

*Special Meeting Brynwood WD#2 Application

October 28, 2015 - **UPDATED FEBRUARY 2016**

Important Dates:

SEPTEMBER 9, 2015: RECEIVED PETITION AND ANNOUNCED PROCESS

SEPTEMBER 24, 2015: SET DATES FOR PROCESS

OCTOBER 28, 2015: SPECIAL MEETING

NOVEMBER 4, 2015: SET PUBLIC HEARING

DECEMBER 9, 2015: PUBLIC HEARING

FEBRUARY 10, 2016: PUBLIC HEARING CONTINUATION

* **ADDITIONAL MEETING DATES**

NOVEMBER 9, 2015: MEETING WITH ROWI BOARD REPRESENTATIVES

JANUARY 25, 2016 MEETING WITH ROWI BOARD REPRESENTATIVES

*The Brynwood Application

- * PETITION SUBMITTED FOR EXTENSION OF WATER DISTRICT #2
- * BRYNWOOD IS CURRENTLY SERVED BY WD2 AS AN OUT OF DISTRICT USER.
- * OUT OF DISTRICT USER RATE IS DOUBLE THE INSIDE RATE; BECAUSE THEY DO NOT PAY TOWARD THE CAPITAL DEBT.
- * THE WATER SUPPLIED TO THE SITE BY THE WATER DISTRICT WOULD ONLY BE USED FOR DOMESTIC CONSUMPTION BY THE CLUB RESIDENCES AND BY THE CLUBHOUSE.
- * THE IRRIGATION SYSTEM FOR THE CLUB GROUNDS, GOLF COURSE AND THE GROUNDS OF THE RESIDENTIAL COMMUNITY WILL BE SUPPLIED BY BRYNWOOD ON-SITE SOURCES, NOT WD2.

*The Brynwood Proposal

* BRYNWOOD PROPOSES, AT ITS OWN EXPENSE TO:

- * DEVELOP NEW WELLS AT THE WATER DISTRICT'S WELL FIELD ON LONG POND ROAD TO SERVE ALL USERS.
- * PREPARED TO DEVELOP WELLS YIELDING TWICE THEIR AVERAGE DAILY DEMAND REQUIREMENTS WITH THE BEST WD2 WELL OUT OF SERVICE (NYSDOH REQUIREMENT), A MINIMUM OF 47.4 GPM (GALLONS PER MINUTE).
- * REPLACE THE EXISTING WATER LINE UNDER ROUTE 22 AND EXTEND MAIN LINE TO PROPERTY.
- * UPGRADE THE WATER SUPPLY SYSTEM, TO INCORPORATE BRYNWOOD, IN ACCORDANCE WITH WESTCHESTER COUNTY DEPARTMENT OF HEALTH (WCDOH) REGULATIONS.

* CURRENT (2012) PEAK WATER DEMANDS:

- MAXIMUM PEAK WATER DEMAND FOR BRYNWOOD AS AN OUT OF DISTRICT USER:

8,147 GPD (GALLONS PER DAY) OR 2.2% OF TOTAL DISTRICT

- MAXIMUM PEAK WATER DEMAND FOR WATER DISTRICT #2 (WITHOUT BRYNWOOD):

356,685 GPD (GALLONS PER DAY)

* PROJECTED PEAK WATER DEMANDS:

- ESTIMATED AVERAGE WATER DEMAND FOR 73 RESIDENTIAL UNITS AND CLUBHOUSE:

34,154 GPD (GAL. PER DAY) OR **23.7** GPM (GAL. PER MIN.)

➤ NEW YORK STATE DEPARTMENT OF HEALTH (NYSDOH) REQUIRES THAT WATER-SUPPLY SOURCE CAPACITY EQUAL OR EXCEED THE PEAK WATER DEMAND ESTIMATE. THE PEAK WATER DEMAND IS CALCULATED AS TWICE THE AVERAGE WATER DEMAND ESTIMATE. THEREFORE THE SOURCE DEVELOPED WOULD NEED TO HAVE THE CAPACITY TO PRODUCE **68,308** GPD OR ABOUT **47.4** GPM WITH THE MOST PRODUCTIVE WELL (BEST WELL) OUT OF SERVICE.

- ESTIMATED COMBINED PEAK WATER DEMAND FOR BRYNWOOD DEVELOPMENT AND WD2:

424,993 GPD (GAL. PER DAY) OR **295** GPM (GAL. PER MIN.)

* PROJECTED PEAK WATER DEMANDS:

➤ HOW CAN WE BE COMFORTABLE WITH THE **23.7 GPM** DESIGN STANDARDS USED FOR THE BRYNWOOD PROJECT?

WE HAVE PREPARED A WATER AUDIT USING CORRESPONDING WATER SALE DATA OF VARIOUS SUBDIVISIONS IN TOWN WITH PUBLIC WATER OVER A TWO YEAR PERIOD 2014-2015.

