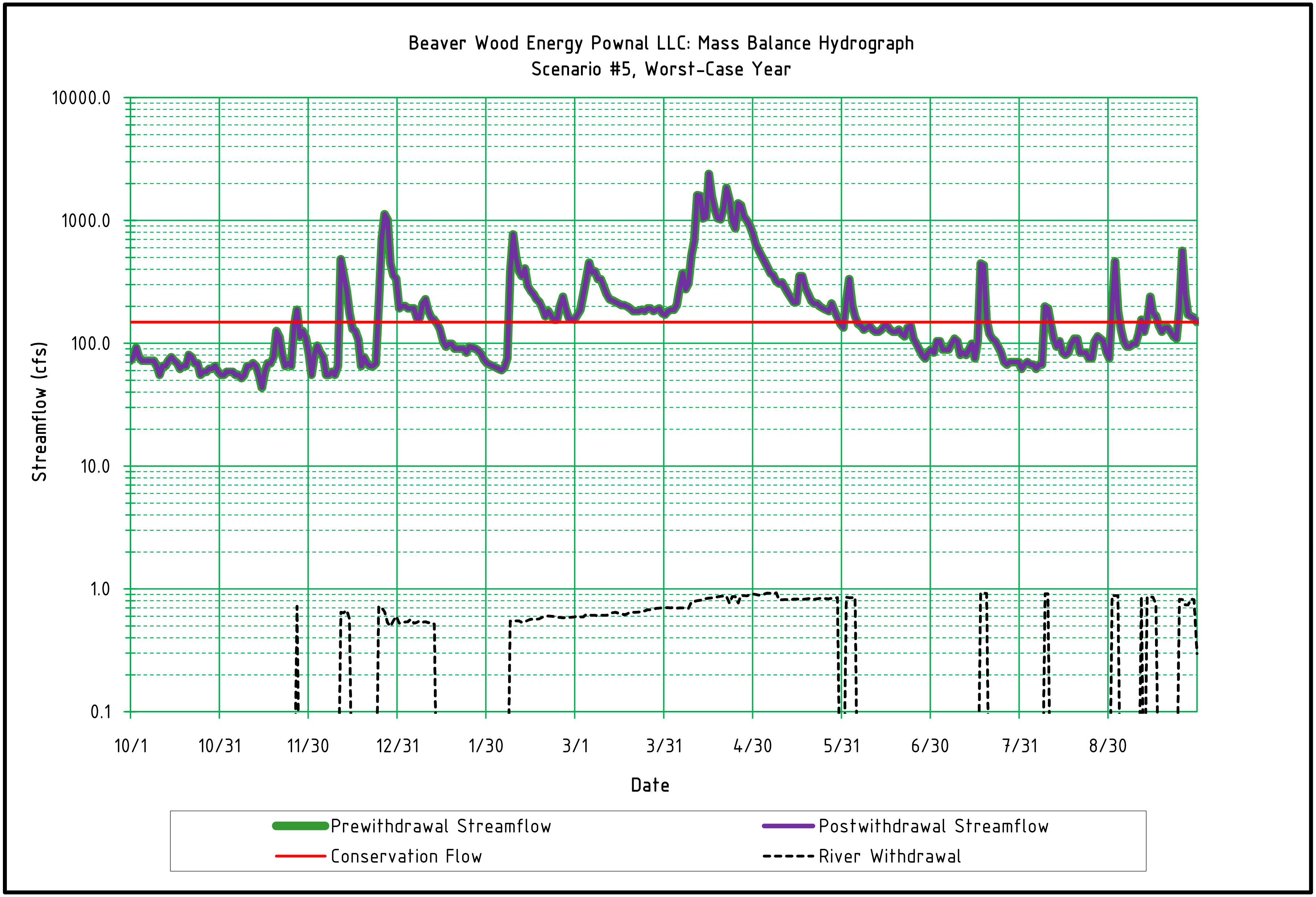
Scenario: 5

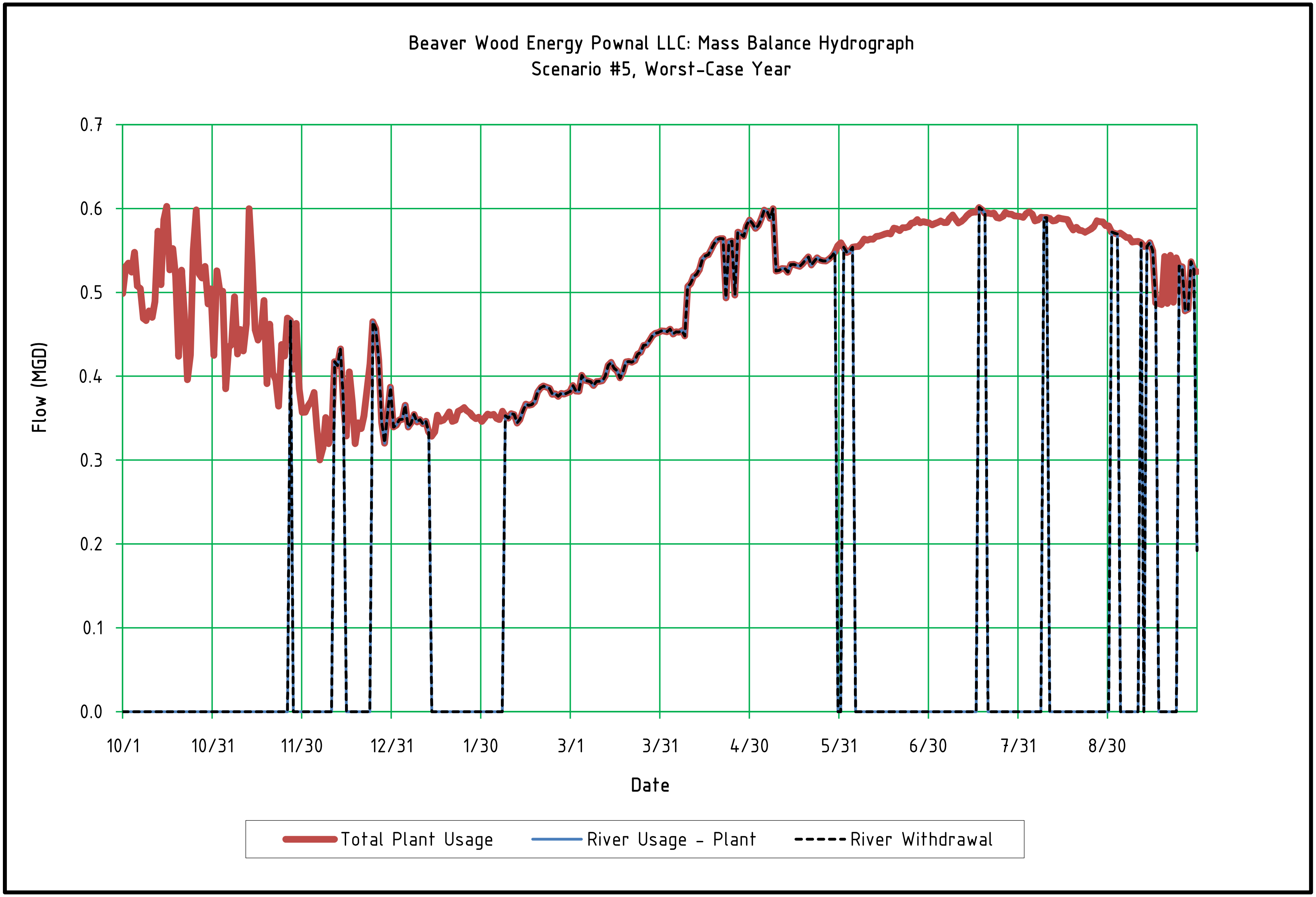
Source	Max Pump Rate (gpm)		Minimum Downstream Flow (csm)
Hoosic River:	1,458		0.70
Well:	500		NA
Storage	Volume (Mgal)		
Pond:	0		
Plant	gpm	MGD	
Average Demand:	321.6	0.46	
Peak Demand:	465.2	0.67	

Output For Scenario 5

Water Year	Wet Bulb Temperatures			Plant Demand				Plant Consumption								Source Production		Storage Pond			
	Min	Mean	Max	Min	Mean	Max	Total	% of	Total	River		Well		Storage Pond		River Total	Well Total	Starting Volume	Minimum Volume	Complete Refill	River Flow Exceedence
	F	F	F	MGD	MGD	MGD	Mgal	Demand	Mgal	Mgal	%	Mgal	%	Mgal	%	Mgal	Mgal	(Mgal)	(Mgal)	Date	(Percentile)
2004	-8.7	44.6	74.4	0.23	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	0	0	Oct 01	3%
2005	-7.2	45.0	76.1	0.22	0.48	0.64	174	100%	174	128	73%	46.7	27%	0.0	0%	128	47	0	0	Oct 01	66%
2006	5.7	45.9	77.8	0.28	0.49	0.64	177	100%	177	165	93%	12.0	7%	0.0	0%	165	12	0	0	Oct 01	13%
2007	0.1	44.7	76.5	0.26	0.49	0.64	177	100%	177	153	86%	24.7	14%	0.0	0%	153	25	0	0	Oct 01	27%
2008	0.5	45.4	77.6	0.26	0.49	0.64	177	100%	177	169	95%	8.6	5%	0.0	0%	169	9	0	0	Oct 01	8%
2009	0.3	43.6	74.5	0.26	0.47	0.64	172	100%	172	172	100%	0.5	0%	0.0	0%	172	0	0	0	Oct 01	2%
Average	-2.0	44.3	75.0	0.25	0.48	0.64	174	100%	174	136	78%	37.6	22%	0.0	0%	136	38	0	0	Oct 01	--
Minimum	-16.1	41.3	68.8	0.20	0.46	0.60	168	100%	168	75	42%	0.0	0%	0.0	0%	75	0	0	0	Oct 01	--
Maximum	18.0	47.0	79.8	0.33	0.50	0.64	181	100%	181	172	100%	102.0	58%	0.0	0%	172	102	0	0	Oct 01	--
Worst-Case Year 1965	12.7	44.3	68.8	0.30	0.48	0.60	177	100%	177	75	42%	102.0	58%	0.0	0%	74.7	102.0	0	0	Oct 01	98%
n=	63																				




Beaver Wood Energy Pownal LLC: Mass Balance Hydrograph
Scenario #5, Worst-Case Year
Streamflow (cfs)
10000.0
1000.0
100.0
10.0
1.0
0.1
10/1
10/31
11/30
12/31
1/30
3/1
3/31
4/30
5/31
6/30
7/31
8/30
Date
Prewithdrawal Streamflow
Postwithdrawal Streamflow
Conservation Flow
River Withdrawal



