



Rcd 4-7-25

April 4, 2025
Project No. 2302435

VIA EMAIL: citymanager@cityofwhitecloud.org

April Storms
City Manager
City of White Cloud
12 North Charles Street
White Cloud, Michigan 49349

Re: **White Cloud Dam Recommendation Letter**
White Cloud, Michigan

Dear Ms. Storms:

Based on our discussion with you on Thursday March 20th, we are providing this formal recommendation letter to accompany the White Cloud Dam Feasibility Study delivered to you on February 17, 2025. Given the identified deficiencies at the dam and the elevated risk of dam failure, GEI recommends the City pursue an immediate drawdown of the impoundment to the extent practicable. This drawdown will need to be implemented in coordination with Michigan Department of Environment, Great Lakes, and Energy (EGLE) Dam Safety unit, and following receipt of a permit from EGLE.

Existing Condition of the Dam

The White Cloud Dam is classified as a high hazard potential dam. Dams with a high hazard potential are those where a failure or mis-operation could result in expected loss of life and severe impacts. As of May 25, 2022 the White Cloud Dam was determined to be in poor condition by the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Dam Safety unit. A poor condition rating means a dam safety deficiency is recognized for loading conditions that may realistically occur. Remedial action or further investigations and studies are necessary to determine risk.

GEI completed a comprehensive review of existing information associated with the dam including review of previous dam safety inspections, available as-built drawings, and a site visit to the dam. Our team also completed geotechnical and structural field investigations and subsequent analysis, and a hydrology and hydraulic analysis of the existing structure.

Through these reviews and engineering analyses the following observations and deficiencies have been identified and have been categorized as follows.

- **Dam Safety:** Ensuring dams are constructed, operated, and maintained in a manner that protects people and property from the risk of failure.

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- Public Safety: Protection of people and their property from harm.
- Operations: Activities involved in maintaining and protecting a dam and the area of affects.
- Maintenance: Regular work performed to keep dam safe and functioning.

Category	Observation/Deficiency
Dam Safety	Insufficient hydraulic capacity to pass the 200-year design flood.
	Dam modifications required to modify parapet wall to span gap of protection at current boat launch.
	Insufficient global factor of safety of right earthen embankment.
	Seepage at downstream toe of right earthen embankment.
	Tailwater erosion at downstream right earthen embankment.
	Concrete deficiencies located throughout the principal spillway.
	Primary spillway intake global stability – overturning, does not meet current industry standards for factors of safety or resultant location.
	Primary spillway intake and chute concrete structural elements do not meet current industry standards for factor of safety (demand to capacity ratios).
	Structural stability concern associated with severe deterioration of beams supporting the existing bridge over the primary spillway.
Public Safety	Install signage and floating barriers (booms) upstream of the spillways to warn and redirect swimmers and boats away from the spillway hazards.
	Deteriorating fencing and guardrail embedment along roadway shoulder and adjacent to primary spillway chute.
	Install fencing at auxiliary spillway crossing.
Operation	Remove sandbagging as part of the EAP.
	Update O&M Plan with results of H&H Analysis regarding stoplog operation to prevent overtopping.
	Trash rack in auxiliary spillway not in use.
	Install staff gauge to monitor and record impoundment levels.
Maintenance	Rotation of flood wall at left embankment with possible upstream toe erosion.
	Fill and armor eroded area at auxiliary spillway left downstream wall.
	Remove vegetation from embankments.
	Cracking in pavement along crest of dam.
	Deterioration of RCC overtopping section on downstream left embankment.
	Minor concrete deficiencies at the auxiliary spillway walls.
	Deteriorating steel bracing across primary spillway chute to be removed.
	Minor concrete repair to traffic barrier over auxiliary spillway.
	Inadequate riprap along waterline of upstream slopes.

The dam safety deficiencies are of biggest concern as they pose the greatest risk to the City of White Cloud and downstream people, environment, property, and infrastructure.

The lack of sufficient hydraulic capacity means that if a large flood event occurs, the existing dam structure does not have the ability to pass enough flow to prevent the impoundment from filling and overtopping the dam in an uncontrolled manner. This could lead to dam failure during a flood and significant impacts downstream of the dam, including potential loss of life.