Year	Quarter	Complex	# of Bills	Avg Daily Sold	Daily Per Un	Complex Daily GPM	Avg Daily GPM/Unit
2014	Qtr1	Cidermill	24	6,828	285	4.7	0.20
		Wampus Close	19	2,578	136	1.8	0.09
		Whippoorwill Hills	133	30,953	233	21.5	0.16
		Whippoorwill Ridge	59	10,644	180	7.4	0.13
		Windmill	366	75,872	207	52.7	0.14
	Qtr2	Cidermill	24	7,735	322	5.4	0.22
		Wampus Close	19	2,601	137	1.8	0.10
		Whippoorwill Hills	133	29,047	218	20.2	0.15
		Whippoorwill Ridge	59	11,080	188	7.7	0.13
		Windmill	367	69,262	189	48.1	0.13
	Qtr3	Cidermill	26	5,792	223	4.0	0.15
		Wampus Close	19	7,121	375	4.9	0.26
		Whippoorwill Hills	133	71,951	541	50.0	0.38
		Whippoorwill Ridge	59	24,774	420	17.2	0.29
		Windmill	367	166,837	455	115.9	0.32
	Qtr4	Cidermill	25	5,102	204	3.5	0.14
		Wampus Close	19	6,910	364	4.8	0.25
		Whippoorwill Hills	133	70,790	532	49.2	0.37
		Whippoorwill Ridge	59	21,344	362	14.8	0.25
		Windmill	367	139,099	379	96.6	0.26
2015	Qtr1	Cidermill	26	5,607	216	3.9	0.15
		Wampus Close	19	3,044	160	2.1	0.11
		Whippoorwill Hills	133	28,706	216	19.9	0.15
		Whippoorwill Ridge	59	8,917	151	6.2	0.10
		Windmill	366	67,385	184	46.8	0.13
	Qtr2	Cidermill	27	6,321	234	4.4	0.16
		Wampus Close	19	2,753	145	1.9	0.10
		Whippoorwill Hills	133	33,405	251	23.2	0.17
		Whippoorwill Ridge	59	11,505	195	8.0	0.14
		Windmill	366	83,146	227	57.7	0.16
	Qtr3	Cidermill	27	5,248	194	3.6	0.13
		Wampus Close	19	9,046	476	6.3	0.33
		Whippoorwill Hills	133	75,378	567	52.3	0.39
		Whippoorwill Ridge	59	25,595	434	17.8	0.30
		Windmill	367	168,473	459	117.0	0.32
	Qtr4	Cidermill	27	5,334	198	3.7	0.14
		Wampus Close	19	7,650	403	5.3	0.28
		Whippoorwill Hills	133	73,778	555	51.2	0.39
		Whippoorwill Ridge	59	25,966	440	18.0	0.31
		Windmill	368	173,115	470	120.2	0.33
				39,667	303	27.5	0.21

* PROJECTED PEAK WATER DEMANDS:

➤ THE WATER AUDIT DATA HAS BEEN AVERAGED IN THE TABLE BELOW INDICATING THAT THE DESIGN STANDARDS ARE ON TARGET WITH ACTUAL WATER SALE CRITERIA.

Two Year Average of Water Sale Data 2014-2015					
	Units	Avg Daily Sold	Avg Daily Gals/Unit	Complex Daily/GPM	Avg Daily GPM/Unit
Cidermill	26	5,996	234	4.2	0.16
Wampus Close	19	5,213	274	3.6	0.19
Whippoorwill Hills	133	51,751	389	36	0.27
Whippoorwill Ridge	59	17,478	296	12.1	0.21
Windmill	367	117,899	321	81.9	0.22
		Average	302.8	27.6	0.21

Financial Impact on Water District #2

WD#2 EXISTING CAPITAL DEBT WITH AN ADDITIONAL 73 RESIDENTIAL UNITS.