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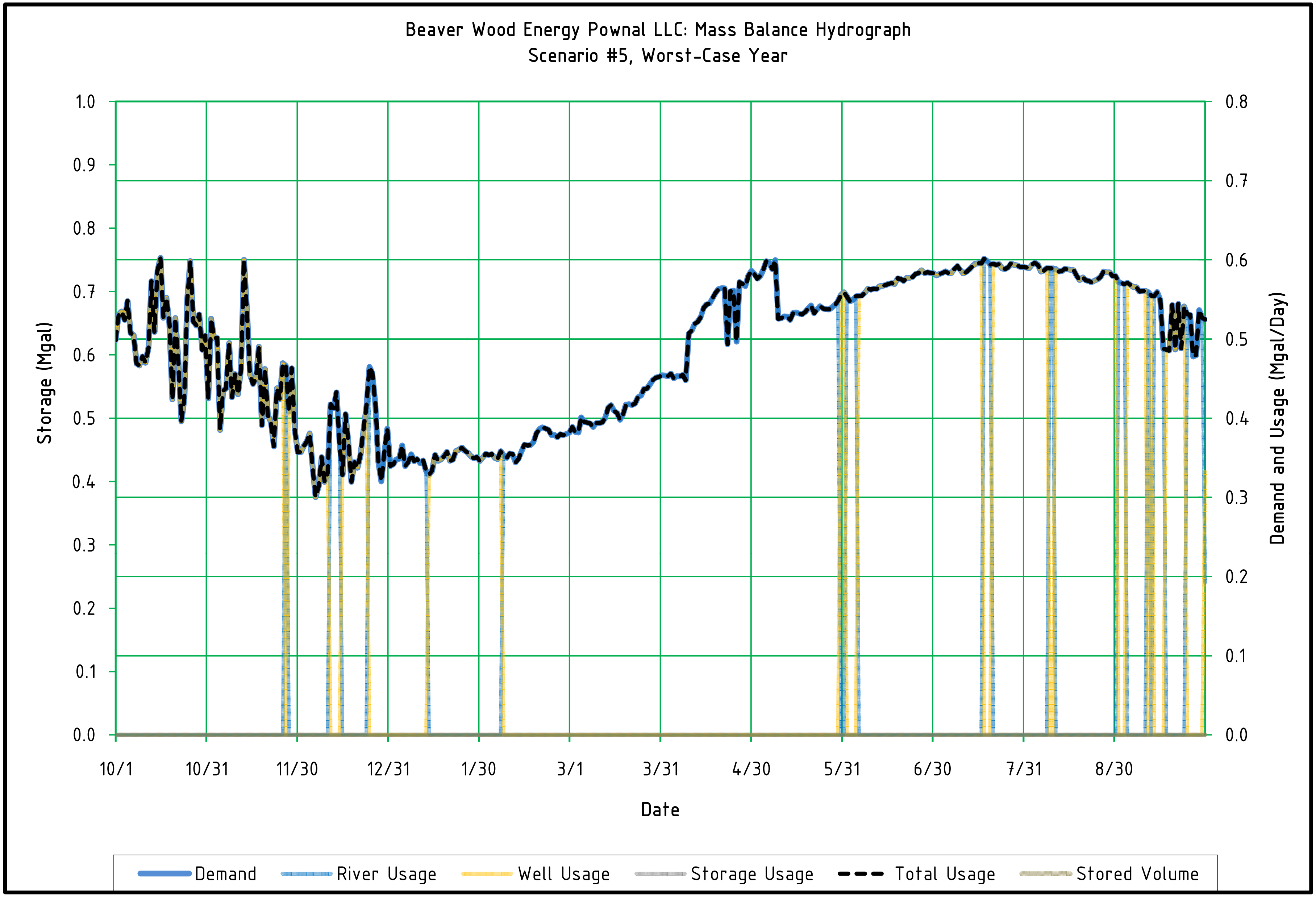

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Beaver Wood Energy Pownal LLC - Water Needs & Availability Study
Streamflow, Groundwater, and Storage Mass Hydrograph Analysis

Model Output

Scenario: 6

Source	Max Pump Rate (gpm)		Minimum Downstream Flow (csm)
Hoosic River:	1,458		0.70
Well:	39		NA
Storage	Volume (Mgal)		
Pond:	0		
Plant	gpm	MGD	
Average Demand:	321.6	0.46	
Peak Demand:	465.2	0.67	

Output For Scenario 6

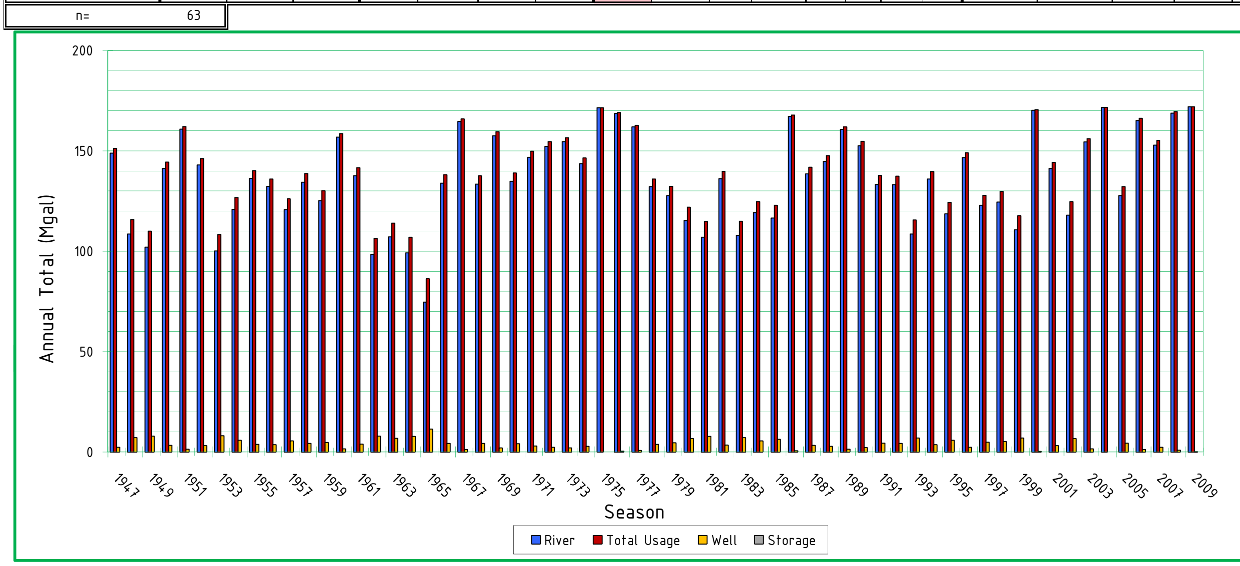
Water Year	Wet Bulb Temperatures Min F	Mean F	Max F	Plant Demand Min MGD	Mean MGD	Max MGD	Total Mgal	% of Demand	Plant Consumption Total Mgal	River Mgal	River %	Well Mgal	Well %	Storage Pond Mgal	Storage Pond %	Source Production River Total Mgal	Well Total Mgal	Storage Pond Starting Volume (Mgal)	Minimum Volume (Mgal)	Complete Refill Date	River Flow Exceedence (Percentile)
1947	4.7	44.6	76.6	0.28	0.47	0.64	172	88%	151	149	98%	2.4	2%	0.0	0%	149	2	0	0	Oct 01	31%
1948	-12.5	42.3	77.5	0.21	0.47	0.64	171	68%	116	109	94%	7.2	6%	0.0	0%	109	7	0	0	Oct 01	86%
1949	3.8	46.2	75.8	0.27	0.49	0.64	178	62%	110	102	93%	8.0	7%	0.0	0%	102	8	0	0	Oct 01	92%
1950	-6.8	43.5	72.7	0.24	0.47	0.64	171	85%	144	141	98%	3.3	2%	0.0	0%	141	3	0	0	Oct 01	41%
1951	-2.0	44.8	72.4	0.24	0.47	0.64	173	94%	162	161	99%	1.3	1%	0.0	0%	161	1	0	0	Oct 01	17%
1952	-6.9	44.4	77.6	0.23	0.48	0.64	174	84%	146	143	98%	3.1	2%	0.0	0%	143	3	0	0	Oct 01	39%
1953	3.6	45.3	75.9	0.29	0.48	0.64	177	61%	108	100	93%	8.1	7%	0.0	0%	100	8	0	0	Oct 01	94%
1954	-2.9	44.4	74.6	0.24	0.48	0.64	174	73%	127	121	95%	5.9	5%	0.0	0%	121	6	0	0	Oct 01	72%
1955	-8.1	45.4	77.4	0.23	0.48	0.64	175	80%	140	136	97%	3.8	3%	0.0	0%	136	4	0	0	Oct 01	47%
1956	-9.0	42.3	73.5	0.22	0.46	0.64	169	80%	136	132	97%	3.7	3%	0.0	0%	132	4	0	0	Oct 01	61%
1957	-13.5	44.2	75.6	0.20	0.48	0.64	176	71%	126	121	96%	5.6	4%	0.0	0%	121	6	0	0	Oct 01	73%
1958	-5.2	44.2	74.4	0.23	0.48	0.64	174	80%	139	134	97%	4.3	3%	0.0	0%	134	4	0	0	Oct 01	53%
1959	-1.9	44.0	77.5	0.26	0.48	0.64	174	75%	130	125	96%	4.8	4%	0.0	0%	125	5	0	0	Oct 01	67%
1960	5.0	44.7	72.4	0.27	0.47	0.64	173	92%	158	157	99%	1.6	1%	0.0	0%	157	2	0	0	Oct 01	22%
1961	-7.6	43.9	75.8	0.23	0.47	0.64	171	83%	142	138	97%	4.0	3%	0.0	0%	138	4	0	0	Oct 01	45%
1962	-4.9	43.8	73.3	0.24	0.48	0.64	176	61%	106	98	93%	7.9	7%	0.0	0%	98	8	0	0	Oct 01	97%
1963	-11.2	41.8	75.6	0.22	0.47	0.64	172	66%	114	107	94%	6.8	6%	0.0	0%	107	7	0	0	Oct 01	89%
1964	-2.0	43.8	75.3	0.24	0.49	0.64	179	60%	107	99	93%	7.8	7%	0.0	0%	99	8	0	0	Oct 01	95%
1965	12.7	44.3	68.8	0.30	0.48	0.60	177	49%	86	75	87%	11.5	13%	0.0	0%	75	12	0	0	Oct 01	98%
1966	18.0	44.3	68.8	0.33	0.48	0.60	176	79%	138	134	97%	4.2	3%	0.0	0%	134	4	0	0	Oct 01	55%
1967	18.0	44.3	68.8	0.33	0.48	0.60	176	94%	166	165	99%	1.2	1%	0.0	0%	165	1	0	0	Oct 01	14%
1968	-16.1	43.5	76.9	0.20	0.48	0.64	176	78%	138	133	97%	4.2	3%	0.0	0%	133	4	0	0	Oct 01	56%
1969	-6.6	44.0	68.8	0.23	0.48	0.60	176	91%	159	157	99%	2.0	1%	0.0	0%	157	2	0	0	Oct 01	20%
1970	18.0	44.3	68.8	0.33	0.48	0.60	176	79%	139	135	97%	4.2	3%	0.0	0%	135	4	0	0	Oct 01	52%
1971	18.0	44.3	68.8	0.33	0.48	0.60	176	85%	150	147	98%	3.0	2%	0.0	0%	147	3	0	0	Oct 01	33%
1972	18.0	44.3	68.8	0.33	0.48	0.60	176	88%	155	152	98%	2.4	2%	0.0	0%	152	2	0	0	Oct 01	30%
1973	-3.5	45.1	74.1	0.24	0.47	0.64	173	90%	157	155	99%	2.0	1%	0.0	0%	155	2	0	0	Oct 01	23%
1974	-10.8	43.0	73.2	0.22	0.46	0.64	169	87%	146	144	98%	2.9	2%	0.0	0%	144	3	0	0	Oct 01	38%
1975	-0.9	43.4	76.8	0.25	0.47	0.64	171	100%	171	171	100%	0.0	0%	0.0	0%	171	0	0	0	Oct 01	5%
1976	-12.2	44.5	73.8	0.21	0.47	0.64	172	98%	169	169	100%	0.4	0%	0.0	0%	169	0	0	0	Oct 01	9%
1977	-1.6	42.9	77.3	0.26	0.47	0.64	171	95%	163	162	99%	0.8	1%	0.0	0%	162	1	0	0	Oct 01	16%
1978	-2.2	42.6	75.0	0.25	0.46	0.64	168	81%	136	132	97%	3.8	3%	0.0	0%	132	4	0	0	Oct 01	63%
1979	-10.4	43.5	75.6	0.22	0.47	0.64	171	77%	132	128	97%	4.5	3%	0.0	0%	128	5	0	0	Oct 01	64%
1980	0.3	44.1	75.9	0.26	0.48	0.64	177	69%	122	115	95%	6.7	5%	0.0	0%	115	7	0	0	Oct 01	81%
1981	-9.5	42.2	76.9	0.22	0.47	0.64	172	67%	115	107	93%	7.8	7%	0.0	0%	107	8	0	0	Oct 01	91%
1982	-6.9	41.3	77.9	0.23	0.47	0.64	170	82%	140	136	97%	3.5	3%	0.0	0%	136	4	0	0	Oct 01	48%
1983	-4.5	45.9	77.3	0.25	0.47	0.64	173	66%	115	108	94%	7.1	6%	0.0	0%	108	7	0	0	Oct 01	88%
1984	-8.9	43.8	75.1	0.22	0.46	0.64	168	74%	125	119	96%	5.5	4%	0.0	0%	119	6	0	0	Oct 01	75%
1985	1.5	45.1	76.3	0.26	0.48	0.64	174	71%	123	116	95%	6.3	5%	0.0	0%	116	6	0	0	Oct 01	80%
1986	-1.0	44.8	77.4	0.25	0.47	0.64	171	98%	168	167	100%	0.6	0%	0.0	0%	167	1	0	0	Oct 01	11%
1987	-4.7	45.0	76.5	0.24	0.47	0.64	172	82%	142	139	98%	3.3	2%	0.0	0%	139	3	0	0	Oct 01	44%
1988	-5.0	44.3	79.1	0.24	0.48	0.64	174	85%	148	145	98%	2.9	2%	0.0	0%	145	3	0	0	Oct 01	36%
1989	-4.6	44.0	76.0	0.23	0.47	0.64	172	94%	162	161	99%	1.4	1%	0.0	0%	161	1	0	0	Oct 01	19%
1990	-3.8	44.3	73.1	0.24	0.48	0.64	174	89%	155	153	99%	2.2	1%	0.0	0%	153	2	0	0	Oct 01	28%
1991	0.0	46.3	75.8	0.26	0.49	0.64	180	76%	138	133	97%	4.5	3%	0.0	0%	133	4	0	0	Oct 01	58%
1992	4.7	43.9	73.2	0.27	0.47	0.64	173	80%	137	133	97%	4.3	3%	0.0	0%	133	4	0	0	Oct 01	59%
1993	-6.7	43.9	78.4	0.23	0.47	0.64	172	67%	116	109	94%	7.0	6%	0.0	0%	109	7	0	0	Oct 01	84%
1994	-14.9	42.7	77.0	0.20	0.47	0.64	171	82%	140	136	97%	3.6	3%	0.0	0%	136	4	0	0	Oct 01	50%
1995	-4.9	45.6	77.3	0.24	0.49	0.64	178	70%	124	119	95%	5.8	5%	0.0	0%	119	6	0	0	Oct 01	77%
1996	-9.2	43.6	72.7	0.22	0.46	0.64	169	88%	149	147	98%	2.4	2%	0.0	0%	147	2	0	0	Oct 01	34%
1997	-1.9	44.2	76.6	0.25	0.47	0.64	172	75%	128	123	96%	4.9	4%	0.0	0%	123	5	0	0	Oct 01	70%
1998	3.5	46.5	74.4	0.26	0.48	0.64	174	75%	130	125	96%	5.2	4%	0.0	0%	125	5	0	0	Oct 01	69%
1999	-7.1	45.8	79.8	0.22	0.49	0.64	177	66%	118	111	94%	7.0	6%	0.0	0%	111	7	0	0	Oct 01	83%
2000	-6.5	45.0	73.6	0.23	0.47	0.64	172	99%	170	170	100%	0.3	0%	0.0	0%	170	0	0	0	Oct 01	6%
2001	7.6	44.1	78.0	0.30	0.48	0.64	174	83%	144	141	98%	3.1	2%	0.0	0%	141	3	0	0	Oct 01	42%
2002	14.6	47.0	77.5	0.31	0.50	0.64	181	69%	125	118	95%	6.7	5%	0.0	0%	118	7	0	0	Oct 01	78%
2003	-6.6	43.4	74.9	0.24	0.47	0.64	170	92%	156	154	99%	1.5	1%	0.0	0%	154	2	0	0	Oct 01	25%

