O. Infrastructure and Energy

1. Introduction

This section provides a summary of the Site Utility Report plan for the proposed project. The complete Site Utility Report is included in the Appendix.

2. Sanitary Sewage

a. Existing Conditions

(1) Sewer Main Distribution

As shown on Exhibit III.O-1, Existing Sanitary Sewer System, the Project site is currently served by a network of sewer mains and a treatment facility which handled the sanitary sewer loads of the former Harlem Valley Psychiatric Center (HVPC). The sewer mains extend through the eastern portion of the site and connect to the existing buildings and structures on the parcel. A 20 inch sanitary sewer pipe crosses under NYS Route 22 and extends into the western portion of the property, serving the old Store House and old Power House buildings located adjacent to the railroad tracks. A sanitary sewer trash rack and pump station located in the lower levels of the Power House building collect large debris for removal and pump the untreated sewage to the wastewater treatment plant via a force main pipe that extends over the Swamp River via the existing bridge on Wheeler Road. The pipe then extends north to the treatment plant. A sewer main also extends west along Wheeler Road into the western section of the site to service some remote buildings located next to the old farm buildings. The processed flows from the wastewater treatment facility discharge to an outfall to the Swamp River as shown in Figure III.O-1. The existing sewer main network was constructed in the 1930's and consists of a series of clay and cement pipes with brick manholes. Observations of the sewage influent indicate high concentrations of groundwater evident of significant amounts of water infiltration.

(2) Wastewater Treatment Facility

The existing wastewater treatment facility, located west of the Swamp River was constructed in the 1930's and designed to treat 1.2 million gallons of wastewater daily from the HVPC. The facility was subsequently upgraded in the 1980's due to equipment problems and the inability to find replacement parts. Since the 1990's, the facility has been under the care of private contract operation companies.

Currently, the treatment plant is operating under a permitted discharge limit of 1.2 MGD (million gallons per day). At the height of the site's operation in the 1950's, flows from the treatment facility were approximately 600,000 gpd. According to facility records, the treatment facility currently averages approximately 30,000 gpd. However, during wet weather periods flows are significantly greater due to inflow and infiltration into the sewer main system. The facility's current mechanical condition would prevent it from treating its permitted SPDES discharge limit of 1.2 MGD. A full description of the existing condition and operation of the treatment plant is presented in the Wastewater Treatment Facility Report prepared by Delaware Engineering (DE) dated November 21, 2008, and included in the Appendix.

b. Potential Impacts of the Proposed Project

(1) Proposed Project Demand

As presented in Table III.O-1, Estimate of Average Daily Wastewater and Water Demand, the proposed Project is anticipated to generate approximately 467,000 gpd of sanitary flow. This figure includes a 20 percent flow reduction for the use of water conservation fixtures. Flows from the Project would be 584,500 gpd without the use of water saving fixtures. The proposed project's anticipated average daily design flow (467,000 gpd) represents only 39 percent of the facility's design capacity of 1.2 MGD.

(2) Treatment Facility Upgrades

Modifications associated with treatment facility upgrade plan can be accommodated within the existing footprint of the facility, and the area of the existing sludge beds could be used to house the new sludge process. No significant visual impacts are anticipated as a result of the upgrade and any such impacts would be no greater than what currently exists on the site. Some temporary removal of vegetation may be required during construction and staging of equipment, and some removal of the overgrowth around the structures may be undertaken for security purposes. The potential for construction-related impacts on the Swamp River are anticipated to be limited since the facility is located approximately 400 feet west of the river. Any substantial construction would include a detailed erosion and sedimentation control plan. Once the treatment facility is upgraded, the proposed development's construction phasing ~~will~~ would allow the facility operator to make adjustments as required to meet the increasing loadings. Because the build-out ~~will~~ would occur over an extended period of time, the operators ~~will~~ would be able to adjust operations to assure compliance with the SPDES permit limits.

Table III.O-1
Estimate of Average Daily Wastewater and Water Demand

Use/Description	Size (sf)	Number of Dwelling Units	Unit [1]	Unit Flow (gpd)	Wastewater (gpd)	Wastewater with Water Saving Fixtures [2] (gpd)	Water [3] (gpd)
Residential							
Single-Family, Large Lot (assume 5BR)		36	DU	550	19,800	15,840	17,424
Single-Family, Other (assume 4BR, 33 %)		186	DU	475	88,350	70,680	77,748
Single-Family, Other (assume 3BR, 67%)		373	DU	400	149,200	119,360	131,296
Townhomes (assume 4BR, 33%)		88	DU	475	41,800	33,440	36,784
Townhomes (assume 3BR, 67%)		175	DU	400	70,000	56,000	61,600
Other Res. Unit Types (assume 2BR) [4]		517	DU	300	155,100	148,080	168,488
Total		**1,375**			**524,250**	**419,400**	**461,340**
					Avg./unit	305	336
General Commercial/Retail/Office							
New	149,000						
Retained	178,500						
Total	**327,500**	**NA**	**SF**	**0.1**	**32,750**	**26,200**	**28,820**
Civic/Community							
Church (w/o expansion)	29,000						
Recreation Facilities [5]	65,800						
Total [6]	**94,800**	**NA**	**Each**	**12,500**	**12,500**	**10,000**	**11,000**
Golf Clubhouse [6]	12,000	NA	Each	15,500	15,000	12,000	13,200
Average Daily Flow (gpd) excluding irrigation					584,500	467,600	514,360
Average Daily Flow (gpm) excluding irrigation							357
Maximum Day Demand (gpd) [7]							**874,412**
Maximum Day Demand (gpm) [7]							**607**
Peak Hour Demand (gpd) [8]							**1,250**

Use/Description	Size (sf)	Number of Dwelling Units	Unit [1]	Unit Flow (gpd)	Wastewater (gpd)	Wastewater with Water Saving Fixtures [2] (gpd)	Water [3] (gpd)
Irrigation							
Site Irrigation (Common Areas) [9]	5		Ac	5,430	N/A	N/A	27,150
Golf Course Irrigation – 9 holes [10]	35		Ac	5,430	N/A	N/A	190,050
Irrigation Demand (gpm)							**151**
Total Project Flow (gpd) including Irrigation				**Average Daily (gpd)**		**467,600**	**731,560**

(1) Unit Flow Rates based on NYSDEC Design Standards for Wastewater Treatment Works (1988)

(2) Water Saving Fixtures result in a 20% flow reduction

(3) Water demand estimated at 110% of wastewater flow. Does not include fire demand.