	WATER DISTRICT NO.2 CAPITAL DEBT TABLE									
	CURRENT WD2 DEBT TABLE						Current Dist.		381	
Fiscal Year	Remaining Current Debt		Water System Borrowing		Total Annual Capital Debt Includes	Annual Cost Per Parcel/Unit Exisiting Dist.	Bryn Dwellings	Starts 2018	73	Existing District Total Annual Reduction w/ Additions
	400K Ban	Tank & Well 1,650,000 Bond	\$9,950,000				Bryn Clubhouse	Starts 2017	14	
			Principle	Interest			Total		468	
							W / Additions annual per unit cost	22 Units used for club in 2018	Exist.Dist Per/unit Reduction	
	5 Year	15 year	30 year		P&I	381				
2016	\$80,736	\$175,813	\$200,000	\$348,700	\$805,249	\$2,114		Indv. % Reduction		
2017		\$174,941	\$205,000	\$338,700	\$718,641	\$1,886	\$1,819	3.5%	-\$67	-\$25,471
2018		\$178,013	\$210,000	\$328,450	\$716,463	\$1,880	\$1,539	18.2%	-\$342	-\$130,141
2019		\$175,713	\$220,000	\$317,950	\$713,663	\$1,873	\$1,533	18.2%	-\$340	-\$129,620
2020		\$178,256	\$230,000	\$306,950	\$715,206	\$1,877	\$1,536	18.2%	-\$341	-\$129,907
2021		\$178,769	\$235,000	\$295,450	\$709,219	\$1,861	\$1,523	18.2%	-\$338	-\$128,794
2022		\$151,230	\$245,000	\$283,700	\$679,930	\$1,785	\$1,461	18.1%	-\$324	-\$123,349
2023			\$250,000	\$271,450	\$521,450	\$1,369	\$1,122	18.0%	-\$246	-\$93,888
2024			\$260,000	\$258,950	\$518,950	\$1,362	\$1,117	18.0%	-\$245	-\$93,423
2025			\$270,000	\$245,950	\$515,950	\$1,354	\$1,110	18.0%	-\$244	-\$92,866
2026			\$280,000	\$236,500	\$516,500	\$1,356	\$1,112	18.0%	-\$244	-\$92,968
2027			\$290,000	\$226,700	\$516,700	\$1,356	\$1,112	18.0%	-\$244	-\$93,005
2028			\$300,000	\$216,550	\$516,550	\$1,356	\$1,112	18.0%	-\$244	-\$92,977
2029			\$310,000	\$206,050	\$516,050	\$1,354	\$1,111	18.0%	-\$244	-\$92,884
2030			\$320,000	\$195,200	\$515,200	\$1,352	\$1,109	18.0%	-\$243	-\$92,726
2031			\$330,000	\$184,000	\$514,000	\$1,349	\$1,106	18.0%	-\$243	-\$92,503
2032			\$345,000	\$172,450	\$517,450	\$1,358	\$1,114	18.0%	-\$244	-\$93,145
2033			\$355,000	\$160,375	\$515,375	\$1,353	\$1,109	18.0%	-\$243	-\$92,759
2034			\$370,000	\$147,950	\$517,950	\$1,359	\$1,115	18.0%	-\$245	-\$93,238
2035			\$380,000	\$135,000	\$515,000	\$1,352	\$1,108	18.0%	-\$243	-\$92,689
2036			\$395,000	\$121,700	\$516,700	\$1,356	\$1,112	18.0%	-\$244	-\$93,005
2037			\$410,000	\$107,875	\$517,875	\$1,359	\$1,115	18.0%	-\$245	-\$93,224
2038			\$425,000	\$93,525	\$518,525	\$1,361	\$1,116	18.0%	-\$245	-\$93,344
2039			\$440,000	\$78,650	\$518,650	\$1,361	\$1,116	18.0%	-\$245	-\$93,368
2040			\$460,000	\$63,250	\$523,250	\$1,373	\$1,126	18.0%	-\$247	-\$94,223
2041			\$475,000	\$47,150	\$522,150	\$1,370	\$1,124	18.0%	-\$247	-\$94,018
2042			\$495,000	\$30,525	\$525,525	\$1,379	\$1,131	18.0%	-\$248	-\$94,646
2043			\$510,000	\$18,150	\$528,150	\$1,386	\$1,137	18.0%	-\$250	-\$95,134
2044			\$530,000	\$7,950	\$537,950	\$1,412	\$1,157	18.0%	-\$254	-\$96,956
							Average	17.5%		

DEBT TABLE INCLUDES THE CLUBHOUSE BEGINNING IN 2017 WITH 14 UNITS. 2018 -73 DWELLING UNITS ARE ADDED AND THE CLUBHOUSE GOES UP TO 22 UNITS (GOING FORWARD THE CLUBHOUSE WILL BE ASSESSED UNITS ANNUALLY)

* PROJECTED ANNUAL HOUSEHOLD SAVINGS:

• PROJECTED WITH CLUBHOUSE*:

➤ AVERAGE OF ANNUAL SAVINGS PER HOUSEHOLD:

2017 = 3.5% (*CLUBHOUSE CONSTRUCTION PHASE-
HISTORICAL USAGE = 14 UNITS)

2018 = 18.2% (*CLUBHOUSE INCREASES TO HIGH END
OF PROJECTED USAGE = 22 UNITS)

*CLUBHOUSE TO BE ADJUSTED ANNUALLY ACCORDING TO USAGE AFTER 1ST FULL YEAR

* HOW WILL THE CLUBHOUSE UNITS BE CALCULATED?:

YEAR	2015	2014
Total Annual Water Sales	47,540,154	43,630,755
Minus → School Ann. Gals -	496,000	653,500
Minus → Clubhouse Ann. Gals -	2,753,400	2,385,950
Subtotal	44,290,754	40,591,305
In district Accounts	367	367
Days	365	365
Subtotal/Accts./days	331	303
Clubhouse Ann. Gals	2,753,400	2,385,950
Club Ann gals ÷ 365	7,544	6,537
÷ Subtotal/Accts./days	331	303
= # of Units	22.8	21.6

* PROJECTED ANNUAL HOUSEHOLD SAVINGS:

➤ EXISTING DISTRICT PROPERTY OWNERS WILL EACH REALIZE:

A TOTAL SAVINGS OF **\$7,150** (THROUGHOUT THE EXISTING DEBT PERIOD)

➤ A CUMULATIVE REDUCTION OF EXISTING MEMBER DEBT = **\$2,724,271**

*Evaluation of Current System

OVERVIEW

* WATER DISTRICT #2 CURRENT SYSTEM:

