5.0 WATER RESOURCES

The majority of comments on the DEIS related to potential impacts to water resources from the project. These comments relate to: stormwater treatment and water quality, proposed septic systems potential impacts to off-site water resources --specifically Beaverdam Lake--, and potential impacts to existing wells from proposed water supply wells at Lake Blooming Grove. These potential impacts and mitigation are described below.

Comments and responses related to water resources are included at the end of the section. Responses 3.3-1 through 3.3-21 below were provided during the public comment period on the DEIS which was accepted for circulation on April 28, 2004. Responses 3.3-22 through 33.3-25 respond to the review letter prepared by the Town Planning Board Engineer Pat Brady dated June 25, 2007.

5.1 Comparison of the DEIS Plan and the FEIS Conservation Plan

The FEIS Conservation Plan proposes two community supply wells instead of individual wells and includes modifications for improved stormwater management and reduced impacts to wetlands and Beaverdam Lake.

Surface Water

Wetlands

The FEIS Conservation Plan is expected to disturb approximately 0.03 acres of wetlands in one distinct area associated with the installation of one community well access road. (Figure 5-1). In addition, there would be a temporary disturbance of 0.061 acres related to the placement of a drainage pipe along the west side of Lake Road. The on-site wetlands are regulated by the Town and the US Army Corps of Engineers (USACOE), and the proposed impacts to the wetlands will require approval by the USACOE. Although alternatives were reviewed by the project engineer, the location of the well and impact to wetlands were unavoidable. Wetland impacts were minimized to the extent possible by shifting the location and orientation of the well access drive and the placement of a retaining wall in an area where the roadway grading approaches the wetland. To mitigate the loss of wetland associated with the project, the applicant is proposing several measures. As described below, the three stormwater basins would be planted with wetland vegetation, and therefore, similar wetland functions would be retained in those portions of the site. These basins would provide additional filtering of storm flows and biological uptake of nutrients.

Beaverdam Lake

Numerous comments on the DEIS related either directly or indirectly to the project's potential impact to Beaverdam Lake. While the DEIS provided a discussion regarding Beaverdam Lake and the project's potential impacts to the lake, additional information regarding the Lake is provided in this FEIS, including: the Lake's history, current environmental condition and future condition with the proposed project.

Approximately 158 acres in size, Beaverdam Lake is located at the shared corner of three municipalities: Blooming Grove to the southwest, Cornwall to the southeast and New Windsor to the north. It's location is shown in Figure 5-2. The lake is primarily fed from an unnamed

stream which flows from the north and discharges to a stream and then to Moodna Creek to the south.

Based upon historical USGS topographic maps, Beaverdam lake was originally a smaller natural pond approximately 87 acres in size. Between 1902 and 1935 a small dam was constructed directly north of Route 94 expanding the lake towards the north and south to approximately double its original size. The 1902 Shunemunk Quadrangle map shows the pond as unnamed. The lake is identified as Ramsdell Lake in the 1935 Quadrangle map. The 1935 map shows approximately 18 residences near the southwest corner of the lake in the Town of Blooming Grove.

Over time, relatively dense residential development has occurred around Beaverdam Lake, mostly in the towns of New Windsor and Cornwall on the northwest and northeast portions of the lake. In the Town of New Windsor the Suburban Residential R-4 zoning district allows one-half acre single family residential lots, if central sewer is provided. Since the R-4 zoned area surrounding Beaverdam Lake is served by a central sewer system, more dense development has occurred. Numerous older lots around the lake are close to one-half acre in size, and approximately 256 residents are located within approximately 750 feet of the lake shore. The closest proposed residence in the Lake Blooming Grove subdivision would be approximately 750 feet from the edge of the lake.

The drainage area for the lake, shown in Figure 5-2, extends mostly to the north, including the property of Stewart Airport, and based upon the USGS maps it is estimated to be approximately 4,610 acres. As provided in the DEIS, the Lake Blooming Grove subdivision includes approximately 15 acres that drain to Beaverdam Lake, or approximately 0.3 percent of the entire drainage basin.

According to the lake and stream classification criteria used by the New York State Department of Environmental Conservation (NYSDEC) to maintain or improve water quality, Beaverdam Lake has a water quality classification of B. Under this classification waters are considered suitable for fish propagation and survival, and the best uses of the lake include primary and secondary contact recreation (swimming and boating) and fishing. Class B waters are not suitable for drinking. It should be noted that the tributaries, both flowing into and exiting Beaverdam Lake are classified as D. Class D streams are represent the lowest classification by the DEC and are not suitable for drinking, recreation, or fish propagation.

According to a comment letter to the DEIS, Allied Biological, Inc. has been assessing water quality issues for Beaverdam Lake for approximately 15 years. Allied Biological Inc. Is a environmental consulting firm that specializes in assessing, monitoring and improving water quality in lakes and ponds. According to Mr. Glenn Sullivan, President of Allied Biological, Inc., his firm conducted a study of Beaverdam Lake approximately 10 to 15 years ago. Since then, the firm has treated the lake chemically to reduce algae, which has been a reoccurring problem for residents who live near and use the Lake.

The presence of algae in Beaverdam Lake is an indication of fertilizers such as phosphorus and nitrates entering the Lake in excess amounts. Phosphorus and nitrates in stormwater runoff is a serious problem for the health of many small lakes and ponds particularly in reservoirs where the recirculation of water is poor. Shallow lakes also have the disadvantage of water temperatures rising more rapidly in the summer, thereby accelerating the growth of algae and nuisance plants. Although the depth of Beaverdam Lake is not known, the lake appears to be

relatively shallow, based upon historical topographic maps, made prior to the damming of the Lake. The relatively dense development surrounding the lake with numerous lawns, as well as the relatively large upstream drainage basin all contribute to the potential for fertilizers and nutrients to enter the lake at rates far greater than would come from the project site with current stormwater treatment methods.

Stormwater Runoff

The Planning Board and the public have expressed concern regarding stormwater treatment and the projected increase in levels of biological oxygen demand (BOD) that would result in the stormwater runoff from the development proposed in the DEIS. Biological oxygen demand is a measure of how much oxygen is being used by aerobic organisms in water to decompose organic matter. It is a general indicator of the organic material in water, including nitrates and phosphates, which are a source for aerobic bacteria. If the bacteria is using too much of the dissolved oxygen in the water, then there is not enough oxygen to support a healthy variety of aquatic organisms. This was a particular concern in the northeast corner of the property, where stormwater is proposed to be discharged to Beaverdam Lake.

Site generated stormwater runoff that would otherwise flow into Beaverdam Lake has been, to the greatest extent practicable, diverted to the southwest and two stormwater facilities (B) are proposed in series in the northeastern-most portion of the site to reduce the stormwater pollutant loading on Beaverdam Lake. At each of the other two stormwater facilities (A-1 and A-2) practices are proposed in a series to reduce to the greatest extent practicable the site generated stormwater pollutant loading. As a result of the stormwater management facilities, pollutant loading for the project has been reduced to below pre-development levels. (See Table 5-3 and Appendix 4 of the Stormwater Pollution Prevention Plan (SWPPP).

Existing Drainage Conditions

Stormwater from the site currently flows to three discharge points on the property identified as A, B, and C (Figure 5-3). The majority of the site flows to a small stream on the southern edge of the property and then towards Moodna Creek. A small area, approximately 8 acres in size, flows towards the northwest to an off-site stream. The northeast corner of the site, consisting of approximately 15 acres of on-site drainage area and 9 acres off-site, flows into a culvert under Lake Road and into a privately owned shallow grass lined swale and into Beaverdam Lake. Therefore approximately 20 percent of the 79 acre site drains to Beaverdam Lake, while the balance of the site flows towards the west and Moodna Creek. Only three of the proposed 37 homes are located in the drainage area for Beaverdam Lake.

The contributing areas of various soil types and ground covers were determined for each drainage area and input into the PondPack Model. Based upon this data, a cumulative Curve Number (CN) was determined that relates the rainfall to the runoff over the drainage areas (See Appendix *2* within the SWPPP). The travel paths shown are those that are the hydraulically most distant to the outlet of each drainage area. Based on the travel paths, the Time of Concentration was determined within the PondPack program and indicates the time at which the entire drainage area is contributing (See Appendix 2 of SWPPP).

The PondPack program used these values in determining resultant hydrographs for each drainage area The peak discharge and runoff volume were recorded from the generated

hydrographs. Table 5-1 summarizes the drainage characteristics for each drainage area associated with the design storm frequencies.

Table 5-1
Pre-Development Peak Discharges

				1 Year	10 Year	100 Year
Drainage Area	**Area (ac.)**	**Cum. CN**	**Tc (hrs.)**	**Peak Runoff (cfs)**	**Peak Runoff (cfs)**	**Peak Runoff (cfs)**
A	61.88	73	0.4034	31.98	117.98	212.19
B	25.88	73	0.3095	14.86	54.26	97.64
C	8.15	73	0.2683	4.9	18.16	32.66
	95.9	--	-	-		-

Source: Lanc & Tully Engineers & Surveyors, 4/8/2008

Proposed Stormwater Management Drainage Areas

The proposed stormwater management plan has been designed to maintain the existing drainage patterns within the site (to the greatest extent practicable) to properly manage the volume and quality of stormwater. The proposed drainage areas are shown in Figure 5-4.

Drainage Area A-1 and Stormwater Basin A-1. Drainage Area A-1 comprises 21.28 acres. A large portion of the site development and proposed impervious areas, would be located within it -- specifically a majority of the proposed Town Road and 15 residential lots totaling 3.29 acres of impervious surfaces. In addition this area includes undisturbed meadow, wooded areas within open space area, and lawn/landscaping areas. The proposed development of the roadway and dwellings cause an increase in the curve number, as well as a decrease in the time of concentration.

In the southern portion of the site Stormwater Basin A-1 is proposed to be constructed to provide both water quality and quantity treatment for runoff originating from Drainage Area A-1. The facility includes a 4 foot deep sediment forebay with a submerged berm to prevent sediment from depositing into the permanent wetpool. The design also includes a 20 foot wide emergency spillway, an outlet control structure, a 10 foot wide berm for access, and a pond drain. After attenuation in this basin runoff would discharge into existing on site Federal Wetland"A" and ultimately to outfall A.

A bioretention area located in front of the pond is proposed to provide further water quality treatment during typical storm events. This area would receive discharge through a splitter designed to ensure that only the water quality volume would be discharged through this facility.

Drainage Area A-2 and Stormwater Basin A-2. Drainage Area A-2 comprises 11.40 acres within the central portion of the project site, where development is proposed, including a total of 2.84 acres of impervious surfaces. Associated runoff from this area would be collected in the proposed drainage network within the roadway and discharged into a proposed series of NYSDEC approved stormwater facilities. A Dry Swale, Bioretention Area and Dry Basin are to be constructed behind Lots 1-3. The Dry Swale and Bioretention area would serve as areas for water quality treatment. The dry basin would serve as the water quantity control facility.

Drainage Area A-3. Drainage Area A-3 comprises 33.32 acres of land and includes Federal Wetland Area A, therefore the majority the land would remain unchanged from the

pre-development ground cover. Four dwellings with lawn and landscaping areas, all outside the wetland, would be constructed within this drainage area leading to a small increase in impervious area and lawn. Due to the minimal development, a decrease in the peak discharge for this area has been calculated and no stormwater quantity controls are necessary. Grass filtration swales would be constructed along the rear of the lots to ensure water quality treatment. Runoff patterns from this watershed area remain the same as compared to pre-development conditions and discharge to Outfall A.

Drainage Area B-1. Drainage Area B-I is 21.70 acres located along the northern boundary of the project site consisting mostly off site undisturbed woods and meadows and one proposed dwelling. The discharge would be via overland flow that travels throughout Federal Jurisdictional Wetland Area B and C, where it would enter an existing ditch prior to discharging under Lake Road via a proposed 24" culvert. Currently at Outfall B is a 15" corrugated metal pipe (CMP) culvert that crosses under Lake Road. As part of the site development this culvert would be upgraded to a 24" HDPE in order to safely pass the existing peak flow rate without roadway overtopping. In addition, based on analysis of existing conditions, the channel that currently conveys runoff from the culvert would be stabilized with rip rap to prevent further erosion. Water quality treatment would be provided by grass swales.

.

Drainage Area B-2 and Stormwater Basin B. Drainage Area B-2 consists of 3.32 acres of existing meadow areas, proposed roadway, and two proposed dwellings. A total of 0.88 acres of new impervious surfaces is proposed within this area. The discharge would be collected through the proposed drainage network and discharges into a proposed NYSDEC pocket pond design located at the entrance to the subdivision adjacent to Lake Road (Stormwater Basin B). The pond would serve as the primary facility for water quality and quantity before discharge to the proposed 24" reinforced concrete pipe (RCP) culvert. The pond would provide the necessary water quality treatment and water quantity control. To further provide water quality treatment for pollutant removal, a bioretention area is proposed for typical storm events and is located in the front of the pond. This bioretention area would receive discharge through a flow splitter, which has been designed to ensure that only the water quality volume would be discharged.

