

Pennoni

PENNONI ASSOCIATES INC.
CONSULTING ENGINEERS

Sewage Facilities and Potable Water Report



For The

P o c o n o *P* M a n o r R e s o r t & C a s i n o

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EXECUTIVE SUMMARY

Water and Sewer Service

The development of the 3,000 acre Pocono Manor site envisions a world class destination hotel/casino resort complex along with convention and meeting space retail, residential and mixed use development throughout the site. As explained by the attached Water Impact Analysis and Sewer Impact Analysis, Pocono Manor proposes a comparable world class system to manage water resources on-site. The overall environmental objective is aimed at preserving and protecting the Swiftwater Creek which flows through the heart of the property. To accomplish this, a water conservation plan will reuse, recycle and reclaim water to the fullest extent possible, thereby reducing demands on available groundwater supplies.

For water service, a self-contained on-site system will be developed through expansion of the existing Pocono Manor Village system. The proposed system will provide a public community system to meet domestic water demands as well as fire service demands for the proposed development. The system will expand from that now servicing the existing Pocono Manor Village through a series of water transmission and distribution main extensions, construction of a one million gallon water storage tank, re-rating of existing wells, along with development of additional groundwater wells as development proceeds throughout the site.

For sewer service, an on-site 600,000 gallon per day advanced technology treatment plant with seasonal discharge by spray irrigation to golf courses and other areas will be installed to serve the Phase 1 and Phase 2 hotel/casino resort complex. As Phase 1 is underway, the plan includes construction of a outfall pipeline for discharge of highly treated wastewater effluent into Brodhead Creek, downstream of its high quality designation. When that outfall pipeline is available, the existing 140,000 gallon per day Pocono Manor treatment plant (circa 1902) flows will be connected to the new plant and, at that point, all flows will be discharged to bypass the high quality stream segments of the Swiftwater Creek and Brodhead Creek basin either by disposal via spray irrigation or surface water discharge through the outfall pipeline. That will then realize the broader environmental objective to improve surface water quality within the Swiftwater Creek and Brodhead Creek basins by eliminating the current Pocono Manor effluent discharge.

In combination, the water and sewer service plans will preserve and protect to the maximum extent possible water resources throughout the Pocono Manor property while improving stream water quality in the process.



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CONSULTING ENGINEERS

SEWER ANALYSIS

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P o c o n o M a n o r
R e s o r t & C a s i n o

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WASTEWATER MANAGEMENT PLAN

Proposed Development

The Pocono Manor property comprises some 3000 acres in the Township of Pocono, the Borough of Mount Pocono and the Township of Tobyhanna within Monroe County. Initial development plans include a hotel/casino resort complex along with retail and residential development slated primarily for the portion of the site within Tobyhanna Township, generally north of Swiftwater Creek. Future development of the site will extend into Pocono Township and Mount Pocono.

The Phase 1 hotel/casino resort complex includes a 750 room hotel with casino gaming, convention and meeting space, entertainment areas as well as retail shopping Village. Within the casino complex, a total of 775 golf villas and time share villas will be built primarily adjacent to the proposed west golf course.

Phase 2 envisions further expansion of the casino/hotel complex itself along with an additional 1000 hotel rooms and related amenities.

Phase 1 and Phase 2 will be developed over a multi-year period within Tobyhanna Township on approximately 300 acres of the overall site. Future plans envision a destination hotel/casino resort complex along with mixed use residential and retail development planned within Pocono Township and Mount Pocono Borough.

PLAN SUMMARY

To provide sewer service for the proposed Pocono Manor development initially for Phase 1 and Phase 2, and ultimately for future development as well, an onsite advanced tertiary 600,000 gpd wastewater treatment plant will be constructed in the general vicinity of the existing 140,000 gpd facility. The plant will be designed and permitted for an initial 600,000 gpd discharge via spray irrigation (seasonal) onto the existing east golf course, the relocated west golf course as well as to landscaped areas and lawns throughout the property.

During non-spray periods, high quality treated effluent will be stored in lined storage ponds. The stored effluent will be seasonally discharged to the spray fields. Therefore no surface discharge to the Swiftwater Creek is proposed for flows to be generated by the new development. On an interim basis, the existing Pocono Manor treatment plant will continue to service the existing Manor and surrounding development but no flows will be added to the existing plant.

The wastewater treatment plant will employ a biological treatment process known as a membrane bioreactor technology. Although the plant will be designed and permitted at 600,000 gpd, it will be constructed in 200,000 gpd modules. It is expected that the first two modules with a total capacity of 400,000 gpd will be installed to service the Phase 1 development while the third module, bringing the total plant capacity to 600,000 gpd,

will be installed for Phase 2. For flows beyond 600,000 gpd, the plant will require further expansion which will be accomplished as required for each subsequent phase, again, in modular fashion.

Consistent with the zero discharge strategy described above, Pocono Manor proposes to construct a 12 mile effluent outfall pipeline for discharge of treated effluent to the non-high quality portion of the Brodhead Creek. On completion of the effluent outfall pipeline, the existing plant will be abandoned and those flows will be directed to the new plant for treatment and discharge to the Brodhead and via spray irrigation along with the treated effluent from the casino/hotel complex itself. The existing plant will be removed and decommissioned at that point.

The spray irrigation system will have two separate components. The first will be the spray irrigation required for the east golf course and the relocated west golf course. The second component will involve the construction of a non-potable water system throughout the complex, generally parallel with the potable water distribution system. This dual distribution system will be employed to deliver non-potable (treated effluent) water to landscaped areas and lawn areas expanding throughout the complex as the development progresses.

The final component of the system will be the delivery of non-potable water to the casino complex for use in non-potable applications, primarily within the casino floor and gaming areas as well as all retail spaces. The non-potable water will be supplied via the dual distribution system into the casino and retail areas where separate plumbing systems will be employed to appropriately segregate the potable water applications from the non-potable water uses.