(4) This category will consist primarily of Stacked Townhouses, Flats, Residential Over Retail and Conversion Units

(5) Includes existing Smith Hall recreation center/gym (49,000 sf) and other recreation facilities (16,800 sf)

(6) The assumed wastewater flows for the Civic/Community components (12,500 gpd) and the Clubhouse (15,000 gpd) are subject to additional program information

(7) 1.7 times the Average Daily Flow (Standard Handbook for Civil Engineers, 1995, 4th Edition, Merritt Loftin Ricketts, Editors recommend 1.65 times Average Daily Flow)

(8) Population Density approximately 3,000 persons. Peak flow ratio is 3.5, Recommended Standards for Wastewater Facilities, 2004 Edition.

(9) Assuming 5 acres at 1 inch per week. Seasonal average over 5 days.

(10) Assuming 35 acres at 1 inch per week. Seasonal average over 5 days.

Note: Program information presented above was obtained from Torti Gallas and Saccardi & Schiff, Inc. in February 2008.

c. Mitigation Measures

(1) Proposed Sanitary Sewer Main Distribution

The existing collection system is not adequate to provide service to the proposed Project due to high water infiltration into pipes and manholes. The Applicant proposes to construct a new network of sewer mains as shown in Exhibit III.O-2, Proposed Sanitary Sewer Main Distribution. The new sewer mains ~~will~~would extend through the eastern and western portions of the project site to service the proposed buildings, as well as the existing buildings to be retained and modernized. The proposed system also includes four new sanitary sewer pump stations to be installed in the four quadrants of the site. Force mains are proposed in select locations of the development area as shown in Exhibit III.O-2. New piping and manholes ~~will~~would be constructed in phases to accommodate the project. The existing pump station located in the old power house (Building #34) ~~will~~would be retained during the initial stages of development and ~~will~~would be either rehabilitated or replaced when development on the east side of NYS Route 22 is completed.

(2) Wastewater Treatment Plant Improvements

The existing treatment plant ~~will~~would require some improvements; however the plant has capacity to treat and is permitted for up to 1.2 MGD. Treated wastewater ~~will~~would continue to discharge to the Swamp River. The plant upgrade ~~will~~would be a phased plan whereby the entire train of the process is drained, cleaned and rehabilitated, while the current flow is treated through the other train. The initial phase ~~will~~would focus on major pieces of equipment, the primary clarifier, sludge processes, final clarification, and disinfection. As discussed in the Wastewater Treatment Facility Report prepared by Delaware Engineering dated November 21, 2008 (see Appendix), state-of-the-art equipment ~~will~~would be installed in the plant. Because the proposed Project's anticipated average daily wastewater flow of 467,000 gpd is significantly lower than the permitted flow of 1.2 MGD, and because the proposed modernization of the facility ~~will~~would improve the discharge quality, the discharged effluent is expected to exceed the requirements of the current SPDES permit and no significant adverse impacts to the Swamp River are anticipated.

(3) Greywater Reuse for Golf Course Irrigation

Effluent can be piped to a golf course irrigation pond for reuse on the golf course. Reuse effluent (if permitted by NYSDEC) may require the use of rapid rate sand filtration of the effluent. The details of the irrigation system would be developed through the design process. See the Wastewater Treatment Facility Report in the Appendix for additional information.

3. Water Supply

a. Existing Conditions

(1) Water Distribution Network and Supply Source

As shown on Exhibit III.O-3, Existing Water System, the Project site is currently served by a fairly extensive network of water distribution mains, a water supply reservoir, water treatment plant, and both an underground and above grade water storage tank, which provided water for the for Harlem Valley Psychiatric Center (HVPC) complex.

The upland water supply reservoir, located in the southeastern section of the site, has a water surface area of approximately 10 acres and an overall volume of approximately 150 acre feet or 49 million gallons[1] . To supplement water levels in the reservoir when necessary, a pipe is in place which allows for water to be pumped from the Swamp River to the reservoir via a pump house located along the Swamp River. Water is currently siphoned from the reservoir and delivered to the water treatment plant where it is then treated and stored before it is distributed via a network of water mains extending westerly to the former existing HVPC buildings and structures. The water distribution main crosses under NYS Route 22 and extends into the western portion of the project site, serving the Store House and Power House buildings situated along the railroad tracks. The water distribution main then extends generally along Wheeler Road into the western section of the site.

Based on a review of available records, the existing water distribution system appears to be constructed of primarily cast iron pipe; however, it does not appear that the condition of the system is adequate to support the new development due to its age and a piping arrangement that conflicts with the proposed plan. The existing water treatment plant reportedly is designed to treat 1.2 million gallons per day, conveying the processed water to the existing 1 million-gallon underground storage tank and 100,000-gallon above ground backwash water storage tank located in the eastern portion of the site next to the treatment plant. A pump house, which permits water to be pumped from the Swamp River to the reservoir, is located in the western section of the site (see Exhibit III.O-3). The pump house, while it appears to have been maintained, has not been in service for some time.

(2) Water Treatment Facility

The water treatment plant was constructed some time in the 1930's. It was designed as a conventional system to treat approximately 1.2 million gallons daily (MGD). A full description of the existing condition and operation of the plant is presented in the Water Treatment Facility Report prepared by Delaware Engineering (DE), dated November 21, 2008, and included in the Appendix.