Drainage Area C. Drainage Area C consists of 4.77 acres and flows off site in the northeastern portion of the property. The flow is not concentrated, which is consistent with pre-development conditions. Due to a reduction in area and no significant proposed construction of impervious areas, no detention is necessary in this drainage area. To ensure water quality treatment, four dry wells are proposed to collect any runoff from the proposed dwelling rooftops.

Runoff quantity was calculated using the TR-55 Method, as analyzed in the Pond Pack computer model. Table 5-2 shows the post-development peak discharges for the outfalls in each drainage area. Existing runoff from the Project Site has been calculated for the 1-year, 10-year, and 100-year storm events. A comparison of the predevelopment flow rates in the previous table indicates that after development the flow rates would decrease in all of the drainage areas. In Drainage Area B, which discharges to Beaverdam Lake, a decrease of approximately 17 percent would be anticipated for the range of storms analyzed. For a detailed analysis of the areas flow rates please refer to Appendix 2 of the SWPPP.

Table 5- 2
Post-Development Peak Discharges

Drainage Area	Area (ac.)	Cum. CN	Tc (hrs.)	1 Year Peak Runoff (cfs)	10 Year Peak Runoff (cfs)	100 Year Peak Runoff (cfs)
A-1	21.28	77	0.2726	16.92	53.67	92.20
A-1*	----	--		2.37	32.78	62.50
A-2	11.4	79	0.24	10.61	33.78	53.14
A-2*	----	--		6.4	34.78	52.32
A-3	33.42	74	0.4	18.75	35.78	117.69
A (Detained)	**66.00**	**--**	**-**	**24.48**	36.78	**196.28**
					37.78	
B-1	21.7	73	0.3095	12.47	38.78	82.64
B-1*	3.33	80	--	3.41	39.78	16.31
B-2	----		0.2164	0.6	40.78	10.29
B (Detained)	**25.03**	**--**		**12.68**	41.78	**90.36**
C	**4.77**	**76**	0.1968	**3.92**	**12.80**	**22.20**

*Reflects discharge values with Proposed Retention/Detention Conditions
Source: Lanc & Tully Engineers & Surveyors, 4/8/2008

The project engineer assessed the potential impact of discharge to the existing drainage swale which flows to Beaverdam Lake. Based upon a bottom width of 1.5 feet , a depth of 2 feet and a width of 8 feet, the capacity of the ditch is 92.84 cfs. This rate is slightly greater than the projected designed 100-year-storm flow rate from Watershed Area B. Therefore, the existing drainage swale is capable of conveying the 100 year storm event. Additionally, the applicant has agreed to further stabilize the existing swale with a geotextile-lined rip-rap channel.

The engineer also assessed alternatives to the existing and proposed discharge point in the northeast corner of the site. Since the roadway south of the site rises 25 feet in grade above the elevation at the existing culvert, piping the stormwater drainage towards the south, along Lake Road would require earth cuts of 25 feet, tunneling the pipe or pumping the stormwater over a hill, which are impractical options. As discussed above, the stormwater management design would divert as much water as practicable to the on-site wetlands located in the southern portion of the project site. Diverting all site generated stormwater is not feasible.

Stormwater Quality

The New York State Stormwater Management Design Manual (August, 2003) was prepared to provide standards for the design of stormwater management practices (SMPs) to protect surface water from the impacts of stormwater runoff. It presents a Water Quality Volume (WQv) technique that was designed to improve water quality sizing of SMPs to capture and treat 90% of the average annual stormwater runoff volume.

The revised stormwater pollution prevention plan (SWPPP) in this FEIS was prepared according to these standards and meet the WQv requirement. The plan includes wet retention basins, bioretention areas, and dry swales. Stormwater collected on developed portions of the property would be treated using these SMPs to reduce off-site discharge of sediment and pollutants. Primary stormwater treatment would occur in the two extended detention pocket ponds A-1 and B.

In addition to designing the stormwater management plan to meet the WQv criteria, the project engineer prepared a Pollutant Loading Estimate indicating overall pollutant loading rates would decrease in the post-development condition (with treatment) compared to the existing condition. In contrast to the plan proposed in the DEIS, the revised stormwater management plan in the FEIS Conservation Plan would result in an expected overall decrease in concentrations of BOD.

As shown in Table 5-3 below, pollutant rates would be estimated to increase following development of the site, prior to stormwater treatment. Following treatment, compared to existing stormwater run-off conditions, total phosphorus rates for Areas A and B would be expected to decrease in total phosphorous, nitrate and BOD rates, and Area C would be expected to decreases in total phosphorous and nitrate rates. An increase in BOD would be expected in Area C, but while limited locations for stormwater treatment are available in that area, drywells would be used to treat stormwater from impervious surfaces draining into it, thereby by minimizing the BOD rate. This slight increase is offset by more significant decreases in BOD in Areas A and B.

Table 5-3
Existing Versus Proposed Pollutant Loading Estimates

Parameter	Existing	Developed (without treatment)	Developed (with treatment)	Change (Existing vs. Developed with treatment)
Total Phosphorus (lbs./yr)				
Area A	11.4	28.3	7.0	-44.0
Area B	5.0	6.9	3.3	-1.7
Area C	.0.9	2.7	1.6	0.7
Total	17.3	37.9	11.9	-5.4
Total Nitrate (lbs/yr)				
Area A	186.1	276.8	117.5	-68.5
Area B	80.3	85.1	40.6	-39.7
Area C	20.9	23.2	11.6	-9.3
Total	287.2	385.1	169.7	**-117.5**
BOD (lbs/yr)				
Area A	595.8	913.8	317.6	-278.2
Area B	275.8	259.2	209.0	-66.8
Area C	58.0	80.2	80.2	22.2
Total	929.6	1,253.2	606.8	**-322.8**

Source: Lanc & Tully Engineers & Surveyors, PC, 1/2004

Stormwater discharged from the pocket pond in the northeast corner of the site (Area B), would be discharged to an existing swale, which flows to a culvert under Lake Road. The treated stormwater from drainage Area B eventually would flow to Beaverdam Lake, located approximately 500 feet from the site. As shown in the engineering estimates, the levels of phosphorus, nitrates, and BOD are expected to decrease compared to existing run-off concentrations. Under typical drainage and rainfall conditions, the 500 foot long drainage swale would act as a biofilter, prior to the stormwater reaching Beaverdam Lake. Credit for this off-site treatment was not reflected in the stormwater analysis, but should be noted.

The design of the stormwater management facilities is projected to substantially reduce the estimated levels of BOD exiting the site when compared to the previous stormwater treatment design. The revised stormwater treatment plan provides calculations of current and post development stormwater flow rates that take into account the change in surface conditions and the introduction of impervious surface into the site (see Appendix F).

Based upon the above described estimates, the project is not expected to have an adverse impact to Beaverdam Lake and other downstream receiving waters. For certain parameters, as discussed above, water quality is likely to improve as a result of the project.

Erosion and Sediment Control

The general State Pollutant Discharge Elimination System (SPDES Permit GP-02-01) for construction activities also requires the preparation of an Erosion and Sediment Control plan. This plan was developed as part of the site plans and would be available at the Town Hall and the construction site. In compliance with current and proposed regulations, the plan provides, both short and long term maintenance of facilities including construction sequencing, storage of materials and temporary and permanent structures. Please refer to the Erosion and Sediment Control Plan and standard details of facilities and devices to be utilized on-site.

Erosion control methods employed are based upon the guidelines within the New York State Standards and Specifications for Erosion and Sediment Controls for new developments. To mitigate potential impacts from site disturbance during construction such as grubbing and topsoil removal, temporary seeding and stabilization measures would be implemented within 14 days of inactivity in an area. Erosion control devices such as silt fencing and diversion berms would be placed upstream of existing wetlands and the existing watercourse on the eastern property boundary outside construction areas prior to construction. A temporary construction entrance would be installed along Lake Road at locations specified in the plan, and temporary sediment basins, traps and outlet structures throughout the site as designed on the plan would be completed prior to the start of any major earthwork movement or site construction. In addition, on site ditches would be used to convey stormwater to the sediment basins and/or traps, and diversion swales on the uphill side of the property would be installed.

Long-term Maintenance of permanent stormwater structures could be provided by a Homeowner's Association or by the municipality through the formation of a Town Drainage District. In addition, it may also be possible to establish a waterworks corporation under the transportation corporation law to manage strormwater structures. Ownership and maintenance of site features is discussed in Section 1.6 of the Introduction. Regardless of the ownership the following facilities would require maintenance: Structures that collect stormwater such as catch basins and pipes, stormwater basins and any other constructed stormwater practice (bioretention areas & swales). The long-term maintenance of the on-site drainage structures would include periodic inspections of various structures, including outlet structures, pipes and spillways, to insure proper operation and good equipment condition. In addition, periodic removal of deposited sediment in catch basins, pipes and stormwater basins would be necessary on an infrequent basis as described above.

Groundwater

For the DEIS Plan individual wells were proposed for each lot, whereas in the FEIS Conservation Plan, a community water supply utilizing two bedrock wells is proposed as the source of water supply for the Lake Blooming Grove subdivision. Following installation of the test wells by Northern Well Drilling Company, Leggette Brashears & Graham, Inc. completed the installation and testing of the two wells. Two 72-hour pumping tests were completed on the proposed water supply wells and the results were summarized in a Pumping Test Report prepared by Leggette Brashears & Graham, Inc. in April 2007 and revised in June and August 2007. The full report includes a discussion of the hydrologic setting, recharge/discharge

estimates, water demand, and the pumping test procedure and results, is provided in Appendix E and is summarized below. The proposed community wells are located on the south side of the development as shown in Figure 5-1.

As part of the proposed DEIS Plan, four test wells were requested by OCDOH and these were drilled on the property in October/November 2004 by Boyd Artesian Well Company (Boyd). Three additional pumping test wells drilled on the property in November/December 2006 by Northern Well Drilling Company to support the revised FEIS Conservation Plan. Prior to drilling the OCDOH was consulted for approval of the proposed new well locations and for concurrence of the water demand estimate for the project. Two 72-hour pumping tests were completed on the proposed water supply wells (pumping test Wells 2 and 3), between January 22, 2007 and February 12, 2007 to demonstrate the yield potential and water quality of the proposed supply wells. In addition, an off-site well monitoring program was conducted during the pumping tests to determine the potential impacts on neighboring off-site wells from pumping the on-site wells. The pumping test program followed the guidelines and requirements for the NYSDEC "Recommended Pump Test Procedures for Water Supply Application."

The following discussion of groundwater and well testing is summarized from the 72-Hour Pumping Test Report, revised August, 2007, prepared by Leggette Brashears & Graham, Inc.

Local Recharge/Discharge Estimates

For sites with planned new development, water availability within the watershed becomes important to determine if the proposed demand would oversubscribe the available resources. If on-site recharge meets or exceeds the proposed demand, the water supply should be reliable and not adversely affect the aquifer in off-site areas. Although water-budget analyses are useful in estimating available ground water resources, drilling and testing supply wells is the only definitive indicator and confirmation of ground water availability from the aquifer source and any potential impacts to neighboring water supplies.

LBG has conducted extensive reviews of several published studies to develop estimates of groundwater recharge to aquifers in Orange County for the Orange County Water Authority (LBG 1995, LBG 2003). The most appropriate study to apply to the subject area is the 1980 report developed for the Fishkill-Beacon area (Snavely 1980) which indicates that recharge to the till-covered metasedimentary bedrock is approximately 400,000 gallons per day per square mile (gpd/sq. mi.) or about 8 inches annually. The recharge estimate for the property of 49,620 significantly exceeds the estimated water demands (15,760 gpd) for the proposed residential development under both normal and drought conditions.

72-Hour Pumping Test

Water Demand

The 72-Hour Pumping Test Report provides an estimate of water demand for the Lake Blooming Grove Subdivision consisting of 41 single-family homes (as previously proposed), and assuming the build-out of 33 four-bedroom homes and 8 three-bedroom homes. The water demand estimate is summarized on Table 5-4. The current proposal is for 37 units with 30 four-bedroom and 7 three-bedroom homes. Therefore, the estimate provided would be in excess of the demand in the modified plan.

Table 5-4 Estimated Water Demand			
Residence Type	**Number of Proposed Residences***	**Gallons per Day**	**Total Average Daily Demand (gpd)**
3-bedroom	8	320	2,560
4-bedroom	33	400	13200
Twice Average Daily Demand			15760.0
* Calculations in the 72-Hour Pumping Test report are based on an interim proposal of 41 units. Source: Leggette Brashears & Graham, 2007			

Water demand was estimated to be 15,760 gpd or about 10.9 gallons per minute (gpm). The estimate was reviewed by Ed Sims of the Orange County Department of Health (OCDOH) for concurrence and confirmed in a letter from his office dated January 18, 2007 (Appendix I of the Pumping Test Report). The New York State Department of Health (NYSDOH) requires that the available well supply for the proposed development equal or exceed twice the average daily demand estimate. Therefore, the water supply must have the capacity to produce a minimum of approximately 31,520 gpd or about 21.9 gpm. The NYSDOH requires proof of this supply with the most productive well out of service.

