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**FOUR LAKES TASK FORCE**

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**Four Lakes  
Lake Level Restoration Project  
Gladwin and Midland Counties**

**2020 – 2025 Creation of a Path Forward**

***A Community's Response to the 2020  
Edenville Dam Failure***

OCTOBER 2025



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# Chapter 1: Executive Summary

## 1a. Introduction

Four Lakes Task Force (FLTF) published its position on recovery and restoration on June 19, 2020. It then published its initial Recovery and Restoration Plans in September of 2020. In May 2021, a year after the dam failures, FLTF published a comprehensive feasibility study and restoration plan. The conclusion of the May 2021 study was that the best and only path forward was to restore and repair the dams to protect and preserve property values and the ecosystems of the lakes.

This report is the final update to the May 2021 Feasibility Study and Restoration Plan, with the experiences and learnings of the past four years to be fully permitted and funded. Moving forward, reporting will focus on dam and lake restoration, lake refill, and environmental and recreational progress. This is a large and comprehensive public works project, and this report frames FLTF's and the community's accomplishments over the past five years that led to permitting, financing and implementation of the 2021 plan. A final report on implementation will be published when construction concludes on all four dams and the four lakes are filled.

## 1b. Background

On May 19, 2020, after days of steady rain, Edenville Dam in Gladwin County, Michigan, failed. The resulting surge overwhelmed Sanford Dam in Midland County, causing it to fail. The upstream Secord and Smallwood dams were also damaged by the flood, and the Federal Energy Regulatory Commission (FERC) ordered the private dam owner, Boyce Hydro Power (Boyce), to lower both lakes for the inspection and repair of the two dams. Ten thousand people evacuated from their dwellings, the area was declared a national disaster by the President of the United States, and the community was left with extensive economic, environmental and property damage.

More than five years have passed since the dam failures. Four Lakes Task Force secured engineering designs and construction contracts to repair, improve and restore all four dams, as well as over \$200 million dollars to assist with recovery (following the dam failures) and restoration (design and repairs of the dams and lake levels).



In February 2024, Gladwin and Midland counties approved the financing plan along with a lake level capital improvement special assessment roll. The final phase of restoration was delayed as FLTF and Midland and Gladwin counties worked to resolve an appeal of the lake level special assessment rolls, and two federal lawsuits filed by Heron Cove Association (HCA). The delay impacted the cost and timing of the project. However, with the Midland Circuit Court and Michigan Court of Appeals affirming the Four Lakes Special Assessment, and the U.S. Circuit Court dismissing the lawsuits, financing proceeded, and project construction resumed on all four dams by July of 2025.



## 1c. Two Key Takeaways of this Report

**The best alternative for Midland and Gladwin counties was to repair and restore the dams** (the “Lake Level Project” or “Project”). The lake levels and special assessment district were established in May 2019 pursuant to Part 307 of Michigan’s Natural Resources and Environmental Protection Act (Part 307). The Counties had a legal obligation to return the Four Lakes to their legally established lake levels. Surveys conducted by FLTF showed that property owners were overwhelmingly in favor of rebuilding and restoring the dams to restore the lakes.<sup>1</sup> Pursuant to Part 307, normal lake levels is legally defined as: “...that best protect public health, safety and welfare; that best preserve the natural resources of the state; and *that best preserve and protect the value of property around the lakes.*”<sup>2</sup> Without the lakes, properties on the lakes would lose value. The best and only alternative was to restore the Four Lakes – a plan that EGLE leadership supported.<sup>3</sup>

**The lake level restoration plan is permitted and underway, along with an approved financing plan.** The total project cost is \$398,875,000 which includes \$34,584,150 in contingency. The State of Michigan provided \$220.5 million towards recovery, design and restoration, of which \$180 million was allocated to design and construction of the final phase of restoration. The remaining \$217.7 million is necessary to finance the final phase of restoration and is being assessed to properties within the Four Lakes Special Assessment District. The lake level special assessment revenue was necessary to enable the issuance of municipal bonds to complete the project. FLTF continues to seek grants to lower cost burdens.