ENVIRONMENTAL OBJECTIVES

The wastewater collection and treatment system now servicing the existing Pocono Manor Village does not have sufficient capacity for the proposed development. To provide a sewer service plan and, more broadly, a wastewater management plan for the hotel/casino complex as well as the balance of the Pocono Manor property, a comprehensive facilities plan has been developed in recognition of a number of strategic environmental considerations and water resource conservation goals. Since the turn of the twentieth century, Pocono Manor has maintained responsible stewardship over its lands and is committed to maintain that stewardship through protection of the local environment with specific emphasis on local high quality water resources.

Surface water and groundwater resources are abundant throughout the region and within the Pocono Manor property itself. Consequently, the wastewater management plan has been designed to recognize those resources particularly the inherent exceptional value of the Swiftwater Creek basin. Swiftwater Creek's headwaters, including the subbasins of Indian Run, Transua Run and the Saw Mill Run are within the Manor property. In combination, these basins and subbasins form the headwaters of the Brodhead Creek watershed, a tributary of the Delaware River basin.

Zero Discharge Strategy

Classified as a high value (HV), Cold Water Fishery (CWF), Swiftwater Creek and its tributaries will be protected consistent with that water quality classification. In fact, as a broader objective, Pocono Manor proposes to not only maintain current water quality within the Swiftwater Creek basin but to enhance the existing stream quality. Currently, Pocono Manor is serviced by a treatment plant permitted for a 140,000 gpd (0.140 mgd) discharge. The existing plant is permitted to discharge 29 pounds per day or more than 10,000 pounds annually of BOD and suspended solids into the surface water body. As a part of its wastewater management plan, Pocono Manor proposes a zero discharge strategy to completely eliminate the existing discharge by abandonment of the antiquated sewage treatment plant. When realized, the Swiftwater Creek high value water resource quality will not only be sustained but will be improved and enhanced through the elimination of the current surface water discharge.

The zero discharge to Swiftwater Creek will initially be accomplished by seasonally applying treated wastewater effluent via spray irrigation, consistent with PADEP regulations. Spray irrigation is a zero discharge alternative relying on evapotranspiration in the soil matrix for negative uptake and evaporation of the effluent resulting in no surface water nor groundwater discharge. During non-spray periods, the treated effluent will be stored in a series of lined storage ponds.

As soon as possible, preferably during Phase 1, treated effluent from both the new 600,000 gpd advanced treatment plant and that of the existing Pocono Manor plant will be seasonally discharged into the Brodhead Creek downstream of its high quality segment classification. That will be accomplished by construction of an off-site effluent outfall pipeline which will convey the treated wastewaters (i.e., effluent) by gravity miles downstream for discharge into the Brodhead within Stroud Township.

Water Conservation (Reuse/Recycle/Reclaim)

An integral part of the plan is an extensive water conservation program to reuse, recycle and reclaim water resources to the maximum extent practical. That objective will be accomplished through a series of individual strategies. First and foremost, water conservation measures will be used throughout the complex. In addition to utilization of low flow fixtures throughout the resort, Pocono Manor will install, for example, fixtures with automatic shutoffs (laser and/or infrared type) while conservation management practices will be used throughout the complex including food preparation areas, laundries and housekeeping areas.

To achieve the overall conservation goal, Pocono Manor proposes an integrative strategy to conserve potable water resources while protecting surface waters and groundwaters through minimization of wastewater discharges. In combination with stormwater management recharge and detention strategies, implementation of these strategies will

assure the fullest possible protection for the environment including water resources generally.

It should be noted that manmade water features will be developed throughout the site including several that are or will be a part of the stormwater management system. However, no wastewater effluent will be discharged into any stormwater management ponds. Separate effluent storage facilities will be constructed for wastewater management purposes.

Dual Distribution System

For effluent application to landscaped areas and lawns throughout the complex, the wastewater management plan includes construction of a dual water distribution system, that is, a separate potable water supply system along with a non-potable water supply system. The latter will be used for spray irrigation on the existing east golf course, the relocated west golf course, landscaped and lawn areas throughout the casino/hotel complex and, as required, within outlying forest areas as well.

Non-Potable Water Recycling System

Another water conservation strategy to be employed involves reuse and recycling of wastewater effluent within the casino complex for non-potable uses. By employing this strategy, Pocono Manor projects some 30,000 to 50,000 gallons per day of treated effluent can be re-used for non-potable purposes, conserving an equal amount of potable water supply.

Effluent Outfall Pipeline

The zero discharge to Swiftwater Creek will be accomplished by construction of an effluent outfall pipeline. The effluent outfall will be employed during non-spray (seasonal) periods and will convey high quality treated effluent from the Pocono Manor site miles downstream for discharge into the Brodhead Creek below the point where it is classified as a high quality cold water fishery. On completion, the effluent outfall will meet the zero discharge to the Swiftwater Creek objective by effectively bypassing the high quality stream segments of both Swiftwater Creek and Brodhead Creek for effluent discharge into the lower reaches (non-high quality) of the Brodhead just upstream of the Delaware River.

Abandonment of Existing Treatment Plant & Discharge

On availability of the effluent outfall pipeline, the existing Pocono Manor wastewater treatment plant will be abandoned. That will then eliminate the present outfall and discharge into Swiftwater Creek within the Pocono Manor property. Since abandonment of the existing Pocono Manor treatment plant, outfall and discharge to Swiftwater Creek is a high priority objective (i.e., zero discharge) Pocono Manor will seek expedited

approval from the PADEP, the Delaware River Basin Commission, Pocono Township as well as Stroud Township for construction of that line.

Energy Conservation

Energy conservation considerations are also paramount in the wastewater management planning process. To that end and key to design considerations, would be minimization of pumping throughout the site and for the offsite facilities as well. Fortunately, due to significant elevation changes within the property and to the point of discharge at the Brodhead Creek miles downstream, the wastewater collection and trunk sewer system as well as the effluent outfall conveyance mains will be primarily gravity pipelines. In some cases, the lines will be designed as pressure conduits without the need for supplemental energy normally provided by pumping.

