

## Memorandum

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Date: 12/8/2021

AG Job No.: 10-118

To: Scott Grosscup

From: Craig Ullmann

**RE: Lake Avery Enlargement – Next Steps**

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As you know our past work on a potential Lake Avery Enlargement has focused on the volume of water that could potentially be stored at the site without normal storage levels impacting the Livingston Property to the north. It is our understanding that the Yellow Jacket Water Conservancy District (YJWCD) is interested in further evaluation of this option. The purpose of this memo is to provide a high level outline of the steps necessary to further investigate this site. Since this structure is currently owned by CPW, we assume there will be ongoing coordination and interaction with their staff which is not specifically discussed below.

### **Task 1: Dam Breach and Flood Hydrology Analysis**

The existing Hydrology study for Lake Avery was completed by Boyle Engineering in 1992. In this study the dam was assumed to be a high hazard dam and the regulations at that time required the spillway to pass 75% of the Probable Maximum Precipitation event. In 2020 the Colorado Dam Safety Branch published new guidelines and criteria for the construction and modification of embankment dams in the State of Colorado. These regulations introduced the new concept of Hydrologic Hazard classification which is separate from the existing Hazard Classification. This analysis factors in the population at risk during a dam failure and the hydraulic parameters of a dam breach event below the dam in order to estimate to potential loss of life from a risk-based perspective. Based on this analysis the Hydrologic Hazard for the structure will be classified as Extreme, High, Significant, and Low depending on the potential loss of life from an overtopping dam failure of the dam. This classification will determine the required spillway capacity for the structure. While the embankment dam is classified as a High Hazard dam, Lake Avery could potentially fall under either a High or Extreme Hydrologic Hazard.

#### *Preliminary Dam Breach Analysis*

An initial analysis of a dam breach would be performed using estimated dam breach values and an existing online tool offered by FEMA called DSS-WISE. This analysis would calculate the necessary parameters to estimate the population at risk, fatality rate, and thus potential loss of life. Using this information the likely Hydrologic Hazard could be estimated. A cursory analysis of the number of homes downstream of the dam indicates that the structure will likely fall into the Extreme category but since this has dramatic impacts on the spillway design we feel an initial analysis is warranted to verify this assumption prior to performing a Hydrology analysis.

### *Opinion of Probable Cost*

Concept drawings would be used to estimate the quantities and construction costs associated with any improvements. These cost estimates could be used by YJWCD to strategize potential project funding for the two identified options. Costs would include construction as well as design and permitting costs.

### **Task 3 – Financial Planning & Funding**

Following the feasibility study and generation of the opinion of probable cost, the next step should involve the financial planning of the selected option. Funding for this type of multiple benefit project could include many sources such as Colorado Water Plan Grants, CWCB low interest loan, WSRF Grant, and grants through non-profit groups whose interests and goals would be supported by the construction of the additional storage.

### **Task 4: Field Data Gathering**

If the project continues to be pursued following the completion of the tasks above the project would then move into data gathering phase to collect necessary data needed for final design.

#### *Geotechnical Data*

Additional geotechnical information will likely be needed prior to final design, however, the scope will be determined by the work performed in task 2 following a detailed review of existing information. Given that any existing information on the structure was collected over 50 years ago and Dam Safety regulation have evolved since that time, additional geotechnical exploration is highly likely.

#### *Survey*

A topographic survey of the existing dam and surrounding area will be needed. This will include any existing infrastructure, property lines, existing utilities, and other pertinent information. A bathymetric survey would also likely be needed to generate an accurate stage-storage curve for the reservoir. This information would also allow CPW to estimate how much storage may have been lost due to sedimentation since the reservoir was constructed.

#### *Wetlands*

As mentioned above, enlargement of this reservoir will require permitting through the Army Corps of Engineers due to its on-channel location. A wetlands specialist would survey any existing wetlands that would be impacted at the site and what the likely permitting path and mitigation requirements would be.

### **Task 5: Final Design & Permitting**

Following the collection of all necessary field data the project design could begin. This would involve preparation of detailed construction drawings and specifications for the project as well as