- * WD2 SUPPLIES POTABLE WATER AND FIRE PROTECTION TO:
368 RESIDENTIAL SERVICE CONNECTIONS
APPROXIMATELY 1200 PEOPLE
- * POTABLE WATER IS SOURCED FROM A SAND AND GRAVEL AQUIFER
WITHIN THE MIANUS WATERSHED.
- * THERE ARE FOUR SAND AND GRAVEL WELLS LOCATED AT THE
INTERSECTION OF WINDMILL AND LONG POND ROADS:
WELLS IN OPERATION: 2, 3, 4 AND 5
- * WELLS 2, 3 AND 5 CANNOT BE OPERATED SIMULTANEOUSLY

* WATER DISTRICT #2 CURRENT WELL CAPACITY:

Current water supply source

Supply Source	Yield Capacity	Daily Capacity GPD (24 hour cycle)
Well 2	50 gpm	72,000
Well 3	100 gpm	144,000
Well 4	190 gpm	273,600
Well 5	280 gpm	403,200

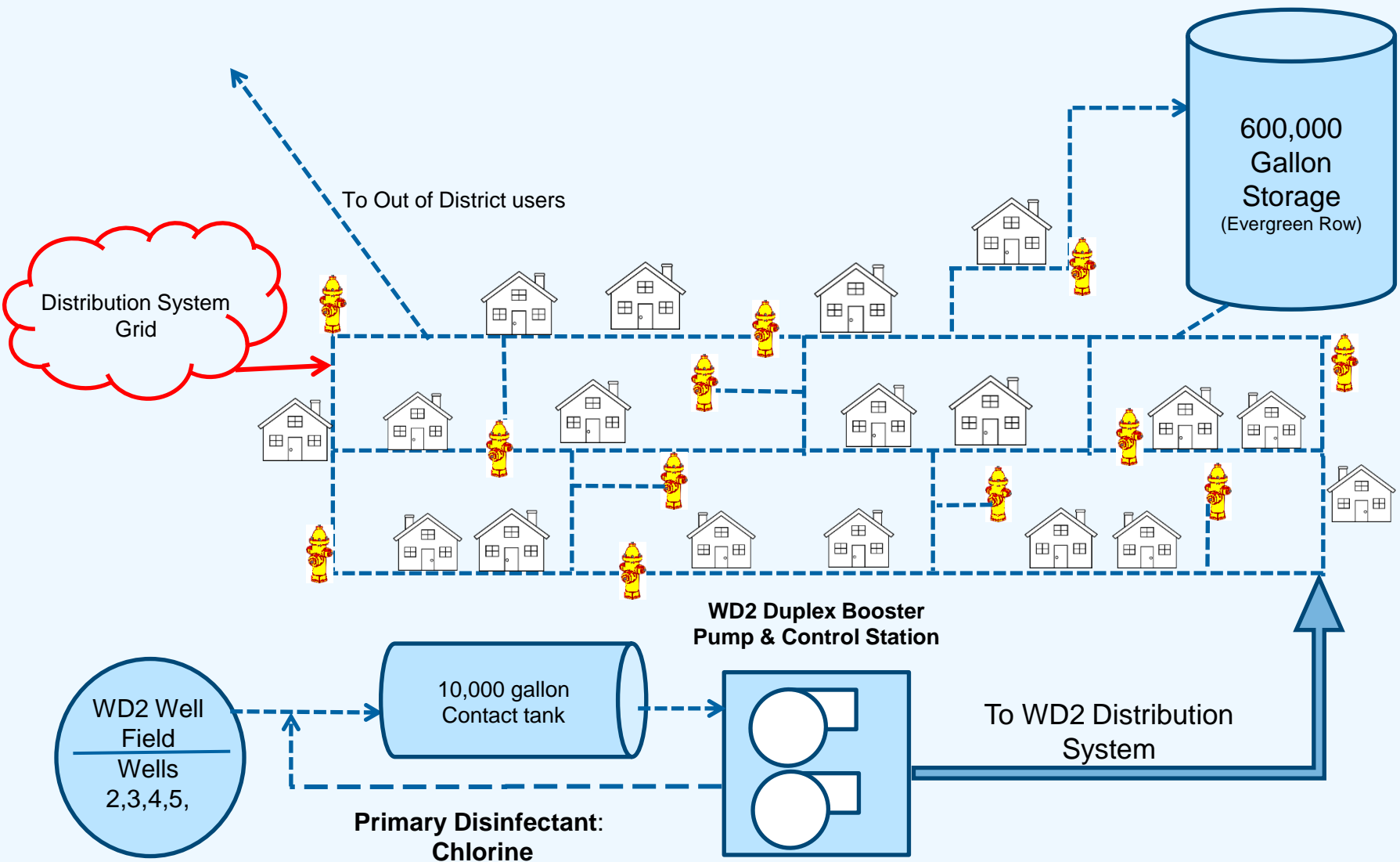
Note: Wells 2, 3 & 5 cannot run simultaneously!

*THE EXISTING NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) WATER-TAKING PERMIT LIMITS THE TAKING FROM THE DISTRICT WELLS TO 290 GPM (GALLONS PER MINUTE) OR 0.42 MGD (MILLION GALLONS PER DAY).



*How the System Works

* WATER DISTRICT #2 EXISTING SYSTEM



*Current System Water Demands

* HOW SYSTEM DEMANDS ARE EVALUATED:

The existing system has been evaluated based upon various demand conditions: Average Daily Demand; Maximum Day Demand; Peak Hour Demand (on the maximum day). Pumping data reflecting the total volume of water pumped over the period of 2001 thru 2013 was used for the demand calculations.