## 1d. Alternative Analysis: “Doing Nothing” was Not an Option

The four dams continue to be regulated as high hazard dams, existing in the floodplain, even after the Edenville failure. The dams either needed to be restored or removed.

**To do nothing** implied that the dams could remain in their post-failure interim stabilized condition. By not maintaining the legal lake levels there would have been no clear understanding of who would maintain the dams, and who would fund the maintenance or regulate upgrades of the dams. Also, significant instability and environmental degradation would have continued and therefore needed to be mitigated within the lake basins. Along with long-term economic damage, home values would have certainly decreased while the final state of the dams was resolved.

**Any alternative that involved removing the dams** would have significantly altered and changed the Four Lakes system that has been in existence for the last 100 years. There was no clear legal path to do this, and it would have taken years to determine how this decision would be made. Moreover, there was no entity, government or otherwise, identified to administer, finance or undertake the decommissioning and removal of the existing dam structures. Using estimates from the 2021 study<sup>4</sup> and adjusting for inflation, this alternative would have likely cost as much as restoration of the dams.

**Restoration of the four hydroelectric facilities was not financially feasible.**<sup>5</sup> The hydroelectric facilities were marginally economic before the May 2020 failures. Prior to the dam failures, the hydroelectric facilities required significant capital investment. Any capital investment would have needed to be recovered over time. The cost of restoring hydroelectric capability, hydroelectric licensing and power sale agreement structures that exist today make hydropower financially impractical.

<sup>1</sup> See PSC 2022 “Four Lakes Survey Report” the Chapter 1 Appendix.

<sup>2</sup> Michigan Legislature MCL 451 1994 Inland Waters Part 307.

<sup>3</sup> In a letter dated June 29, 2021, EGLE Director Liesl Clark thanked FLTF for its cooperative engagement with the Agency and affirmed its support of FLTF’s path forward. Read the letter in the Chapter 1 Appendix.

<sup>4</sup> See “Decommissioning Report for Secord, Smallwood, Edenville and Sanford dams” by The Essex Partnership in the Chapter 1 Appendix.

<sup>5</sup> See “Desktop Study – Restoration of Hydroelectric Generation at Secord, Smallwood, Edenville and Sanford Dams” by The Essex Partnership in the Chapter 1 Appendix.



**The dams are not designed for flood control nor were they prior to the failures.** It is well-documented these dams were not constructed as “flood control dams.” ***The regulatory focus has been on ensuring that design, construction and operation of the dams do not contribute to downstream flooding or pose an intolerable risk to public safety.***

To put it succinctly, reservoir capacity makes it impossible for any of the dams and their respective embankments to provide adequate downstream flood control. There were also no sources of revenue or grants for this purpose. This issue is addressed in more detail in [Chapter 4](#) of this report.



## Chapter 2: Introduction and Background

### 2a. Pre-Dam Failure Background

Secord, Smallwood, Wixom and Sanford lakes (Four Lakes) are in Midland and Gladwin counties in central Michigan and were created by the impoundment of the Tittabawassee and Tobacco rivers by four hydroelectric dams. Prior to December 2020 the dams and the bottomlands of the lakes were privately owned. Secord, Smallwood, Edenville (for Wixom Lake) and Sanford hydroelectric dams were in place for nearly 100 years and became regulated by the Federal Energy Regulatory Commission (FERC) in the 1976 to late 1990 period. In early 2018, after years of regulatory non-compliance issues, including lack of spillway capacity, FERC proposed revoking the hydropower license on Edenville, and did so in September of 2018. In fact, all four dams faced regulatory compliance and spillway capacity issues.

In addition to producing hydroelectricity, over the last 100 years residential and commercial development around all Four Lakes created an important recreational resource. Looking for a solution to ensure the long-term viability of the Four Lakes, in 2018, representatives from the lake associations began the process of transitioning the four hydroelectric dams and bottomlands from private ownership to public ownership. The counties of Midland and Gladwin established a citizen task force to explore the process of acquiring, financing and managing the dams and lake levels per Part 307 “Inland Lake Levels” of the Michigan Natural Resources and Environmental Protection Act (Part 307).