Groundwater Withdrawals Within 2,500 feet of a Well

There are no public groundwater supply wells within 2,500 feet from pumping test Wells 2 and 3 with the exception of a low density of individual homeowner wells.

Groundwater Exploration Program

Existing Bedrock Test Wells

Four bedrock pumping test wells were drilled on the property in October/November 2004 by Boyd Artesian Well Company (Boyd), The wells are identified as monitor wells MW-1, 2, 3 and 4. Well logs for these wells are located in Appendix II of the Pumping Test Report in Appendix E.

Pumping Test Wells IA, 2 and 3

A community water system and individual septic systems are proposed to support the FEIS Conservation subdivision plan. This Concept Plan was submitted and reviewed as part of the Land Conservation Analysis to the Planning Board, and whose Environmental Findings were adopted on August 23, 2006. To support the water demands of the project, three wells, labeled as Wells IA, 2 and 3, were proposed to meet the water-supply requirements of the project. After receiving approval for the well locations from the OCDOH, the wells were installed by Northern Drilling Company in November/December 2006. The reported yields for Wells 1A, 2 and 3 are 15 gpm, 27 gpm and 50 gpm, respectively. Well logs for Wells IA, 2 and 3 are located in Appendix E.

Pumping Test Program

The pumping test program on the Lake Blooming Grove community supply wells included two separate 72-hour pumping tests completed on pumping test Wells 2 and 3 between January 22 and February 12, 2007. The driller's estimated yields for pumping test Wells 2 and 3 indicated each well was able to meet twice the average water demand independently. Therefore, Well 1A, because of its lower reported yield, was not included as a pumping well.

Well Monitoring Program

During the 72-hour pumping tests on Wells 2 and 3, a well monitoring program was conducted which included on-site wells MW-1, 2, 3 and 4 and Well 1A; and 11 off-site domestic wells near the project site. Solicitation of homeowners for participation in the well monitoring program was completed on January 2, 2007. Solicitation letters were hand delivered to neighboring residences. A copy of the letter and a summary of the residences surrounding the study parcel that were solicited, are provided in Appendix E. The purpose of the well monitoring program was to determine if the pumping of Wells 2 and 3 for 72 hours, at pumping rates exceeding twice the average water demand of the project, would significantly affect water-level and/or yields of existing neighboring wells. LBG also installed two piezometers into an on-site wetland, adjacent to the pumping wells, to determine any hydraulic connection between the bedrock aquifer and the wetlands, under pumping conditions.

The well monitoring program began on January 11, 2007 with the installation of monitoring equipment in the on-site and off-site residential monitoring wells, and continued until February 16, 2007, when all monitoring equipment was removed.

Onsite Wells - Water-level drawdown was observed in the on-site monitoring wells MW-1, 2, and 4 and Well 1A during the testing of Wells 2 and 3. The observed drawdown ranged from 7.1 to 47.4 feet during the test on Well 2, and from 12.3 to 32.2 feet during the test on Well 3. Hydrographs of water-level measurements collected for each of the wells are included in Appendix E along with a table summarizing observed water-level drawdown for each well and approximate distance from the pumping test wells. The data indicate the monitoring wells within close proximity to the pumping test wells reported a greater degree of drawdown interference effects, with drawdown diminishing as distance increased from the pumping wells, as expected.

Offsite Wells - As a result of permission granted by neighboring homeowners, eleven (11) adjacent off-site residential wells were included in the well monitoring program. Water-level changes from pumping Well 2 were observed in all off-site wells during the test. Observed drawdown during the test, which was pumping at a yield of twice the average water demand, ranged from 2.9 to 19.4 feet. Water-level changes from the pumping of Well 3 were also observed in all off-site wells. Water-level drawdown ranged from 3.3 to 16.7 feet during the test at a yield of twice the average water demand. Hydrographs of the water-level measurements collected from all wells are included in Appendix E along with a table summarizing observed water-level drawdown for each well and approximate distance from the pumping test wells.

Piezometers -To determine if a hydraulic connection exists between the bedrock aquifer and the on-site wetland feature under pumping condition, two piezometers (PZ- A and B) were installed in the wetlands adjacent to pumping test Wells 2 and 3. PZ-A is located adjacent to Well 2 and PZ-B is located adjacent to Well 3. No drawdown was observed in the piezometers

or the surface water in the wetlands as a result of pumping Wells 2 and 3. Hydrographs for PZ-A and PZ-B are located in Appendix E.

Water Quality Results

Water samples collected from pumping test Wells 2 and 3 during the testing period were submitted to Orange County Laboratory Analytical Services (OCL) and analyzed for parameters specified in the NYSDOH Sanitary Code Part 5, Subpart 5-1. In addition, the wells are located within 200 feet of a surface-water body which required they be sampled for microparticulate analysis (MPA) to determine if the wells are recharged from ground water under the direct influence of surface water (GWUDI).

The water-quality results for pumping test Wells 2 and 3 meet all NYSDOH standards with the exception of odor. The maximum concentration level (MCL) for odor is 3 units. The concentration reported for Wells 2 and 3 were 10 units, respectively. The odor reported is attributed to the hydrogen sulfide content in the water. Hydrogen sulfide gas commonly occurs in wells in Orange County. An effective and standard method of treatment to remove hydrogen sulfide is chemical oxidation by chlorination which will be provided. If additional treatment is necessary, chlorination will be supplemented by a stacked aeration system.

Although the NYSDOH does not currently have an MCL for sodium, reported sodium levels were 44 mg/l in Well 2 and 39 mg/l in Well 3. Water containing more than 20 mg of sodium is not recommended for drinking by people on severely restricted sodium diets. The elevated sodium levels appear to be naturally occurring since reported levels of chloride, which is normally associated with sodium contamination, are very low, less than 4.0 mg/l in both pumping test wells. It is not uncommon for a well in Orange County to report elevated sodium concentrations above 20 mg/1.

The presence of total coliform was also reported in the sample collected from Well 3. LBG recommends disinfection and resampling of Well 3 before it is placed in service.

The MPA results for both Wells 2 and 3 were negative for the presence of indicator organisms for GWUDI. Copies of the laboratory results are included in Appendix E.

Conclusions and Recommendations

- The estimated water demand for the proposed Lake Blooming Grove Subdivision is 15,760 gpd or 10.9 gpm. The NYSDOH requires that the water supply for the proposed development equal or exceed twice the average water demand of 31,520 gpd, or about 21.9 gpm, with the most productive well out of service.
- The 72-hour pumping tests completed on pumping test Wells 2 and 3 indicate a safe yield of 22 gpm from each well. The respective yields meet the water-supply requirements of the regulatory agencies noted above.
- Recharge of the bedrock aquifer on the 79.39-acre parcel has been estimated to be 49,620 gpd under normal precipitation conditions and 34,235 gpd under drought conditions. The recharge estimates significantly exceed the estimated water demands (15,760 gpd) under both normal and drought conditions.

- The water-level drawdown response in off-site monitoring was summarized in the table located in Appendix E. Wells 2 and 3 were tested at pumping rates (22 gpm) which exceeded twice the average water demand (10.9 gpm) of the project. Therefore, the water-level interference in the off-site wells which will occur from normal (12 to 18-hour daily pumping cycles) and rotational use of the supply wells to meet the actual water demands of the project should be significantly less than observed during the pumping tests. The pumping of Wells 2 and 3 at rates of twice the average water demand of the project did not impair the normal performance of these domestic wells. The data from the recent pumping test events on Wells 2 and 3 indicate normal operation of the these wells to meet the project water demand (10.9 gpm) will not likely result in meaningful impact to off-site wells.
- The groundwater supply development for the proposed Lake Blooming Grove project will ultimately be reviewed and approved by the NYSDEC, NYSDOH and OCDOH, prior to being placed into operation.
- Once the new water system is placed into operation, a monitoring program will be established for a period of two years after full operation to evaluate the effect on neighbor's wells. A draft Complaint Response and Remediation Plan is located in Appendix E.
- Water-level measurements collected from on-site piezometers indicate no hydraulic connection between the bedrock aquifer and the on-site wetland feature under pumping conditions.
- The water quality for both pumping test Wells 2 and 3 meets all New York State drinking water standards and guidelines, with the exception of odor. Water-quality results indicate the presence of hydrogen sulfide odor above the MCL in both Wells 2 and 3, which will likely be reduced to acceptable levels following chlorination. Well 3 was also positive for the presence of total coliform. LBG recommends disinfection and resampling of Well 3 before it is placed in service.

Septic Systems

Several comments on the DEIS indicated a concern that the proposed septic systems could potentially impact Beaverdam Lake and/or private drinking water wells. The construction of new septic systems for the three proposed homes in the Beaverdam Lake drainage area is not expected to impact either the lake or groundwater.

The proposed septic systems, including their location, soil conditions, design and sizing are all subject to review and approval by the OCDOH. Septic systems are designed to use a layer of suitable soil to treat the domestic wastewater prior to its eventual seepage into underlying soil, which may be saturated or impervious. The deep hole and percolation testing completed to date indicates that the soils are acceptable and meet septic system design requirements. Where deep tests in the vicinity of the sewage disposal systems indicate groundwater conditions at depths less than 48 inches, curtain drains have been shown uphill and (where appropriate) around the septic system area. These drains will divert shallow groundwater percolating through the soil *above* the drain fields, and will not divert wastewater to the surface.

No septic system is designed to discharge to surface water. For comparison purposes, the NYSDEC Protection Final Regulations related to subsurface sewage treatment systems (Section 18-38) require new absorption fields to be a minimum of 100 feet from a watercourse

or wetland and 300 feet from a reservoir, reservoir stem or controlled lake. By contrast, the closest proposed septic system for Lake Blooming Grove is at least 600 to 700 feet from Beaverdam Lake. This distance is double the New York City Department of Environmental Protection (NYCDEP) distance requirement to protect a drinking water source. It should be noted that the NYCDEP regulations were enacted for the primary purpose of protecting New York City's water supply.

Septic systems are specifically designed not to impact drinking water wells. New York State Department of Health guidelines require a separation distance of 100 feet for wells that are upgradient from septic systems and 200 feet for wells that are downgradient from septic systems. The proposed septic systems and wells all meet this requirement. Based upon the plans and aerial photographs, no existing off-site well is within a 200 foot radius of proposed septic systems. Modern, properly designed septic systems are not a threat to drinking water wells. Based upon the local geology and topography, the proposed septic systems will not impact any drinking water well.

Comments and Responses

Comment 5-1 (Mr. Tom Corall, Public Hearing for Lake Blooming Grove; June 23, 2004): Personally I think fifty percent of your total usable soils is a pretty high level anyplace, much less in wet times where you're potentially going to drain right into the lake. So I think it is imperative that we follow Jerry's idea of ensuring that all of the runoff during construction not only be take care of by silt fences but at least go into these ponds or away from the lake. Even in the DEIS it was mentioned that, they're going to give best efforts with respect to the silt fences. I think we all know that silt fences are less than 100 percent effective.

Response 5-1: *The project would involve the disturbance and replanting of approximately 33.7 acres or 43 percent of the site. Section 5.1 of this Water Resources chapter provides a discussion of pre-development and post development drainage and stormwater flow on the property, and specifically potential impacts to Beaverdam Lake. As described on page 5-3, approximately 20 percent of the site drainage flows to Beaverdam Lake, while the remainder flows toward the southwest and northwest, eventually to Moodna Creek.*

Silt fences are one of several proposed methods to control stormwater run-off and prevent soil erosion. As indicated in the SWPPP, temporary stormwater management facilities located at Lake Road will be used to control sediment during construction.

Comment 5-2 (Mr. Tom Corall, Public Hearing for Lake Blooming Grove, June 23, 2004): We pointed out before the lake is in a state of nitrification. I've got a 1992 study right here, it was developed for Beaver Dam Lake Rehabilitation and Protection District. It was put out by Allied Biological. Twelve years ago the lake was in the earlier stages of nitrification. The reason that thousands of dollars was spent on the study in the first place was to see how the lake association might try to reverse that trend and save the lake. The limnology books I've read say there's a major factor of lake nitrification and it's man, it's building, it's development and it's phosphates. The silt from construction goes into the lake, fills up the lake and pretty soon you don't have a lake anymore. The healthiest lake is a deep lake, not a shallow lake.

Response 5-2: *As described in Section 5.1 above, the drainage basin for Beaverdam Lake is relatively large and is estimated to be approximately 4,610 acres based upon*

USGS maps. Approximately 15 acres of the Lake Blooming Grove Subdivision drains to Beaverdam Lake or approximately 0.3 percent of the entire drainage basin. This FEIS describes erosion control methods during construction and long term stormwater management facilities that will minimize any potential impacts to Beaverdam Lake from the project.