* DEMAND CONDITIONS:

AVERAGE DAILY DEMAND = 0.15 MGD

MAXIMUM DAY DEMAND = 0.37 MGD

PEAK HOUR DEMAND¹ = 1.10 MGD

(ON THE MAXIMUM DAY)

MGD = MILLION GALLONS PER DAY

¹GHD Modeling Study prepared for WD2—July 2012

* WATER DISTRICT DEMAND SUMMARY:

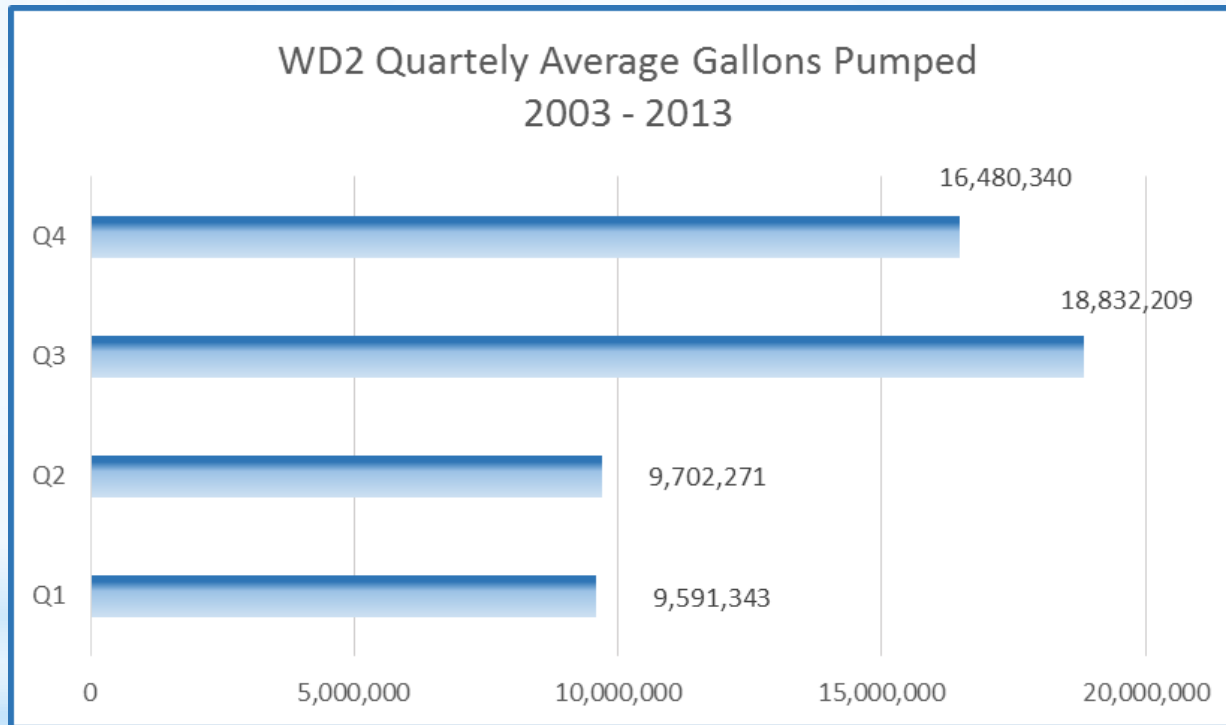
DEMAND ALLOCATION SUMMARY

	Average Day	Maximum Day	Peak Hour ⁽¹⁾
In-District	96	240	720
Residential customer (gpm/customer)	0.26	0.65	2.0
Out-of-District			
Brynwood Golf & Country Club	5.3	13	40
Coman Hill Elementary School	1.2	3.0	9.0
TOTAL (gpm)	100	260	770
TOTAL (mgd)	0.15	0.37	1.1

¹GHD Modeling Study prepared for WD2—July 2012

* WATER DISTRICT DEMAND SUMMARY:

Quarterly water pumping demands



*Current System Summary

* NON PEAK DEMAND: ADEQUATE CAPACITY TO SUPPLY THE NEEDS OF EXISTING CUSTOMERS.

* PEAK DEMAND: CHALLENGING DUE TO THE INCREASING DEMAND OF RESIDENTIAL IRRIGATION SYSTEMS IN THE DISTRICT.

* CURRENT MAINTENANCE NEEDS:

- REHABILITATION OF WELL 4 (2016)
- TEST WELLS 2,3 AND 5 TO DETERMINE CURRENT PRODUCTION YIELD.