Advanced Treatment System

PADEP regulations require high level treatment for spray irrigation and non-spray discharges as well. To accomplish that, Pocono Manor will utilize a state-of-the-art treatment process known as a membrane bio-reactor for the biological treatment process. This advanced technology tertiary level treatment will accomplish extremely high removal efficiencies exceeding state and federal water quality standards.

Projected Wastewater Flows

The following table summarizes the projected wastewater flows for the Phase 1 and the Phase 2 development:

WASTEWATER FLOW SUMMARY

	<u>Phase 1</u> (GPD)	<u>Phase 2</u> (GPD)	<u>Total</u> (GPD)
Casino Hotel Complex (Incl. Retail)			
• 750 Keys	249,445		
• 1000 Keys		133,250	382,695
Villas	<u>124,000</u>	----	<u>124,000</u>
SUBTOTAL	<u>373,445</u>	<u>133,250</u>	<u>506,695</u>
Existing Flows	----	<u>42,500</u>	<u>42,500</u>
TOTAL	<u>373,445</u>	<u>175,750</u>	<u>549,195</u>
<hr/>			
WWTP DESIGN CAPACITY			
	<u>400,000</u>	<u>200,000</u>	<u>600,000</u>

Seasonal Effluent Discharge

As shown below, the 400,000 GPD Phase 1 treatment plant will seasonally discharge up to 144,000,000 gallons of highly treated effluent annually. Initially, all flows will be used for spray irrigation on the two golf courses and throughout the landscaped areas and lawns of the complex. During non-spray periods (November through March), effluent will be stored in a series of lined effluent lagoons with a combined capacity up to 60 million gallons. These lagoons and the spray fields will be developed as necessary to meet the Phase 1 development flows.

EFFLUENT SPRAY IRRIGATION & SEASONAL DISCHARGES

	<u>Phase 1</u>	<u>Phase 2</u>
Projected Flow	373,445 GPD	549,195 GPD
WWTP Capacity	400,000 GPD	600,000 GPD
TOTAL ANNUAL DISCHARGE	146,000,000 GAL.	219,000,000 GAL.

SPRAY IRRIGATION VOLUMES (SEASONAL SPRAY PERIODS)

• East Course	45,500,000	45,500,000
• West Course	45,500,000	45,500,000
• Landscaping/Lawn Areas	25,200,000	32,000,000
• Forest Areas (Temporary)	<u>29,800,000</u>	<u>---</u>
SPRAY CAPACITY	<u>146,000,000 GAL.</u>	<u>123,000,000 GAL.</u>

SNOWMAKING

OPTIONAL

OPTIONAL

**SWIFTWATER CREEK EXISTING
SURFACE WATER DISCHARGE**

- | | | |
|-------------------------------|------------|-----------------------|
| • WWTP Capacity @ 140,000 GPD | 51,100,000 | Zero Discharge |
|-------------------------------|------------|-----------------------|

**PROPOSED SEASONAL
DISCHARGE (NON-SPRAY
PERIODS VIA OUTFALL TO
BRODHEAD CREEK)**

N/A

96,000,000

EFFLUENT STORAGE VOLUME

60,000,000 GAL.
(w/o Effluent Outfall)

37,500,000 GAL.
(w/Effluent Outfall)

Transition to Brodhead Creek Discharge

The effluent outfall pipeline will be designed and permitted during Phase 1. To the extent that the outfall is ready before Phase 1 is fully completed, during non-spray periods, effluent will be diverted for seasonal discharge to the Brodhead. At that point, the existing treatment will be abandoned to realize the zero discharge objective. Further, since the effluent outfall pipeline is expected to be on line before Phase 1 is completed, temporary extension of the spray irrigation system into forest areas would not be necessary.

PROPOSED FACILITIES PLAN

The following provides further technical background on the existing and proposed wastewater systems supplementing the information in Sections 1, 2 and 3 of this analysis.

Existing Conditions

Site Description

The majority of the 3000 acre Pocono Manor site is wooded with sloping to steeply sloping areas generally draining in a southwesterly direction primarily tributary to Stillwater Creek and other small creeks on site. These creeks are part of the larger Brodhead Creek Basin and are designated as High Value (HV) Cold Water Fisheries (CWF).

Infrastructure on site is limited to that needed to support the existing Resort and Spa and private residences. Water is provided through a privately owned community drinking water system supplied by groundwater. Wastewater treatment is provided by a small privately owned facility described below.

Soils

The USDA mapped soils on the site consist of coarse stony loam, primarily of the Lackawanna, Swartswood, and Wurtsboro series. As is typical in this region, these soils are identified as soils having severely limited use for onsite wastewater disposal facilities (septic systems) due to their slope and low permeability.

Soil test pits were taken for the purpose of identifying the soil depth to limiting zones for spray irrigation of treated effluent. The test pits performed by a Soil Scientist and observed by the Regional DEP Soil Scientist in the golf course area indicate that the descriptions in the USDA Soil Survey are accurate and that the soils are suitable for spray irrigation for disposal of the effluent. They further confirmed that the soils are not suitable for on-site septic systems.

Existing Facilities/Infrastructure

Existing sewerage facilities serve the Pocono Manor Resort and Spa and Pocono Manor Village. They include a small sewage collection system and sewage treatment plant. The Pocono Manor treatment plant is a stepped gravity fed trickling filter process with chlorination and post aeration. The plant discharges to the Stillwater Creek in the east

central area of the property. The plant was constructed in 1902 and operates under NPDES Permit No. PA0029149. It is presently rated at 140,000 GPD of discharge and operates at approximately 60,000 GPD in-season (summer) and 25,000 GPD off-season (winter). Expansion or upgrading of the sewage treatment plant to accommodate the Pocono Manor Resort and Casino is not considered viable. The existing flows will be included in the design of the new conveyance and treatment facilities so that the existing plant can be abandoned. That will then achieve the primary environmental objective to cease the present surface water discharge into Swiftwater Creek (i.e., zero discharge).

Other sewerage facilities in the vicinity of the Pocono Manor property include the Mount Pocono Borough Wastewater Treatment Plant and several small privately owned facilities. None of these facilities have the available capacity to meet the needs of the planned development of the Pocono Manor Resort and Casino.