Due to very low demand, the plant is currently treating only approximately 0.03 MGD. Water is currently being provided to Building Nos. 19 and 20 where New York State has leased the buildings to house correctional officers; Building No. 39,

[1] The reservoir's discharge pipe is elevated off its bottom which reduces the reservoir volume to approximately 39 million gallons. The overall volume is based on a watershed area of 250 acres which appears to be conservative as the report entitled "Engineering Feasibility Study of Proposed Ownership & Operation of Water & Wastewater Facilities at the Harlem Valley Psychiatric Center", dated September 21, 1993, prepared by Gray, Railing & Heinsman estimates the reservoir watershed area at approximately 257 acres. In a second source, the report by Joseph C. Lu, P.E., entitled "Phase I Report, Harlem Valley Psychiatric Center Water Supply Study", dated August 1988 identifies the reservoir watershed area to be approximately 275 acres. Independent measurements conducted by Divney Tung Schwalbe identify the reservoir watershed area at approximately 278 acres.

also known as the Manor House; Building No. 60, the golf clubhouse; Building Nos. 22 and 34, the former HVPC Storehouse and Pumphouse; Building No. 118, Haven House; and several smaller buildings. A treatment process flow schematic of the existing water facility is illustrated in Exhibit III.O-3. Records of the former HVPC indicate that the treatment system was designed and approved to deliver 1.2 MGD of potable water. Further, the historical records indicate that there were very few issues with maintaining compliance under the applicable regulations in effect when the HVPC was in full operation. As discussed herein, the condition of the existing water treatment facility ~~will~~would require some level of improvement if it is to be used as part of an overall water supply system for the Proposed Project.

b. Potential Impacts of the Proposed Project

(1) Proposed Project Demand

Based on conservative unit flow values from the New York State Department of Environmental Conservation's "Design Standards for Wastewater Treatment Works" (1988) and with water conservation measures providing a 20 percent flow reduction, the estimates average daily water demand for the Project site is approximately 731,560 gpd inclusive of irrigation requirements as shown in Table III.O-1, Estimate of Average Daily Wastewater and Water Demand Seasonal irrigation of the common planted areas and the proposed 9-hole golf course are projected to have an average daily water demand of approximately 217,200 gpd. Without irrigation during the cool weather months, the Project's total average daily water demand is estimated to be approximately 514,360 gpd.

The piping system ~~will~~would be designed to accommodate this flow rate as well as a fire flow rate of up to 2,500 gpm. Fire demand for the complex is estimated to be between 750 and 1,200 gpm. Maximum Day Demand, calculated at 1.7 times average day demand, provides for a factor of safety against summer demands when usage ~~will~~would be higher. The maximum day demand of 607 gpm can be met with the development of new groundwater sources and the reservoir and water treatment plant as a backup system (see Exhibit III.O-4, Proposed Water System).

(2) Well Testing Protocol

(a) Objective

The purpose of ~~The Knolls at Dover~~the Project's pumping test program is to comply with Dutchess County Health Department regulations for development of community supply wells as well as meeting the Draft Environment Impact Statement (DEIS) scoping requirement to determine if sufficient ground water is available to meet the water supply demands of the ~~proposed project~~Project. The testing program is also designed to determine if the development of the on-site water supply well system ~~will~~would have an adverse ~~impact~~ effect on neighboring private wells, on and off-site wetlands, and/or on and off-site water bodies. ~~Further, the collected pump test data will be used in preparing a groundwater recharge and water use budget, and forecasting whether the site is self supporting in its water requirements or relies on wells under the influence of the Swamp River. Upon completion of the pump test program, a report will~~

~~be prepared and made a part of the EIS.~~ The testing program is detailed in the Knolls of Dover Well Supply and Aquifer Recharge Analysis, located in the Appendix. The report ~~will~~ includes a site recharge budget, analysis of any on-site and off-site impacts including surface water bodies and nearby private wells, any water supply quality concerns associated with any potential contaminant sources on the site, and drought yield estimates based on reduced annual recharge rates during droughts and 180-day periods without precipitation. Recharge areas for existing and proposed wells and a wellhead protection plan will be described.

(b) Procedure & Test Wells

The well drilling program included the drilling of 17 borings, 16 of which have been converted into wells. Several of the wells, although productive, were not selected for testing at this time because they were either too far from the central portion of the Project Site or were too close to private wells located off-site (see Exhibit III.O-5). ~~Eleven (11) productive wells have been drilled for this project, eight (8) of which have been selected for testing (see Exhibit III.O-5, Well Testing Program).~~ Seven wells were selected for testing, but the testing of Well 15A was cancelled (see Table III.O-2).

All test wells were pumped at a targeted combined rate of 1.7 times average day demand, or Maximum Day Demand. Maximum Day Demand provides for a factor of safety against summer demands when usage would be higher. Each test well was fitted with a suitable test pump with a water flow meter that reads in GPM, a ball valve for flow control, and sufficient discharge line to prevent recharge of the aquifer in the area of the test well. A digital data logger was installed in each test well and was programmed to record water level information every 60 seconds for the duration of the test period, including recovery.

During the pumping test, the Swamp River was monitored at two locations. The Project would not pump water from the Swamp River. The only purpose of this test was to assure that the test wells would not draw water from the Swamp River. One location was near the Swamp River Pump House near the site's southerly property line and the second location was at the northerly end of the site where the Swamp River exits the property in the vicinity of the existing wastewater treatment plant. A data logger was placed in the well point and in the surface water adjacent to the well point. Both loggers were programmed to record water levels hourly. Due to the small changes expected in the river levels during the test period, high sensitivity pressure transducers with barometric compensation were used for these points.

~~All wells will be pumped at a targeted combined rate of twice average daily demand [twice 514,360 gpd or 358 gpm or approximately 716 gpm with the best well out of service] for a minimum of 72 hours. Pumping will be terminated after at least 6 hours of stabilization [both pumping rate and drawdown] is~~

achieved. A minimum of 24 hours of recovery [at least 90 percent] will be recorded. The data will be recorded using digital data loggers that will be set to record each minute during the pretest period, the test period and the recovery period.

The water pumped from the production wells will be diverted towards the nearest surface water body either directly with a hose or through silt fencing or straw bails. Flow rates from each pumping well will be measured using a combination of flow meters and periodic bucket/ stopwatch readings. Water level data will be based on drawdown and referenced to a depth-to-water level from a convenient measuring point.

The test wells will be stagger started, up to one hour delay between starts, at a constant rate. The test will start after a minimum of 48 hours of background data are collected from selected neighboring wells and monitoring wells. The test will continue for a minimum of 72 hours with a minimum of 6 hours of stabilization in pumping wells. If the pumping wells do not stabilize for the minimum 6-hour period, the test will continue until the wells stabilize for the required duration. After a minimum of 24-hours, Well 15B will be started and run for a minimum of 72 hours with 6 hours of stabilization. All data loggers will be kept running during the entire combined pumping test to produce a continuous data record of the pre test, between test, second test and recovery. After all samples are collected, the pumps will be removed at the conclusion of the test program and the wells will be resealed.