Comment 5-3 (Mr. Tom Corall, Public Hearing for Lake Blooming Grove, June 23, 2004):
The next thing is fertilization. Phosphates come out of the fertilizer. That's the main area for phosphates, and the wooded area that they're taken out of here, which I think is 14.5 acres, is not going to absorb any more phosphates. Wooded areas absorb ten times more phosphates. You're going to delete that. A good portion of that wooded area is out of here. So I think that...following the contour of the property itself with this road so you don't have to cut out 25,000 cubic feet worth of land and doing something to protect the wooded area along with ensuring that not only do we reduce the silt coming out of the soils during construction, we make sure we eliminate them, and put them into setting ponds.

Response 5-3: *See Responses 5-1 and 5-2, above. The FEIS Conservation Plan would result in the preservation of 41.4 acres of designated open space, allowing the preservation of existing vegetation and woods in those portions of the property (see Figure 1-2 Proposed FEIS Conservation Plan. During construction, stormwater will be captured and treated in stormwater management facilities.*

Comment 5-4 (Mr. Tom Corall, Public Hearing for Lake Blooming Grove, June 23, 2004):
Martin and Erie soils have severe limitations with regard to building development and septic system absorption fields. These limitations are based on the slope of the Martin soils and the poor drainage of the Erie soils. The poor drainage of these soils may have an adverse affect upon the lake and poorly designed septic systems may leach into the surface waters and drain the lake thereby adding nutrients and promoting the growth of algae. With regard to soils with steep slopes, adequate control methods must be implemented to prevent unwanted siltation of the water. So I think in summary we've got to get those soils that don't go in the lake at all costs. Why they rejected putting the waste treatment up where it would not have an opportunity to drain to the lake, just kind of a hand wave saying I guess it's too expensive and fairly complex. I don't think they addressed that question at all. I think a great deal of these would be reduced by dropping the density count.

Response 5-4: *See Response 5-1, 5-2 and 5-3. Proposed septic system design and construction and stormwater management are described in detail in Section 5-1, above. The community sewage disposal system was not considered viable due to topography and wetlands, as well as potential concerns with regard to ownership, and maintenance of the system.*

Comment 5-5 (Letter #1, Fine and Associates, Beaverdam Lake Civic Association Data Base for Public Hearing, June 23, 2004): The Lake will see pollution from at least three (3) sources: sewage, stormwater, and fertilizers. What is being done about this? How will this effect the eutrophication the Lake is undergoing currently? Why was the cumulative effect of the various sources of pollution on the Lake stipulated in the scoping document not addressed in the DEIS?

Response 5-5: *A detailed discussion of Beaverdam Lake and the project's potential impact to the lake are provided in the introduction above. Potential pollution sources to*

Beaverdam Lake can be summarized as originating from two possible sources: 1) septic systems and 2) stormwater run-off which may contain contaminants from pavement and driveways as well as fertilizers from residential lawns. As described in the DEIS and the FEIS above, the newly constructed septic systems are not expected to have an impact on Beaverdam Lake. The subsurface deep-hole testing for the septic systems has demonstrated that adequate soils are present to treat the sanitary discharge generated. The closest proposed septic system to Beaverdam Lake is approximately 600 to 700 feet from the edge of the Lake. Based upon a visual survey and tax map records, approximately 250 existing homes surrounding the Lake are closer to the lake than the proposed Lake Blooming Grove subdivision homes. Most of these homes are in the Town of New Windsor and are connected to municipal sewer. Those homes in the Town of Blooming Grove (approximately 25) have individual septic systems.

The Stormwater Management Plan provided in FEIS Conservation Plan indicates an overall reduction in the levels of phosphorus, nitrogen, and BOD in the stormwater exiting the project site, compared to existing conditions. These reductions, shown in Table 5-3 above, would result from the stormwater treatment features that would be constructed as part of the proposed project. While in the DEIS the pollutant loading estimates showed that BOD levels would increase compared to existing conditions, the current stormwater plan would be expected to reduce the rates overall even with the slight increase projected for Area C. It should be noted that only three homes are proposed in the 15 acre drainage area for Beaverdam Lake. The balance of the homes and the site drain towards the west, and Moodna Creek.

Comment 5-6 (Letter #1, Fine and Associates, Beaverdam Lake Civic Association Data Base for Public Hearing, June 23, 2004): The worst enemy of the Lake is the fertilizers containing large portions of Phosphorus and Nitrogen. How can the DEIS suggest that Phosphorus and Nitrogen be reduced by the project?

Forested areas tend to absorb phosphates 10 times better than sod. Is it possible to minimize the reduction of wooded areas and minimize the creation of lawn areas? The DEIS indicates that approximately 50% of the site will be disturbed. Contributing to this is the road layout which is cutting across contours instead of following them. Can this be improved?

Response 5-6: *The stormwater treatment basins have been designed to meet NYSDEC guidelines for the treatment of stormwater, which would result in the overall reduction in the levels of nitrates and phosphorus, compared to current conditions. The stormwater pollutant loading analysis completed by Lanc & Tully was done according to NYSDEC recommended methods (Pollutant Loading Coefficient Method, in Reducing the Impacts of Stormwater Runoff from New Developments, 1993).*

The applicant's proposed site density and layout are appropriate for the site. It should be noted that the site is not entirely wooded and that approximately 28 acres or approximately one third of the site are open fields formerly used for growing hay and corn. The FEIS Conservation Plan would result in 37 homes on 79.3 acres or approximately one home per two acres. The use and residential density is consistent with the character of the neighborhood. Wooded buffers at the edges of the property and at the back of most lots would provide some water quality treatment function, in addition to the designed treatment systems. The looped road was designed to provide safe access into the site and the layout was designed to work with the site's topography.

The northernmost road entrance (Road A) was requested by the Town of Blooming Grove Highway Superintendent.

Comment 5-7 (Letter #1, Fine and Associates, Beaverdam Lake Civic Association Data Base for Public Hearing, June 23, 2004): The treatment by the septic systems is minimal. Is it correct that a portion will enter the groundwater system, join the stormwater system, received minimal treatment from flora and enter the Lake? Will the flow proceeding the Lake pass existing wells causing them to be chlorinated? The increase of BOD is 45%, correct? Would it be better to transport the sewage to the northwest corner of the site to a community septic where the ground travels away from the Lake?

Response 5-7: *The commentor provides no documentation to make the statement that the subsurface sanitary systems would provide minimal treatment. The proposed septic systems would be constructed according to NYSDOH and will require the review and approval of the OCDOH prior to approval. A community sewage disposal system is not considered to be a viable option due to site constraints (geometry and topography of the site) as well as potential concerns with regards to ownership, maintenance, and other fiscal constraints.*

With regard to the increase in BOD, stormwater quality would not be substantially different than current conditions. Certain compounds such as phosphorus, nitrates, as well as BOD are projected to be reduced by the proposed stormwater treatment. See Table 5-3 Pollutant Loading Estimates and the discussion of stormwater quality in Response 5-5 above.

Comment 5-8 (Letter #1, Fine and Associates, Beaverdam Lake Civic Association Data Base for Public Hearing, June 23, 2004): Due to the mottling found in the pits have curtain drains been called for, for every tile field? Do curtain drains convert groundwater to surface water? Will this decrease the water budget? Will curtain drains increase the amount of runoff including tile field effluent? If the tile field effluent is carried by the stormwater system to the lake will this create an unsafe condition for swimmers and bathers?

Response 5-8: *See discussion of septic systems above. Curtain drains have been proposed by the engineer to mitigate seasonal drainage concerns for on-site soils. The curtain drains would divert shallow groundwater to the surface where it is expected that this drainage would percolate back into the ground at the edges of each building lot. The drains would not be connected to the stormwater system. Therefore, the water recharge, and surface water flow rates are is not expected to change significantly by diverting flow in limited areas around individual septic systems.*

Comment 5-9 (Letter #1, Fine and Associates, Beaverdam Lake Civic Association Data Base for Public Hearing, June 23, 2004): Wells cannot be tested until the curtain drains are installed due to the change in surface water conditions, correct? Would this trigger a Special Use Permit?

Response 5-9: *As described above, there is no connection at all between surface water in the vicinity of the septic systems and drinking water wells.*

Comment 5-10 (Letter #1, Fine and Associates, Beaverdam Lake Civic Association Data Base for Public Hearing, June 23, 2004): Stormwater carries a larger fraction of pollution than was previously thought. The treatment here is apparently sand filtration and flora, both of these techniques are newly applied by the DEC and require stringent maintenance. Who will be operating these facilities? The drawings show the ponds on extra large lots, are the lots owners going to own and operate the ponds? To achieve the flora described by the DEIS, would require a stagnant pool of water waiting for a period of rain to move it along. Is this recommend with West Nile so prevalent?

Response 5-10: *See Responses 5-15 and 5-16 regarding the design and maintenance of the stormwater management basins. Ownership and maintenance of the stormwater management facilities is discussed in Section 1.7 Ownership and Maintenance of Site Features and Open Space.*

Comment 5-11 (Letter #1, Fine and Associates, Beaverdam Lake Civic Association Data Base for Public Hearing, June 23, 2004): There is not enough information in the DEIS or drawings for clarity regarding the nature of treatment for the retention ponds. Can you supply this? Is the northwest corner its own drainage basin? Should it be designed appropriately? Should it have treatment and retention before discharge? The northeast corner shows capacity in equals capacity out. Is this correct?

Response 5-11: *The grading for the detention basins is provided on the Site Plans and more detailed design of the basin is provided in the Stormwater Pollution Prevention Plan in the DEIS. The basins were designed according to the latest Stormwater Management Design Manual by NYSDEC (August, 2003).*

Comment 5-12 (Letter #1, Fine and Associates, Beaverdam Lake Civic Association Data Base for Public Hearing, June 23, 2004): The discharge of the southwest pond is not displayed. To where does it flow? Does it flow to the Lake or around the Lake?

Response 5-12: *The southwestern detention pond flows to a small stream at the southern edge of the property. This stream flows towards the southwest and Moodna Creek. This discharge does not flow to Beaverdam Lake, but below it.*

Comment 5-13 (Letter #1, Fine and Associates, Beaverdam Lake Civic Association Data Base for Public Hearing, June 23, 2004): The discharge across Road A south of Lake Road, where does it go? Where will the discharge go? Will it be treated? Will it be stored?

Response 5-13: *The location of drainage described above is not clear from the comment. Lake Road runs in a north - south direction. A full discussion of drainage design is provided above.*

Comment 5-14 (Letter #1, Fine and Associates, Beaverdam Lake Civic Association Data Base for Public Hearing, June 23, 2004): Excessive disturbance of the site will produce significant sediment runoff. Instead of installing temporary drainage facilities, should the ponds be constructed first and employed as sedimentation basins? No sediment should enter the Lake. Are you trying to serve basements and is that making the pipes 15' deep?

Response 5-14**:** *The stormwater detention basins would be among the first features constructed on the site, in order to capture stormwater run-off and control the sediment*

leaving the site. The combined series of stormwater and sediment control features, which would be installed prior to construction, would minimize the amount of sediment that would exit the site and potentially enter the lake.

The reference to pipes being 15 feet deep is unclear. The final plans and specifications for individual homes may have basements where site conditions are favorable for such a feature.

Comment 5-15 (Letter #2, Blooming Grove Planning Board, June 29, 2004): 1) The applicant would like the town to take control of the holding pond. As a taxpayer, I think that is unacceptable, and unfair for the town to take that responsibility. 2) What if their engineering is wrong? What if the pond does not work correctly? What happens five years down the road? Who will be responsible?

Response 5-15**:** *Long term maintenance of the stormwater management facilities is important for their continued effectiveness in treating stormwater. Similar to roads and catch basins, stormwater infrastructure is often dedicated to the Town following the construction of development projects. The stormwater management facilities can be considered public improvements related to the roadway. The formation of a Town Drainage district is another mechanism for long-term maintenance. The applicant has no objection to the formation of a drainage district for maintenance of the three on-site stormwater management areas. The drainage district would consist of all of the lots within the subdivision, the roads and the drainage facilities. Property owners in the district would incur a special tax from the Town for the long-term maintenance of the facilities. Maintenance would be conducted by Town maintenance staff. The district would require an application to the Town Board, and Board review and approval. Ownership and maintenance of the stormwater management facilities is discussed in Section 1.7 Ownership and Maintenance of Site Features and Open Space.*

The project would be required to post a construction bond which would be held until the project is inspected and accepted by the Town Engineer. The Town Engineer or representative would have the opportunity to ensure that the stormwater management facilities operate correctly under typical weather conditions. With routine maintenance, the stormwater management facilities should operate as designed well into the future.