Projected Wastewater Flows

The preliminary plans for the hotel/casino development have been used to project wastewater flow generation from the Pocono Manor Resort and Casino. The calculation of wastewater generation is presented in Tables 1 and 2 below. The average annual flow from the existing Pocono Manor facilities and Pocono Manor Village are included in the Phase 2 development flows.

Table 1: Phase 1 Wastewater Generation

Development Item	Anticipated Wastewater Generation
750 Room Hotel	75,000 GPD
Gaming Space	10,000 GPD
Retail Space	34,200 GPD
Restaurants	96,005 GPD
Meeting Space	5,950 GPD
Entertainment	10,800 GPD
Pool, Spa, Garden, and Fitness Areas	9,500 GPD
Office/Gaming School	8,000 GPD
775 Multi-Residential Units	124,000 GPD
Wastewater Generation – Phase 1 Development (Rounded)	400,000 GPD (0.400 MGD)
Wastewater Generation – Phase 1 Development (Rounded)	146,000,000 Gallons/Year

Table 2: Phase 2 Wastewater Generation

Development Item	Anticipated Wastewater Generation
1,000 Room Hotel	100,000 GPD
Gaming Space, Retail Space, Restaurants, etc.	50,000 GPD
Existing Pocono Manor Wastewater Generation	42,500 GPD
Wastewater Generation – Phase 2 Development (Rounded)	200,000 GPD (0.200 MGD)
Wastewater Generation – Phase 2 Development (Rounded)	73,000,000 Gallons/Year

Proposed Wastewater Treatment System

The proposed treatment method is biological treatment where the biomass consumes the waste, solids are removed, and the effluent is disinfected and discharged. Construction of a new on-site treatment plant will be designed to provide a high level of treatment. The discharge limits for a new treatment plant will be established by PADEP. For purposes of this report, the following discharge parameters have been assumed:

Annual Average Discharge:	0.400 MGD (Phase 1) 0.600 MGD (Phase 2)
BOD:	10 mg/L
TSS:	10 mg/L
Ammonia Nitrogen:	2 mg/L
Nitrate Nitrogen:	10 mg/L
Total Phosphorous:	0.5 mg/L

The nitrogen limits can be met with most secondary treatment processes. The low phosphorous limit can be accomplished biologically or by means of chemical treatment. If a biological nutrient removal plant is not operated in a very stable manner the plant may not achieve reliable biological phosphorous removal. Therefore, chemical treatment may be necessary to ensure adequate phosphorus removal.

A wastewater treatment system utilizing a membrane biological reactor (MBR) will provide reliable biological nutrient removals. The MBR is a compact system that can operate at a biomass 3 or 4 times higher than conventional aeration treatment systems and the MBR eliminates the need for a clarifier. To achieve the necessary biological nutrient removals, its biological system will be configured for anaerobic, anoxic and aerobic zones. The biological treatment units would be constructed in modules with a capacity of 0.200 MGD. Two modules would therefore be needed for Phase 1 and a third module would be needed for Phase 2. Additional modules would be added as the balance of the site is developed.

Other process units associated with this treatment plant will include a fine screen and a flow equalization tank ahead of the biological treatment units. After biological treatment the treated effluent would be disinfected by ultraviolet (UV) light for disposal by irrigation or discharge to surface water.

Proposed Effluent Disposal System

As with septic systems, the site soils are not conducive to subsurface drip irrigation and this disposal method will not be used except in limited applications. Some landscaped areas within the resort complex may use drip irrigation but at a small scale and with suitable natural or augmented soil.

Disposal of treated effluent on-site by spray irrigation involves application of treated effluent to the land surface for evaporation and uptake by natural vegetation (transpiration) within the soil mantle. The evapo-transpiration process results in zero discharge to surface waters and to groundwaters. The system components that are typical of a spray irrigation system include sewage treatment units, disinfection units, and some form of storage facility or lagoon. From the storage facility, the treated effluent is sent to the spray site where it is distributed by either a fixed or mobile sprinkler system.

The soils, topography, and vegetation of the spray site must be conducive to spray application of treated effluent. Test pits performed by a Soil Scientist and observed by the Regional DEP Soil Scientist in the golf course area indicate that spray irrigation is viable on the course. The same soils are present in the forested areas of the site and should therefore be viable in the forest areas as well.

A Wastewater Balance (Attachment 1) was developed for the Phase 1 development using 0.400 MGD of wastewater production and Phase 2 development using 0.600 MGD (including wastewater from Pocono Manor Village). Spray irrigation on the golf course was evaluated based on the soils investigation by a certified golf course irrigation design professional. That analysis estimated that 47 million gallons can be disposed of annually on the East Course and a similar volume disposed on the relocated West Course.

The required annual disposal volume equals the annual wastewater production of 146 million gallons in Phase 1. With disposal on the East and West Courses (91 million gallons), 55 million gallons remains to be disposed of. Spray irrigation in forested areas can be used to dispose of treated effluent on slopes up to 25%. Applying treated effluent at a rate of 0.1 inches per day (0.7 inches per week) results in disposal of 2,700 gallons per acre per day or 581,000 gallons per acre per year. The lawn and landscaped areas and the forested areas required for disposal of the remaining treated effluent in Phase 1 would therefore approximate 94 acres.

The required annual disposal volume in Phase 2 is 219 million gallons. With disposal on the East and West Courses (91 million gallons), 128 million gallons remains to be disposed of. Applying treated effluent at a rate of 0.1 inches per day (0.7 inches per

week) on landscaped, lawn and forested areas would require approximately 220 acres of spray area for disposal of the remaining treated effluent.

However, the effluent outfall pipeline for seasonal discharge to Brodhead Creek is planned for completion during the latter stages of Phase 1. Consequently, additional spray irrigation areas will only be developed if the outfall line is delayed.

