

Four Lakes Task Force Responds to Independent Forensic Team Report



Since the release of the [interim Independent Forensic Team \(IFT\) report](#), Four Lakes Task Force and its consulting engineers have conducted their review of the report to get a better understanding of how the team formed its conclusions. In addition, we are nearing the 60% design phase of Secord and Smallwood and have major stabilization construction ongoing on Edenville to better inform ourselves on the condition of the dams.

Potential primary failure mechanisms considered for the failure of Edenville Dam were grouped by IFT and reflect the following general categories:

- Embankment overtopping
- Internal erosion of the embankment or foundation
- Embankment instability

For Edenville Dam, in IFT's opinion:

- The Edenville Dam embankment did not overtop
- The internal erosion may have contributed to the depression in the crest that was observed about 35 minutes before the failure, but it does not explain the primary physics of the failure
- The Edenville Dam failure is consistent with a static liquefaction failure of loose, saturated sands in the downstream section of the dam which led to embankment instability. Static liquefaction is a phenomenon in which saturated, loose sand tends to lose strength and collapse rapidly under sustained (static) shear loading, generating high pore water pressure in the soil mass and very low strength. The stress-strain behavior is brittle, and the low residual strength is much lower than the static shear stresses, creating a large force imbalance, acceleration and velocity, and flow of the soil mass

For Sanford Dam, IFT stated:

- "The physics of the Sanford Dam failure are very clear. The failure was the result of embankment overtopping. The breach outflows from Wixom Lake after the failure of Edenville Dam caused the water in Sanford Lake to rise more quickly than could be accommodated by the spillways at Sanford.

Resources for More Information

The full IFT interim report is in the [FLTF document library](#).

For those who want a better understanding of why the Edenville Dam failed, you may review a [15-minute video](#), which provides a detailed description of the failure. The video was created by Practical Engineer, which produces a YouTube channel about infrastructure.

Our engineering consultants reviewed the video and feel it provides a good overview of the concepts being discussed in the Interim Report.

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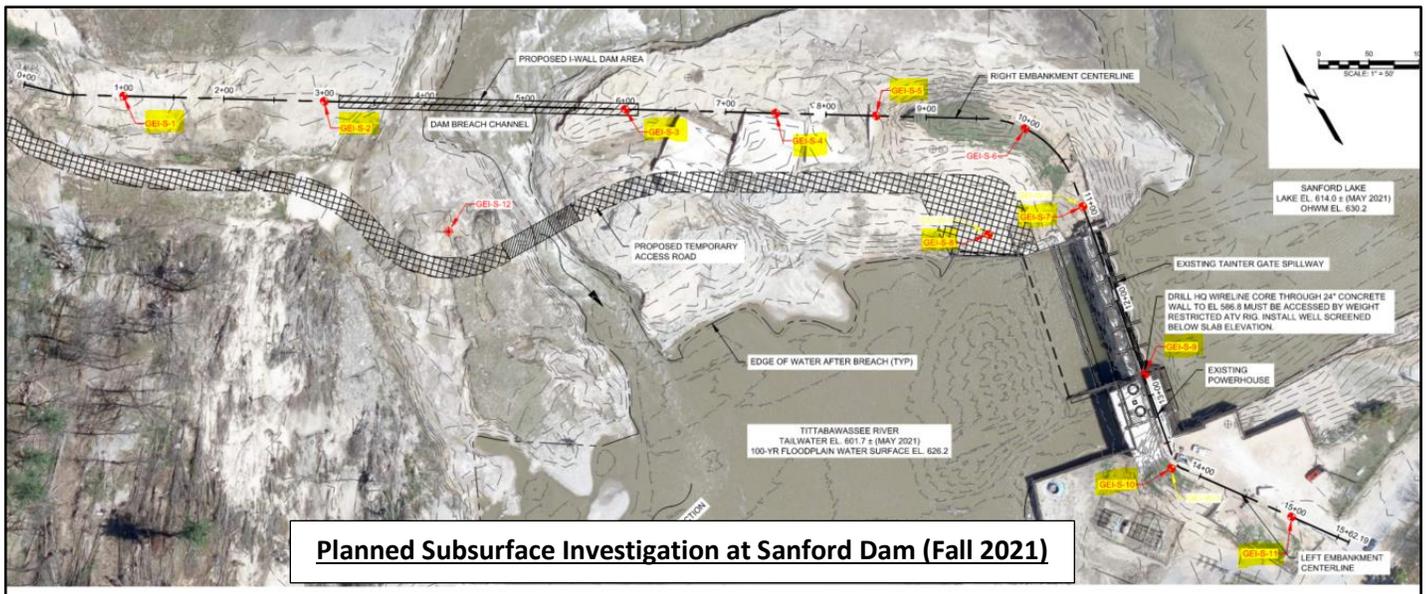
Dam. Based on eyewitness accounts, videos, and photos about 105 minutes after the initial failure of Edenville Dam, the water in Sanford Lake rose to the crest of the fuse plug spillway. As the reservoir continued to rise, the fuse plug eroded, but the additional discharge capacity provided by the eroding fuse plug spillway was not sufficient to prevent the lake level from exceeding the embankment dam crest elevation, which occurred at a little more than 2 hours after the failure of Edenville Dam. As water flowed over the Sanford embankment crest and down the downstream slope, the embankment eroded, creating a breach of the embankment.”

The Path Forward

The overall design for the four dams as presented to the community in our [Restoration Path Forward](#) published in May 2021 is continuing. We have conducted subsurface exploration work at Smallwood and Secord dams. This looks at both the integrity of the soil and the strength as a foundation for the dams. The next phase is to perform similar work on Edenville and Sanford. Edenville has significant subsurface work to start yet this year, given the size and lengths of the remaining concrete dams and earth fill embankments. The following exhibits illustrate the drill rig used to perform the borings at Secord Dam in Spring 2021 and the planned boring locations at Sanford Dam in Fall 2021.



Subsurface Investigation at Secord Dam



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What Does This Mean for the Restoration of the Dams?

- 1) We must consider and satisfactorily address all failure modes that can be contemplated during Potential Failure Modes analysis meeting which will be done after 60% design and again with the contractor before construction to improve dam safety.
- 2) The designs that are being brought forward at 30% design, and near 60%, will consider the IFT reports and other data factors we are observing through our studies and engineering.
- 3) We will likely invest in an additional study and remain conservative in our design basis criteria in spillway and embankment design. The amount of \$215 million for restoration of all Four Lakes and dams is still the planning number for construction, with an overall project cost of \$250 million. It is unlikely this number will be lower in the next phase of estimates. It is yet to be determined whether conducting this additional study will impact the timelines.