Scenario: 6

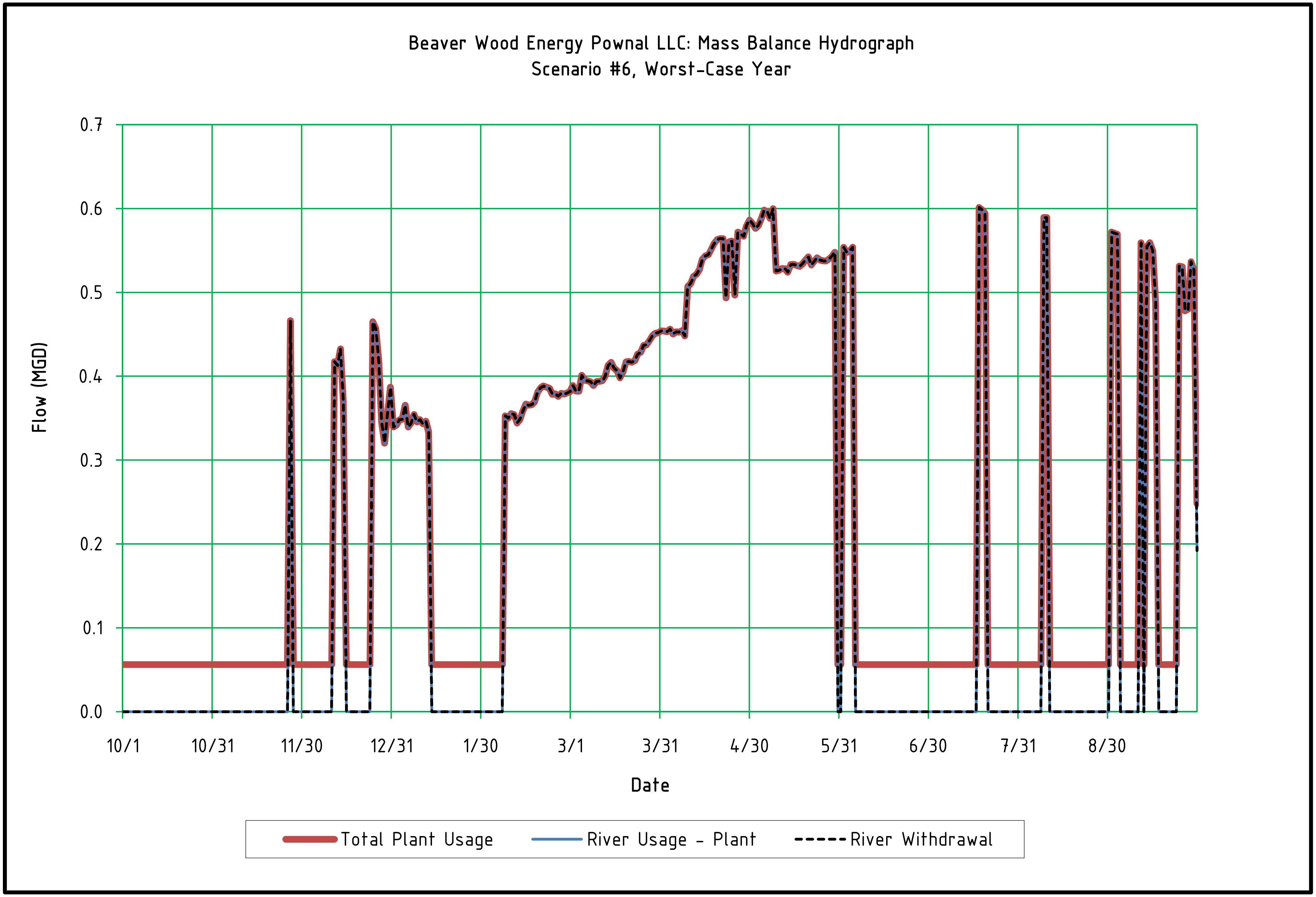
Source	Max Pump Rate (gpm)		Minimum Downstream Flow (csm)
Hoosic River:	1,458		0.70
Well:	39		NA
Storage	Volume (Mgal)		
Pond:	0		
Plant	gpm	MGD	
Average Demand:	321.6	0.46	
Peak Demand:	465.2	0.67	