Table III.O-2
Well Completion Table

Well	Depth (feet)	Casting Amount (feet)	Well Diameter (inches)	Static Water Level (feet)	Formation	Yield (gpm)	Notes
1	959	51	6	38	Stockbridge Marble	50	MW
2	1009	51	6	40	Stockbridge Marble	5	MW
4	807	111	6	14	Stockbridge Marble	40	TW
7	805	51	6	32	Manhattan Formation	25	NU
8	805	51	6	36	Manhattan Formation	15	NU
9	582	141	6	44	Manhattan Formation	100	TW
10	805	41	6	16	Stockbridge Marble	40	TW
11	460	41	6	7	Stockbridge Marble	200	TW
12A	680	140	6	8	Stockbridge Marble	20	NU
13A	54	54	6	6	Sand/gravel	15	MW
13	805	80	6	6	Stockbridge Marble	25	NU
15	305	51	6	15	Stockbridge Marble	200	MW
15A	472	51	8	16	Stockbridge Marble	300+	TW*
15B	450	51	8	16	Stockbridge Marble	200+	TW
16	807	51	6	8	Everett Schist	5	MW
18	745	160	6	3	Stockbridge Marble	150+	TW

MW= Monitoring Well, TW= Test Well, NU= Not Used
*test cancelled
Yields are based on well drilling results, not pump test results

(c) Off-Site Monitoring

Requests for the participation of adjoining property owners in an off-site monitoring program ~~was~~ were mailed to eighty-five (85) adjoining property owners. The request was sent in the form of a letter ~~[~~(sent by certified mail)~~]~~ detailing the test procedure and including a questionnaire for the owner to complete with a request to respond within 10 days of receipt of the letter. Nineteen (19) of those properties were identified as not having any on-site well (i.e. vacant land, MTA property, cemetery, nature preserve land, etc).~~)~~ Of the sixty-six (66) remaining properties, twenty-seven (27) interested parties responded as willing to participate, three (3) responded by declining the opportunity, and thirty-six (36) parcels did not respond.

The ~~Applicant has reviewed the~~ respondent information was reviewed and ~~will select a minimum of between 14 to 16 wells [possibly more],~~ 15 off-site wells were selected, based on well design and access, for monitoring based on their location and proximity to on-site well locations (see Exhibit. Some of the wells in this area ~~are~~ were expected to be inaccessible because they are an older design, which are directly buried to prevent freezing of the water lines. Typically, owners of home wells within 1,000 feet of the production wells are asked to participate in the well testing program. Many of the homes that ~~have~~ were~~been~~ contacted are several thousand feet from the nearest test well, therefore, in some of the groups of homes that are completely outside the area of influence, based on geologic findings, representative private wells in those areas ~~will be~~were selected. Of the selected wells, ~~S~~suitable wells were installed with data loggers and then resealed. ~~Of the selected wells, o~~One well had to be excavated and brought to current DOH code so that it could be monitored. A second well was not monitored because it was not actually a well; the well had been misidentified by the owner.

~~The well owner at each of the selected locations will be interviewed and their well will be inspected to see if it could be monitored. If the well is suitable, a data logger will be installed in the well. If the well is unsuitable, another well site will be selected, if available.~~

The data loggers ~~will be~~were set to collect water level information from the neighboring wells for a minimum of 48 hours prior to the start of the pumping test and for a minimum period of 24 hours after the conclusion of the test. Some of the loggers were actually installed more than a week before the start of the test and all of the loggers remained in the well for at least 48-hours after the conclusion of the testing. The sampling interval ~~will be~~was 60 minutes between readings.

(d) Water Quality

~~A set of water quality samples will be collected from each selected test well just before the test is shut down. The samples will be transported [same day] in iced coolers to a New York State certified laboratory for analysis using the parameters specified by the Dutchess County Department of Health.~~

Water samples were collected at the conclusion of the test from each well. Some of the water samples were collected during earlier pre-tests (72 hour duration). The samples were transported (same day) in iced coolers to a New York State certified laboratory for analysis using the parameters specified by the DCDOH~~G~~, which were consistent with NYSDOH~~G~~ subpart 5.1 parameters for public water supplies. All wells were also sampled for micro-particle analysis (MPA). Since all of the test wells, except for well 9, tapped the marble aquifer, it was required under subpart 5.1 that MPA samples be collected.

Review of the sample results reveals no significant problems with the water quality from each of the wells. Some of the water samples indicate positive coliform results that are typically caused by the handling of the pumping and drilling equipment and do not necessarily indicate a problem with the well's water quality. No wells had positive ecoli results. These wells should be re-sampled for bacteria when the operational pump system is installed and the well undergoes a complete sanitation procedure.

Well 4 was found to have 1.1 parts per billion of toluene. This is a contaminant that is typically associated with the adhesive used in electrician's tape, which is used extensively in pump system wiring. Well 10A was found to have 1.9 parts per billion of tetrachloroethene (dry cleaning fluid), a common contaminant that could have been introduced into the sample by cross-contamination at the lab. Therefore, these wells should be re-sampled for these contaminants when the permanent pumps are installed. These contaminant levels are well below the maximum allowable levels (1 ppm for toluene and 5 ppb for tetrachoroethene).

(e) Collected Data

~~The data collected during the pumping test, outlined above, will be summarized in a technical memorandum as a supplement to the EIS. The data will be presented in both tabular and graphic form. The data from the test wells will be presented on individual charts that include drawdown and pumping rate data plotted on a suitable time scale. The neighboring well data will be presented on a combined graph, which will also include the pumping period. The common format will allow direct comparison and analysis of the possible interference affects.~~

Seven test wells were included in the pumping test program (see Exhibit III.O-6). The test was completed in two phases due to the failure of one of the test pumps (Well 11A) during the first part of the test. Well 10A, located close to Well 11A, was also tested as part of the second phase. Additionally, Well 15A, the second well in the Well 15 group, was initially intended to be tested during a second phase of the test, as a back-up well to Well 15B. However, due to shifting of sand in the aquifer that the Well 15 group taps, Well 15A was not tested, therefore six wells were tested in all. The test results for each well are described below and in the Appendix (see Table III.O-3, Summary of Pumping Test Results).

In summation, the production wells completed for the Project have sufficient yield (625 gpm) to meet the estimated Project water demands (357 gpm) and are suitable for use as a community well system.