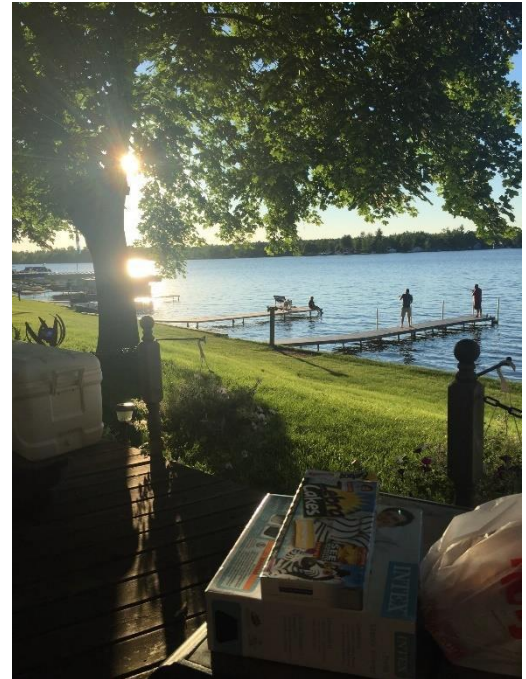
In 2019, following the completion of a lake level study, the counties filed a petition in Midland County Circuit Court pursuant to Part 307 requesting the Court establish normal (legal) levels for all Four Lakes and establish a special assessment district to defray the costs related to maintenance of the lake levels.

Following notice and hearing, in May 2019 Midland County Circuit Court (Hon. Judge Stephan Carras) approved and issued a Lake Level Order that established normal or legal lake levels for each of the Four Lakes and established the Four Lakes Special Assessment District (FLSAD). The Board of Commissioners from Gladwin and Midland counties appointed Four Lakes Task Force (FLTF), as the Counties’ Delegated Authority (per Part 307) to acquire, repair and then operate the four dams. FLTF is a 501(c)(3) non-profit organization dedicated to lessening the burdens of government. It is comprised of property owners within the FLSAD who represent each of the Four Lakes.

Following the approval of the Lake Level order, in December 2019, FLTF and Boyce Hydro Power (the dam owner) entered into a purchase agreement for the acquisition of the dams and flowage rights. In anticipation of the acquisition, FLTF began its due diligence required for the purchase, which included evaluating facilities, equipment and property.

On May 19, 2020, before making the first installment and option payment in June 2020, the embankment on Wixom Lake (Edenville Dam) failed, resulting in a surge of floodwaters causing the dam at Sanford Lake to fail; the upstream dams were also damaged and FERC ordered Secord and Smallwood dams to be lowered for inspection and repair.

Catastrophic flooding occurred throughout the region, destroying and damaging homes and businesses. The purchase of the dams did not go forward.