*** BENEFIT TO THE CURRENT SYSTEM IF A
NEW WATER SOURCE IS PROVIDED:**

- ABILITY TO REST WELLS.**
- REDUCES LIKELIHOOD FOR DIRECT IMPACT TO THE MIANUS RIVER AND ADJACENT WETLANDS.**
- ROTATION OF SAND AND GRAVEL WELLS AND BEDROCK WELL(S) WOULD REDUCE STRESS ON ANY ONE AQUIFER.**

*Definition of Terms

*Well

- A tubular, man-made conduit installed into the ground designed to access and collect groundwater

*Aquifer

- An underground layer of water-bearing rock or sediment from which groundwater can be extracted

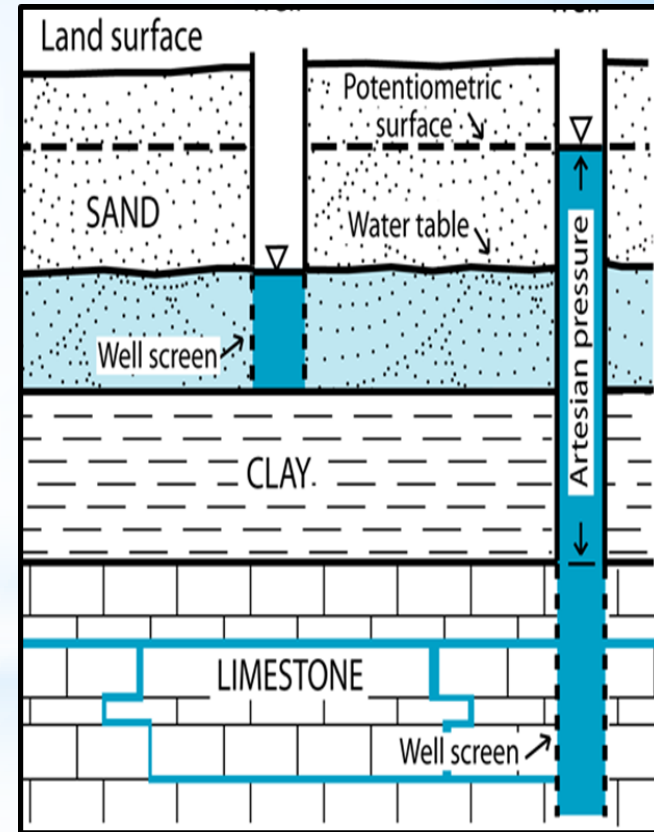
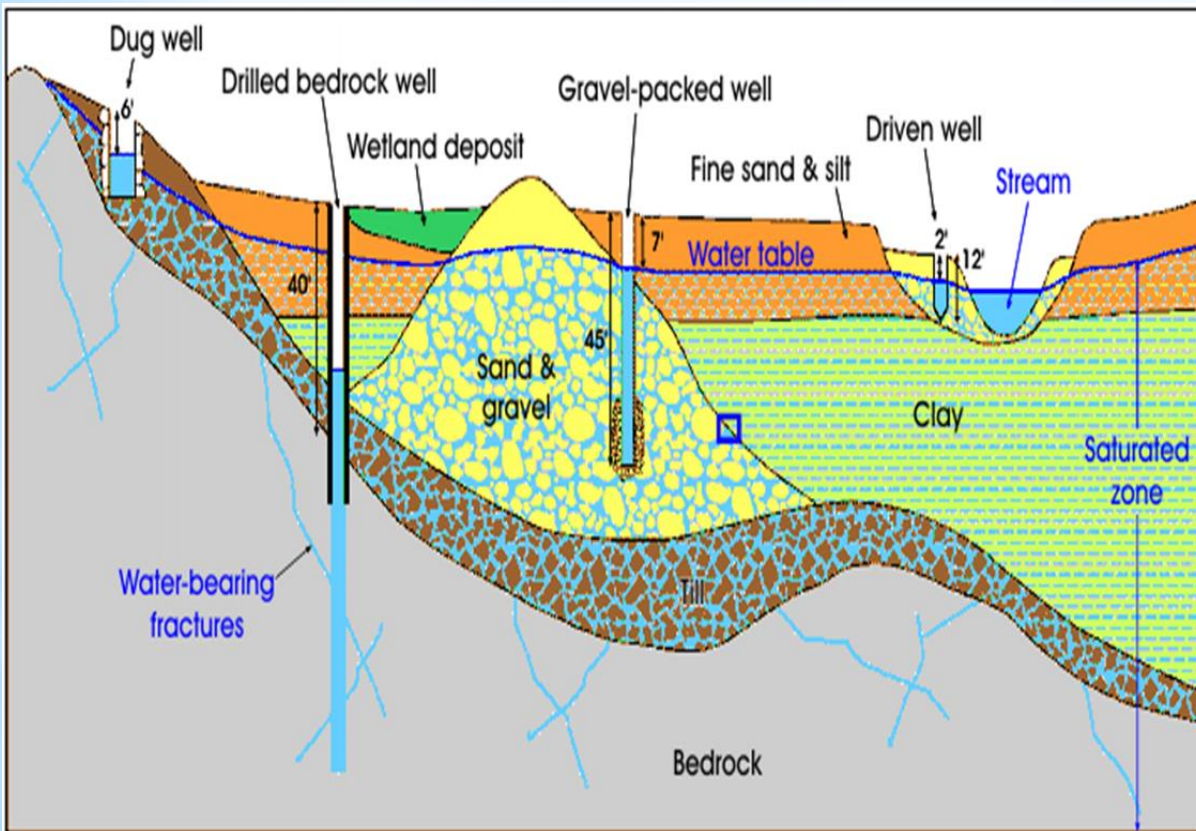
* Sand and Gravel Aquifer

- An aquifer where groundwater is stored in the pore space of unconsolidated sand and gravel
- Typically very permeable and porous material, so groundwater can easily flow in the aquifer through the pore space

* Bedrock Aquifer

- An aquifer composed of consolidated bedrock.
- Groundwater flow can occur in pore space, bedrock fractures, and bedding planes of bedrock.
- Can be permeable or impermeable depending on rock type and degree of fractures.