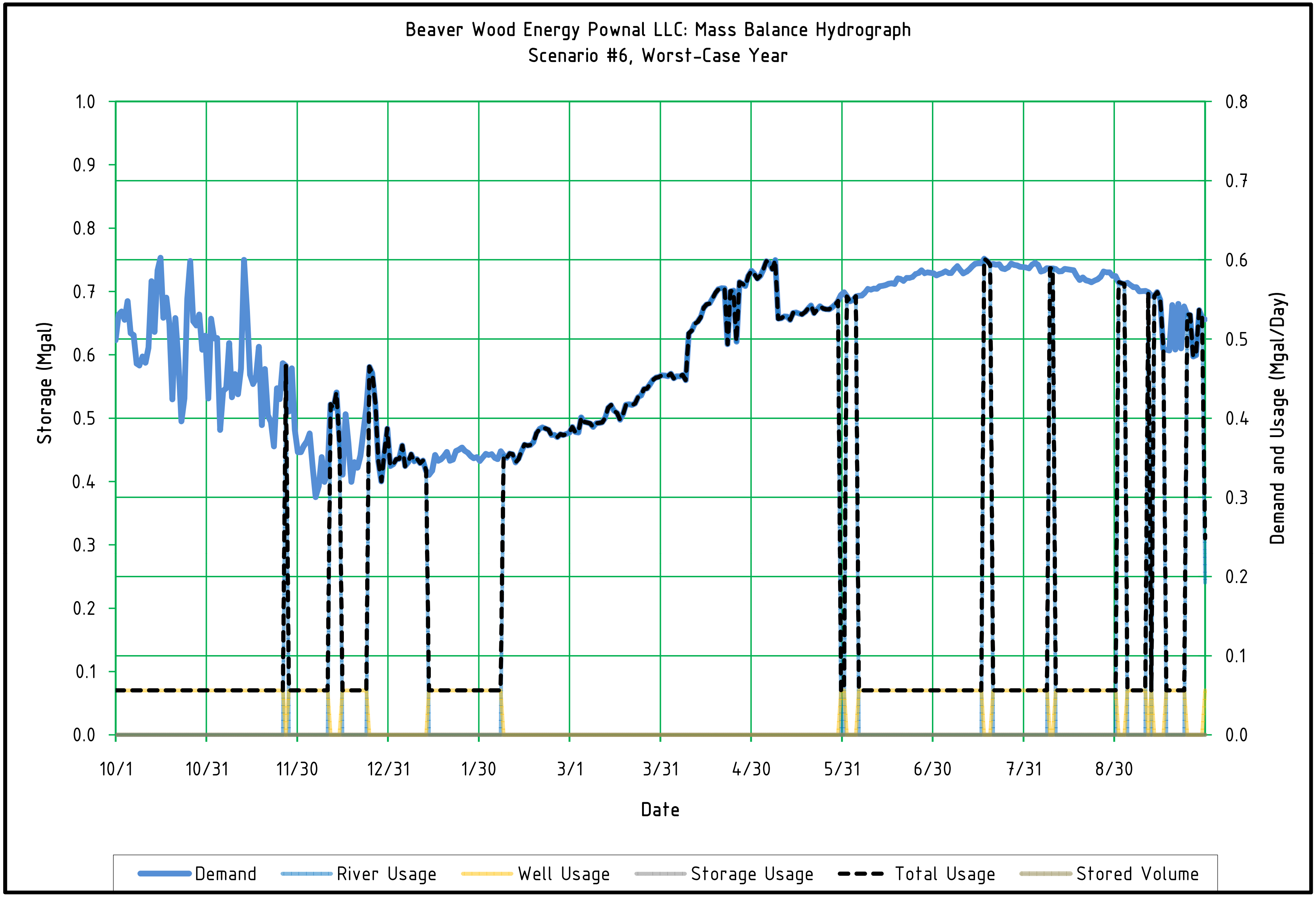
Output For Scenario 6

Water Year	Wet Bulb Temperatures			Plant Demand				Plant Consumption								Source Production		Storage Pond			
	Min	Mean	Max	Min	Mean	Max	Total	% of	Total	River		Well		Storage Pond		River Total	Well Total	Starting Volume	Minimum Volume	Complete Refill	River Flow Exceedence
	F	F	F	MGD	MGD	MGD	Mgal	Demand	Mgal	Mgal	%	Mgal	%	Mgal	%	Mgal	Mgal	(Mgal)	(Mgal)	Date	(Percentile)
2004	-8.7	44.6	74.4	0.23	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	0	0	Oct 01	3%
2005	-7.2	45.0	76.1	0.22	0.48	0.64	174	76%	132	128	97%	4.5	3%	0.0	0%	128	4	0	0	Oct 01	66%
2006	5.7	45.9	77.8	0.28	0.49	0.64	177	94%	166	165	99%	1.2	1%	0.0	0%	165	1	0	0	Oct 01	13%
2007	0.1	44.7	76.5	0.26	0.49	0.64	177	87%	155	153	98%	2.4	2%	0.0	0%	153	2	0	0	Oct 01	27%
2008	0.5	45.4	77.6	0.26	0.49	0.64	177	96%	170	169	99%	0.9	1%	0.0	0%	169	1	0	0	Oct 01	8%
2009	0.3	43.6	74.5	0.26	0.47	0.64	172	100%	172	172	100%	0.1	0%	0.0	0%	172	0	0	0	Oct 01	2%
Average	-2.0	44.3	75.0	0.25	0.48	0.64	174	81%	140	136	97%	4.0	3%	0.0	0%	136	4	0	0	Oct 01	--
Minimum	-16.1	41.3	68.8	0.20	0.46	0.60	168	49%	86	75	87%	0.0	0%	0.0	0%	75	0	0	0	Oct 01	--
Maximum	18.0	47.0	79.8	0.33	0.50	0.64	181	100%	172	172	100%	11.5	13%	0.0	0%	172	12	0	0	Oct 01	--
Worst-Case Year 1965	12.7	44.3	68.8	0.30	0.48	0.60	177	49%	86	75	87%	11.5	13%	0.0	0%	74.7	11.5	0	0	Oct 01	98%
n=	63																				



Beaver Wood Energy Pownal LLC: Mass Balance Hydrograph
Scenario #6, Worst-Case Year


Beaver Wood Energy Pownal LLC: Mass Balance Hydrograph
Scenario #6, Worst-Case Year
Flow (MGD)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
10/1
10/31
11/30
12/31
1/30
3/1
3/31
4/30
5/31
6/30
7/31
8/30
Date
Total Plant Usage
River Usage - Plant
River Withdrawal



F:\57407.00 Beaver Wood Pownal\Data\Hoosic_River\intake_design\MBH_09-22-2010.xlsm, Graph3, 10/12/2010

Beaver Wood Energy Pownal LLC - Water Needs & Availability Study

Streamflow, Groundwater, and Storage Mass Hydrograph Analysis

Model Output

Scenario: 7

Source	Max Pump Rate (gpm)		Minimum Downstream Flow (csm)
Hoosic River:	1,458		0.70
Well:	39		NA
Storage	Volume (Mgal)		
Pond:	12		
Plant	gpm	MGD	
Average Demand:	321.6	0.46	
Peak Demand:	465.2	0.67	

Output For Scenario 7

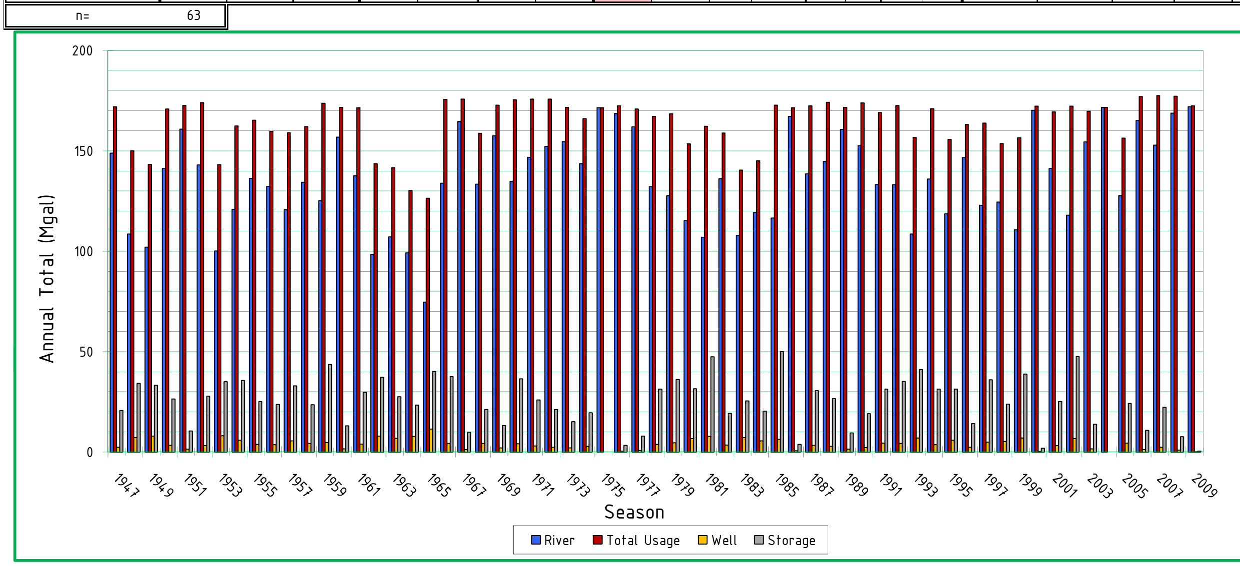
Water Year	Wet Bulb Temperatures Min	Mean	Max	Plant Demand Min	Mean	Max	Total	% of Demand	Plant Consumption Total	River		Well		Storage Pond		Source Production River Total	Well Total	Storage Pond Starting Volume	Minimum Volume	Complete Refill Date	River Flow Exceedence
	F	F	F	MGD	MGD	MGD	Mgal		Mgal	Mgal	%	Mgal	%	Mgal	%	Mgal	Mgal	(Mgal)	(Mgal)		(Percentile)
1947	4.7	44.6	76.6	0.28	0.47	0.64	172	100%	172	149	87%	2.4	1%	20.6	12%	161	3	0	4	Sep 04	31%
1948	-12.5	42.3	77.5	0.21	0.47	0.64	171	88%	150	109	72%	7.2	5%	34.2	23%	138	8	4	0	Sep 30	86%
1949	3.8	46.2	75.8	0.27	0.49	0.64	178	80%	143	102	71%	8.0	6%	33.3	23%	143	9	0	0	Oct 01	92%
1950	-6.8	43.5	72.7	0.24	0.47	0.64	171	100%	171	141	83%	3.3	2%	26.4	15%	167	4	9	6	Sep 30	41%
1951	-2.0	44.8	72.4	0.24	0.47	0.64	173	100%	173	161	93%	1.3	1%	10.6	6%	174	2	9	5	Sep 30	17%
1952	-6.9	44.4	77.6	0.23	0.48	0.64	174	100%	174	143	82%	3.1	2%	27.8	16%	165	4	12	6	Sep 04	39%
1953	3.6	45.3	75.9	0.29	0.48	0.64	177	81%	143	100	70%	8.1	6%	35.0	24%	127	9	7	0	Sep 30	94%
1954	-2.9	44.4	74.6	0.24	0.48	0.64	174	93%	162	121	74%	5.9	4%	35.7	22%	167	7	0	0	Oct 01	72%
1955	-8.1	45.4	77.4	0.23	0.48	0.64	175	94%	165	136	83%	3.8	2%	25.1	15%	161	4	12	0	Sep 25	47%
1956	-9.0	42.3	73.5	0.22	0.46	0.64	169	95%	160	132	83%	3.7	2%	23.7	15%	155	4	12	0	Sep 22	61%
1957	-13.5	44.2	75.6	0.20	0.48	0.64	176	90%	159	121	76%	5.6	3%	32.9	21%	141	6	12	0	Jul 04	73%
1958	-5.2	44.2	74.4	0.23	0.48	0.64	174	93%	162	134	83%	4.3	3%	23.5	14%	168	5	1	0	Sep 30	53%
1959	-1.9	44.0	77.5	0.26	0.48	0.64	174	100%	174	125	72%	4.8	3%	43.7	25%	157	6	12	1	Sep 02	67%
1960	5.0	44.7	72.4	0.27	0.47	0.64	173	99%	172	157	91%	1.6	1%	13.1	8%	180	2	1	0	Sep 30	22%
1961	-7.6	43.9	75.8	0.23	0.47	0.64	171	100%	171	138	80%	4.0	2%	29.8	17%	162	5	12	2	Sep 04	45%
1962	-4.9	43.8	73.3	0.24	0.48	0.64	176	82%	144	98	69%	7.9	6%	37.3	26%	130	9	8	0	Sep 30	97%
1963	-11.2	41.8	75.6	0.22	0.47	0.64	172	82%	142	107	76%	6.8	5%	27.5	19%	134	8	3	0	Sep 30	89%
1964	-2.0	43.8	75.3	0.24	0.49	0.64	179	73%	130	99	76%	7.8	6%	23.4	18%	118	8	3	0	Sep 30	95%
1965	12.7	44.3	68.8	0.30	0.48	0.60	177	72%	126	75	59%	11.5	9%	40.1	32%	125	13	0	0	Oct 01	98%
1966	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	134	76%	4.2	2%	37.5	21%	167	5	12	0	Sep 30	55%
1967	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	165	94%	1.2	1%	9.8	6%	174	1	8	4	Sep 30	14%
1968	-16.1	43.5	76.9	0.20	0.48	0.64	176	90%	159	133	84%	4.2	3%	21.1	13%	146	5	8	0	Sep 30	56%
1969	-6.6	44.0	68.8	0.23	0.48	0.60	176	98%	173	157	91%	2.0	1%	13.2	8%	177	3	0	0	Sep 30	20%
1970	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	175	135	77%	4.2	2%	36.4	21%	175	5	7	0	Sep 30	52%
1971	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	147	83%	3.0	2%	26.0	15%	172	4	12	4	Sep 12	33%
1972	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	152	87%	2.4	1%	21.2	12%	162	3	12	1	Oct 01	30%
1973	-3.5	45.1	74.1	0.24	0.47	0.64	173	99%	172	155	90%	2.0	1%	15.1	9%	175	3	1	0	Sep 30	23%
1974	-10.8	43.0	73.2	0.22	0.46	0.64	169	98%	166	144	87%	2.9	2%	19.5	12%	167	4	7	0	Sep 30	38%
1975	-0.9	43.4	76.8	0.25	0.47	0.64	171	100%	171	171	100%	0.0	0%	0.0	0%	171	0	12	12	Oct 01	5%
1976	-12.2	44.5	73.8	0.21	0.47	0.64	172	100%	172	169	98%	0.4	0%	3.3	2%	172	1	12	10	Sep 26	9%
1977	-1.6	42.9	77.3	0.26	0.47	0.64	171	100%	171	162	95%	0.8	0%	8.0	5%	170	1	12	9	Sep 13	16%
1978	-2.2	42.6	75.0	0.25	0.46	0.64	168	99%	167	132	79%	3.8	2%	31.4	19%	151	4	12	0	Aug 08	63%
1979	-10.4	43.5	75.6	0.22	0.47	0.64	171	98%	168	128	76%	4.5	3%	36.1	21%	174	6	0	0	Oct 01	64%
1980	0.3	44.1	75.9	0.26	0.48	0.64	177	87%	153	115	75%	6.7	4%	31.5	21%	134	7	12	0	Jul 12	81%
1981	-9.5	42.2	76.9	0.22	0.47	0.64	172	94%	162	107	66%	7.8	5%	47.5	29%	165	10	0	0	Oct 01	91%
1982	-6.9	41.3	77.9	0.23	0.47	0.64	170	94%	159	136	86%	3.5	2%	19.2	12%	143	4	12	0	Sep 30	48%
1983	-4.5	45.9	77.3	0.25	0.47	0.64	173	81%	140	108	77%	7.1	5%	25.5	18%	133	8	0	0	Oct 01	88%
1984	-8.9	43.8	75.1	0.22	0.46	0.64	168	86%	145	119	82%	5.5	4%	20.4	14%	139	6	0	0	Oct 01	75%
1985	1.5	45.1	76.3	0.26	0.48	0.64	174	99%	173	116	67%	6.3	4%	49.9	29%	176	8	0	0	Sep 30	80%
1986	-1.0	44.8	77.4	0.25	0.47	0.64	171	100%	171	167	97%	0.6	0%	3.7	2%	171	1	12	10	Sep 30	11%
1987	-4.7	45.0	76.5	0.24	0.47	0.64	172	100%	172	139	80%	3.3	2%	30.6	18%	168	4	12	2	Sep 14	44%
1988	-5.0	44.3	79.1	0.24	0.48	0.64	174	100%	174	145	83%	2.9	2%	26.5	15%	169	4	12	0	Sep 18	36%
1989	-4.6	44.0	76.0	0.23	0.47	0.64	172	100%	172	161	94%	1.4	1%	9.6	6%	171	2	11	7	Sep 30	19%
1990	-3.8	44.3	73.1	0.24	0.48	0.64	174	100%	174	153	88%	2.2	1%	19.1	11%	170	3	12	2	Sep 27	28%
1991	0.0	46.3	75.8	0.26	0.49	0.64	180	94%	169	133	79%	4.5	3%	31.3	19%	164	6	11	0	Sep 30	58%
1992	4.7	43.9	73.2	0.27	0.47	0.64	173	100%	173	133	77%	4.3	2%	35.2	20%	162	5	12	4	Aug 19	59%
1993	-6.7	43.9	78.4	0.23	0.47	0.64	172	91%	157	109	69%	7.0	4%	41.1	26%	153	9	7	0	Sep 30	84%
1994	-14.9	42.7	77.0	0.20	0.47	0.64	171	100%	171	136	80%	3.6	2%	31.4	18%	164	5	12	1	Aug 19	50%
1995	-4.9	45.6	77.3	0.24	0.49	0.64	178	88%	156	119	76%	5.8	4%	31.3	20%	139	7	10	0	Sep 30	77%
1996	-9.2	43.6	72.7	0.22	0.46	0.64	169	96%	163	147	90%	2.4	1%	14.2	9%	172	3	0	0	Sep 30	34%
1997	-1.9	44.2	76.6	0.25	0.47	0.64	172	96%	164	123	75%	4.9	3%	36.0	22%	148	6	12	0	Jul 08	70%
1998	3.5	46.5	74.4	0.26	0.48	0.64	174	88%	154	125	81%	5.2	3%	23.9	16%	146	6	2	0	Sep 30	69%
1999	-7.1	45.8	79.8	0.22	0.49	0.64	177	88%	156	111	71%	7.0	4%	38.9	25%	160	9	0	0	Oct 01	83%
2000	-6.5	45.0	73.6	0.23	0.47	0.64	172	100%	172	170	99%	0.3	0%	1.9	1%	172	0	12	10	Feb 14	6%
2001	7.6	44.1	78.0	0.30	0.48	0.64	174	98%	169	141	83%	3.1	2%	25.2	15%	165	4	12	0	Sep 29	42%
2002	14.6	47.0	77.5	0.31	0.50	0.64	181	95%	172	118	68%	6.7	4%	47.6	28%	162	8	12	0	Sep 30	78%
2003	-6.6	43.4	74.9	0.24	0.47	0.64	170	100%	170	154	91%	1.5	1%	13.8	8%	171	2	9	7	Sep 30	25%

