*Special Meeting Brynwood WD#2 Application

October 28, 2015

*Dates to Remember:

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

*The Brynwood Application

* Petition submitted for extension of water district #2 (WD#2)

* Brynwood is currently served by WD#2 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 WD#2.

*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 64 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 peak water demands:

- Peak water demand for Brynwood as an out of district user:

  4,400 GPD (gallons per day) or 1.2% of total district

- Maximum peak water demand for water district #2 (without Brynwood):

  360,432 GPD (gallons per day) 2012

* Projected peak water demands:

- Estimated average peak water demand for 73 residential units and clubhouse:

  34,744 GPD (gallons per day) or 24 GPM (gallons per minute)

➢ Projected peak water demands would be 8.7% of the total district.

- Estimated combined peak water demand for Brynwood development and water district #2:

  395,176 GPD (gallons per day) or 296 GPM (gallons per minute)

*Financial Impact on Water District #2

WD#2 Existing Capital Debt with an additional 73 residential units.
(projected clubhouse not included)

WATER DISTRICT NO.2 CAPITAL DEBT TABLE

CURRENT WD2 DEBT TABLE

Fiscal Year	Remaining Current Debt		Water System Borrowing $9,950,000		Total Annual Capital Debt Includes	Annual Cost Per Parcel/Unit Exisiting Dist.	Current Dist. 381 Bryn Dwellings 73 Bryn Clubhouse Total 454		Existing District Total Annual Reduction w/ Additions
	400K Ban	Tank & Well 1,650,000 Bond	Principle	Interest			W / Additions annual per unit cost	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	$1,774	-$340	-$129,478.36
2017		$174,941	$205,000	$338,700	$718,641	$1,886	$1,583	-$303	-$115,552
2018		$178,013	$210,000	$328,450	$716,463	$1,880	$1,578	-$302	-$115,202
2019		$175,713	$220,000	$317,950	$713,663	$1,873	$1,572	-$301	-$114,752
2020		$178,256	$230,000	$306,950	$715,206	$1,877	$1,575	-$302	-$115,000
2021		$178,769	$235,000	$295,450	$709,219	$1,861	$1,562	-$299	-$114,037
2022		$151,230	$245,000	$283,700	$679,930	$1,785	$1,498	-$287	-$109,328
2023			$250,000	$271,450	$521,450	$1,369	$1,149	-$220	-$83,845
2024			$260,000	$258,950	$518,950	$1,362	$1,143	-$219	-$83,444
2025			$270,000	$245,950	$515,950	$1,354	$1,136	-$218	-$82,961
2026			$280,000	$236,500	$516,500	$1,356	$1,138	-$218	-$83,050
2027			$290,000	$226,700	$516,700	$1,356	$1,138	-$218	-$83,082
2028			$300,000	$216,550	$516,550	$1,356	$1,138	-$218	-$83,058
2029			$310,000	$206,050	$516,050	$1,354	$1,137	-$218	-$82,977
2030			$320,000	$195,200	$515,200	$1,352	$1,135	-$217	-$82,841
2031			$330,000	$184,000	$514,000	$1,349	$1,132	-$217	-$82,648
2032			$345,000	$172,450	$517,450	$1,358	$1,140	-$218	-$83,202
2033			$355,000	$160,375	$515,375	$1,353	$1,135	-$218	-$82,869
2034			$370,000	$147,950	$517,950	$1,359	$1,141	-$219	-$83,283
2035			$380,000	$135,000	$515,000	$1,352	$1,134	-$217	-$82,808
2036			$395,000	$121,700	$516,700	$1,356	$1,138	-$218	-$83,082
2037			$410,000	$107,875	$517,875	$1,359	$1,141	-$219	-$83,271
2038			$425,000	$93,525	$518,525	$1,361	$1,142	-$219	-$83,375
2039			$440,000	$78,650	$518,650	$1,361	$1,142	-$219	-$83,395
2040			$460,000	$63,250	$523,250	$1,373	$1,153	-$221	-$84,135
2041			$475,000	$47,150	$522,150	$1,370	$1,150	-$220	-$83,958
2042			$495,000	$30,525	$525,525	$1,379	$1,158	-$222	-$84,501
2043			$510,000	$18,150	$528,150	$1,386	$1,163	-$223	-$84,923
2044			$530,000	$7,950	$537,950	$1,412	$1,185	-$227	-$86,499

* Projected annual household savings:

- Projected (without clubhouse included):

➢ **Average of annual savings per household:** = 16.1 %

➢ **Existing District property owners will each realize:**

A total savings of $6,957 (throughout the existing debt period)