Spray irrigation is limited by season to warm months of the year. From approximately April 1 to October 30 spray irrigation is possible in northeastern PA. From November 1 to March 31 sufficient storage capacity is needed to hold treated effluent until spray season returns. Storage can be provided on-site in lined lagoons located around the golf courses and in large tanks. The maximum storage volume calculated for the treated effluent for Phase 1 of the Pocono Manor Resort and Casino is 60 million gallons. The maximum storage volume calculated for the treated effluent for Phase 2 of the Pocono Manor Resort and Casino is 91 million gallons.

To help manage the volume of treated effluent storage needed over the winter months, the potential for snowmaking using the treated effluent is under consideration. Preliminary discussions with PADEP indicate that snowmaking is an available option. At this point however, snowmaking is not part of the project's wastewater management plan.

Disposal of all treated effluent on-site by spray irrigation requires significant piping and storage facilities. While spray irrigation of forested land and associated storage of treated effluent is possible, a more efficient means of effluent disposal is desired.

Disposal of the treated effluent to the Stillwater Creek is complicated by its classification as a High Value (HV) Stream and Cold Water Fishery (CWF). Disposal of treated effluent to the Stillwater Creek is therefore not proposed for the hotel/casino development.

Downstream of Swiftwater Creek, the Brodhead Creek is not classified as a high value stream as it passes under the Stokes Avenue Bridge in Stroudsburg although it is classified as a trout stocking and migratory fishery. While the discharge limits that would be imposed by PADEP on the treated effluent would be stringent, they can be accomplished with conventional treatment technology. The Brodhead is also over 100 ft wide at this location and has a greater assimilative capacity than the Stillwater Creek as it passes through the Pocono Manor site.

In order to discharge to this location from Pocono Manor, a 12 mile long outfall is needed. The outfall would operate by gravity and be constructed of high density polyethylene (HDPE) for its high strength and flexibility. The outfall would exit the Pocono Manor site onto Route 314 near the Route 314 bridge over the Stillwater Creek. The outfall would then run along Route 314 to Route 611. At Route 611 it would continue towards Stroudsburg. The outfall would turn onto Wigwam Park Road in Bartonsville and proceed to Chipperfield Drive to Route 191. The outfall would cross

Route 191 and then proceed on Stokes Avenue to the bridge over the Brodhead Creek. The proposed route is shown in Figure 2.

The entire route off of the Pocono Manor site is within public roadways avoiding acquisition of private right-of-way. There are approximately 13 stream crossings that would be accomplished either by open cut (where feasible), bore and jack, or directional drilling.

Phase 1 Wastewater Balance Utilizing Spray Irrigation Disposal of Treated Effluent

Month	Monthly Wastewater Generation at 0.400 MGD (Gallons)	Disposal by Spray Irrigation on Golf Courses (Gallons)	Remaining Wastewater Requiring Disposal (Gallons)	Disposal by Spray Irrigation into Forest Areas (Gallons)	Required Treated Effluent Storage* (Gallons)
January	12,400,000	0	12,400,000	0	36,800,000
February	11,200,000	0	11,200,000	0	48,000,000
March	12,400,000	0	12,400,000	0	60,400,000
April	12,000,000	4,578,552	7,421,448	7,647,513	60,173,935
May	12,400,000	9,670,708	2,729,292	7,902,430	55,000,797
June	12,000,000	21,397,376	(9,397,376)	7,647,513	37,955,908
July	12,400,000	30,715,978	(18,315,978)	7,902,430	11,737,500
August	12,400,000	13,931,781	(1,531,781)	7,902,430	2,303,289
September	12,000,000	6,422,188	5,577,812	7,647,513	233,588
October	12,400,000	4,731,158	7,668,842	7,902,430	0
November	12,000,000	0	12,000,000	0	12,000,000
December	12,400,000	0	12,400,000	0	24,400,000
Annual Total	146,000,000	91,447,741	54,552,259	54,552,259	

*Based on storage being empty at the end of spray irrigation season.

Phase 2 Wastewater Balance Utilizing Spray Irrigation Disposal of Treated Effluent

Month	Monthly Wastewater Generation at 0.600 MPD (Gallons)	Disposal by Spray Irrigation on West Course (Gallons)	Remaining Wastewater Requiring Disposal (Gallons)	Disposal by Spray Irrigation into Forest Areas (Gallons)	Required Treated Effluent Storage* (Gallons)
January	18,600,000	0	18,600,000	0	55,200,000
February	16,800,000	0	16,800,000	0	72,000,000
March	18,600,000	0	18,600,000	0	90,600,000
April	18,000,000	4,578,552	13,421,448	17,881,158	86,140,290
May	18,600,000	9,670,708	8,929,292	18,477,196	76,592,386
June	18,000,000	21,397,376	(3,397,376)	17,881,158	55,313,852
July	18,600,000	30,715,978	(12,115,978)	18,477,196	24,720,678
August	18,600,000	13,931,781	4,668,219	18,477,196	10,911,700
September	18,000,000	6,422,188	11,577,812	17,881,158	4,608,354
October	18,600,000	4,731,158	13,868,842	18,477,196	0
November	18,000,000	0	18,000,000	0	18,000,000
December	18,600,000	0	18,600,000	0	36,600,000
Annual Total	219,000,000	91,447,741	127,552,259	127,552,259	

*Based on storage being empty at the end of spray irrigation season.

WATER ANALYSIS

For The

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P o c o n o M a n o r
R e s o r t & C a s i n o

*TOBYHANNA TOWNSHIP
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INTRODUCTION

The existing Pocono Manor Village is currently served by an on-site water and fire supply, distribution and storage system designed to meet domestic and fire service demands of the existing Pocono Manor Inn and Conference Center including the Manor Spa. Since the projected water demands and fire flows for the proposed hotel/casino resort development exceed the capacity of the existing Pocono Manor Village water system, infrastructure improvements and additions to that system will be made to satisfy the service levels projected for each developmental phase.

The following report outlines the components of the existing Pocono Manor water system, the projected demands for the new development along with a description of the proposed water supply, distribution and storage elements planned in stages for the development over the next several years. It also outlines a water conservation program aimed at protecting and conserving groundwater resources.