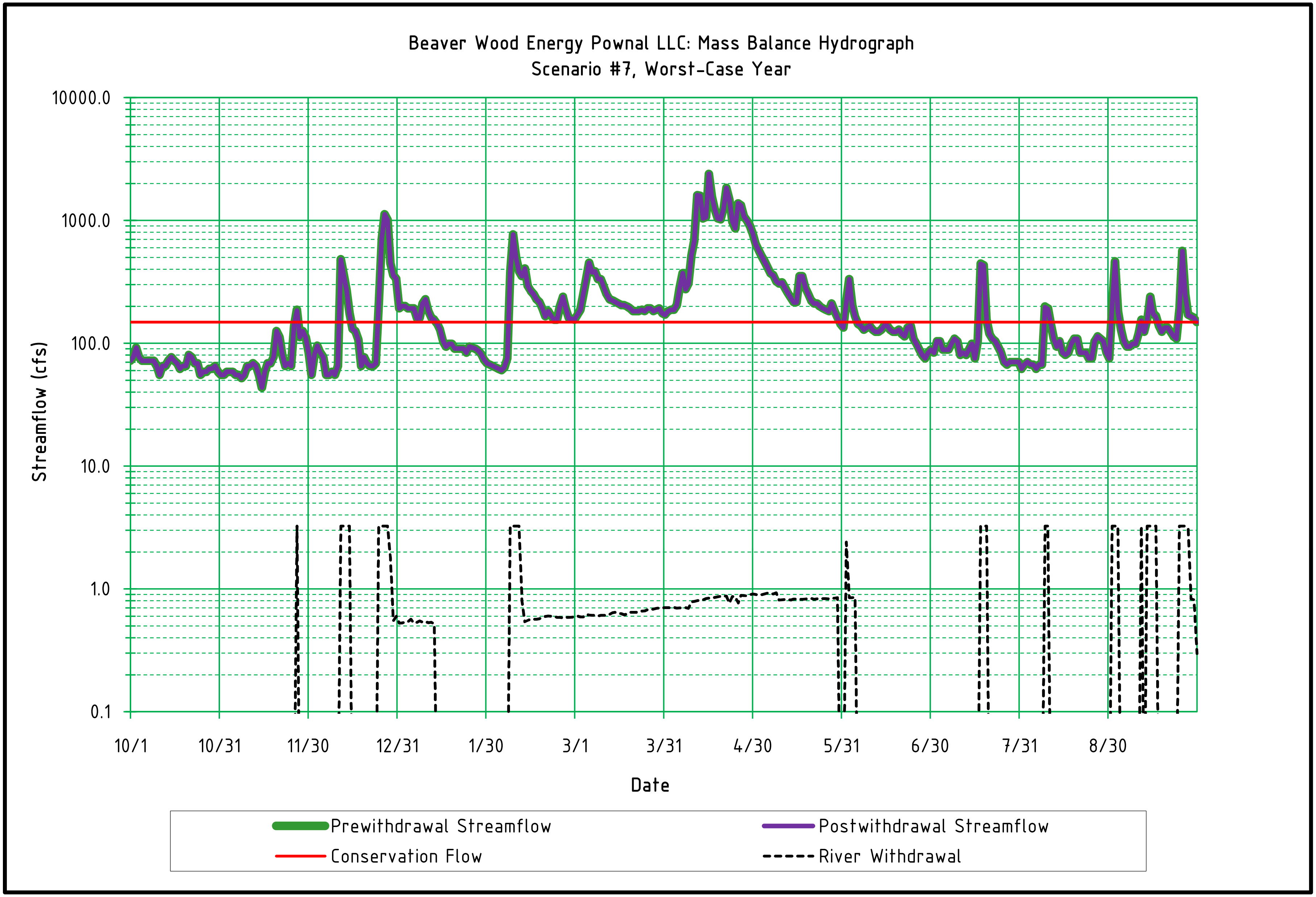
Scenario: 7

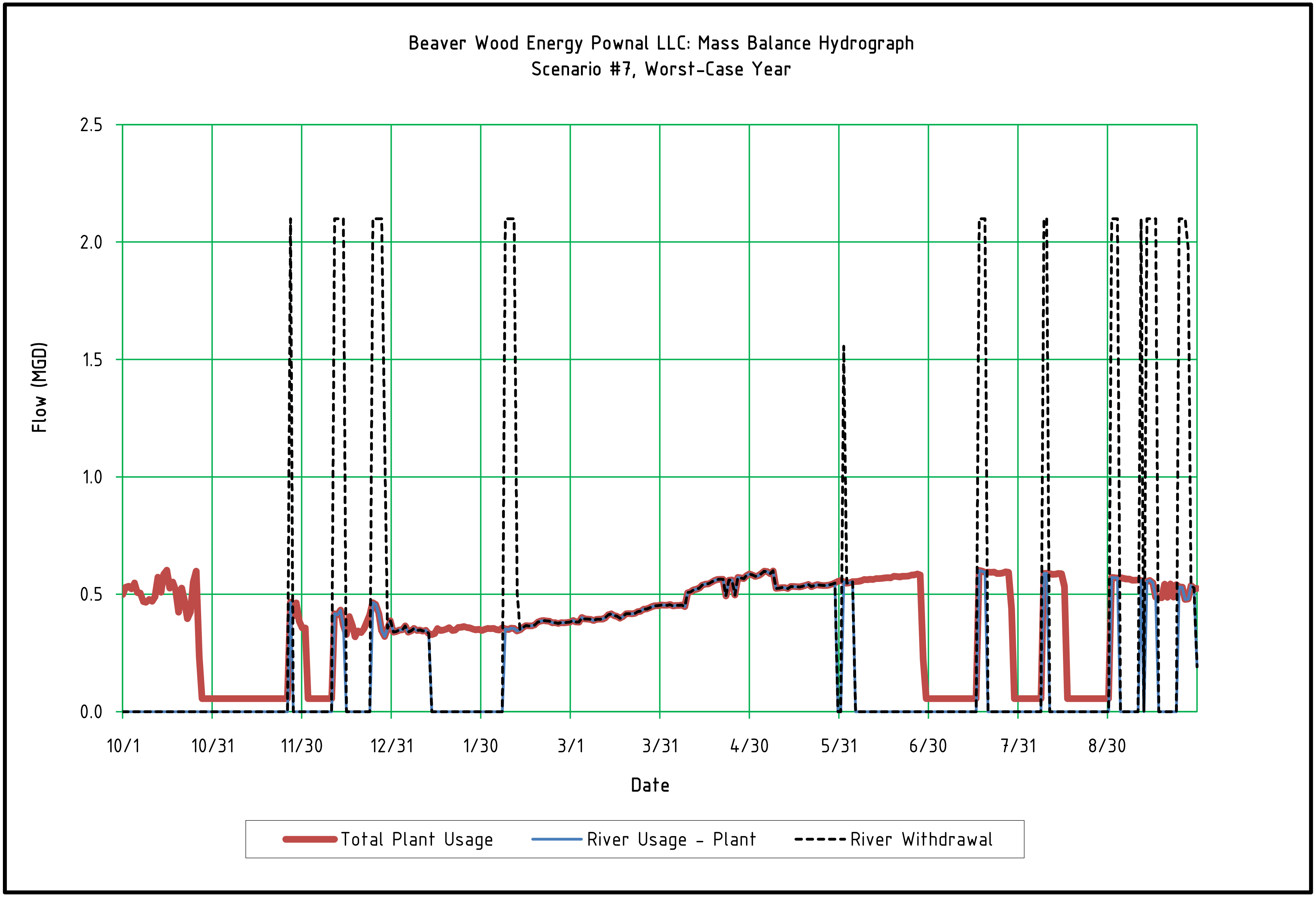
Source	Max Pump Rate (gpm)		Minimum Downstream Flow (csm)
Hoosic River:	1,458		0.70
Well:	39		NA
Storage	Volume (Mgal)		
Pond:	12		
Plant	gpm	MGD	
Average Demand:	321.6	0.46	
Peak Demand:	465.2	0.67	