Well 4

The Well 4 pumping test was run as part of the main test and was pumped at a rate of 40 gpm for 72 hours. This well test produced a stabilized drawdown of 140 feet with a full recovery. The drawdown curve shows a slope change after about 24-hours of pumping indicating that a small fracture dewatered at that time. However, the drawdown curve quickly stabilizes about 4 hours later and remained stable for the duration of the test.

Well 9

Well 9 is located near the former hospital and is the only well that does not tap the Stockton Marble; the well taps the Manhattan formation. This well test was run with a 10-horsepower four inch pump, capable of producing 100 gpm. The test was conducted for at least 72 hours and showed a stabilized drawdown that was limited to about 190 feet, indicating that the well is marginally better than 100 gpm, but could not be tested at the higher rate due to the size limitation imposed by the six inch well diameter.

Well 10A

The Well 10A test was run at 40 gpm during the second phase of the test. The test drawdown was limited to a stabilized 290 feet with full recovery. As in the Well 4 test, the drawdown curve changes slope during the first 24-hours of the test, indicating a minor fracture dewatering (see the Well Supply and Aquifer Recharge Report in the Appendix for detailed testing results). The Well 4 test appears to have produced a 50 foot drawdown in Well 10A when it was used as a monitoring well during the primary test period. This level of interference between the two wells should not be sufficient to cause a reduction in yield for either well if they are pumped simultaneously.

Well 11A

Well 11A initially produced a high yield during drilling (250 gpm). However, during pre-testing, it was found that the yield had reduced significantly and was limited to 60 gpm. This was probably due to a fractured collapse. The final test was run at 60 gpm with a final drawdown of 300 feet. Again, as was observed in wells 4 and 10A, a slope change within the first 24-hours indicated a minor fracture dewatering. The test drawdown stabilized for the final day and fully recovered when the test was shutdown.

Well 15B
The Well 15 group was initially thought to be the best well in the system, as a result of the observation of rates as high as 400 gpm during the development of these wells. The development process required that fine calcareous sand be removed from the large water bearing fractures that were discovered in these borings. The development process resulted in the removal of several truck loads of sand before the test could be started. Unfortunately, it appears that after the initial development process, more of the fracture system, further from the well, collapsed and partially clogged the fracture system, reducing the water producing capability of the well.

The test on Well 15B was designed to run at a rate between 250 and 350 gpm. However, it was quickly apparent that the well yield was limited to 175 gpm with the pumping water level at the pump intake. The pumping rate stabilized at 175 gpm with the pumping level at a forced stabilization. Therefore, it is clear that this well is capable of producing 175 gpm, but the final rate should be reduced by approximately 20 percent to protect the pump.

Well 18
This well is a hybrid well that taps both the heavily fractured upper formation of the Stockton Marble, and the deeper, more lightly fractured Stockton Marble. The upper portion of the aquifer behaves in a manner similar to a gravel well, and therefore, it had to be tested twice to determine the well characteristics so that a target pumping test rate could be set.

The first test was conducted at a rate of 150 gpm ,gpm, and produced a stabilized drawdown of 80 feet with the stabilization period lasting about 60 hours. The second test was run at 250 gpm with a drawdown of about 140 feet, and a stabilization period that started half way through the test. The two tests on Well 9 indicate that this well is capable of higher yields than the tested 250 gpm. The 250 gpm rate was limited due to the pump that was used for the test.

Table III.O-3
Summary of Pumping Test Results

Well	Pumping Rate (gpm)	Test Duration (hours)	Stabilization (hours)	Projected Yield (gpm)
4	40	72	24+	40
9	100	72	8	100
10A	40	72	8	40
11A	60	72	6	60
15B	400-175	72	12*	175
18	250	72	60	250+

*Constant head test

On-Site Monitoring Wells

Four wells were monitored on-site during the pumping tests: MW-16, MW-1, MW-2 and MW-13.

MW-16 is located on the southwestern side of the Project Site, and was used to monitor the possible effects of the pumping test on off-site wells in this southwestern quadrant. Based on the observed data (see Appendix), there was no effect from the pumping test in this well, and therefore, there would be no effect on any of the private wells along Hoags Road.

MW-1 was initially intended to be a production well because it produced approximately 40 gpm during drilling. However, since it was located in the north-central portion of the Project Site, and was relatively close to several homes on Pleasant Ridge Road, it was used as a monitoring well instead. There was no effect from the pumping test on this well and would not effect any of the private wells.

The MW-2 well is located in the northern portion of the Project Site, south of Pleasant Ridge Road and west of Route 22 (near the sewer plant). This well was used to monitor the water level in the north central portion of the property. The data shows no adverse effects on the water level in this area. There was no effect from the pumping test on this well and would not effect private wells.

MW-13 is a low yield (15 gpm) gravel well located south of Well 18, and north of the Well 15 group, in close proximity to the former Power Plant. The data shown on the chart below indicates that although both Well 18 and Well 15 are bedrock wells, that both draw some water from the overburden overlying the bedrock.

Swamp River Base Flow Analysis
A base-flow analysis of the Swamp River was conducted to determine the impact of estimated water withdrawals from the Project on the flow rate of the River during drought periods. The base-flow analysis showed that the wells would have no impact on the Swamp River.

The estimated water consumption of the Project is estimated at 357 gpm. If that quantity of water is removed from the base flow to the Swamp River, the total flow would be reduced to 3,942 gpm during drought conditions, or 10.5 cubic feet per second (cfs). Since the total normal flow is 23 cfs, and that amount is reduced by 50 percent to simulate drought conditions (11.5 cfs), the total consumed water removed from the Swamp River represents 1.0 cfs. This does not take into account the water returned to the Swamp River after treatment. Since typically only 10 percent of the water supply is lost to consumption, 90 percent of the water used for the Project would be returned to the Swamp River after treatment. This represents a reduction of the 1.0 cfs to 0.1 cfs impact to the Swamp River. Therefore, during normal conditions, the expected reduction in flow of the Swamp River would be 22.9 cfs instead of 23 cfs. Under drought conditions the flow would be 11.4 cfs instead of 11.5 cfs (see the Well Supply and Aquifer Recharge Analysis in the Appendix for a more detailed analysis).