Bedrock Wells and Aquifers vs. Sand & Gravel Wells and Aquifers



*Overview from Town Hydrogeologist

***UPDATED NYSDEC DESIGN FOR WATER USAGE (2014):** ADJUSTMENTS FROM THE ORIGINAL DEMAND FOR THE PROJECT FROM 32 GPM TO THE UPDATED DEMAND OF 24 GPM, PLACES LESS STRESS ON THE UNDERLYING BEDROCK AQUIFER AND RECHARGE.

***RECHARGE RATE CONSERVATIVELY STATED:** RECHARGE TO THE BEDROCK AQUIFER ARE UNDERSTATED AT 7 INCHES PER YEAR VERSUS 8.45 INCHES PER YEAR BASED ON THE 1995 USGS STUDY FOR RECHARGE TO A BEDROCK AQUIFER IN THE LOWER HUDSON VALLEY. BOTH RECHARGE NUMBERS INDICATE SUFFICIENT WATER TO SUPPORT THE WATER DEMAND OF THE PROJECT EVEN IN A SEVERE DROUGHT.

* INTER-BASIN TRANSFER OF WATER: GIVEN THE ANNUAL TOTAL RECHARGE TO THE MIANUS RIVER DRAINAGE BASIN AND THE REVISED WATER BUDGET OF 24 GPM, THE INTER-BASIN TRANSFER WOULD BE 0.225% OF THE AVAILABLE RECHARGE. THE DAILY DEMAND OF THE PROJECT WILL HAVE A NEGLIGIBLE EFFECT ON THE MIANUS RIVER WATERSHED.

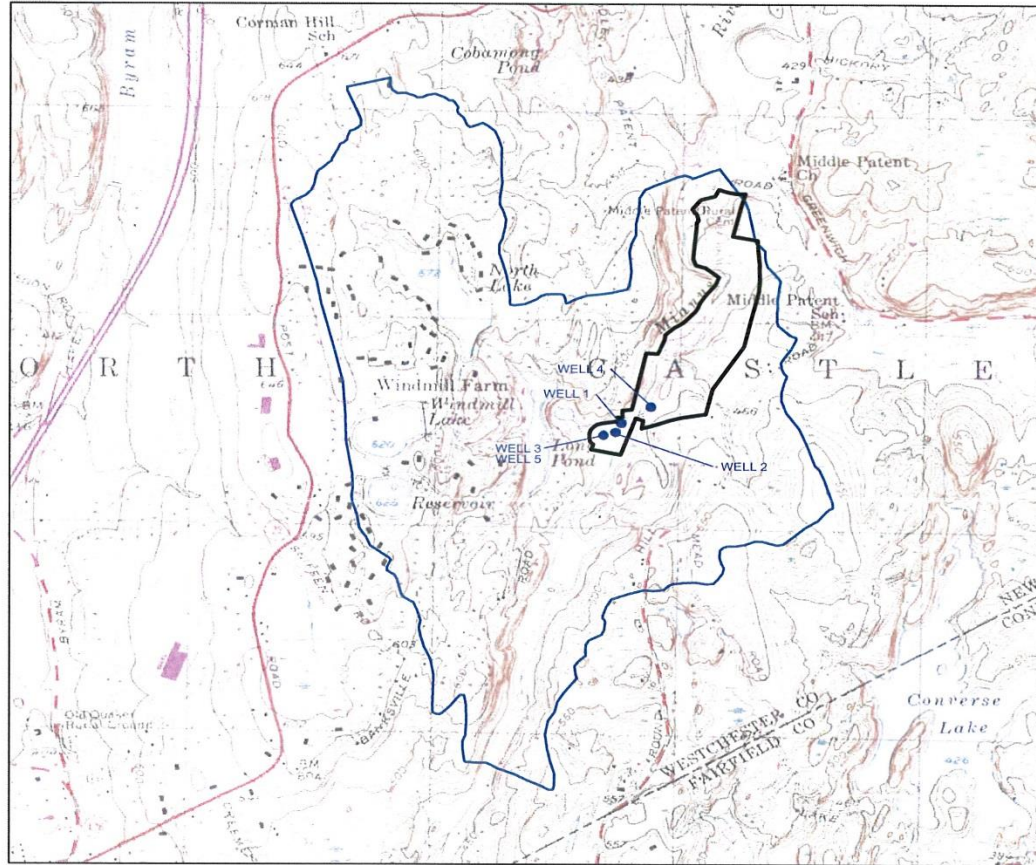
* SUPPLYING THE PROJECT FROM BEDROCK WELLS: WILL MINIMIZE THE EFFECTS ON INTER-BASIN TRANSFER AS BEDROCK WELLS WILL HAVE LESS OF AN EFFECT ON SURFACE WATER BODIES AND THE SHALLOW SAND AND GRAVEL AQUIFER.