PROPOSED DEVELOPMENT

The Pocono Manor property comprises some 3000 acres in the Township of Pocono, the Borough of Mount Pocono and the Township of Tobyhanna within Monroe County. Initial development plans include a hotel/casino resort complex along with retail and residential development slated primarily for the portion of the site within Tobyhanna Township, generally north of Swiftwater Creek. Future development of the site will extend into Pocono Township and Mount Pocono.

The Phase 1 hotel/casino resort complex includes a 750 room hotel with casino gaming – convention and meeting space, entertainment areas as well as retail shopping Village. Within the casino complex, a total of 775 golf villas and time share villas will be built primarily adjacent to the proposed west golf course.

Phase 2 envisions further expansion of the casino/hotel complex itself along with an additional 1000 hotel rooms and related amenities.

Phase 1 and Phase 2 will be developed over a multi-year period within Tobyhanna Township on approximately 300 acres of the overall site. Future plans envision a destination hotel/casino resort complex along with mixed use residential and retail development planned within Pocono Township and Mount Pocono Borough.

EXISTING WATER SYSTEM

From its initial development in the early 1900s, the existing Pocono Manor Village has been served by an on-site system, for many years deriving its supply from two springs, the Manor Spring and the Kettle Spring, generally north of the Village proper. In order to bring that system into compliance with state and federal regulations, Pocono Manor recently developed two groundwater well sources along with related treatment and chlorination facilities and abandoned the springs as potable water supply sources. The

first well, Well No. 1, water storage tank and treatment system were placed into service in 2001. Over the past several years, Pocono Manor has developed, permitted and recently placed into service a backup water supply (Well No. 2) and treatment system which will supplement the primary Well No. 1 supply.

The existing water supply system demands range from approximately 20,000 gpd during the winter to 50,000 – 60,000 gpd during the peak summer period. Those demands include irrigation of landscaped and lawn areas of the Manor Inn and Conference Center as well as the Manor Spa building immediately adjacent to it. The system also provides domestic water and limited irrigation supply for approximately 60 residential units within the Village center.

Groundwater Supply

The existing Manor Village is supplied by two existing groundwater wells, each rated at 70 gallons per minute (gpm).

Well No. 1 was drilled in 1999 and placed into service in early 2001 under PADEP Permit No. 2450064 initially issued on April 3, 2001.

The characteristics of Well No. 1 are summarized as follows:

Well Depth	:	600 feet
Static Water Level	:	370 feet
Casing Diameter	:	8-inch
Screen Length	:	60 feet
Specific Capacity	:	0.90 gpm/foot
Permitted Capacity	:	70 gpm

¹From December 1999, "Well Completion Report" by Brian Oram, Professional Geologist.

Well No. 2 was drilled in 2001 and permitted on October 18, 2004 under PADEP Permit No. 4504501. Well No. 2 is located north of State Route 314, northwest of the Pocono Manor Village adjacent to Indian Run Creek. The characteristics for Well No. 2 are summarized as follows:

Well Depth	:	155 feet
Static Water Level	:	3 feet
Casing Diameter	:	12-inch
Screen Length	:	None (fractured rock bore hole)
Specific Capacity	:	N/A
Permitted Capacity	:	70 gpm

¹From "Public Water Supply Permit and Request for Pocono Manor Well #2 (P.W.S.I.D. #2450064)" dated April 29, 2002 by Austin James Associates, Inc.

Water Storage Tank

Prior to the development of Well No. 1 and the related water treatment system discussed in greater detail below, Pocono Manor installed a welded steel 200,000 gallon capacity water storage tank (standpipe) immediately adjacent to Well No. 1. The storage tank provides a constant pressure source to meet the system's domestic demands and also provides a 100,000 gallon storage volume dedicated to fire service. Fire service is available by means of a dry fire suppression system fed only on demand by fire pumps.

The existing 200,000 gallon water storage tank characteristics are summarized below:

Tank Height	:	72' - 0"	
Tank Base Elevation	:	1745 feet ⁽¹⁾	
Overflow Elevation (HWL)	:	1817 feet ⁽¹⁾	
Low Water Level (LWL)	:	1780 feet	
Normal Operating Range	:	20 feet	
Normal Tank Operating Levels			
	HWL	:	1817 feet
	LWL	:	1797 feet

⁽¹⁾ Elevations provided by surveyor

Since the overflow of the existing tank is approximately elevation 1817 feet, with a normal low water level approximating elevation 1800 feet, the existing hydraulic gradient (i.e., the hydraulic grade line or HGL) is adequate to serve structures with first floor elevations at approximately elevation 1750 feet and below without booster pumping.

Water Treatment

Water quality of the Pocono Manor wells is generally consistent with other groundwater sources in the area. It is characterized by relatively high levels of hardness, low pH and associated low alkalinity with moderate levels of iron and calcium.

The water supply sources in the region generally, consistent with the two existing Pocono Manor wells, are potable quality with minimal treatment, if any, required.

The existing Pocono Manor system provides disinfection (by means of sodium hypochlorite injection) as well as the addition of soda ash for reduction of scaling and corrosion potential.

Water Distribution System

The existing Pocono Manor Village relies on a public community water distribution system, primarily consisting of small diameter water mains for domestic supply to the

Manor Inn and Conference Center, the Manor Spa and to the residential units within the Village area.

Fire service is presently provided to the existing Manor Inn and Conference Center and to the Manor Spa. In addition, the distribution system includes fire hydrants throughout most of the Village.

PROJECTED DEMANDS

Water Conservation Program

As shown below, the domestic demands are projected to increase from the present 50,000 to 60,000 maximum monthly demand to an estimated 600,000 gpd, again on a maximum monthly basis. Those demands anticipate implementation of the proposed water conservation program in conjunction with future development of the property. The key elements of the Pocono Manor water conservation plan include maximum reuse, recycling and reclamation of water resources through use of high quality treated wastewater effluent for irrigation purposes throughout the development complex. That includes irrigation of the golf courses, landscaped areas as well as lawns for the individual villas and other residential units to be constructed in future development phases.