Output For Scenario 7

Water Year	Wet Bulb Temperatures			Plant Demand				Plant Consumption								Source Production		Storage Pond			
	Min	Mean	Max	Min	Mean	Max	Total	% of Demand	Total	River		Well		Storage Pond		River Total	Well Total	Starting Volume	Minimum Volume	Complete Refill	River Flow Exceedence
	F	F	F	MGD	MGD	MGD	Mgal		Mgal	Mgal	%	Mgal	%	Mgal	%	Mgal	Mgal	(Mgal)	(Mgal)	Date	(Percentile)
2004	-8.7	44.6	74.4	0.23	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	12	12	Oct 01	3%
2005	-7.2	45.0	76.1	0.22	0.48	0.64	174	90%	156	128	82%	4.5	3%	24.2	15%	146	5	12	0	Jul 18	66%
2006	5.7	45.9	77.8	0.28	0.49	0.64	177	100%	177	165	93%	1.2	1%	10.8	6%	181	2	6	3	Sep 30	13%
2007	0.1	44.7	76.5	0.26	0.49	0.64	177	100%	177	153	86%	2.4	1%	22.3	13%	168	3	12	5	Sep 12	27%
2008	0.5	45.4	77.6	0.26	0.49	0.64	177	100%	177	169	95%	0.9	1%	7.7	4%	183	1	5	1	Sep 30	8%
2009	0.3	43.6	74.5	0.26	0.47	0.64	172	100%	172	172	100%	0.1	0%	0.4	0%	172	0	12	12	Sep 27	2%
Average	-2.0	44.3	75.0	0.25	0.48	0.64	174	95%	165	136	82%	4.0	3%	24.5	15%	160	5	8	2	Jul 13	--
Minimum	-16.1	41.3	68.8	0.20	0.46	0.60	168	72%	126	75	59%	0.0	0%	0.0	0%	118	0	0	0	Oct 01	--
Maximum	18.0	47.0	79.8	0.33	0.50	0.64	181	100%	177	172	100%	11.5	9%	49.9	32%	183	13	12	12	Sep 30	--
Worst-Case Year 1965	12.7	44.3	68.8	0.30	0.48	0.60	177	72%	126	75	59%	11.5	9%	40.1	32%	124.9	13.1	0	0	Oct 01	98%
n=	63																				




Beaver Wood Energy Pownal LLC: Mass Balance Hydrograph
Scenario #7, Worst-Case Year
10000.0
1000.0
100.0
10.0
1.0
0.1
Streamflow (cfs)
10/1
10/31
11/30
12/31
1/30
3/1
3/31
4/30
5/31
6/30
7/31
8/30
Date
Prewithdrawal Streamflow
Postwithdrawal Streamflow
Conservation Flow
River Withdrawal



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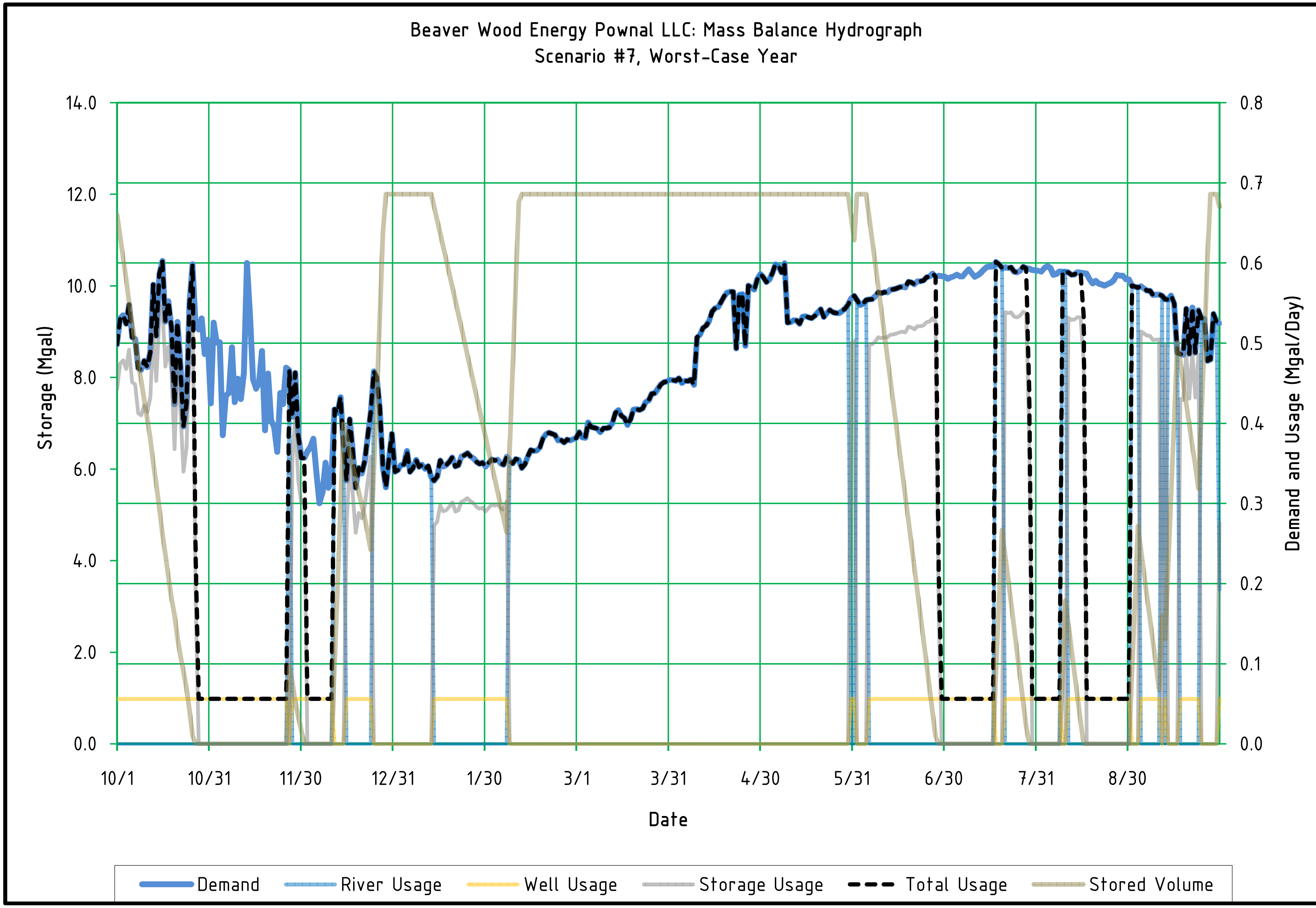

Beaver Wood Energy Pownal LLC: Mass Balance Hydrograph
Scenario #7, Worst-Case Year
Storage (Mgal)
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Demand and Usage (Mgal/Day)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
10/1
10/31
11/30
12/31
1/30
3/1
3/31
4/30
5/31
6/30
7/31
8/30
Date
Demand
River Usage
Well Usage
Storage Usage
Total Usage
Stored Volume

Beaver Wood Energy Pownal LLC - Water Needs & Availability Study
Streamflow, Groundwater, and Storage Mass Hydrograph Analysis

Model Output

Scenario: 8

Source	Max Pump Rate (gpm)		Minimum Downstream Flow (csm)
Hoosic River:	1,458		0.70
Well:	39		NA
Storage	Volume (Mgal)		
Pond:	73		
Plant	gpm	MGD	
Average Demand:	321.6	0.46	
Peak Demand:	465.2	0.67	