Comment 5-16 (Letter #2, Lake Blooming Grove Planning Board, June 29, 2004): A perfectly working holding pond still attracts all types of bugs, which in the present day, is dangerous. What is going to be done about this? Holding ponds also have a tendency to smell. Why, as homeowners, should we deal with this problem?

Response 5-16**:** *The stormwater management facilities were designed according to the stormwater requirements of the NYSDEC (SPDES General Permit for Stormwater Discharges from Construction Activities, Permit No. GP-02-01) and are required to include a "wet pond" component.*

The stormwater basins are designed with outlet structures that control the rate of stormwater exiting the basins. The lowest pipe invert is a minimum of 4.0 feet above the bottom of the pond and therefore, the ponds would maintain a depth of 4.0 feet. Since the basins are designed to discharge water slowly, water would circulate in the basins and they would not become stagnant. The basins would be planted with water tolerant

plants and the perimeter and slopes would be landscaped. A properly planted stormwater basin would function similar to a natural wetland or shallow pond. Such a wetland would support varied wildlife including a variety of insects. While the basin may support mosquitoes, it would also support frogs, birds, dragonflies and other insects which feed upon mosquitoes. Since the basins are designed to circulate stormwater, odors from the basin are not expected to be a problem.

Comment 5-17 (Letter #2, Lake Blooming Grove Planning Board, June 29, 2004): What about the decline in property value? There must be other locations for this holding pond so it does not directly affect so many houses. According to the drawings, the pond would be directly across the street from four homes. When we all purchased our homes, we realized that someday homes may be built across the street. But, we never realized or imagined that we would be having a swamp built across the street.

Response 5-17: *As described above, the stormwater management facility would be planted with water tolerant plants, landscaped, and maintained. They would be similar to other natural wetlands in the vicinity of the site and would be maintained. Based upon the topography and proposed grading, all that would be visible from Lake Road and neighboring residents east of the road, would be a landscaped slope.*

Comment 5-18 (Letter #2, Blooming Grove Planning Board, June 29, 2004): I am concerned about possible contamination of my well and other wells directly across the street. Who will monitor the water quality in the holding pond?

Response 5-18: *As described above, there typically is little connection between surface water quality and groundwater quality found in bedrock wells. The New York State Department of Health requires that drinking water wells be installed in aquifers (groundwater sources) that are not influenced by surface water contamination or the potential for contamination. There is no requirement by the State for the monitoring of stormwater quality from residential developments.*

Comment 5-19 (Letter #2, Blooming Grove Planning Board, June 29, 2004): Nowhere on the drawings outline where the water from the culvert will be going. Presently, that water goes through private property. No one has approached any of the three owners of the affected property about the additional water coming through our property. The families that own these properties have small children. When the additional water comes through the private property, will there be any water tests to determine if the water is clean? Has anyone contacted the health department regarding this?

Response 5-19: *A meeting with affected property owners was conducted on May 17, 2005. A representative from Lanc & Tully Engineers and Mr. Pat Brady, the Town Consulting Engineer attended. At the meeting, the applicant committed to stabilizing off-site portions of the culvert, on the east side of Lake Road that are subject to erosion. Details of this stabilization are provided on the Subdivision Drawings. As described above, stormwater quality would not be substantially different than current conditions. Certain compounds such as phosphorus, nitrates, as well as BOD are projected to be reduced by stormwater treatment. Following stormwater treatment on the site, the discharged stormwater would not pose a potential threat to human health, nor would it adversely impact Beaverdam Lake.*

Comment 5-20 (Letter #2, Blooming Grove Planning Board, June 29, 2004): When the town placed the original culvert pipe several decades ago, there were virtually no homes on Lakeside. Now that there are homes, the homeowners, at their own expense, have had to maintain a ditch to make sure winter run-off did not flood our homes. Even though the flow will not be greater, the amount of water will dramatically increase. How will this affect our property? What if the flow rate becomes greater than before? How will the property owners be compensated? There are also two leech fields that the ditch goes near. If the ditch erodes more, will it affect our septics?

Response 5-20: *As described above, the stormwater from the northeast corner of the project would be released from an outlet structure that would permanently control the flow of stormwater at a designed flow rate. The stormwater management facility was designed to accommodate a 100 year storm. Based upon a field visit by the project engineer, the existing drainage ditch is capable of conveying flows exceeding the projected 100 year storm flow rate. As designed, the project would reduce the rate of flow to the culvert and ditch under all design storms studied, and is not expected to adversely affect neighboring properties.*

Comment 5-21 (Letter #2, Blooming Grove Planning Board, June 29, 2004): Presently, we only get water from the culvert during the winter melt down. Will that still be the case after the holding ponds? If not, what will be the effect on the surrounding properties and the lake? Has anyone done extensive research about the possible adverse affects this water may have on the lakes?

Response 5-21: *The project engineer visited the site and the culvert during a typical summer storm and observed water flowing in the culvert and in the drainage swale. Since the swale is grass lined, it would carry water intermittently, based on the rate of rainfall and runoff. As described above, the flow rate through the culvert and swale would actually decrease between 7 and 18 percent, after the construction of the stormwater management facilities.*

Comment 5-22 (Letter #2, Blooming Grove Planning Board, June 29, 2004, Letter #10, Town of Blooming Grove Planning Board Plan Review, July 26, 2004): A.) According to Allied Biological, who has been working with the lake for decades, the building of these homes may add to the deterioration to the lake. Any respectable amount of research takes at least two seasons of data. Has the developer ever done any research regarding the lake? Why was there no analysis addressing the pollution effects these homes will have on the lake? B.) What are the potential impacts of the proposed subdivision on Beaverdam Lake?

Response 5-22: *See Response 5-5 above. Research on Beaverdam Lake has been conducted by Allied Biological. Based upon the engineer's pollutant loading analysis the stormwater runoff from the proposed subdivision is expected to have minimal impact to the lake. The subdivision is proposed with the most current and efficient stormwater management facilities as recommended by the NYSDEC.*

Comment 5-23 (Letter #2, Blooming Grove Planning Board, June 29, 2004): Hudson Valley Drilling reported severe problems with wells going dry north of the site. What if our wells go dry?

Response 5-23: *When interviewed, Hudson Valley Drilling did not report problems with wells going dry north of the site. The 72 hour pumping test completed by LBG, described above, resulted in no impacts to the functioning of off-site wells that were monitored during the testing. Following construction there will be private well monitoring program to evaluate that off-site private wells are not adversely impacted by the project (see Appendix E).*

Comment 5-24 (Letter #4, Thomas and Kathleen Corl, July 10, 2004): What will the effect of sewage combined with stormwater runoff and fertilizer runoff be to the health of the Beaverdam Lake? The scoping document adopted by the Planning Board included the October 21, 2003 WSBDLA letter outline this comment, the first paragraph indicates that a "comprehensive sanitary engineering study is required". Was this completed?

Response 5-24: *See the discussion of septic systems and stormwater runoff above. The project engineer has completed septic system analysis on the 37 proposed lots (percolation testing), demonstrating the viability of individual sanitary disposal systems. As designed, the proposed septic systems would not impact Beaverdam Lake. A detailed analysis of stormwater runoff and pollutant loading has been completed and is summarized above.*

Comment 5-25 (Letter #5, William F. Auerbach, July 12, 2004): It has been stated that upon completion of the project the utilities such as the storm water collection system, and the storm water quality and detention basins, will be proposed for dedication to the Town. Will the Lake Blooming Grove tax payers be held liable for the fines by the U.S Department of Environmental Protection and/or the Orange County if there are pollutants found to have contaminated Beaverdam Lake as the result of runoff?

Response 5-25: *The stormwater management basins would either be maintained by the Town, through the formation of a drainage district, or by the project Homeowners Association (See Section 1.7, above). The applicant will follow a standard maintenance program selected by the Lead Agency and the Town of Blooming Grove. The above methods are standard practice for the maintenance of infrastructure. As described above and in DEIS, stormwater from the northeast corner of the site would be treated prior to discharge from the property and its eventual flow to Beaverdam Lake. EPA and the County typically only level fines for gross contamination from point sources or spills, which are not expected to occur from the subject site. Additionally, only those individuals responsible for the impact are subject to penalties.*

Comment 5-26 (Letter #7, Ralph and Evelyn Juarbe, July 11, 2004): The DEIS does not provide a sure solution for containing the silt that will be free to transfer into the Lake. The study indicates that the silt fences are less then 100%. Is there a solution to protect the Lake form the silt?

Response 5-26**:** *Silt fences are one element of the proposed plan to prevent soil erosion and silt from flowing off-site during construction. Prior to the commencement of any phase of this project that would result in the disturbance of soils, erosion and*

sediment control measures would be placed in accordance with the specifications attached to final construction drawings. *The permanent stormwater management facility located near the site entrance and Lake Road would be used as a construction stormwater sediment control basin. This basin, along with the other stormwater control features would be the first features constructed as part of the subdivision. The 20 percent of the site that drains to Beaverdam Lake would be treated by the stormwater management facility located alongside Lake Road. The balance of the site would be treated by a second large facility in the southwest portion of the site. Therefore, during construction stormwater would be directed to the stormwater basins, and silt would be settled out, prior to it discharging off-site.*

All stormwater runoff and sediment control measures would be maintained in good condition and left in place until permanent vegetative cover is established. The Town of Blooming Grove would require a construction bond to insure the proper installation and maintenance of sediment and erosion control measures, and for site restoration if necessary. The construction contractor would be required to install all sediment and erosion control measures and maintain them throughout the entire construction process. These measures would be monitored during construction by the Town Engineer or his designee. See the Stormwater Pollution Prevention Plan in Appendix E for a complete description of the pollution and sediment controls to be undertaken for the proposed development.

Comment 5-27 (Letter #8, Rick and Chris Basso, July 11, 2004, Letter #10, Town of Blooming Grove Planning Board Plan Review, July 26, 2004): A.) Will analysis be presented for the effect of runoff on downstream wells? No analysis was presented to indicate that the area will support additional wells other than the statement from one local drilling firm. Hudson Valley Drilling has indicated that existing wells just north of this location have required additional drilling to deep depths to maintain adequate flow. Has this been taken into consideration? B.) It has been recommend that four (4) wells be drilled on-site and test for water quantity and quality. Will this be completed in the near future?

Response 5-27: *As described above, two production wells were tested by LBG. The results of the well testing are described above and are included in Appendix E.*

Comment 5-28 (Letter #8, Rich and Chris Basso, July 11, 2004): Will there be an analysis made regarding the increase in storm water runoff due to the increase in impervious surfaces associated with rooftops and paved roads and driveways?

Response 5-28: *A detailed analysis of stormwater quality and quantity was prepared by the project engineer and is provided in the DEIS. Following the construction of the project, the rate of stormwater flow from the site would be less than current conditions, since stormwater management facilities would slow the rate of discharge from the site.*

Comment 5-29 (Letter #9, Town of Blooming Grove Planning Board Review, Patrick Brady, July 26, 2004): What are the potential impacts the sanitary disposal systems may have on Beaverdam Lake? What impacts to the Lake could be associated with the increase in BOD loading?

Response 5-29: *As described above, the proposed septic systems would be constructed according to NYSDOH and OCDOH standards. These standards provide for*

the treatment of residential wastewater to protect human health, groundwater and nearby surface water. The systems are designed for the wastewater to be filtered through a soil layer with the treated water recharging the upper groundwater.

As described in the discussion of septic systems above, the stringent requirements of the NYCDEP require 300 feet separation between new residential sanitary septic systems and their drinking water reservoirs. The Lake Blooming Grove subdivision would provide 600/700 feet of separation between the closest septic system and Beaverdam Lake. No impact to Beaverdam Lake is expected from septic systems on the site.

The engineer's report indicates that each of the stormwater parameters studied, including BOD, would be decreased as a result of the implementation of the stormwater management facilities.

Comment 5-30 (Letter #9, Town of Blooming Grove Planning Board Plan Review, July 26, 2004): What are the impacts from the discharge of outlet control basin (lot 24) on the lake? What is the capacity of the exiting 15" culvert under Lake Road and the drainage ditch to the Lake?

Response 5-30: *The water quality impacts from stormwater exiting the control basin on Lot 24 are described in the discussion of water quality above. The engineer's report indicates that each of the stormwater parameters studied, would be decreased as a result of the implementation of the stormwater management facilities. The project is not expected to result in any adverse impact to water quality in Beaverdam Lake.*

The 15 inch culvert is proposed to be replaced based upon consultation with the Town Engineer. The capacity of the drainage swale is described above. The project engineer assessed the potential impact of discharge to the existing drainage swale which flows to Beaverdam Lake. Based upon a bottom width of 1.5 feet, a depth of 2 feet and a top width of 8 feet, the capacity of the swale has been calculated as being 92.8 cfs. This rate is slightly greater than the projected 100-year-storm flow rate from the eastern stormwater management facility. Therefore, the existing swale is capable of conveying the 100-year-storm event. As discussed above, the applicant has nonetheless agreed to stabilize the existing swale with rip-rap.