Necessarily then, the water conservation plan includes construction of a dual distribution system including a traditional potable water distribution system along with a non-potable distribution system for irrigation purposes.

Another element of the water conservation plan will draw water from the dual distribution system for non-potable plumbing fixture purposes within the casino complex and retail areas.

Overall, the water conservation program will substantially reduce reliance on potable groundwater supplies. Further, the recycling of treated effluent to service certain non-potable plumbing applications within the casino complex and retail areas is such that the projected water demands would actually be less than the projected wastewater flows. For planning purposes, however, the water demands projected herein are equal to the wastewater flow generation estimated in other sections of these appendices (See "Sewer Impact Analysis").

Domestic Demands

The following summarizes the projected water demands for domestic supply for future development of the Pocono Manor property, specifically, for Phase 1 and Phase 2 within Tobyhanna Township:

		<u>Phase 1</u>	<u>Phase 1 & Phase 2</u>
TOTAL AVERAGE DAILY DEMAND	GPD :	400,000	600,000
	GPM :	278	417
MAXIMUM DAILY DEMAND (@ 1.5 peaking factor)	GPD :	600,000	900,000
	GPM :	417	625
PEAK DAILY DEMAND (@ 3.0 peaking factor)	GPD :	1,200,000	1,800,000
	GPM :	833	1,250

The Phase 1 average daily demand of 400,000 gpd and the corresponding Phase 2 demand of 600,000 gpd will be met from on-site groundwater supply sources as described in greater detail below. The maximum daily demands and peak demands as well as fire service demands will be met from storage. As also described below, the proposed water storage tank will be designed to augment the flows available from well supply sources during high demand periods. In addition, fire demands will be satisfied from the two storage tanks which will retain dedicated fire storage volumes for that purpose.

Fire Flows

Fire service for the proposed development, notably, the casino hotel, casino gaming areas, entertainment areas as well as retail shopping Village, will be provided by internal fire suppression sprinkler systems. Those systems will be fed from the potable water distribution system. In addition, the complex will be served by exterior fire hydrants on the water distribution system with “needed fire flows” in accordance with AWWA Manual of Practice M31. While it is presently anticipated that the Villas will be sprinklered, internal fire suppression systems will be evaluated further as architectural plans are developed. In general, the fire flows will be determined in conjunction with fire code requirements for the various types of structures within the complex.

Preliminarily, fire flows for the Phase 1 and Phase 2 development are projected as follows:

	<u>Projected Fire Flows</u>
Fire Suppression Systems : (Building Sprinkler Systems)	1000 – 1500 gpm
On-site Distribution System : (External Fire Hydrants)	2500 gpm

Since fire protection will be provided for the Pocono Manor development, it must be in accordance with PADEP regulations. The system should be capable of providing the

greater of the required fire demand plus the required maximum daily residential demand, or the peak hour flows. In accordance with AWWA M-31 [*Manual of Water Supply Practices—Distribution System Requirements for Fire Protection*, ISO methodology-Table 1-5], preliminarily, the “needed fire flow” is estimated at 2500 gpm over a 2 hour fire duration:

Based on the above, for fire protection purposes, the corresponding water storage requirement for a 2500 gpm “needed fire flow” over a 2 hour duration (per AWWA M-31, Table 1-1) is as follows:

Needed Fire Flow	:	2500 gpm
Fire Duration	:	2 hours
Water Storage Volume (2500 gpm) (2 hours) (60 min./hour)	:	300,000 gallons

The proposed Pocono Manor water system, as described in detail below, will have more than adequate firm capacity to meet the demand/storage requirements for the proposed development in compliance with PADEP regulations, and the International Building Code including the recommendations of the fire underwriters under the National Fire Protection Association’s “Fire Protection Handbook”.

PROPOSED WATER SYSTEM

General

In order to meet the projected demands outlined in Section 4 above for the proposed Pocono Manor hotel/casino resort development, the existing Village water system will be expanded through a series of infrastructure improvements. Those improvements will be advanced consistent with the service levels necessary for each stage of the development and ultimately will provide a complete on-site system including water distribution mains (as noted above, including a dual distribution for non-potable water sources), a water storage tank, water supply groundwater wells and, as may be required, water treatment, notably, disinfection.

Proposed Pressure Zones

Topographically, the 3000 acre Pocono Manor property ranges from a high elevation along Bear Mountain in the southwest quadrant approximating 1940 feet to the lowest point in the site along Swiftwater Creek near State Route 314 in the northeast quadrant approximating elevation 1300 feet.

The proposed development, specifically, the initial development of Phase 1 and Phase 2 comprising the hotel/casino resort complex will be constructed in an area where the surface topography ranges from approximately 1760 feet to 1840 feet. Consequently, the first floor elevations for the primary structures of Phase 1 and Phase 2 are expected to be within that elevation range.

Existing 1817 Pressure Zone

Over the years, the existing Pocono Manor Village has been developed at elevations approximating 1700 to 1750 feet. As noted above, the existing 200,000 gallon water storage tank has an overflow elevation of 1817 feet which establishes the hydraulic gradient or pressure zone serving the existing Pocono Manor Village.

Proposed 1960 Pressure Zone

Proposed improvements to the existing water system will create a new pressure zone, preliminarily set at elevation 1960 feet, for the initial phases of the hotel/casino resort development within Tobyhanna Township, specifically, Phase 1 and Phase 2. In order to establish that pressure zone, a one million gallon prestressed concrete tank is proposed for a location at the high point along Bear Mountain immediately north of Sullivan Trail. With an overflow elevation of 1960 feet, the new pressure zone will be able to service structures with finish grade elevations approximating 1880 feet and below.

In order to create the new pressure zone at a gradient of 1960 feet, a booster pumping station drawing from the existing 200,000 gallon water storage tank (1817 HGL) will be constructed discharging to the new distribution system with a fill/draw line interconnected with the proposed one million gallon water storage tank. The new tank (1960 HGL) will float off the system to establish a constant pressure source for the areas within the 1960 gradient.