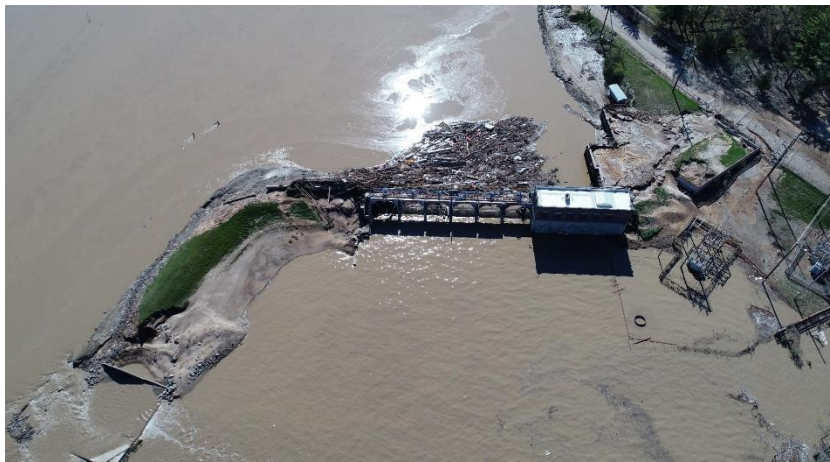




## 2b. Post-Failure Recovery

Following the 2020 dam failures, FLTF immediately went to work to address damage to the Four Lakes system. The State of Michigan, counties, local municipalities and most importantly, the Four Lakes community looked to FLTF to address immediate emergency concerns including dam stabilization, shoreline erosion, restoration and debris removal. Because the dams and bottomlands were privately owned, the first step was to acquire dam and bottomland properties and coordinate funding with federal and state agencies. To this end, the boards of commissioners for Midland and Gladwin appointed FLTF to coordinate the acquisition of the Boyce Hydro Properties (via condemnation), and address debris removal, shoreline restoration, dam stabilization, and acquisition of funding to restore the Four Lakes. FLTF became a sponsor for matching grants with the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS).

FLTF acted as the counties' agent in the Boyce Hydro bankruptcy, and with a settlement, in December 2020, the dams and bottomlands were acquired from Boyce Hydro by Midland and Gladwin counties which allowed recovery to begin. Following the volunteer surrender of the remaining FERC licenses, regulatory



authority over the dams defaulted to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) – Dam Safety Unit.<sup>6</sup>

The recovery phase on all four lakes included stabilization of over 10,000 feet of shoreline and removal of a vast quantity of debris. All four dam structures underwent extensive stabilization projects allowing the dams to safely pass moderate flows in the interim period.

The restoration phase is now underway. Design engineering and

permitting are complete and all four dams are under construction.

In addition, FLTF has completed numerous studies and surveys, and received 84 EGLE and Soil Erosion and Sedimentation Control Program (SESC)<sup>7</sup> permits to get to the point of beginning construction.

Since the May 2020 dam failures, the State of Michigan has granted \$220.5 million through appropriations to assist in the recovery and restoration of the Four Lakes system. With federal funds and private donations, FLTF has received donations totaling approximately \$247 million.

Recovery costs included debris removal, shoreline erosion and culvert and dam stabilization. Pre-construction restoration included bankruptcy and condemnation settlement and legal fees, environmental and flood studies, and design engineering and permitting for all four dams. Pre-construction was approximately \$60 million, paid for by state grants, federal funds and private donations. To administer, operate and maintain the dams, an Operation and Maintenance Special Assessment was levied for years 2022-2024 and 2025-2029.

<sup>6</sup> On June 30, 2021, EGLE acknowledged Midland and Gladwin counties as the dam owners and that regulation of the dams now falls under Part 307 and Part 315 of the Natural Resources and Environmental Protection Act. Read the letter in the Chapter 2 Appendix.

<sup>7</sup> The total number of permits are split between the EGLE Joint Permits and the SESC permits issued by EGLE and the counties. Permits still in process/under review are not included in this total number.



Before and after erosion mitigation on Anderson Drive as part of the Natural Resources Conservation Service Emergency Watershed Protection program conducted after the flood.



## Chapter 3: Future Use and Function of the Lakes

The primary purpose when the dams were constructed nearly a century ago was to impound water for the purpose of hydroelectric power generation. At that time, the adjacent properties had deeded access to the Four Lakes for recreational purposes. The impoundment of the Tittabawassee and Tobacco rivers created a rich and diverse ecosystem. Homes and cottages were constructed, and businesses sprang up to meet the needs of boaters and anglers, and communities formed around the lakes.



Figure 1: Tobacco Dam. Photo taken May 31, 1924.

Over many decades the value of hydropower generation diminished to the point where continued operation was no longer economically viable, the environmental, societal and economic functions of the lakes continued to thrive. The lakes became an integral part of the communities and were a vital part of their economy. More than 8,400 properties, nine townships, a village, two counties and the State of Michigan directly benefit from the maintenance of lake levels created by dams on each lake.

The counties recognized this and created the Four Lakes Special Assessment District (FLSAD) as the primary source

of funding to maintain the legal lake levels and preserve property values around the lakes. The lakes, once restored, will have a new primary purpose to support property values, valuable ecosystems and recreational opportunities, and contribute to the quality of life and economic vitality of the region.