Off-Site Well Monitoring
Of the 15 wells initially selected, only 14 were monitored. One of the private wells was misidentified by the property owner and during the on-site investigation was found to not a well (see Exhibit III.O-6). A review of the data shows that only three of the monitored wells were affected by the pumping test (see Figures 18 through 30 in the Well Supply and Aquifer Recharge Analysis in the Appendix). The three were affected only minimally, and based on the observed results, do not appear to be in any danger of being adversely affected by the Project's proposed well system.

Two of the affected wells appear to be connected to the same fracture system that supplies Well 9. The Hough-Evans home had a total water level test related change of about nine feet during the test. The water level changes due to the owner's usage did not exceed five feet at any time during the monitoring period. This indicates that the well is productive and that the nine foot decline in water level should have no noticeable effect to the water available to the home. The Stra home had a similar test related change, but to a smaller degree. The third affected well was that of the Yeno Apartments. This well appeared to have a minor interconnection with the test wells. The well appeared to lower about two feet during the test. This well feeds several apartments, and it has a total drawdown range of about three feet, indicating that the well has a high yield and will not be adversely affected by the Project.

The production wells completed for the Project have sufficient yield (625 gpm) to meet the estimated Project water demands (357 gpm) and are suitable for use as a community well system. The recharge analysis showed that the property receives between 561 and 993 gallons per minute of recharge to the underlying aquifers. The Swamp River Base Flow analysis produced a recharge rate of 660 gallons per minute and an overall impact to the flow of the Swamp River of 0.1 cubic feet per second of flow reduction from the total normal flow of 28 cfs. Use of these wells would not, based on observation of the wells used for monitoring during these tests, adversely affect off-site private wells. Water quality appears to be suitable for use for a potable water system.

(3) Water Treatment Facility

The result of the Water Treatment Facility Report by Delaware Engineering (see Appendix) indicate that the conditions at the existing water facility do not allow for the production of the volumes necessary to support the proposed full build-out of the project. In fact, the treatment facility may require some level of improvement if it is to be used during the early phases of the proposed Project. The timing and level of improvements needed to support the Project ~~will~~would be determined during the preparation of the construction documents and permitting process. Two potential options have been evaluated to improve the existing water treatment facility as discussed below in the "Mitigation Measures" section.

c. Mitigation Measures

(1) Proposed Water Distribution System

As noted above, based on review of available records, the existing water distribution system appears to consist primarily of cast iron pipe, and, in light of recent water main breaks and the age of the system, it does not appear that its condition is adequate to support the new development. Further, while the existing reservoir can supply water to the project, it cannot meet the total project demand. Thus, a series of groundwater wells ~~will~~would be developed to provide water to the project site with the existing reservoir and water treatment plant available as a backup system, if required. It is anticipated that the groundwater supply wells ~~will~~would be adequate to provide sufficient water supply to both the residential and commercial buildings.

The existing water distribution system would be reconstructed in stages to serve ~~only~~ those areas with on-going construction, the timing of which would be influenced by market conditions. The existing 1,000,000 gallon underground water storage tank would remain and be used to meet the Project's domestic water demand as well as provide fire protection. The present plan uses the reservoir as a back-up water supply to the Project's best well, should that well need to be taken out of service for an extended period. Water treatment plant upgrades would only be implemented should use of water from the reservoir become necessary. Water quality treatment for the domestic water supply system planned to serve the Project would occur at the individual water supply well site locations. ~~The existing distribution system will be abandoned or removed and a new piping system will be designed and constructed to meet the project demands, both peak and average day. The existing 1 million gallon water storage tank will have adequate capacity to meet the domestic water demand, as well as excess capacity to provide fire protection.~~

The current water supply plan anticipates that the Project's water demand would be met by the development of new groundwater well sources, with the existing reservoir and water treatment plant retained as a supplemental back-up to the proposed groundwater supply system. There are no plans to pump water from the Swamp River.

The Applicant proposes a new network of water mains in combination with the development of new groundwater well facilities to serve the proposed Project as shown on Exhibit III.O-~~6~~7, Water Distribution Schematic.

(2) Water Treatment Facility Improvements

The current treatment plant, dating back to the 1930's, has aged, is in need of repair and requires frequent maintenance; however, it is providing potable water to its users. Water samples are taken on a continuous basis to assure the water is safe for consumption. To provide a more efficient and reliable treatment plant, two potential options have been evaluated in the Water Treatment Facility Report by Delaware Engineering, see the Appendix.

One option is to undertake a complete upgrade the existing treatment facility to provide modern, state-of the-art water filtration plant by replacing and rebuilding major pieces of equipment and installing new modernized equipment. This complete system upgrade option would provide the treatment necessary to meet the ultimate demand of the proposed Project at full build-out.

The second option is to temporarily upgrade the existing treatment facility by repairing and replacing existing equipment to insure the facility's continued compliance with the NYS Sanitary Code. The proposed treatment plant improvements and on-site well system ~~will~~would be reviewed and approved by the NYSDEC, NYSDOH, and Dutchess County DOH. The intent of this preliminary/interim option would be to provide an adequate backup supply of high quality po~~r~~table water for the initial phases of the proposed Project. During construction of the initial phases of the Project, a new facility could be designed and permitted by the NYSDEC. Depending on the initial water demand, the new facility would be designed to provide between 0.25 and 0.5 MGD of potable water. The new facility could be constructed as a backup to the groundwater/well facilities that would be constructed concurrently with construction of the proposed Project. In the event the ground water sources are determined by New York State Department of Health to be of adequate volume such that the treatment plant is not required, the treatment plant could be decommissioned and removed. The reservoir could remain as a water body for recreational purposes and for flood control.

3. Water Saving Fixtures

The planned use of water conservation fixtures such as reduced flow plumbing fixtures and shower heads ~~will~~would reduce water demand by approximately 20 percent.

4. Electrical Supply

a. Existing Conditions

(1) History

The HVPC electrical needs were previously derived from coal fired steam generating boiler systems that drove steam turbines in the main power house directly adjacent to the west bank of the Swamp River.

The steam powered turbines generated electricity on site, developing a 4,160 volt three phase 3 wire power system. Generated power was routed through a main switchboard in the power house at medium voltage (4160 V), and electricity was supplied to transformer vaults via a medium voltage 5 KV rated radial feeder system of conduit and wire that was routed from the power house to the electrical vaults in the respective buildings.

The electrical vaults were equipped with oil filled fused disconnect switches and arrays of transformers configured to transform the 4160 volt three phase power supply to 120/208 volt three phase 4 wire systems serving the respective buildings which housed the vaults.