➢ **A cumulative reduction of existing member debt** = $2,650,555

*Evaluation of Current System

Overview

*Water district #2 Current System:

*WD#2 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

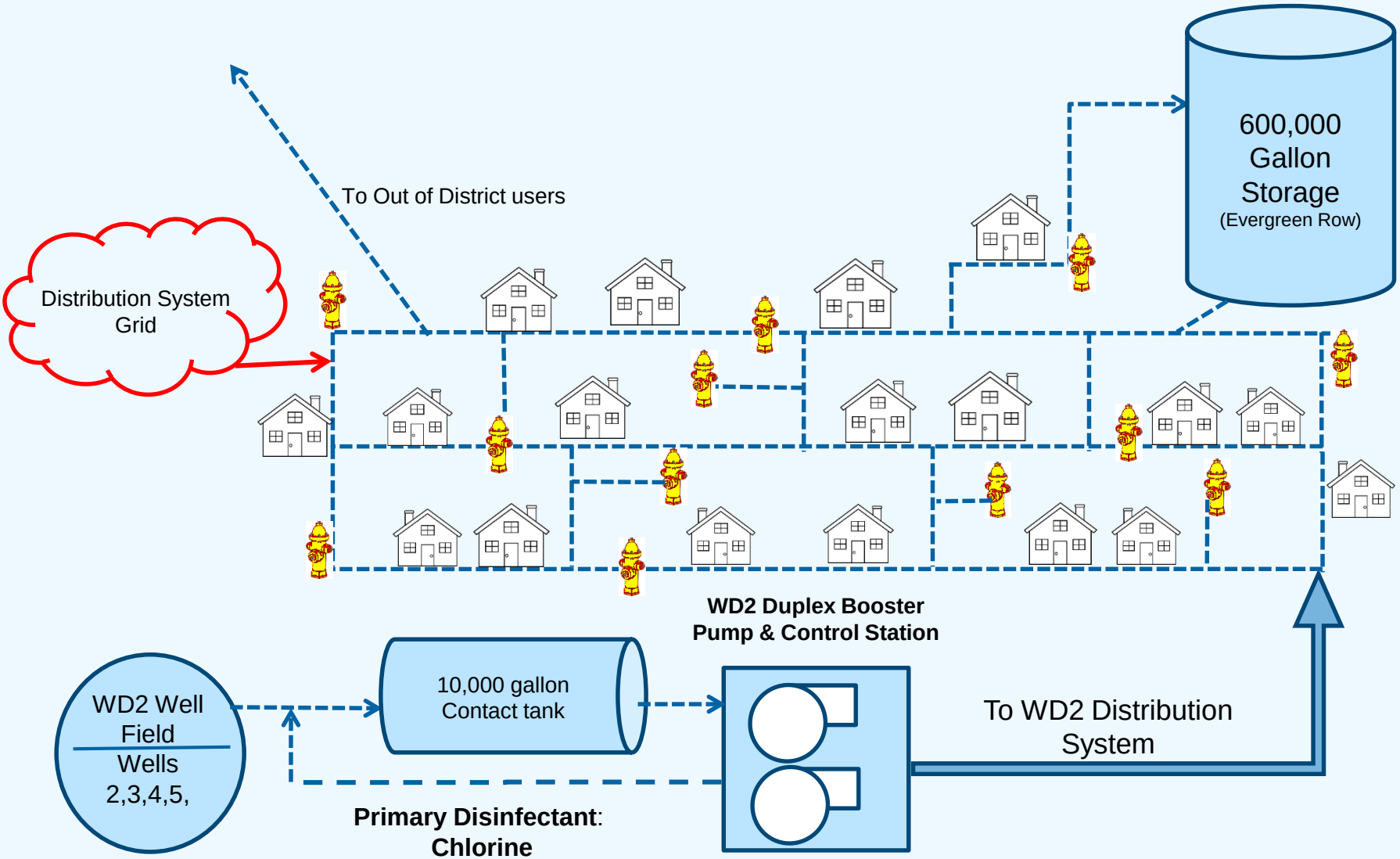
Supply Source	Yield Capacity	Daily Capacity GPD (24 hour cycle)
Well 2	50 gpm	72,000
Well 3	100 gpm	144,000
Well 4	190 gpm	273,600
Well 5	280 gpm	403,200

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 demand[1] = 1.10 MGD
(on the maximum day)

MGD = million gallons per day

[1]GHD Modeling Study prepared for WD2—July 2012

* Water District Demand Summary:

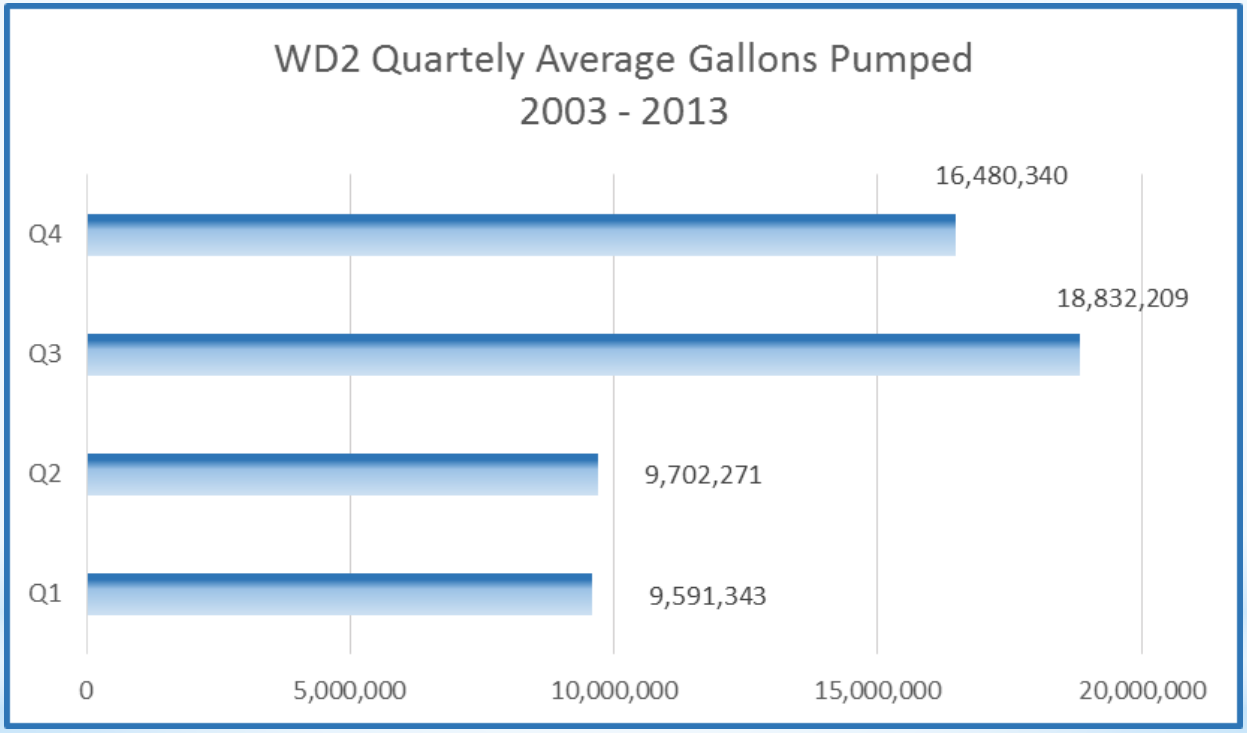
Demand Allocation Summary

	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**

[1]GHD 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 (*planned for this winter*)