The following comments were submitted in a review letter prepared by the Town Planning Board Engineer and dated June 25, 2007. The response to Comment #5-27 below, related to the Wastewater Treatment Analysis, was prepared by Lanc & Tully Engineers, and the remaining responses related to the Water Supply Analysis were prepared by Leggette, Brashears & Graham, Inc. (LBG). In addition to these responses, Lanc & Tully Engineers revised the Wastewater Treatment Analysis to reflect the Planning Board preferred alternative of 30 four-bedroom units and 7 three-bedroom units as described in section 5.1 above.

Comment 5-31 (Letter #10, Review Letter, Patrick F. Brady, Town Planning Board Engineer, June 25, 2007): I have reviewed the Water Supply Analysis prepared by Leggette, Brashears & Graham, Inc. (LBG) and offer the following comments: The water analysis and flow test were based on design flow generated by 41 3-bedroom dwellings. This is in conflict with the wastewater analysis.

Response 5-31: *At the direction of the Planning Board, the water demand estimate in the LBG report was revised to increase the proposed unit count from 41 three-bedroom units to a combination of 30 four-bedroom units and 7 three-bedroom units. The revised report indicates that the additional four-bedroom units can be adequately served as evidenced by the results of the well tests. The FEIS Conservation Plan reduces the lot count to 37 total lots with 7 three-bedroom and 30 four-bedroom units, and therefore would be adequately served.*

Comment 5-32 (Letter #10, Review Letter, Patrick F. Brady, Town Planning Board Engineer, June 25, 2007): The pump test results show that there is sufficient water for the proposed subdivision, however there are still drawdowns in neighboring wells. Although, the pump tests were run at 2.4 times the average daily demand, we can still expect to see drawdowns in the neighboring wells under normal pumping rates. I have discussed this with LBG and they have proposed a draft complaint response and remediation plan. This response and remediation plan is a typical requirement of the NYSDEC in permitting water supply wells.

Response 5-32: *The drafted Complaint Response and Remediation Plan is located in the LBG Pumping Test Report (dated (revised) July 2007)(see Appendix E). In summary, the developers would respond promptly to any complaints from off-site well owners within 2,000 feet of Wells 2 and 3 that allege damage caused by the operations of the well-supply source presently in service. If any complaint is caused by drawdown resulting from pumpage by the Wells 2 and 3 well-supply source, the problems would be remediated at the cost of the developers. Remedies might include lowering a well pump, replacing a well pump, deepening a well, redeveloping a well or drilling a new well. The developer would be responsible for the cost of the remediation, as well as the restoration of disturbed land and/or plantings.*

Also, in response to homeowner concerns, sections have been added to the Complaint Response and Remediation Plan regarding potential increases in hydrogen sulfide concentrations in neighboring wells.

Comment 5-32 (Letter #10, Review Letter, Patrick F. Brady, Town Planning Board Engineer, June 25, 2007): In review of the off-site monitoring results, it appears that the majority of the off-site wells did not recover[y] to the levels recorded prior to the start of any of the pump tests.

Response 5-32: *In the attached revised report, LBG provides a detailed review of two example off-site homeowner wells included in the monitoring program (see Appendix E). It should be noted that three days prior to the start of the first pumping event on Well 2, a regional water-level decline (trend) was observed in a majority of the monitoring wells. The data indicates a regional water-level decline of about 0.7 feet from January 19 to January 22, 2007, just prior to the start of the test. The regional water level decline (trend) prior to the start of the pumping test on Well 2 is shown on the 64 Station Road and 43 Lake Road hydrographs (Appendix II) attached. No regional trend was observed prior to the start of the test on Well 3 on February 9, 2007.*

The hydrographs of many of the off-site wells including the two example wells indicated minor fluctuation in the water-levels from their domestic uses. An example of fluctuations from domestic uses (i.e., showering, laundry, etc.) is a rapid decline

(drawdown) in the water level from the pumping of the homeowners well for domestic use, followed by a rapid rise in the water level from the pumping turning off.

In the evaluation of pumping test data, the goal is to achieve 90% or greater recovery in static water level in a pumping well following shutdown of the test at a period equal to the pumping time interval. While this is applicable to the non-pumping monitoring wells (off-site monitoring wells) in many instances, the monitoring well(s) will continue to show a delayed recovery response, particularly bedrock wells.

Bedrock aquifers are comprised of two media, the fractures which have low storage and high permeability and the matrix rock, which have very low permeability but high storage potential. As a result, during pumping, the drawdown tends to be more pronounced because of the limited storage of the fractures. However, with termination of pumping, water tends to fill the fractures immediate to the pump well and takes longer to fill the voids (or fractures) in the monitoring wells at a greater distance from the pumping well. This delayed response is due to gravity drainage of the overlying aquifer and slow drainage of the water stored in the rock matrix. The delayed response in a bedrock aquifer tends to be of longer duration as compared to sand and gravel aquifer; and bedrock aquifers often tend to recover faster in the pumping well than a monitor well. However, eventually the monitored well would recover, but it takes a longer time period as compared to the pumping well.

A review of the water level data and hydrograph of the 43 Lake Road well indicates the well was 98 percent recovered from the water-level drawdown experience from the Well 2 pumping test event at about 72-hours following shutdown of the test. This assumes the regional declining water-level trend observed prior to the start of the test continued into the post-test period. This well was reported to be about 70% recovered at about 72-hours from shutdown of the test on Well 3; and about 75% recovered 96-hours following shutdown of the test. The pumping for domestic use of the well is attributed to the delay in the water-level recovery response following the shutdown of the test on Well 3.

A review of the water-level data and hydrograph of 64 Station Road indicates the well was 91 percent recovered from the water-level drawdown experience from the Well 2 pumping test event at about 72-hours following shutdown of the test. This also assumes the regional water-level decline observed prior to the start of the test in the evaluation of the recovery data for the well. This well was reported to be about 87% recovered at about 72-hours from shutdown of the test on Well 3; and about 93% recovered at about 96-hours following shutdown of the test.

The data for the off-site homeowner wells demonstrate good water-level recovery data which does not support storage depletion effects of the aquifer from the pumping test events of Wells 2 and 3. A number of off-site monitoring wells reported a delayed recovery response which is not uncommon in bedrock well pumping tests as discussed above. In addition, the hydrographs included in the LBG reports for the off-site monitoring wells utilized a 10 foot scale; a more realistic, 50 foot scale was utilized in this revised report for the two example wells and are provided on the following four pages. Considering that bedrock wells average about 300 feet in depth in the study area, the 50 foot scale is a more representative illustration of the water fluctuation from domestic use of the wells; drawdown impacts from pumping Wells 2 and 3; and water-level recovery following shutdown of the respective test. The hydrograph at the 50

foot scale better represents the water-level drawdown observed from the test events on Wells 1 and 2 and favorable water-level recovery response in the wells.

Finally, the water-level drawdown response in off-site monitoring wells from the test events on Wells 2 and 3 was reported at pumping rates (22 gpm) at twice the average water demand (10.9 gpm) of the project. Therefore, the water-level interference in the offsitc wells which would occur from normal (12 to 18-hour daily pumping cycles) and rotational use of the supply wells to meet the actual water demands of the project should be significantly less than observed during the recent test events. The pumping of Wells 2 and 3 at rates of twice the average water demand of the project did not impair the normal performance of these domestic wells. The data from the recent pumping test events on Wells 2 and 3 indicate normal operation of these wells to meet the project water demand (10.9 gpm) would not likely result in meaningful impact to off-site wells.

Comment 5-33 (Letter #11, Review Letter, Patrick F. Brady, Town Planning Board Engineer, June 25, 2007): The analysis states that wells 2 and 3 did not meet the NYS drinking water standards and guidelines for odor. It should be noted that it has been brought to my attention that Johnson and Corl experienced rotten egg odor (Hydrogen Sulfide) in their drinking water after each of the pump tests.

Response 5-33: *Water-quality results indicate the presence of hydrogen sulfide odor above the maximum concentration level (MCL) in both Wells 2 and 3, which would likely be reduced to acceptable levels following chlorination, or further treated by aeration, if required, to meet drinking water standards.*

Hydrogen sulfide is a dissolved gas present in some bedrock units in Orange County. The Orange County, New York, Groundwater Resource Study (LBG, 1995) completed for the Orange County Water Authority reported hydrogen sulfide is prevalent in wells completed in the Martinsburg Formation which underlies the study region. The gas is present in extremely small concentrations in the ground water in Orange County and presents no health risks, therefore, is more of a nuisance constituent that can be remediated.

The presence of the hydrogen sulfide in well(s) results from, when the well is drilled, the well borehole encountering fractures which contain the gas. The hydrogen sulfide gas in neighboring wells is most likely a pre-existing condition considering the gas is prevalent in wells in the study region. It is unlikely that the pumping test on Wells 2 and 3 would contribute to the Johnson and Corl wells experiencing increased hydrogen and sulfide odor. However, because of the concern regarding this issue, the Complaint Response and Remediation plan has been revised to address these concerns as described above.

In addition, LBG contacted the Johnson residence (67 Lake Road) twice by phone to further discuss the report of turbid water conditions and hydrogen sulfide odors reported in their well at the recent Planning Board meeting. A message was left on both occasions and no response has been received to date. It is LBG's understanding that Mr. Johnson reported the turbid water conditions following the drilling of MW-3 (required as part of the original 39, 2 acre-lot subdivision proposal), located on the Lake Blooming Grove Subdivision in 2004. MW-3 was drilled as an on-site test well for an individual lot well and was located approximately 120 feet from the existing well located on the

Johnson property. The drilling activities to complete MW-3 may have disturbed the water bearing fracture which connected both wells and temporarily affected the water quality of the Johnson well. The MW-3 well would not be utilized as a water-supply source for the proposed project since individual lot wells are no longer proposed, and the well would be abandoned and the area would be restored. The proposed water-supply Wells 2 and 3 are approximately 1,215 feet and 1,315 feet from the well located on the Johnson property, respectively. LBG has sent a letter to Mr. Johnson to request further clarification of this incident.

The Town's hydrogeologic consultant, HydroQual provided a comment letter on November 21, 2007 to the August 2007 (Revised) 72-Hour Pumping Tests Report by the applicant's hydrogeologist Leggette, Brashears & Graham, Inc. The HydroQual comment letter is provided in Appendix A - Comment Letters, and is responded to by Leggette, Brashears and Graham in a letter dated June 30, 2008 (see Appendix C - Correspondence). The responses are summarized below.

Comment 5-34 (Letter #12, HydroQual, Inc., November 21, 2007): The reported calculations were accurate with one minor exception. On page 4, the calculated recharge on the 79.39 acre site is reported as 49,620 gpd. HydroQual calculated this parameter to be 47,246 gpd using an area of 79.39 acres, 4,356 sq. ft. per acre, 8 inches of recharge per year (0.666 ft), 7.48 gallons per cubic foot, and 365 days per year. Assuming a 69% reduction in this recharge under drought conditions, the drought scenario recharge would be 32,600 gpd rather than the 34, 235 gpd reported. These changes are not considered significant, since even the revised estimate for the drought condition is more than twice the estimated water demand of 15,760 gpd.

Response 5-34: *Comment noted. Leggette Brashears & Graham, Inc. (LBG) concurs with the HydroQual recharge calculation for the site. Please note the reduction in recharge under drought conditions is to 69 % of normal, not a 69 % reduction.*

Comment 5-35 (Letter # 12, HydroQual, Inc., November 21, 2007): The field procedures were generally conducted in accordance with NYSDEC recommendations. One minor exception is that the pumping rate in the Well 2 test was allowed to fall to approximately 50% of the design rate after about 7 hours into the test. The DEC recommends that a constant rate pumping test be conducted with the discharge rate maintained within 5% of the design rate. However, a review of the impact of this decline on the various hydrographs did not indicate that it had a negative impact to the data or the final drawdown in any of the monitored wells. A similar conclusion is drawn regarding the 30-minute shut down of pumping in Well 3 due to generator repairs.

Response 5-35 : *Comment noted.*

Comment 5-36 (Letter #12, HydroQual, Inc., November 21, 2007): Finally, there is no mention in the report if precipitation occurred prior to, during or in the recovery portion of the two tests as required by NYSDEC.

Response 5-36: *Precipitation information is provided in the June 30, 2008 response letter from LBG (see Appendix C).*

Comment 5-37 (Letter # 12, HydroQual, Inc., November 21, 2007): Although the content of the report meets the general requirements specified in the NYSDEC guidance, the following additions would have been useful to allow the reader to gain a better insight of the test results.

Comment 5-37 A: On-site precipitation records for the antecedent, pumping, and recovery portions of both tests. This information would be useful to determine how short-term recharge influences groundwater levels.