Output For Scenario 8

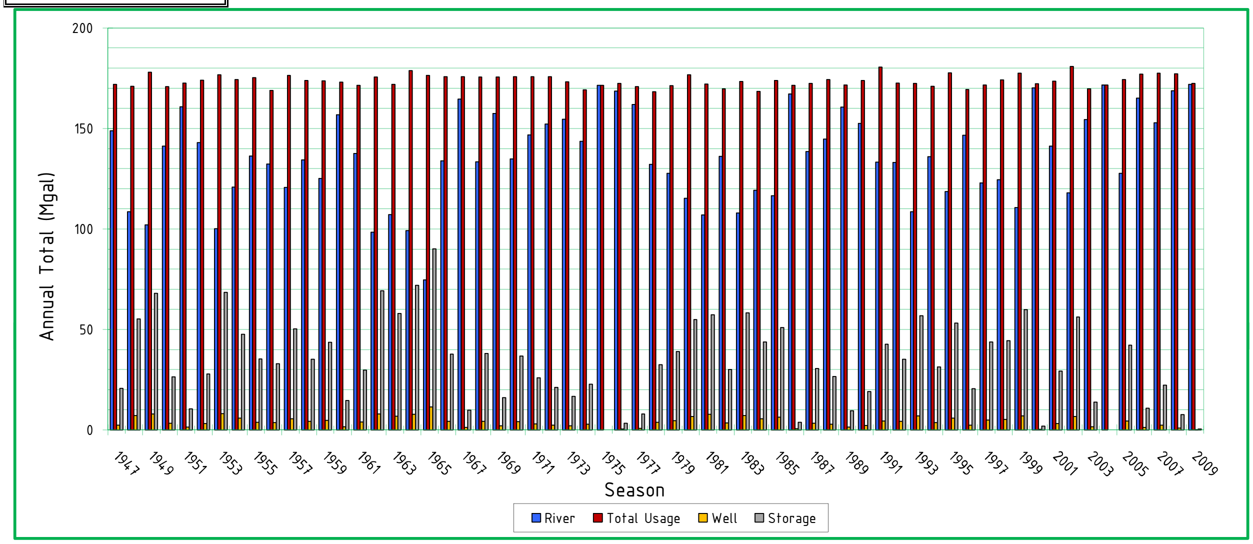
Water Year	Wet Bulb Temperatures Min F	Wet Bulb Temperatures Mean F	Wet Bulb Temperatures Max F	Plant Demand Min MGD	Plant Demand Mean MGD	Plant Demand Max MGD	Plant Demand Total Mgal	Plant Consumption % of Demand	Plant Consumption Total Mgal	River Mgal	River %	Well Mgal	Well %	Storage Pond Mgal	Storage Pond %	Source Production River Total Mgal	Source Production Well Total Mgal	Storage Pond Starting Volume (Mgal)	Storage Pond Minimum Volume (Mgal)	Complete Refill Date	River Flow Exceedence (Percentile)
1947	4.7	44.6	76.6	0.28	0.47	0.64	172	100%	172	149	87%	2.4	1%	20.6	12%	161	3	0	65	Sep 04	31%
1948	-12.5	42.3	77.5	0.21	0.47	0.64	171	100%	171	109	64%	7.2	4%	55.2	32%	147	8	65	50	Sep 30	86%
1949	3.8	46.2	75.8	0.27	0.49	0.64	178	100%	178	102	57%	8.0	4%	68.0	38%	168	10	50	35	Sep 30	92%
1950	-6.8	43.5	72.7	0.24	0.47	0.64	171	100%	171	141	83%	3.3	2%	26.4	15%	186	5	50	48	Sep 30	41%
1951	-2.0	44.8	72.4	0.24	0.47	0.64	173	100%	173	161	93%	1.3	1%	10.6	6%	174	2	70	66	Sep 30	17%
1952	-6.9	44.4	77.6	0.23	0.48	0.64	174	100%	174	143	82%	3.1	2%	27.8	16%	165	4	73	67	Sep 04	39%
1953	3.6	45.3	75.9	0.29	0.48	0.64	177	100%	177	100	57%	8.1	5%	68.4	39%	135	9	68	35	Sep 30	94%
1954	-2.9	44.4	74.6	0.24	0.48	0.64	174	100%	174	121	69%	5.9	3%	47.6	27%	203	9	35	24	Sep 30	72%
1955	-8.1	45.4	77.4	0.23	0.48	0.64	175	100%	175	136	78%	3.8	2%	35.2	20%	170	5	73	51	Sep 25	47%
1956	-9.0	42.3	73.5	0.22	0.46	0.64	169	100%	169	132	78%	3.7	2%	33.0	20%	164	5	73	52	Sep 28	61%
1957	-13.5	44.2	75.6	0.20	0.48	0.64	176	100%	176	121	68%	5.6	3%	50.3	29%	141	6	73	44	Jul 04	73%
1958	-5.2	44.2	74.4	0.23	0.48	0.64	174	100%	174	134	77%	4.3	2%	35.1	20%	196	6	44	32	Sep 30	53%
1959	-1.9	44.0	77.5	0.26	0.48	0.64	174	100%	174	125	72%	4.8	3%	43.7	25%	157	6	73	62	Sep 02	67%
1960	5.0	44.7	72.4	0.27	0.47	0.64	173	100%	173	157	91%	1.6	1%	14.6	8%	182	2	62	60	Sep 30	22%
1961	-7.6	43.9	75.8	0.23	0.47	0.64	171	100%	171	138	80%	4.0	2%	29.8	17%	162	5	73	63	Sep 04	45%
1962	-4.9	43.8	73.3	0.24	0.48	0.64	176	100%	176	98	56%	7.9	5%	69.3	39%	134	9	69	33	Sep 30	97%
1963	-11.2	41.8	75.6	0.22	0.47	0.64	172	100%	172	107	62%	6.8	4%	57.9	34%	161	9	36	31	Sep 30	89%
1964	-2.0	43.8	75.3	0.24	0.49	0.64	179	100%	179	99	55%	7.8	4%	71.9	40%	162	10	34	16	Sep 30	95%
1965	12.7	44.3	68.8	0.30	0.48	0.60	177	100%	176	75	42%	11.5	7%	90.2	51%	187	15	27	0	Sep 30	98%
1966	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	134	76%	4.2	2%	37.6	21%	186	6	53	54	Sep 30	55%
1967	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	165	94%	1.2	1%	9.8	6%	174	1	69	65	Sep 30	14%
1968	-16.1	43.5	76.9	0.20	0.48	0.64	176	100%	176	133	76%	4.2	2%	38.1	22%	146	5	69	44	Sep 30	56%
1969	-6.6	44.0	68.8	0.23	0.48	0.60	176	100%	176	157	90%	2.0	1%	16.1	9%	196	3	44	41	Sep 30	20%
1970	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	135	77%	4.2	2%	36.8	21%	175	5	68	61	Sep 30	52%
1971	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	147	83%	3.0	2%	26.0	15%	172	4	73	65	Sep 12	33%
1972	18.0	44.3	68.8	0.33	0.48	0.60	176	100%	176	152	87%	2.4	1%	21.2	12%	162	3	73	62	Oct 01	30%
1973	-3.5	45.1	74.1	0.24	0.47	0.64	173	100%	173	155	89%	2.0	1%	16.6	10%	176	3	62	59	Sep 30	23%
1974	-10.8	43.0	73.2	0.22	0.46	0.64	169	100%	169	144	85%	2.9	2%	22.8	13%	171	4	68	58	Sep 30	38%
1975	-0.9	43.4	76.8	0.25	0.47	0.64	171	100%	171	171	100%	0.0	0%	0.0	0%	171	0	73	73	Oct 01	5%
1976	-12.2	44.5	73.8	0.21	0.47	0.64	172	100%	172	169	98%	0.4	0%	3.3	2%	172	1	73	71	Sep 26	9%
1977	-1.6	42.9	77.3	0.26	0.47	0.64	171	100%	171	162	95%	0.8	0%	8.0	5%	170	1	73	70	Sep 13	16%
1978	-2.2	42.6	75.0	0.25	0.46	0.64	168	100%	168	132	78%	3.8	2%	32.4	19%	151	4	73	60	Aug 08	63%
1979	-10.4	43.5	75.6	0.22	0.47	0.64	171	100%	171	128	75%	4.5	3%	39.1	23%	178	6	60	58	Sep 30	64%
1980	0.3	44.1	75.9	0.26	0.48	0.64	177	100%	177	115	65%	6.7	4%	54.9	31%	134	7	73	38	Jul 12	81%
1981	-9.5	42.2	76.9	0.22	0.47	0.64	172	100%	172	107	62%	7.8	5%	57.3	33%	197	11	38	29	Sep 30	91%
1982	-6.9	41.3	77.9	0.23	0.47	0.64	170	100%	170	136	80%	3.5	2%	30.1	18%	143	4	73	50	Sep 30	48%
1983	-4.5	45.9	77.3	0.25	0.47	0.64	173	100%	173	108	62%	7.1	4%	58.3	34%	156	9	50	37	Sep 30	88%
1984	-8.9	43.8	75.1	0.22	0.46	0.64	168	100%	168	119	71%	5.5	3%	43.7	26%	170	7	41	29	Sep 30	75%
1985	1.5	45.1	76.3	0.26	0.48	0.64	174	100%	174	116	67%	6.3	4%	50.9	29%	188	9	50	49	Sep 30	80%
1986	-1.0	44.8	77.4	0.25	0.47	0.64	171	100%	171	167	97%	0.6	0%	3.7	2%	171	1	73	71	Sep 30	11%
1987	-4.7	45.0	76.5	0.24	0.47	0.64	172	100%	172	139	80%	3.3	2%	30.6	18%	168	4	73	63	Sep 14	44%
1988	-5.0	44.3	79.1	0.24	0.48	0.64	174	100%	174	145	83%	2.9	2%	26.6	15%	169	4	73	61	Sep 18	36%
1989	-4.6	44.0	76.0	0.23	0.47	0.64	172	100%	172	161	94%	1.4	1%	9.6	6%	171	2	72	68	Sep 30	19%
1990	-3.8	44.3	73.1	0.24	0.48	0.64	174	100%	174	153	88%	2.2	1%	19.1	11%	170	3	73	63	Sep 27	28%
1991	0.0	46.3	75.8	0.26	0.49	0.64	180	100%	180	133	74%	4.5	2%	42.7	24%	175	6	72	50	Sep 30	58%
1992	4.7	43.9	73.2	0.27	0.47	0.64	173	100%	173	133	77%	4.3	2%	35.2	20%	163	5	73	65	Sep 30	59%
1993	-6.7	43.9	78.4	0.23	0.47	0.64	172	100%	172	109	63%	7.0	4%	56.9	33%	155	9	68	45	Sep 30	84%
1994	-14.9	42.7	77.0	0.20	0.47	0.64	171	100%	171	136	80%	3.6	2%	31.4	18%	177	5	60	61	Sep 30	50%
1995	-4.9	45.6	77.3	0.24	0.49	0.64	178	100%	178	119	67%	5.8	3%	53.2	30%	139	7	71	39	Sep 30	77%
1996	-9.2	43.6	72.7	0.22	0.46	0.64	169	100%	169	147	87%	2.4	1%	20.4	12%	199	4	39	38	Sep 30	34%
1997	-1.9	44.2	76.6	0.25	0.47	0.64	172	100%	172	123	72%	4.9	3%	43.7	25%	148	6	73	53	Jul 08	70%
1998	3.5	46.5	74.4	0.26	0.48	0.64	174	100%	174	125	72%	5.2	3%	44.3	25%	154	6	55	41	Sep 30	69%
1999	-7.1	45.8	79.8	0.22	0.49	0.64	177	100%	177	111	62%	7.0	4%	59.8	34%	194	10	41	38	Sep 30	83%
2000	-6.5	45.0	73.6	0.23	0.47	0.64	172	100%	172	170	99%	0.3	0%	1.9	1%	177	1	68	69	Sep 30	6%
2001	7.6	44.1	78.0	0.30	0.48	0.64	174	100%	174	141	81%	3.1	2%	29.2	17%	166	4	73	57	Aug 12	42%
2002	14.6	47.0	77.5	0.31	0.50	0.64	181	100%	181	118	65%	6.7	4%	56.2	31%	165	8	69	52	Sep 30	78%
2003	-6.6	43.4	74.9	0.24	0.47	0.64	170	100%	170	154	91%	1.5	1%	13.8	8%	179	2	61	62	Sep 30	25%