  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

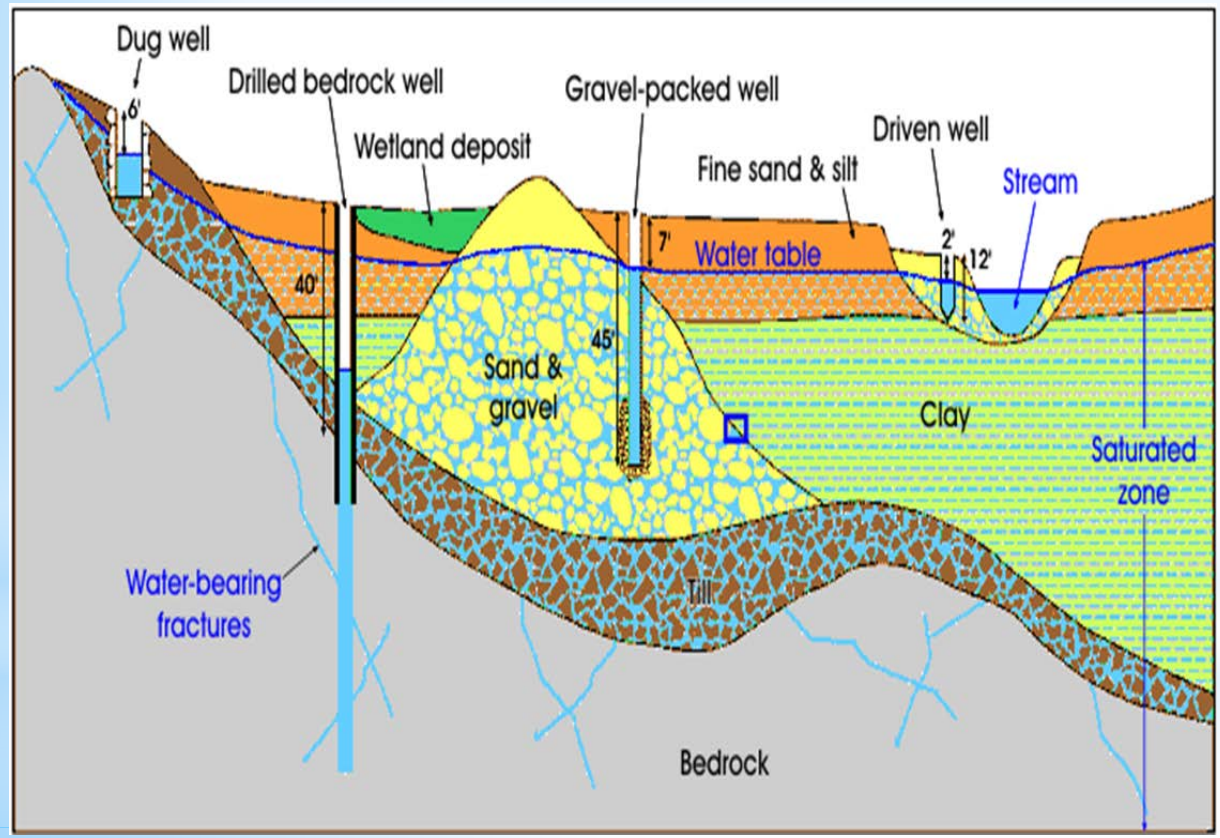
*Sand and Gravel Aquifer

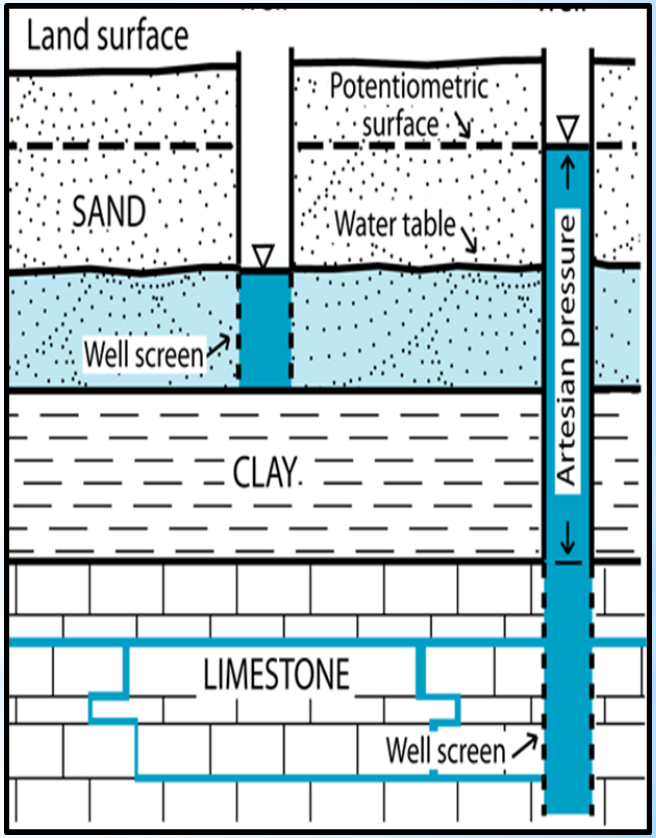
- An aquifer where groundwater is stored in the pore space of unconsolidated sand and gravel
- Typically very permeable and porous material, so groundwater can easily flow in the aquifer through the pore space

*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.