120/208 volt 3 phase 4 wire systems were distributed throughout the existing buildings from a main building switchboard located adjacent to the transformer vaults to localized panel boards and electrical equipment throughout the buildings.

As the facility was phased out by NYS to transition to non-centralized group home care for the State's psychiatric patients, the multiple coal fired boiler centralized steam system was no longer efficient to operate and was phased out, with localized oil fired boiler systems strategically located to serve the heating and hot water needs of the buildings that remain on campus.

(2) Distribution System Overview

The HVPS electrical distribution system: the main medium voltage switchboards located at the power house, the 5 KV rated radial conduit and wire distribution system, and the transformer vaults have been maintained and utilized since the phase-out of the steam system. Electricity is currently provided by New York State Electric and Gas (NYSEG) from an overhead high voltage distribution system that is routed north and south along Route 22, which passes by the site and provides the 4160 volt three phase 4 wire power supply, effectively replacing the previous self-generated steam turbine created power supply.

(3) Power Supply to Site – Maintenance

NYSEG maintains the facilities supplying medium power 4160 volt power to the site, as part of the maintenance of equipment and facilities within their franchise area.

(4) Existing Power System on Site – Maintenance

The Development Group, Dover Knolls Development Company II, LLC (Developer), maintains on-site electrical system: the existing 4160 volt switchboard, distribution system, and transformer vaults existing on campus.

b. Potential Impacts of the Proposed Project

(1) Impact to Existing Power System on Site

It is anticipated that the extent of construction ~~will~~would impact the existing system in many areas, and the impacts of construction on the existing system and requirements to upgrade the system to current codes and standards ~~will~~would eliminate a majority of the existing electrical distribution systems. Proper disposal of unused equipment and materials ~~will~~would be undertaken in accordance with the applicable Federal, State and local laws.

(2) Proposed Electrical Supply

(a) New High Voltage Distribution System – NYSEG

A new high voltage distribution system ~~will~~would be provided by NYSEG, as the Project is built out. Within the development site, the new electrical system ~~will~~would be an underground conduit and wire distribution system with pad mounted switches and transformers. The existing substation located south of the power house is owned by the Developer and ~~will~~would be removed as part of the proposed project.

At the initial phase of the Project, NYSEG ~~will~~would provide a simple radial electrical distribution system for the distribution on site.

Where it is economically feasible to provide looped systems to increase electrical system supply redundancy and increase flexibility to isolate portions of the electrical system when necessary, it is anticipated that NYSEG ~~will~~would incorporate these measures into the electrical distribution system design.

It is anticipated that electrical distribution cabling, street lighting circuiting, telephone system cabling, cable television system cabling, and potentially natural gas piping would be installed in a common trench. Trench configuration ~~will~~would be as required by NYSEG in coordination with the other respective utility suppliers. Please refer to Exhibit III.O-~~7~~8, Proposed Common Utility Trench System.

(b) Future Substation

At some time in the future, as loads in the Town of Dover and the site exceed the existing medium voltage feeders' capacity, NYSEG may provide additional feeders from the existing Dover Substation to meet the Project's electrical consumption demands, or NYSEG may provide a new, smaller substation on the Project Site. One area that could be used for the substation would be adjacent to the existing sanitary sewer plant and west of the Swamp River. The new substation could be served from a tap of the existing 145 KV distribution system routed parallel to New York State Route 22. The 145 KV distribution system would be extended to the new substation location by NYSEG, and it is anticipated that they would use an overhead pole line extending from Route 22 over the Swamp River.

(c) Voltage Configuration

The high voltage distribution for the Project is anticipated to be 4160 volt three phase three wire to match the current existing electrical supply. NYSEG may elect to utilize a cable that allows them to upgrade to a 13.2 KV three phase three wire system in the future, pending future implementation of the new substation. 5 KV rated equipment utilized for the distribution of the 4160 volt system would be changed out to 15 KV rated equipment to accommodate the 13.2 KV system, and the remainder of the build out of the high voltage electrical system ~~will~~would be 13.2 KV three phase three wire system once the new substation was completed.

(d) Secondary Electric Services

Secondary electrical services to the residential units ~~will~~would be 120/240 single phase three wire systems in configurations of 150 ampere, 200 ampere and 400 ampere, dependent on the size and electrical consumption of the residential units.

Secondary electrical services to the commercial properties ~~will~~would most likely be 208/120 volt three phase 4 wire systems, and where electrical demands warrant due to the size of the electrical requirements and when requested by a NYSEG customer, 465/277 volt three phase 4 wire systems may be obtained at an additional cost.

(e) Street Lighting

NYSEG can also provide street light circuits for publicly dedicated and other locations approved by NYSEG for roadway street lighting. The specific locations ~~will~~would be as designated by NYSEG.

Where required, NYSEG can provide metered street lighting services for privately dedicated roadways and other public and common areas.

It is anticipated that most street lighting fixtures shall be "cut off" type to minimize the impact of uplight on the surrounding community.

Street lighting systems ~~will~~would be constructed by the Developer in accordance with the Town of Dover's land use and subdivision regulations and project specific design guidelines.

c. Mitigation Measures

(1) Project Energy Efficiency Measures

(a) New York State Energy Code

All electrical, mechanical, and plumbing systems shall be designed to be compliant with the New York State Energy Code.

(b) Residential Air Conditioning Systems

Residential air conditioning or heat pump systems shall meet or exceed the U.S. Department of Energy 13 Seasonal Efficiency Energy Rating (SEER).

(c) Natural Gas Heating Systems

Residential natural gas heating systems shall meet or exceed the U.S. Department of Energy 80% Annual Fuel Utilization Efficiency (AFUE).

(d) Energy Star Appliances

Efforts to utilize Energy Star appliances ~~will~~would be undertaken in the final design phase of the Project. Where it can be economically feasible, Energy Star appliances ~~will~~would be specified.

(e) Energy Efficient Lighting

Energy efficient lighting ~~will~~would be utilized in the design of the residential and commercial properties, where economically feasible. All lighting shall be in conformance with the New York State Energy Code.

(f) Existing Facilities

1.) Existing Water and Sanitary Sewer Plant – The existing water and sanitary sewer treatment plants are anticipated to be upgraded over time, and energy efficient motors shall be utilized in any upgrades.