The gap in the parapet wall, the short concrete wall that runs nearly the entire length of dam, requires City of White Cloud staff to place sand bags in order to prevent uncontrolled overtopping during large

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flood events. Given the dam's inability to pass large flood flows, this gap in the wall is a significant risk to uncontrolled overtopping and potential dam failure.

The seepage visually observed on the right earthen embankment indicates there is saturated conditions in the earthen embankment under normal impoundment water surface elevations. Increased water surface elevations in the impoundment may increase flow through the earthen embankment and this could cause a dam failure.

The low global factor of safety of the right earthen embankment and stability concerns associated with the primary spillway and bridge over the primary spillway indicate these features of the White Cloud Dam are at risk of failure as they do not meet current industry standards during normal conditions or during flood events. If any one of these were to fail, this could cause a dam failure.

Based on the severity and risk associated with the deficiencies above, GEI recommends that immediate actions be taken to reduce the risk of dam failure to the extent practicable.

Immediate Recommendations

The dam safety deficiencies of greatest immediate concern are the lack of sufficient hydraulic capacity and the seepage and insufficient global factor of safety at the right earthen dam embankment. A drawdown of the impoundment is recommended to lower the risk associated with these deficiencies. The water level within the impoundment should be lowered to the maximum extent possible by removing all stop logs from both the primary and auxiliary spillways.

Before a drawdown is completed, the City needs to submit a Joint Permit Application through the MiEnviro Portal here: <https://www.michigan.gov/egle/maps-data/mienviroportal>

What will a drawdown look like

The recommended drawdown will lower the normal water surface elevation in the impoundment approximately 6-7 feet during normal flows, like what was seen in late August/early September 2024. The approximate limits of the new impoundment during normal flow are depicted in Figure 1 below.

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Figure 1. Approximate limits of White Cloud impoundment after drawdown during normal flow.



The drawdown will expose impounded sediment, primarily in the upper impoundment area and edges of the current impoundment, and in the near term following the drawdown there will be bare soil exposed. The native seed bank held within the soils will fairly quickly (2-3 weeks) germinate and green vegetation will establish (2-3 months), similar to Figure 2.

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Figure 2. Pigeon River cuts a channel through the muck where there once was an eight-foot-deep impoundment behind the dam. (Photo Credit: Howard Meyerson)



Source: (<https://howardmeyerson.com/2014/09/30/golden-lotus-dam-permanent-draw-down-complete-removal-to-come/>)

Long Term Recommendations

The White Cloud Dam has significant dam safety deficiencies which should be addressed through rehabilitation of the dam or dam removal. The City of White Cloud needs to decide which alternative presented in the feasibility study they wish to pursue and then seek funding sources (e.g. grant funds, special assessment district, taxes, etc) to fund the selected alternative including engineering design, permitting, and construction costs.

Summary

Given the identified deficiencies at the dam and the elevated risk of dam failure, GEI recommends the City pursue an immediate drawdown of the impoundment. This drawdown will need to be implemented in coordination with the EGLE Dam Safety unit and following receipt of a permit from EGLE.

We are also aware that the City received a response from EGLE regarding the feasibility study on April 1, 2025. In this letter EGLE ordered the following corrective actions to address the White Cloud Dam deficiencies:

1. Develop a high-level plan and schedule to address the deficiencies at the dam. Due May 1, 2025.
2. Finalize a plan for interim risk reduction measures. Due June 2, 2025.
3. Finalize a plan for long-term remedial action including a repair or removal plan, or a proposal for an alternative dam modification project. Due November 3, 2025.

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The immediate drawdown of the impoundment recommended by GEI addresses the second requirement. GEI can assist you with the first and third requirements as well as the permitting for drawdown of the impoundment through a new contract, scope of work, and fee.

If you have any questions or would like to discuss continued services with GEI, please feel free to contact me at 734-680-1612 or jmcdermott@geiconsultants.com.

Sincerely,

GEI CONSULTANTS OF MICHIGAN, P.C.



Janeen McDermott, P.E.
Senior Water Resources Engineer



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Senior Project Manager

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