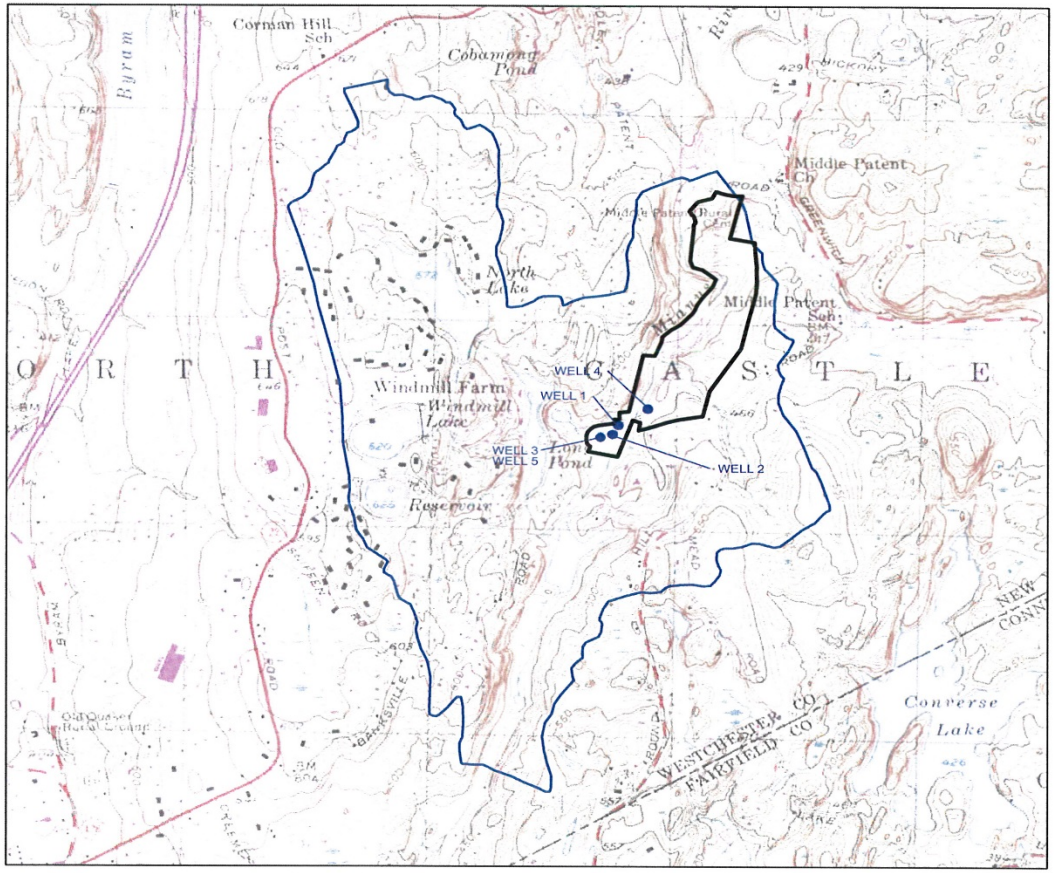
* **Inter-Basin Transfer of Water**: Given the annual total recharge to the Mianus River Drainage basin and the revised water budget of 24 GPM, the inter-basin transfer would be 0.225% of the available recharge. The daily demand of the project will have a negligible effect on the Mianus River watershed.

* **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.



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

0 600

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

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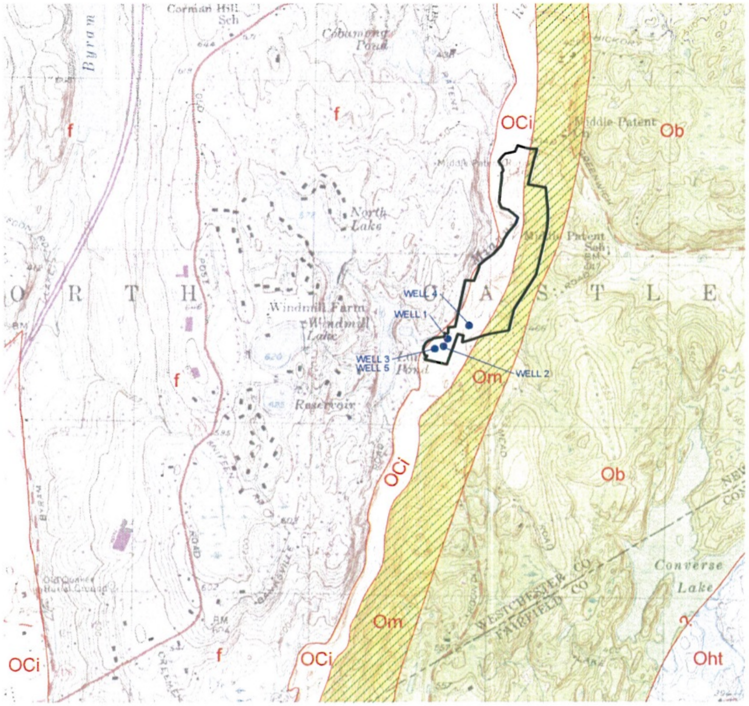

LEGEND

Property Boundary

f — Fordham Gneiss, undivided - garnet-biotite-quartz-plagioclase gneiss and amphilbolite

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

Om — Manhattan Formation, undivided - peltite schists, and amphilbolite

Ob — Bedford Gneiss - biotite-quartz-plagioclase gneiss and interlayered amphilbolite

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 Areawide 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

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*Questions?