2.) Well Supply System – The new well pumps ~~will~~would be constructed with energy efficient pump motors.

3.) Commercial Properties – HVAC Systems – HVAC systems for commercial properties ~~will~~would comply with New York State Energy Code requirements.

(g) Project Electrical Loads

Project Estimated Energy Consumption – Electric and Natural Gas loads have been prepared and are included in the Appendix.

5. Natural Gas

Natural gas does not currently exist at the project site. NYSEG has indicated that natural gas may be available for the Project, pending their financial analysis on the feasibility of the rate of return on their required investment in the development and delivery of gas to the Project site.

NYSEG has indicated that natural gas service for the Project is achievable from a connection to the Algonquin Natural Gas Transmission Line, which is routed through the Town of Dover, east of the Project site.

NYSEG has considered a potential routing of the natural gas system that would be routed from a new pressure reducing station located near the Algonquin Natural Gas Pipe Line, in a route southwest along New York State Route 55, south to the Project site on Hutchinson Avenue and Wheeler Road. It is anticipated that a crossing would be necessary across New York State Route 22 at Wheeler Road. From Wheeler Road, gas distribution mains would be manifolded into the Project site to serve the respective buildings. Distribution is anticipated to be radial configuration, with looped piping systems where economically feasible to NYSEG to provide greater reliability and flexibility to isolate portions of the piping system. Refer to Exhibit III.O-~~8~~9, Approximate Location of Iroquois Natural Gas Transmission

Pipeline.

Pressure regulating valves and meters ~~will~~would be mounted adjacent to the buildings. It is anticipated that low pressure service and high pressure gas services would be available if gas is supplied to the project site by NYSEG.

NYSEG has indicated that should natural gas service be provided to the site, it would be able to serve other areas of the Town of Dover in the future as demand and required financial returns were able to be realized by NYSEG.

a. Natural Gas Loads – Project Estimated Energy Consumption

Electric and Natural Gas loads have been estimated for the proposed Project and are presented in Table III.O-~~2~~4.

Table III.O-24
Project Estimated Energy Consumption – Electric and Natural Gas Loads

Development Program			Electric				Natural Gas – Heating Season Only			
	Number of Living Units	**SF**	**Watts/SF min.**	**Watts/SF max.**	**Estimated Min. Load (KW)**	**Estimated Max. Load (KW)**	**BTU/SF**	**BTU/SF**	**Estimated Min. Load Therms**	**Estimated Max. Load Therms**
Phase 1-5 years										
Residential	600 units	2,000	6 w/sf	8 w/sf	7,200 KW	9,600 KW	35 btu/sf	35 btu/sf	420 Therms	600 Therms
Commercial		200,000	10 w/sf	14 w/sf	2,000 KW	2,800 KW	50 btu/sf	75 btu/sf	100 Therms	150 Therms
Phase 1 Total Loads					**9,200 KW**	**12,400 KW**			**520 Therms**	**750 Therms**
Phase 2 -5 years										
Residential	776 units	2,000	6 w/sf	8 w/sf	9,312 KW	12,416 KW	35 btu/sf	35 btu/sf	543.2 Therms	776 Therms
Commercial		50,000	10 w/sf	14 w/sf	500 KW	700 KW	50 btu/sf	75 btu/sf	25 Therms	37.5 Therms
Phase 2 Total Loads					**9,812 KW**	**13,116 KW**			**568.2 Therms**	**813.5 Therms**
Project Total										
Electric Loads					**19,012 KW**	**25,516 KW**				
Gas Loads									**1,088 Therms**	**1,564 Therms**

6. Fuel Oil

In the event natural gas supply for the Project is not available, heating and hot water needs would be served from energy efficient oil fired systems.

a. Residential Properties

Residential homes would be equipped with oil burning boilers for heating systems and hot water production, and fuel oil tanks could be located inside the footprints of the residences. Required fill lines and vent lines would be located on the exterior of the buildings. Oil burning boiler efficiency shall meet or exceed the NYS Energy Code.

b. Commercial Properties

Commercial properties, offices and retail, would utilize larger double walled fuel tank systems located below grade. The fuel tanks for commercial properties ~~will~~would be equipped with probes located in the annular space of the double wall tanks to monitor for leaks, and alarms ~~will~~would be sounded automatically by the leak detection system to alert property owners of the condition. Piping from double walled tanks to the interior of the building, where fuel ~~will~~would be utilized, ~~will~~would be double walled pipe, installed to pitch back to the tank or annular space of the tank where sensors are present, or the annular space of the double walled pipe ~~will~~would be equipped with sensors as required at low points to monitor the piping system in coordination with the tank leak detection system.

c. Oil Pollution Prevention Programs

Oil Pollution Prevention Programs, pertinent to the commercial properties, as required by the Environmental Protection Agency's Oil Pollution Prevention Program 40 CRF 112 shall be implemented by the property owners in accordance with all applicable Federal rules, laws and regulations.

d. Commercial Properties – Petroleum Bulk Storage

Petroleum bulk storage, pertinent to the commercial properties, shall be undertaken in conformance with the New York State Department of Environmental Conservation, Division of Environmental Remediation, Bureau of Technical Support's Spill Prevention and Petroleum Bulk Storage program as required by Article 17 Title 10 of Environmental Conservation Law 6 NYCRR Parts 612-614, and in accordance with all other applicable State and County rules, laws and regulations.

e. Supply Fuel Oil

Residential and commercial property owners ~~will~~would obtain fuel oil directly from local oil suppliers serving the Harlem Valley.

7. Alternative Fuel Sources

a. Alternative Energy Supplied Via NYSEG

Residential home owners and commercial properties have the ability to utilize power generated from wind, hydropower, and solar power through the NYSEG electrical system. Home owners may elect to have power transported via the NYSEG distribution system to their homes from the electrical supplier of their choice. NYSEG ~~will~~would provide information to their franchise area electrical customers on how to utilize alternative energy sources to power their homes or businesses, if they choose to utilize those sources of energy.

b. On-Site Wind Power Generation

It is not anticipated at this time that the generation of wind powered systems ~~will~~would be utilized on site for the Project's electrical needs.

c. On-Site Solar Photovoltaic Power Generation

Utilization of photovoltaic power is not anticipated at this time. However, the Applicant has not ruled out the use of these systems once the design of the project becomes further developed.