### 3a. Economic Impact

The Edenville and Sanford dam failures, and the Federal Energy Regulatory Commission (FERC)-ordered drawdown of the Secord and Smallwood impoundments, severely challenged the purpose and benefits of the lakes. Boating, water sports and angling were no longer possible and premium lakefront property overlooked a dry lake bottom with many areas at risk of erosion due to unstable exposed sediment. Additionally, the lowered water level increased the cutting of embankments.

The lakes also benefited the local economy and brought in additional money through tourism, increased home values and annual property tax revenue. The Sanford Lake Association and Sanford Lake Preservation Association (now known as Four Lakes Task Force) had commissioned an economic impact study for Midland County on the value of the lake in 2012. That study found that the lake added \$4.47 million a year to the economy, including \$1.4 million in household income and \$153,912 in sales tax. Sanford Lake County Park alone estimated it received 105,963 visits per year by vehicles.<sup>8</sup>

The report concluded, “Should the lake no longer exist, the potential loss of personal assets due to a drop in property values, the increased number of property mortgage defaults, the number of failed businesses dependent on direct or indirect revenue generated from Sanford Lake, and changes in population in the local area are difficult to predict and measure but are important considerations in determining the future of Sanford Dam.”

<sup>8</sup> See “Four Lakes Task Force Demographic Assessment – March 2024” by PSC in the Chapter 3 Appendix



Public Sector Consultants (PSC) compiled a summary of the demographics of the townships and communities within the FLSAD.<sup>9</sup> The average median household income across the nine townships in the SAD is \$60,220 which is less than the statewide average. The average median home value within the SAD is \$152,455, which is less than the statewide figure of \$201,100 – though fewer homes in the townships associated with the SAD have a mortgage – 52.8 percent compared to 59 percent statewide.

Streamside Ecological Services staff completed an analysis of the economic benefits of the Four Lakes fisheries. Based on this dataset, it would be reasonable to estimate total economic expenditures for fishing activity on the four impoundments would be approximately \$3.4 million annually.<sup>10</sup> This value does not consider people using the lake for recreation other than fishing.

Not only did the failures and drawdowns have a social and economic impact, but there were also substantial environmental impacts (discussed later in the report).

The communities' cultural engagement with nature was broken – a loss of part of the [Pure Michigan Promise](#).

### 3b. Moving Forward with Restoration

The goal of Gladwin and Midland counties and Four Lakes Task Force (FLTF) and its community partners is to restore the lakes and maintain the legal lake levels that provide the most benefits to the public, best preserve the natural resources of the state, and preserve and protect property values – a goal supported by the Michigan Department of Environment, Great Lakes, and Energy.<sup>11</sup> This required developing a feasible and practical solution for each lake that accomplished the following:

**Rebuild the Dams:** FLTF is employing best practices to rebuild the dams to meet or exceed industry standards for dam safety, structural integrity, stability and adequacy. The structures are designed to provide 75 years of usable service life. Spillway capacity was designed based on the Federal Emergency Management Agency's "Selecting and Accommodating Inflow Design Floods" for dams.<sup>12</sup> Additional details are provided in [Chapter 5](#).

**Restore the Environment:** The re-establishment of the legal lake levels is the best environmental alternative. Additional work is being performed to meet Environmental Protection Agency, EGLE, and U.S. Fish and Wildlife Service permitting requirements for Sanford and Wixom. This includes monitoring the re-establishment of wetlands, shoreline restoration and public education. Further details on environmental restoration planning can be found in [Chapter 6](#).

**Implement an Operations and Maintenance Program to Sustain the Lakes for Future Generations:** This involved developing a business model that not only funds routine ongoing operations and maintenance and meets Part 315 Dam Safety requirements but also provides funding for major maintenance and capital improvements that will be required to sustain the dams and lakes indefinitely for future generations. The plan for operations moving forward can be found in [Chapter 9](#).

#### **The future function of the Four Lakes is recreation.**

The lakes' normal (legal) levels, by study and court order, provide the most benefit to the public; best protect public health, safety, and welfare; best preserve the natural resources of this state; and best preserve and protect the value of property around the inland lakes. The State of Michigan regulates design and construction of dams. FLTF worked closely with EGLE to secure construction permits. Each dam required a separate permit that addressed impacts on environmental resources. Construction permits for Sanford and Edenville dams include environmental mitigation projects to offset environmental impacts associated with the reconstruction of the dams and refilling of the lakes.