> ***Response 5-37 A:*** *See Response 5-36. Precipitation data is provided in the June 30, 2008 LBG response letter (see Appendix C).*

Comment 5-37 B: Further explanation of the abrupt drop in water level in Well 2 during the Well 2 pumping test at noon on January 24, 2007.

> ***Response 5-37 B:*** *The water level decline in Well 2 during the test was attributed to the dewatering of a small water bearing fracture in the bedrock. A further discussion is provided in the June 30 2008 response letter from LBG (see Appendix C).*

Comment 5-37 C: Maps showing the final (maximum) drawdown for each of the two tests. A plot of these data for the Well 2 and 3 tests was prepared by HydroQual and is attached.

> ***Response 5-37 C:*** *Maps of the maximum drawdown for the two tests were prepared by HydroQual and are attached to the HydroQual's comment letter (see Appendix A).*

Comment 5-37 D: A delineation of the proposed Wellhead Protection Area. It is assumed that a standard 200 radius is proposed.

> ***Response 5-37 D:*** *A delineation of the proposed Wellhead Protection Areas for the two production wells are provided in Figure 1-2 FEIS Conservation Plan, in this FEIS. The protection areas include a standard 200 foot radius.*

Comment 5-37 E: Calculation of aquifer properties such as transmissivity and storativity.

> ***Response 5-37 E:*** Data from the pumping tests completed on Wells 2 and 3 indicate sufficient storage and transmissivity is available in the bedrock aquifer to support the use of the wells. The pumping test data can be used in lieu of the calculation of the theoretical storativity and transmissivity for the bedrock aquifer. *A further discussion is provided in the June 30 2008 response letter from LBG (see Appendix C).*

Comment 5-37 F: A discussion of the potential impact of the Lake as a recharge boundary.

> ***Response 5-37 F:*** *It is unlikely that Beaver Dam Lake will have any impact on the Wells 2 and 3 as a recharge boundary. Piezometer data collected during the pumping test indicate no direct hydraulic interconnection between the pumping wells and the adjacent surface-water feature.*

Comment 5-38 (Letter #12, HydroQual, Inc., November 21, 2007): The water balance discussion on page 3 comparing recharge rates over the 79-acre site to the estimated water demand implies that the water being pumped will originate on site. This is highly unlikely considering that the overlying soil is reported as “clay till” and ranges from 16 to 155 feet thick.

Response 5-38: *The recharge calculation for the Lake Blooming Grove site represents the precipitation recharge contribution which the 79 acres of land would add to the regional bedrock aquifer. It is likely that water pumped from Wells 2 and 3 comes from recharge which occurs outside the property boundaries. A further discussion is provided in the June 30 2008 response letter from LBG (see Appendix C).*

Comment 5-39 (Letter # 12, HydroQual, Inc., November 21, 2007): As shown on the attached figures, the cone of influence (drawdown contours) created by pumping the proposed water supply wells at twice the estimated demand is elongated in an east-west direction. This is commonly observed in jointed, sedimentary units such as the Martinsburg Formation, and is due to anisotropy of the fracture network. That is, the network of joints and fractures are preferentially oriented in and east-west direction, and thus drawdown is more easily propagated in this direction. Conversely, less drawdown is propagated in the north-south direction.

Response 5-39: *Comment noted. LBG concurs with this assessment.*

Comment 5-40 (Letter #12, HydroQual, Inc., November 21, 2007): The drawdown maps also illustrate a relatively broad cone of depression with the 10-foot drawdown contour encompassing nearly the entire 79-acre site. This type of drawdown footprint is also typical of moderate to low yielding formations such as the Martinsburg.

Response 5-40: *Comment noted. LBG concurs with this assessment.*

Comment 5-41 (Letter #12, HydroQual, Inc., November 21, 2007): HydroQual agrees that since the actual daily water demand of the project will be half of that shown on the attached figures. Thus, the maximum expected drawdown in an off-site residential well (assuming Well 2 is used) will likely be less than 10 feet in an east-west direction and less than 5 feet in a north-south direction. (In reality, the impact of the proposed subdivision will be even less due to the conservative nature of the daily water demand planning numbers).

Response 5-41: *Comment noted. LBG concurs with this assessment of water demand and potential impacts.*

Comment 5-42 (Letter #12, Hydroqual, Inc., November 21, 2007): A review of the recovery data for the two pumping wells indicates that recovery of water levels to 90% of static conditions required 28 hours for Well 2 and 31 hours for Well 3. These values are slightly longer than the NYSDEC recommended time for 24 hours, but are typical for the Martinsburg formation in this geologic setting.

Response 5-42: *Comment noted.*

Comment 5-43 (Letter #12, Hydroqual, Inc., November 21, 2007): Recovery data for the homeowner wells provided in Appendix VI indicates that water levels fully recovered to pre-pumping conditions within approximately 5 days (i.e. Fully recovered on February 9, 2007) after the combined Well 2 and Well 3 (initial attempts) pumping events. The one exception is at the 6 Lesser Lane residential well in which the water level was approximately three feet short of full recovery.

Response 5-43: *Comment noted.*

Comment 5-44 (Letter #12, Hydroqual, Inc., November 21, 2007): Considering the relatively small off-site drawdowns expected from the proposed subdivision as noted above, the proposed monitoring plan appears somewhat conservative. For example, the plots in Appendix VI indicate that the normal daily use of residential wells creates drawdowns in the range of 5 to 20 feet, or approximately 2 to 7 percent of the saturated thickness of a typical 300-foot deep well. Thus, the addition of several feet of drawdown due to pumping at the proposed subdivision is unlikely to cause negative impacts. Perhaps the monitoring plan could be tailored to those homes oriented in an east-west direction from the proposed pumping wells, as these homes would likely experience the greatest impact.

> ***Response 5-44:*** *LBG and the applicant have noted the comment regarding the conservative nature of the proposed monitoring plan. LBG agrees that the addition of several feet of drawdown due to pumping of the proposed subdivision is unlikely to cause negative impacts. Nevertheless, LBG and the applicant have offered to provide an inclusive and conservative monitoring plan that would monitor all homes where there is the potential for impacts, even if they are unlikely. Therefore, no changes to the monitoring plan are proposed at this time.*

Comment 5-45 (Letter # 13, Christopher Murney, February 26, 2008): I have lived at 94 Lake Road for almost thirty years and have watched the area grow, prosper and mature, with careful planning and foresight to the possibilities and limitations of Blooming Grove. There are many aspects of the development across from my home, and others along Lake Road, that concern me. Well tests, perk tests, and other tests that will have a great and lasting Impact on our water supply and the soundness of Beaver Dam Lake are among them. I would like to address two issues of immediate concern. There is a current plan to maintain a "holding pond" across the street from my house and to divert that water to a culvert that runs under Lake Road, through the property bordered by me and Otis Thornton, and continuing through my property to the Lake. A cursory test was conducted to gauge the amount of water the culvert could handle and It was determined that a constant flow of X amount of water (i.e. the amount running through the ditch that day) would have no impact on the existing culvert. That is wrong. That ditch carrying that water is a dry trough nine months of the year, providing runoff in the spring and, on occasion, after intense rainfall. The ditch has almost doubled in depth and width in the past 28 years, carrying debris, rocks, and dirt into the lake and creating a small peninsula. In addition everything that now drains from the heights of the surrounding land, once owned and farmed by Joe Rackawiki, also follows that line of least resistance during spring thaws, and flows into the lake, carrying with It all of the phosphates, fertilizers, and chemicals, needed to maintain the cropland. This is to be replaced by 37 houses, drawing water from the aquifer, leeching phosphorus, fertilizer, salt and chemicals, needed to maintain lawns, roads and services for a small town, which will also flow through my property into the lake, skirting three leach fields (mine, Thornton and Lerner all fall within an 8 to 15 yard radius of the drybed). And if allowed to do so without reinforcement of the dry bed, what will happen to the foundation of Otis Thorntons home, as the constant runoff further erodes the land around his foundation (it is now within 8 feet.)? and What will happen to the lake as this runoff becomes a constant stream of chemical byproducts generated by this small town? Will leach fields in the area be affected? Will Beaver Dam Lake be able to absorb the dynamic onslaught of those byproducts, or will it become a leach field itself?

I have hiked the land above my home and it is a beautiful site. From many locations you can't even see the lake. But please let's not forget it's there. As our area grows, so should our caution. The horse may be out of the barn on this one, but it's not to late to make sure the

impact of the Blooming Grove LLC, development is addressed correctly, and adjustments made. Once it starts, you can't put the genie back in the bottle. Blooming Grove LLC. has no long term interest in the overall community. They build their houses, make their money and move on while we continue to live here. We all need to continue to live in a healthy and eco friendly environment with our lake and community thriving. It can be done and I feel with the insight and guidance of the board, it will be. Thank you for your contributions to the community, it is greatly appreciated

Response 5-45: *The above comment involves two concerns 1) water quantity or the rate of flow following project development and 2) water quality following development. Also see Responses 5-19, 5-20 and 5-21, above.*

Water Quantity

The northeast corner of the site, consisting of approximately 15 acres of on-site drainage area and 9 acres off-site area, currently flows into an existing culvert under Lake Road and into the off-site swale referred to in the comment. This swale crosses several private properties and drains to Beaverdam Lake. Under the FEIS Conservation Plan, only 3.32 acres of this 24 acre drainage area will be developed. A total of 0.88 acres of new impervious surfaces is proposed within this area, designated Drainage Area B-2, and shown in Figure 5-4 of this FEIS. The stormwater from the developed area (3.32 acres) would be collected through the proposed drainage network and discharged into a proposed NYSDEC pocket pond located adjacent to Lake Road (Stormwater Basin B). Flow from the pond would be directed to a new 24 inch concrete culvert under Lake Road, to the existing off-site swale and eventually to Beaverdam Lake.

The pond would serve as both stormwater management and water quality treatment. Stormwater would be released from an outlet structure that would permanently control stormwater flow at a designed flow rate at less than current conditions. The stormwater management facility was designed to accommodate a 100 year storm. The design of the facility was not based upon a single site visit or measurement of flow, but rather standard engineering stormwater models based upon the Soil Conservation Service Technical Release 55 (SCS TR-55) "Urban Hydrology for Small Watersheds Methodology" (see Appendix F Stormwater Pollution Prevention Plan). Based upon these engineering studies, the flow rate through the culvert and swale would decrease between 7 and 18 percent, after the construction of the stormwater management facilities.

It should be noted that the applicant has committed to stabilizing off-site portions of the drainage culvert on the east side of Lake Road, that are subject to erosion. Details of the of the stabilization are provided on the Site Plan drawings.

Stormwater Quality

The proposed stormwater management facility in the northeast corner of the site has been designed to NYSDEC standards for water quality treatment for pollutant removal. The management facility includes a bioretention area to provide further stormwater quality treatment for typical storm events. Proposed stormwater management is further described above.

The treated stormwater from drainage Area B eventually would flow to Beaverdam Lake, located approximately 500 feet from the site. As shown in the engineering estimates, the levels of phosphorus, nitrates, and BOD are expected to decrease compared to existing run-off concentrations. Under typical drainage and rainfall conditions, the 500 foot long drainage swale would act as a biofilter, prior to the stormwater reaching Beaverdam Lake. Based upon engineering estimates described above, the project is not expected to have an adverse impact to Beaverdam Lake and other downstream waters.

Comment 5-46 (Letter # 14, Steven Lerner, March 7, 2008): I am writing this letter because of my deep frustration with the development called Lake Blooming Grove, LLC. Several issues have been brought up during meetings directed to Lake Blooming Grove LLC and I have yet received any answers from them.

Of prime. importance is. a culvert that crosses the road and Intersects between three private properties. During two meetings and a letter directed to their. engineer, I disputed their water readings that the culvert handles. As evidence, two longtime residences (over twenty-five years each) have stated the absurd water levels Lake Blooming Grove LLC claimed they measured.

I was even more disappointed when the Lake. Blooming Grove LLC engineer came to inspect the culvert with one other property owner, the town engineer, and myself. The town engineer, myself, and the other property owner expressed our concerns regarding the increased flow rate with the anticipated development. The ditch was never intended to receive any increased water. This ditch was actually built by hand by the property owners, not the town. With the increased water anticipated, the threat of erosion is severe and loss of personal property, foundations, and septic tanks are a distinct possibility. The town engineer suggested a few solutions including fortifying the dirt walls with rocks, a relatively inexpensive procedure. These, suggestions fell on deaf ears to Lake Blooming Grove, LLC.

It's in the best Interest that this issue is resolved Immediately before any permanent damage is done to the personal property of hard working local residents and the looming legal battles that would occur.

Response 5-46: *Please see Responses* 5-46 and Responses 5-19, 5-20 and 5-21, above.

As described in Response 5-46 above, the proposed stormwater management basin has been designed to decrease the rate of flow for storms up to a 100 year design storm. For a detailed analysis of the stormwater flow rates, please refer to Appendix 2 of the SWPPP.