Proposed 2070 Booster Pressure Zone

In the future, as development progresses to the areas in the vicinity of the proposed 1.0 million gallon storage tank, a small booster pressure zone will be established at a gradient of 2070 feet.

The separate booster pressure zone will serve a small portion of the overall site, the limited areas with elevations greater than 1880 feet which comprise the area generally surrounding the proposed water storage tank site. The vast majority of the proposed development will be at elevations 1880 and below.

Groundwater Supply

As indicated above, there are presently two wells on site, Well No. 1 and Well No. 2, each rated at 70 gpm.

To meet the projected demands of the Phase 1 hotel/casino resort and those of the existing Pocono Manor Village, plans are underway to re-rate the capacity of Well No. 2 from 70 gpm to approximately 300 gpm consistent with the hydrogeological analysis conducted at the time the well was originally drilled. At a total supply capacity of 370 gpm or 532,800 gpd, the increased source capacity will be capable of serving the demands of the entire Phase 1 development along with most of the Phase 2 development demands.

In order to provide a backup supply, an additional well or series of wells will be drilled, developed and permitted to provide increased on-site groundwater well capacity of 300 gpm or 432,800 gpd. That will provide backup source capability for the primary supply with the largest well out of service.

Supplemental geological and hydrogeological investigations are currently underway to locate, develop, construct and permit a series of groundwater wells that will ultimately serve the site. It is expected that these wells will be drilled in various locations throughout the 3000 acre property, principally in areas that will balance the hydraulics of the onsite system allowing for equalized distribution of water supplies into the system from various locations throughout the site.

As the hydrogeological investigations proceed, additional groundwater resource locations will be identified and developed consistent with the staging of the development within Tobyhanna Township, specifically, Phase 1 and Phase 2, as well as for future development throughout the entire site as it is expanded into Pocono Township and Mount Pocono Borough.

Water Storage

As indicated above, a site has been identified at the highest point on Bear Mountain at an elevation approximating 1940 feet for a proposed water storage tank. That tank will have the following characteristics:

Tank Diameter	:	76' - 0"
Tank Height	:	30' - 0"
Base Elevation	:	1930 feet
Tank Type	:	Reservoir
Overflow Elevation (High Water Level)	:	1960 feet
Tank Capacity	:	1,017,982 gallons
Nominal Tank Size	:	1,000,000 gallons

The tank will be designed as a ground storage reservoir with a low profile, thereby minimizing its visibility and aesthetic impact. To further reduce the tank's visual impact, the base elevation has been preliminary established at 1930 feet, approximately 10 feet below surrounding surface grade allowing for the tank to be partially buried on the

upslope side. Given the tank's low profile, its partial burial and with appropriate landscaping, its visual impacts will be minimized.

Water Treatment

Since the hydrogeological investigations for additional groundwater supplies are currently underway, water quality data is not presently available for future groundwater sources. However, as indicated above, based on the existing well water quality characteristics on-site and in the region generally, it is anticipated that groundwater supplies within the Pocono Manor property will meet state and federal standards for community water systems and potable water supplies.

Based on current experience, it is expected that any new well sources will be disinfected and possibly treated for corrosion and scale inhibition.

From a review of water quality data throughout the area generally, further water treatment beyond that described above is not anticipated at this time.

Distribution System

As described above, the new pressure gradient will involve construction of a water storage tank, booster pumping station and will be interconnected with the existing 1817 pressure zone drawing off the existing 200,000 gallon tank within the Pocono Manor Village. As the new water system is developed to provide service to Phase 1 and Phase 2 within Tobyhanna Township, the water distribution and water transmission will be installed between the groundwater supply sources and the new one million gallon water storage tank. Preliminarily, a transmission main system comprising 12-inch diameter water mains will be built with distribution mains of 8-inch diameter extended throughout the site as construction is advanced for each stage of the project.

The water distribution network will be looped throughout the site to enhance the system's reliability under all demand conditions.

ALTERNATIVE WATER PROVIDERS

Pocono Manor plans to continue the expansion of its existing on-site water system to serve Phase 1 and Phase 2. At the same time, it has investigated other water sources in the area and has initiated discussions with two major water purveyors with systems in close proximity to the Pocono Manor site.

The Brodhead Creek Regional Authority is the largest water purveyor within Monroe County and serves the Borough of Stroudsburg, the majority of Stroud Township and an area of Smithfield Township as well. Most recently, water service has been extended along State Route 611 into Pocono Township as far north as Swiftwater at the intersection of Routes 611 and 314.

In addition to the Township of Pocono, Stroudsburg Borough, Stroud Township and Smithfield Township, the Brodhead Creek Regional Authority, municipal membership includes the Township of Hamilton.

The Brodhead Creek Regional Authority derives its water sources from two wells and a surface water intake, generally within the Brodhead Creek basin. Approximately half of the water originates from groundwater sources and the other half from a water intake within Brodhead Creek. The reported total system permitted capacity is 5.38 million gallons per day and the Authority further reports that it produces approximately 1.9 mgd to satisfy its customer demands.

Presently, the Brodhead Creek Regional Authority has a major water transmission main extension that it recently extended along State Route 611 into the Swiftwater area where it also has a two million gallon water storage tank. That line is within approximately one mile of the Pocono Manor site and, therefore, subject to development of appropriate agreements with the Brodhead Creek Regional Authority, Pocono Manor would have access to that water supply source.

In order to develop a connection to the Brodhead Creek Regional Authority system, a booster pumping station would be required in the Swiftwater area in order to increase system pressures from the Brodhead Creek Regional Authority pressure zone to the 1817 pressure zone within Pocono Manor.

The Aqua Pennsylvania Water Company is a major water purveyor serving over 800,000 customers throughout 13 states with more than 400,000 customers within its Pennsylvania service district. Aqua Pennsylvania, a publicly traded company, is a privately owned investor utility operating a number of water and sewerage systems throughout the State of Pennsylvania.

Aqua Pennsylvania officials have expressed interest in providing water service to the Pocono Manor development and have further expressed a willingness to provide this service should Pocono Manor elect to proceed in that manner.