<sup>9</sup> See "An Economic Impact Assessment of Sanford Lake, Midland County, Michigan" by PSC in the Chapter 3 Appendix.

<sup>10</sup> See "Fishing Economic Activity" by Streamside Ecological Services in the Chapter 3 Appendix.

<sup>11</sup> In June of 2021, EGLE sent a letter to FLTF expressing its support of restoring the four lakes. Read the letter in the Chapter 3 Appendix.

<sup>12</sup> See "Selecting and Accommodating Inflow Design Floods for Dams" by the Federal Emergency Management Agency in the Chapter 3 Appendix.



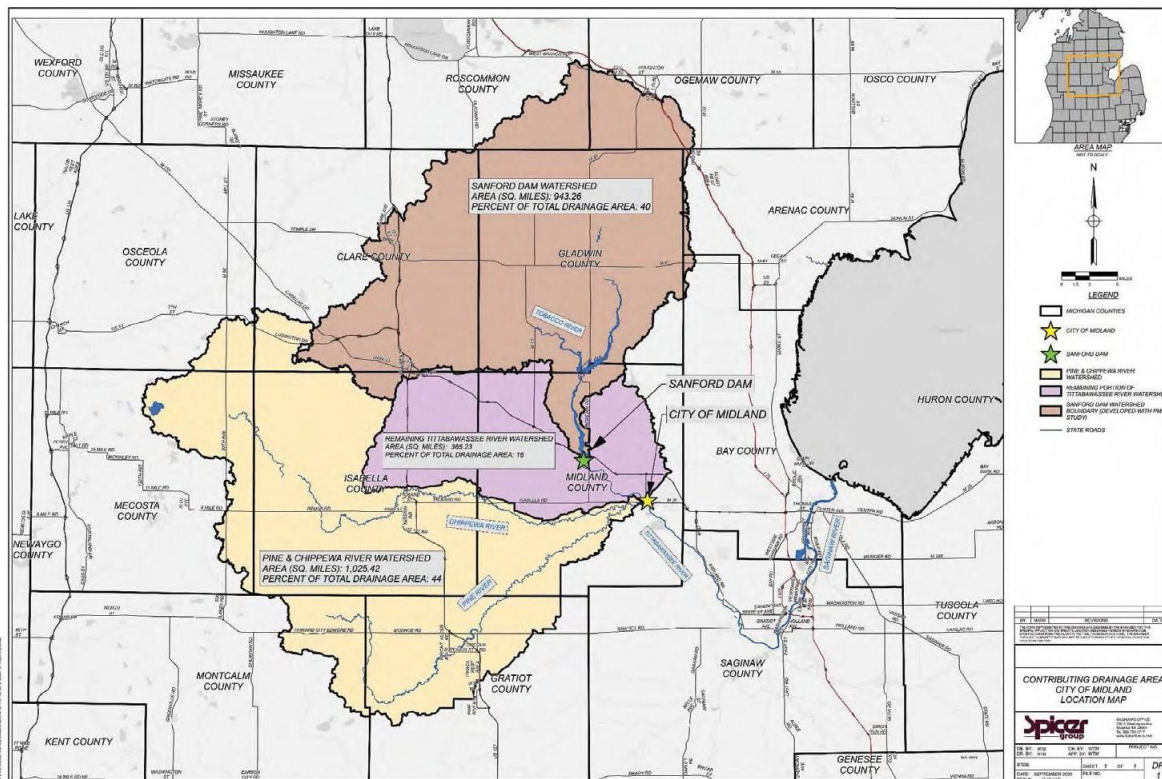
# Chapter 4: Floodplain and Flooding

## 4a. Floodplain Overview

The Tittabawassee River is the largest tributary to the Saginaw River. The main stem of the Tittabawassee River is 91 miles long with a network of contributing tributaries totaling 621 miles. The river generally flows in a southerly and southeasterly direction to its confluence with the Shiawassee River to form the Saginaw River.