* **SURPLUS WATER IS NEEDED DURING PEAK DEMAND TIMES:** THE DISTRICT PUMPS 24 GPM MORE THAN THE NYSDEC WITHDRAWAL PERMIT. THE DISTRICT WOULD BENEFIT GREATLY FROM FINDING SURPLUS WATER IN THE BEDROCK AQUIFER.

* **BENEFITS OF BEDROCK WELLS:**

- WILL LIKELY NOT INFLUENCE NEARBY SURFACE WATER BODIES
- WILL NOT SIGNIFICANTLY AFFECT GROUNDWATER RECHARGE TO THE SAND AND GRAVEL WELL FIELD.
- ALLOW MORE FLEXIBILITY FOR PUMPING THE EXISTING SAND AND GRAVEL WELLS.
- SAND AND GRAVEL WELLS CAN BE CYCLED AND NOT OPERATED CONTINUOUSLY.
- RESTING OF CURRENT WELLS WILL ALLOW SAND AND GRAVEL AQUIFER TO RECHARGE DURING THE DRIER TIMES OF THE YEAR.

C:\DWG\Bromwood\2015\Water District 2\Fig6.dwg, Layout1, 8/11/2015 4:08:37 PM, AutoPlot.pc3



SOURCE: USGS TOPOGRAPHIC QUADRANGLE MOUNT KISCO, NEW YORK (1998).

LEGEND

-  PROPERTY BOUNDARY
-  WELL 1
-  WATER DISTRICT No. 2
-  PRODUCTION WELL LOCATION
-  WATERSHED BOUNDARY



QUADRANGLE LOCATION



SCALE IN FEET

**TOWN OF NORTH CASTLE
WATER DISTRICT No. 2
WELL FIELD ASSESSMENT
(T) NORTH CASTLE, NEW YORK**

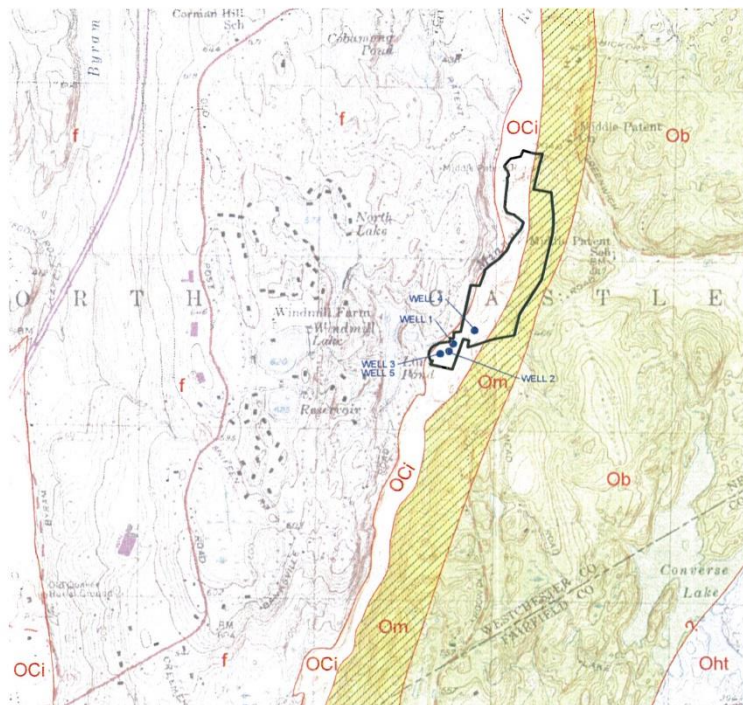
WATERSHED MAP

DATE	REVISED

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



DRAWN: RAC **CHECKED:** SS **DATE:** 08/11/15 **FIGURE:** 5



LEGEND

Property Boundary

f

Fordham Gneiss, undivided - garnet-biotite-quartz-plagioclase gneiss and amphibolite

OCi

Inwood Marble - dolomite marble, calcschist, granulite, and quartzite, overlain by calcite marble

Om

Manhattan Formation, undivided - pelitic schists, and amphibolite

Ob

Bedford Gneiss - biotite-quartz-plagioclase gneiss and interlayered amphibolite

WELL 1

Water District No. 2 Production Well Location

Sources: Geologic Map of New York, Lower Hudson Street, New York State Museum and Science Service, 1970.
208 Area-wide Waste Management Plan, Northern Westchester County, New York, Geraghty & Miller, 1977.



QUADRANGLE LOCATION

0 2000
SCALE IN FEET

TOWN OF NORTH CASTLE WATER DISTRICT No. 2 WELL FIELD ASSESSMENT (T) NORTH CASTLE, NEW YORK

WATER DISTRICT No. 2 BEDROCK GEOLOGY

DATE	REVISED	PREPARED BY:
		LEGGETTE, BRASHEARS & GRAHAM, INC.
		Professional Groundwater and Environmental Engineering Services
		4 Research Drive
		Suite 204
		Shelton, Connecticut 06484
		(203) 929-8555
DRAWN:	RAC	CHECKED: SS
		DATE: 08/11/15
		FIGURE: 3



 **Questions?**