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August 12, 2010

Laura Wildman, P.E., Director  
New England Regional Office  
Princeton Hydro  
20 Bayberry Road  
Glastonbury, CT 06033

Re: Cumberland MD  
Dam Removal Feasibility Project  
Pumping Station Alternatives

Dear Laura:

As requested, G.P.M. Associates Inc. (“GAI”) has looked into the affect the removal of the dam owned by the US Army Corps of Engineers (“Corps”) on the Potomac River in Cumberland, Maryland (“Corps Dam”) would have on the availability of appropriate water capacity for the C&O Canal Rewatering Project (“Canal Project”). This is a letter report on our preliminary findings to date.

GAI has examined the July 2005 Corps Design Documentation Report – Units 1 & 2 for the Canal Project. In addition, GAI has examined the design drawings for the existing pumping station for the Canal Project. GAI has, also, had telephone and e-mail correspondence with the National Park Service that operates the Canal Project.

Currently, Unit 1 of the Canal Project has been completed. Unit 1 rewatered approximately one quarter mile of the C&O Canal. The planned Unit 2 construction will extend the rewatered canal to a length of approximately 1.2 miles of the original canal. The existing pumping station was designed and constructed to meet the rewatering requirements of the combined Unit 1 and Unit 2 project.

The Corps Dam provides a reservoir out of which water is pumped, via the pumping station, for the Canal Project. This pumping station was designed to allow for flowing water in the full 1.2 mile portion of the canal once Unit 2 is completed. Currently, the required water for rewatering the canal is only needed as makeup water for water lost out of the canal. The full pumping capacity for Unit 2 that is required is 8 cubic feet per second (“CFS”) or approximately 3,600 gallons per minute (“GPM”).

There is an intake screen structure located in the reservoir formed by the Corps Dam with the centerline shown at an elevation of 606.25 feet MSL. Water flows by gravity through a 24-inch water line through a sluice gate to the wet well portion of the pumping station. Two 75 HP submersible pumps pump water through two 10-inch discharge pipes, across a pedestrian bridge,

to the canal turning basin. A float switch cluster is located near the canal in a stilling structure that controls the pumps by allowing them to come on and off at various water levels.

If the dam is removed, the water level in the Potomac River at the location of the screens will fall below the current screen location. This water level will fall to a level where it would not be possible for the flow of water to the pumping station's wet well to continue to be by gravity, even if the screens were relocated so that they were submerged in the stream bed. Therefore, modifications to the pumping station would have to be made in order to maintain the Canal Project if the Corps Dam were to be removed.

The following possibilities should be examined further to determine the best way to maintain the capability to provide the needed water supply to the Canal Project if the dam is removed:

1. The intake screen would have to be relocated. There are three likely places where to install the relocated screen:
  - a. In what may be a naturally occurring scour pit in the bedrock nearby the screen location.
  - b. In a new slip stream to be constructed to the side of the river that would provide for the necessary depth to cover the intake screen.
  - c. Construct a small dam in the stream bed (or a portion of it) that would allow for the necessary depth to cover the intake screen.
2. Since the water will not flow by gravity any more, the existing 24 inch inlet pipe line would be used as a suction pipe (or a smaller pipe inserted through this pipe if the 24 inch pipe is determined to be unsuitable).
3. The existing submersible pumps would have to be removed from the pumping station and replaced with two new pumps that would be self priming pumps that would lift the water through the suction pipe to the pumps. Approximately 5 – 7 feet of lift would be required, including headloss through the suction pipe. These pumps would then be connected to the existing 10 inch discharge pipes that go to the canal.

The existing electrical supply for the existing submersible pumps should be sufficient to power the new pumps, however, this will need to be investigated during the design phase due to the loss in suction head due to the lowering of the water in the river. If necessary, motor starters, breakers or the service size may have to be changed if a higher horsepower is needed.

There may be required changes at the pumping station structure to allow for the new pumps with a suction lift to be installed, operated and maintained.

The existing screen cleaning system would be utilized for the relocated screens, with any additional tubing installed for the air scouring system.

One possibility to consider would be to utilize much smaller pumps initially since water is not currently needed to provide flow in the canal and is only used to provide makeup water. When the Unit 2 portion of the Canal Project is constructed, the pump size could be changed to provide the required flow for the full Canal Project. This would allow for any changes in the design of the full Canal Project to be taken into consideration in sizing the appropriate pumping equipment. Also, the provision of a storage tank near the canal could be investigated rather than providing the full required water from the pumping station to provide flow in the canal. This could allow for much smaller pumping equipment to be utilized even when the Unit 2 construction is completed, but, obviously, a site for the storage tank would need to be found and the cost of its construction, versus the larger pumping system, would need to be evaluated.

Until the design phase of the dam removal project is underway, it is difficult to estimate the cost of providing the new pumping equipment and changes to the piping and pumping station structure (if necessary). Based on GAI's experience with pumping stations and river intake structures, it is GAI's estimate that the cost of providing the required changes to allow for the full pumping rate would range between \$200,000 and \$500,000 at today's costs.

David Monie looks forward to attending the public meeting on August 16<sup>th</sup> to answer any questions on this report.

Very truly yours,

G.P.M. ASSOCIATES INC.



David R. Monie, P.E.  
President

cc: Geoffrey Goll, P.E.