During the May 17, 2005 meeting with affected property owners and the Town Engineer, the applicant's representatives made a commitment to stabilize the off-site portion (east of Lake Road) of the drainage swale, subject to erosion. The applicant remains committed to off-site drainage improvements. Stabilization will include geo-textile fabric and rip-rap stone to prevent erosion.

Figure 5-1: Proposed Well Locations and Wetlands

Lake Blooming Grove
Town of Blooming Grove, Orange County, New York
Source: Lanc & Tully Engineering and Surveying, P.C., 4-29-08
Scale: 1" = 250'

W:\Lake Blooming Grove\FEIS 2008\Figures\Conservation Planl4-29-08MD.dwg

Tim Miller Associates, Inc., 10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

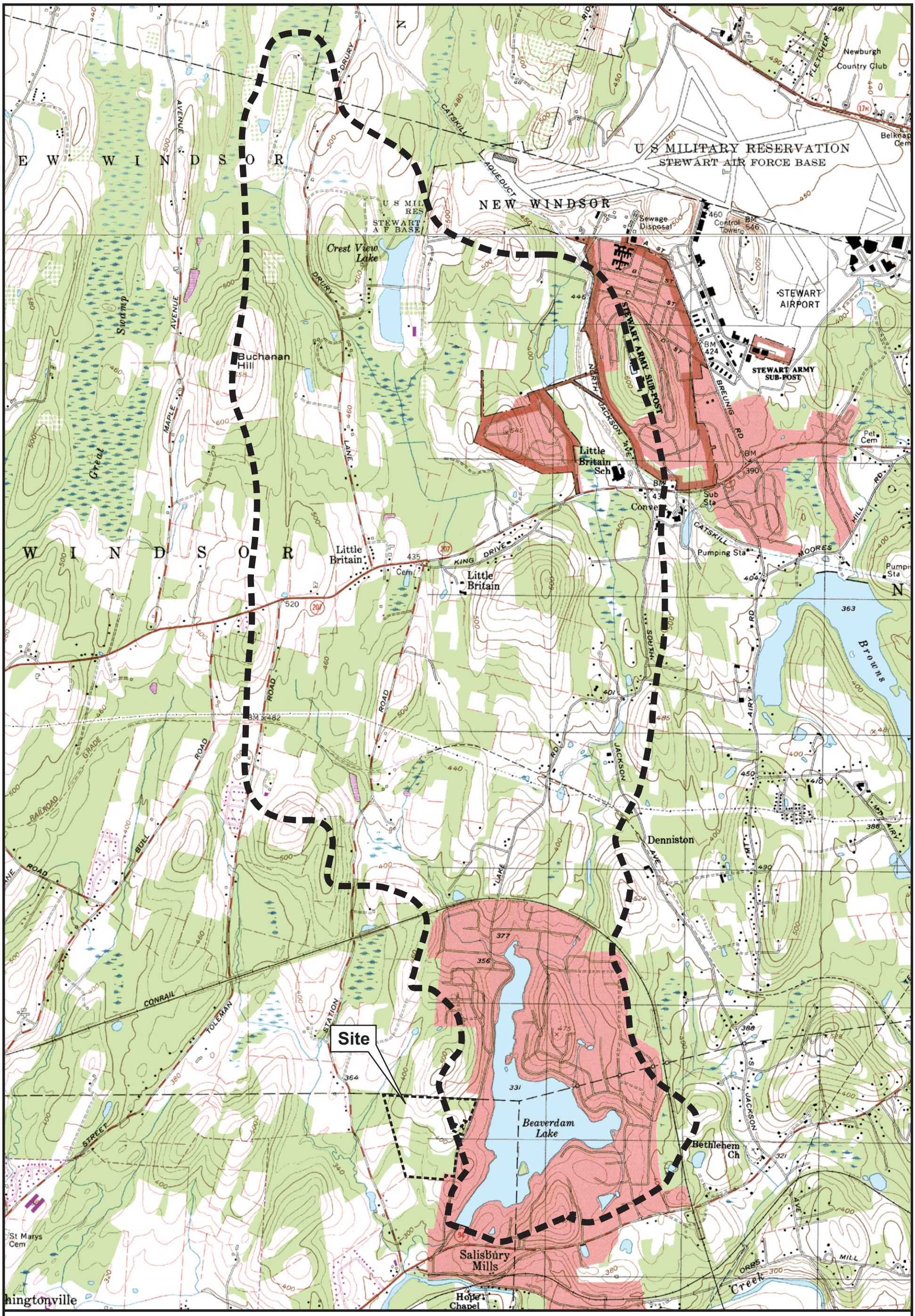

Figure 5-2: Drainage Area for Beaver Dam Lake
Lake Blooming Grove EIS
Town of Blooming Grove, Orange County, New York
Base Map: USGS Topographic Map
Approximate Scale: 1" = 2173'

File 0375 4/17/08
JS/0375

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

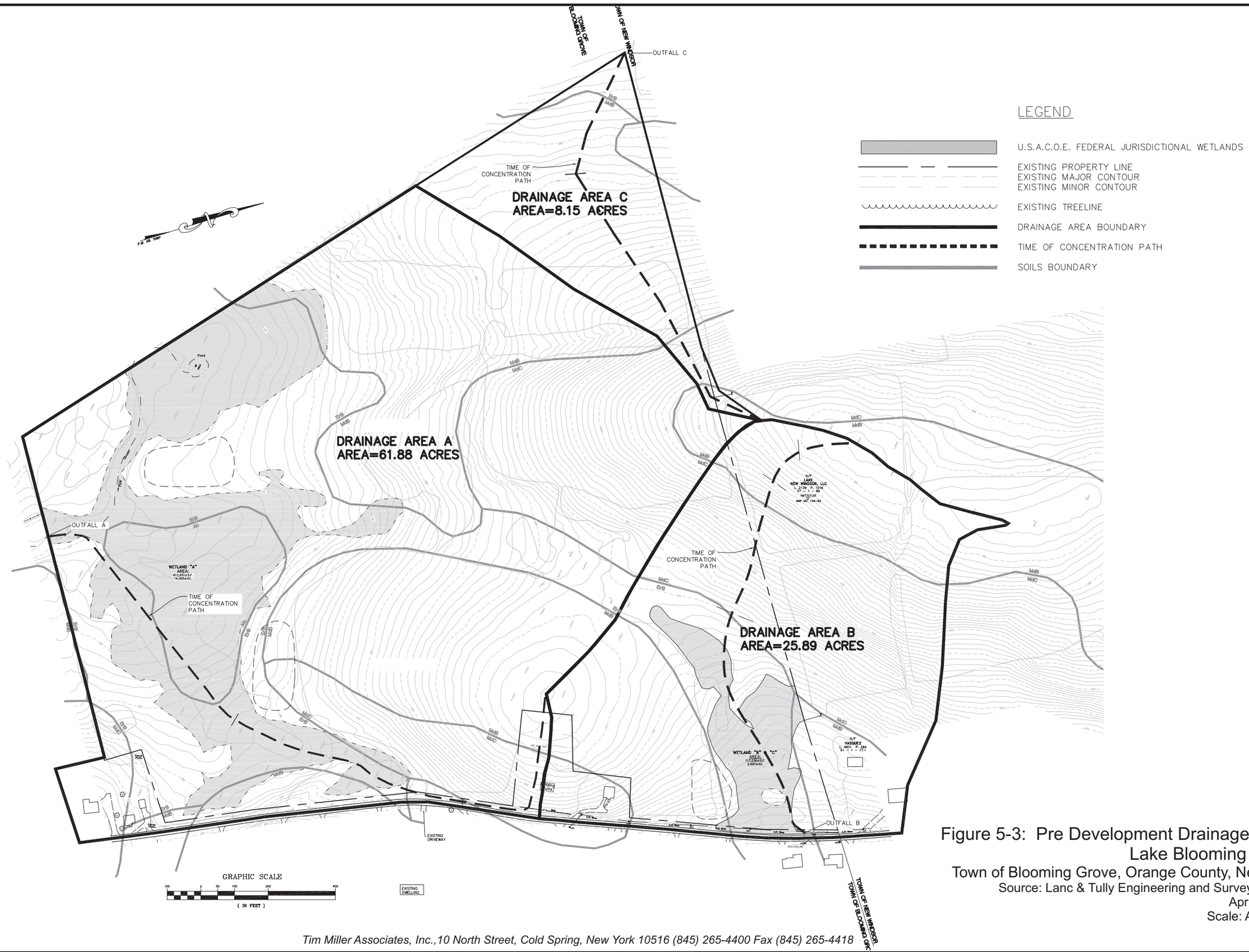

Figure 5-3: Pre Development Drainage Areas
Lake Blooming Grove
Town of Blooming Grove, Orange County, New York
Source: Lanc & Tully Engineering and Surveying, P.C.
April 9, 2008
Scale: As shown

File 0375 4/22/08
JS/0375

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

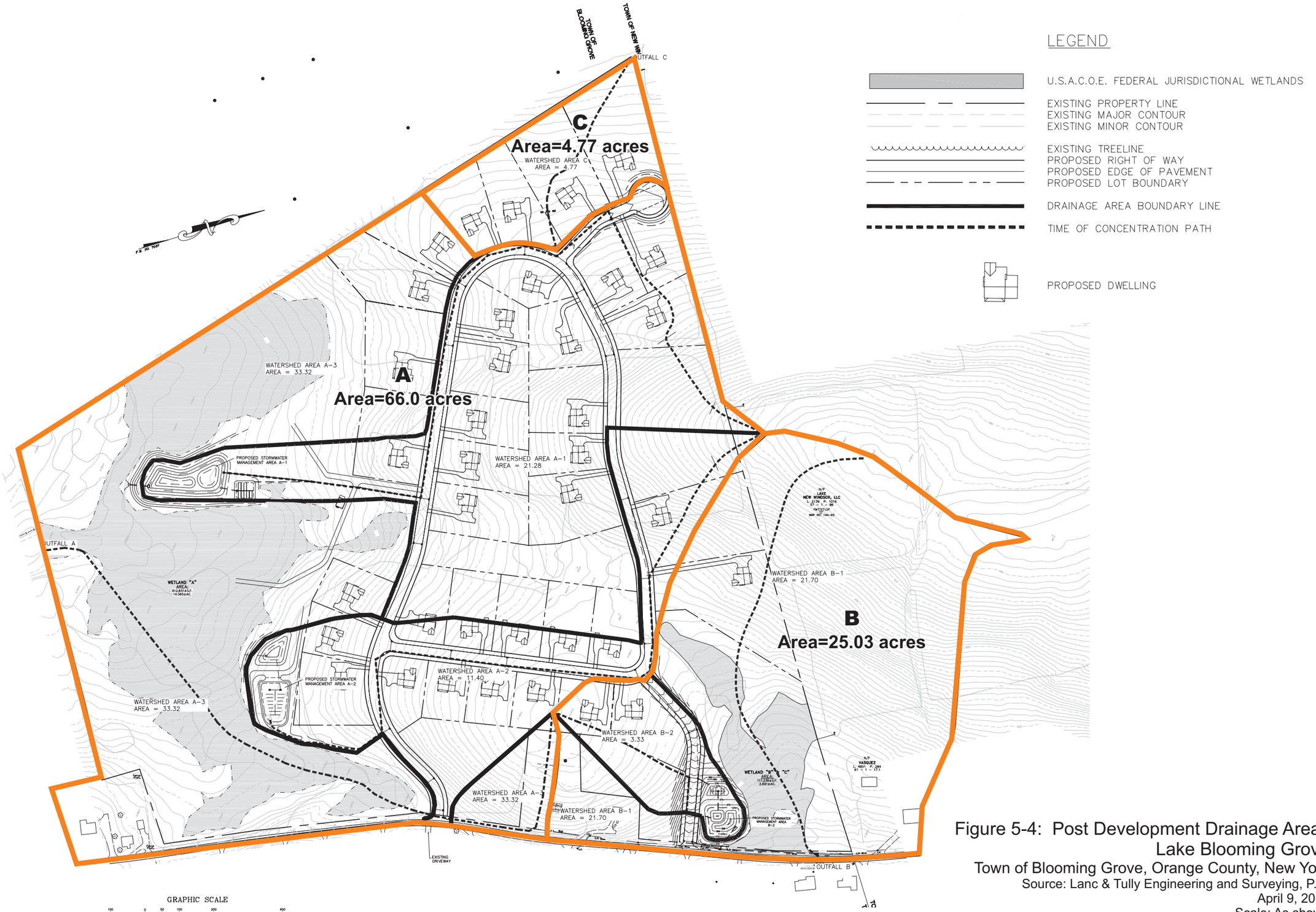

Figure 5-4: Post Development Drainage Areas
Lake Blooming Grove
Town of Blooming Grove, Orange County, New York
Source: Lanc & Tully Engineering and Surveying, P.C.
April 9, 2008
Scale: As shown

File 0375 4/22/08
JS/0375

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418