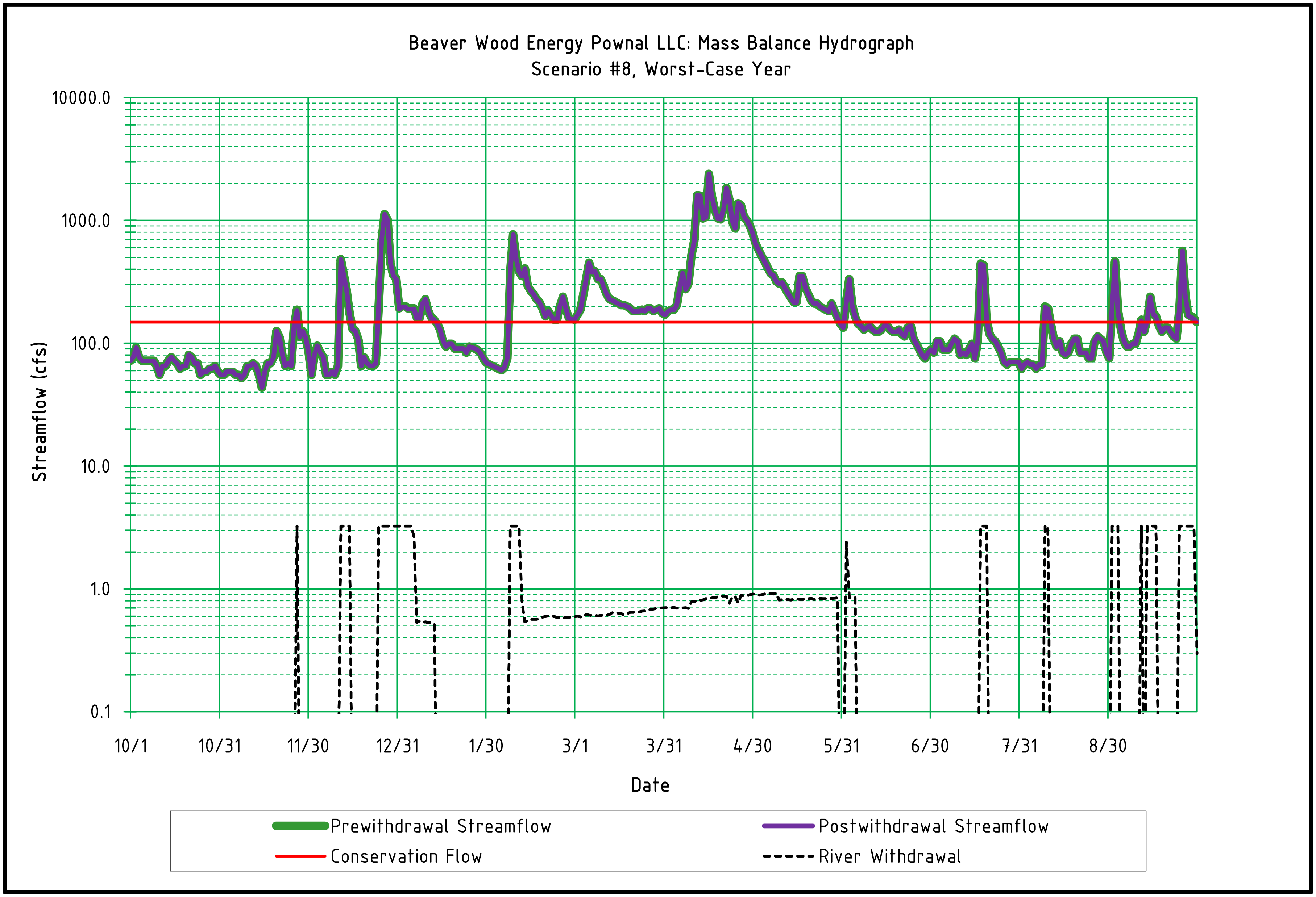
Scenario: 8

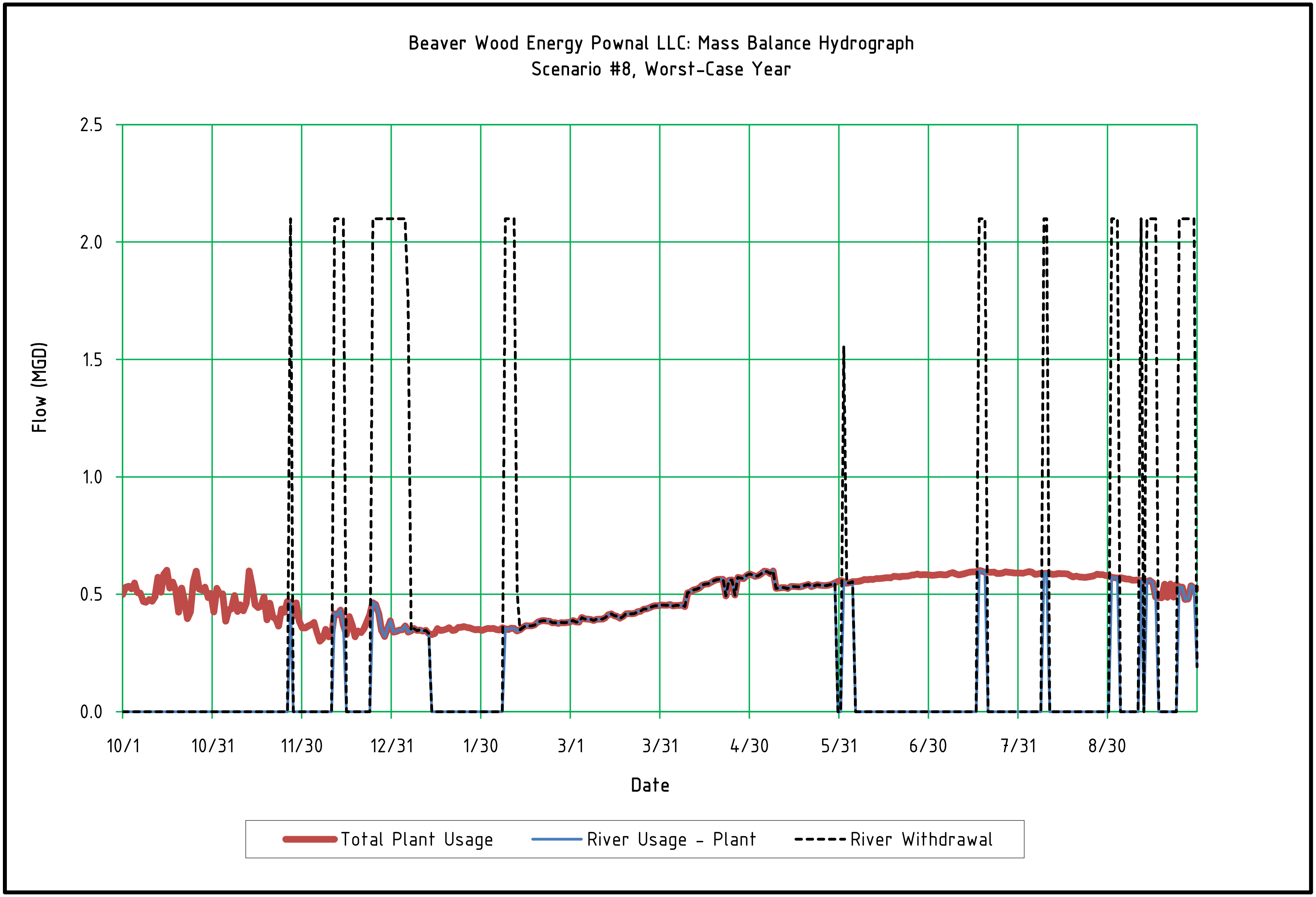
Source	Max Pump Rate (gpm)		Minimum Downstream Flow (csm)
Hoosic River:	1,458		0.70
Well:	39		NA
Storage	Volume (Mgal)		
Pond:	73		
Plant	gpm	MGD	
Average Demand:	321.6	0.46	
Peak Demand:	465.2	0.67	

Output For Scenario 8

Water Year	Wet Bulb Temperatures Min F	Mean F	Max F	Plant Demand Min MGD	Mean MGD	Max MGD	Total Mgal	Plant Consumption % of Demand	Total Mgal	River Mgal	River %	Well Mgal	Well %	Storage Pond Mgal	Storage Pond %	Source Production River Total Mgal	Well Total Mgal	Storage Pond Starting Volume (Mgal)	Minimum Volume (Mgal)	Complete Refill Date	River Flow Exceedence (Percentile)
2004	-8.7	44.6	74.4	0.23	0.47	0.64	172	100%	172	172	100%	0.0	0%	0.0	0%	172	0	73	73	Oct 01	3%
2005	-7.2	45.0	76.1	0.22	0.48	0.64	174	100%	174	128	73%	4.5	3%	42.2	24%	146	5	73	43	Jul 18	66%
2006	5.7	45.9	77.8	0.28	0.49	0.64	177	100%	177	165	93%	1.2	1%	10.8	6%	198	2	50	46	Sep 30	13%
2007	0.1	44.7	76.5	0.26	0.49	0.64	177	100%	177	153	86%	2.4	1%	22.3	13%	168	3	73	66	Sep 12	27%
2008	0.5	45.4	77.6	0.26	0.49	0.64	177	100%	177	169	95%	0.9	1%	7.7	4%	183	1	66	62	Sep 30	8%
2009	0.3	43.6	74.5	0.26	0.47	0.64	172	100%	172	172	100%	0.1	0%	0.4	0%	172	0	73	73	Sep 27	2%
Average	-2.0	44.3	75.0	0.25	0.48	0.64	174	100%	174	136	78%	4.0	2%	33.7	19%	169	5	62	52	Sep 02	--
Minimum	-16.1	41.3	68.8	0.20	0.46	0.60	168	100%	168	75	42%	0.0	0%	0.0	0%	134	0	0	0	Oct 01	--
Maximum	18.0	47.0	79.8	0.33	0.50	0.64	181	100%	181	172	100%	11.5	7%	90.2	51%	203	15	73	73	Sep 30	--
Worst-Case Year 1965	12.7	44.3	68.8	0.30	0.48	0.60	177	100%	176	75	42%	11.5	7%	90.2	51%	187.3	15.2	27	0	Sep 30	98%
n=	63																				




Beaver Wood Energy Pownal LLC: Mass Balance Hydrograph
Scenario #8, Worst-Case Year
10000.0
1000.0
100.0
10.0
1.0
0.1
Streamflow (cfs)
10/1
10/31
11/30
12/31
1/30
3/1
3/31
4/30
5/31
6/30
7/31
8/30
Date
Prewithdrawal Streamflow
Postwithdrawal Streamflow
Conservation Flow
River Withdrawal



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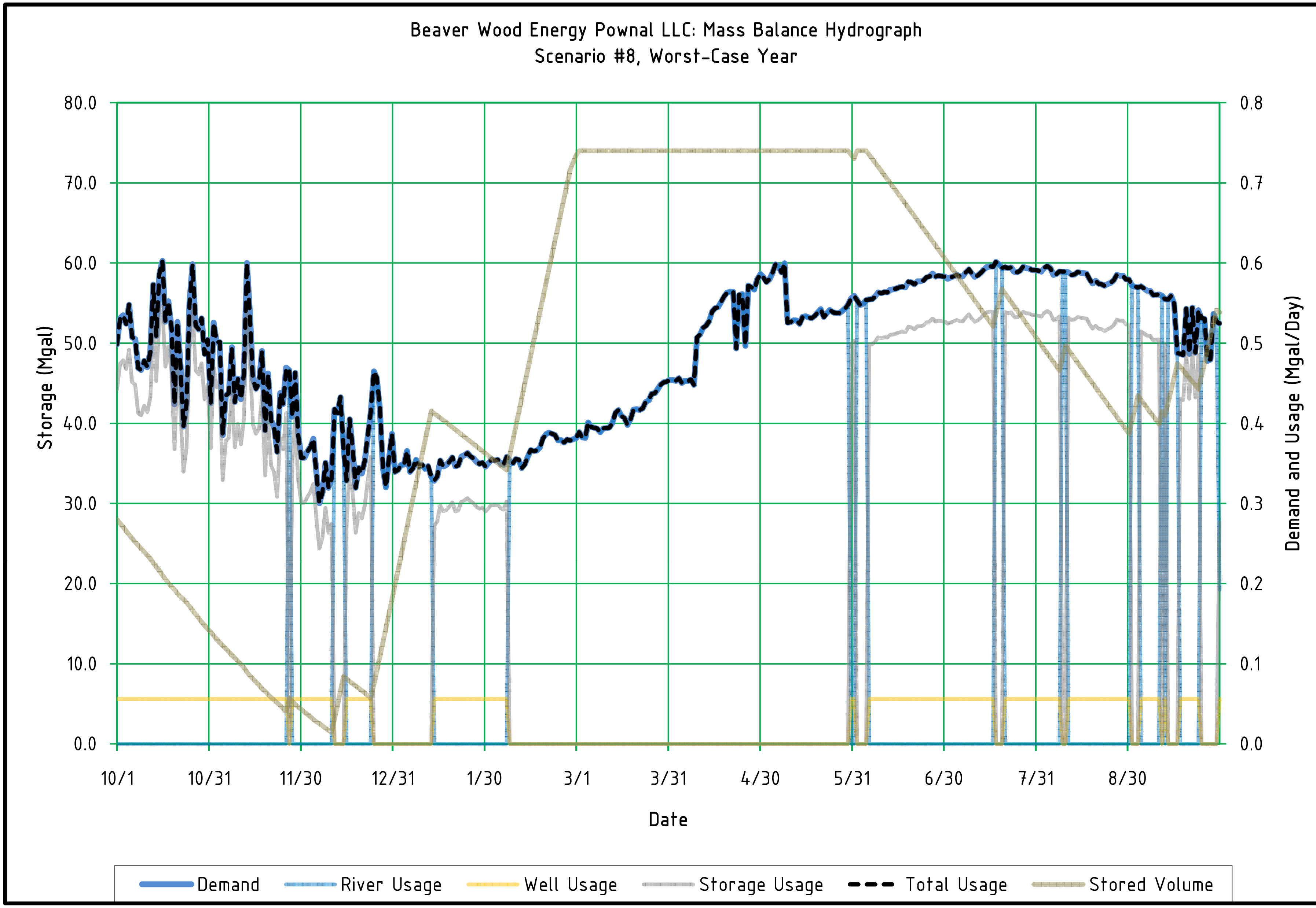

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