The Tittabawassee River has a tributary watershed of 2,471 square miles, the fifth largest in Michigan. The river has a long history of flooding and damaging communities located in the middle and lower portions of the basin. The Federal Energy Regulatory Commission (FERC) October 1998 Amended Order for the Sanford Dam Project, based on the July 1980 United States Army Corps of Engineers (USACE) Study<sup>13</sup> on flood control of the Tittabawassee River for the City of Midland, concluded that the maximum usable storage for all the dams is only one tenth of the storage required for meaningful flood control. In addition to the flood storage limitations, the Four Lakes watershed represents only 40 percent of the tributary drainage area to the City of Midland. It is simply not possible for the Four Lakes to eliminate flooding in Midland and other communities downstream.

Figure 2: Four Lakes Watershed



<sup>13</sup> See 1980 U.S. Army Corps study on flood control of the Tittabawassee River and 1998 FERC Amended Order for the Sanford Dam Project in the Chapter 4 Appendix.



## 4b. National Flood Insurance Program

Multiple communities within the Tittabawassee River Watershed, including the City of Midland, participate in the National Flood Insurance Program (NFIP). The NFIP was established in the National Flood Insurance Act of 1968 and operates under the Federal Emergency Management Agency (FEMA). The NFIP allows communities to establish actuarial flood insurance rates for areas located within defined Special Flood Hazard Areas (SFHAs) representing the one percent annual chance floodplain (“100-year” flood frequency). Properties located within the SFHA are required to be covered under a flood insurance policy when the property is financed by a federally backed mortgage. Properties within the SFHA without a federally backed mortgage, or properties outside of the SFHA, still have the option to be covered under a flood insurance policy, although it is not required.

For Edenville Dam construction only, FEMA required the communities to complete a reassessment of the floodplain below Edenville Dam for national flood insurance purposes including completing a Conditional Letter of Map Revision (CLOMAR). This was completed.

## 4c. Flooding and Dam Safety

Federal agencies, including FERC and USACE, recognized the limited flood control capabilities of the Four Lakes. When constructed, the Edenville earthen embankments did not have any type of mechanism that made it possible to manage downstream flooding. The Edenville Dam embankments were features of the landscape and the dam “gates” (which were located on top of the dam’s embankments), could only lower the reservoir (i.e., Wixom Lake) by 6 or 7 feet, leaving nearly 40 feet of impoundment. This meant that Wixom Lake could not be drained entirely without a failure of its earthen embankment, and – as determined by about 1932 – the storage provided by the dam was found to be inadequate to effectively manage downstream flooding.<sup>14</sup> USACE concluded that the dam gates’ ability to lower Wixom Lake to protect against downstream flooding was “negligible”.<sup>15</sup>

The USACE came to the same conclusion in its 1980 report on flooding on the Tittabawassee, and FERC used their recommendation in its final order in establishing the FERC license for Sanford Dam in 1998.

**The regulatory purpose of the dams was and is not flood control but ensuring that the design, construction and operation of the dams does not contribute to downstream flooding or pose an intolerable risk to public safety.**

## 4d. Dam Spillway Capacity

Under EGLE and FERC criteria, all four dams are classified as high hazard potential because of the risk that failure poses to life and property. High-hazard potential dams are required to meet stringent requirements for structural adequacy, integrity and spillway capacity.

All four dams transitioned to the State of Michigan’s jurisdiction and are required to meet dam safety requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE). Following the dam failures, EGLE formed a 19-member Michigan Dam Safety Task Force to thoroughly review Michigan’s existing dam safety program and recommend policy, legislative, budgetary and enforcement reforms “to prevent a catastrophe of this kind from happening again.” The Dam Safety Task Force’s findings are summarized in their February 12, 2021, report,<sup>16</sup> which recommended revising or adopting laws and/or rules to meet FEMA’s Model Dam Safety Program (MDSP).

<sup>14</sup> IFT Report, F-2.

<sup>15</sup> Id. at F-2.

<sup>16</sup> See the February 12, 2021 “Michigan Dam Safety Task Force Report” in the Chapter 4 Appendix.

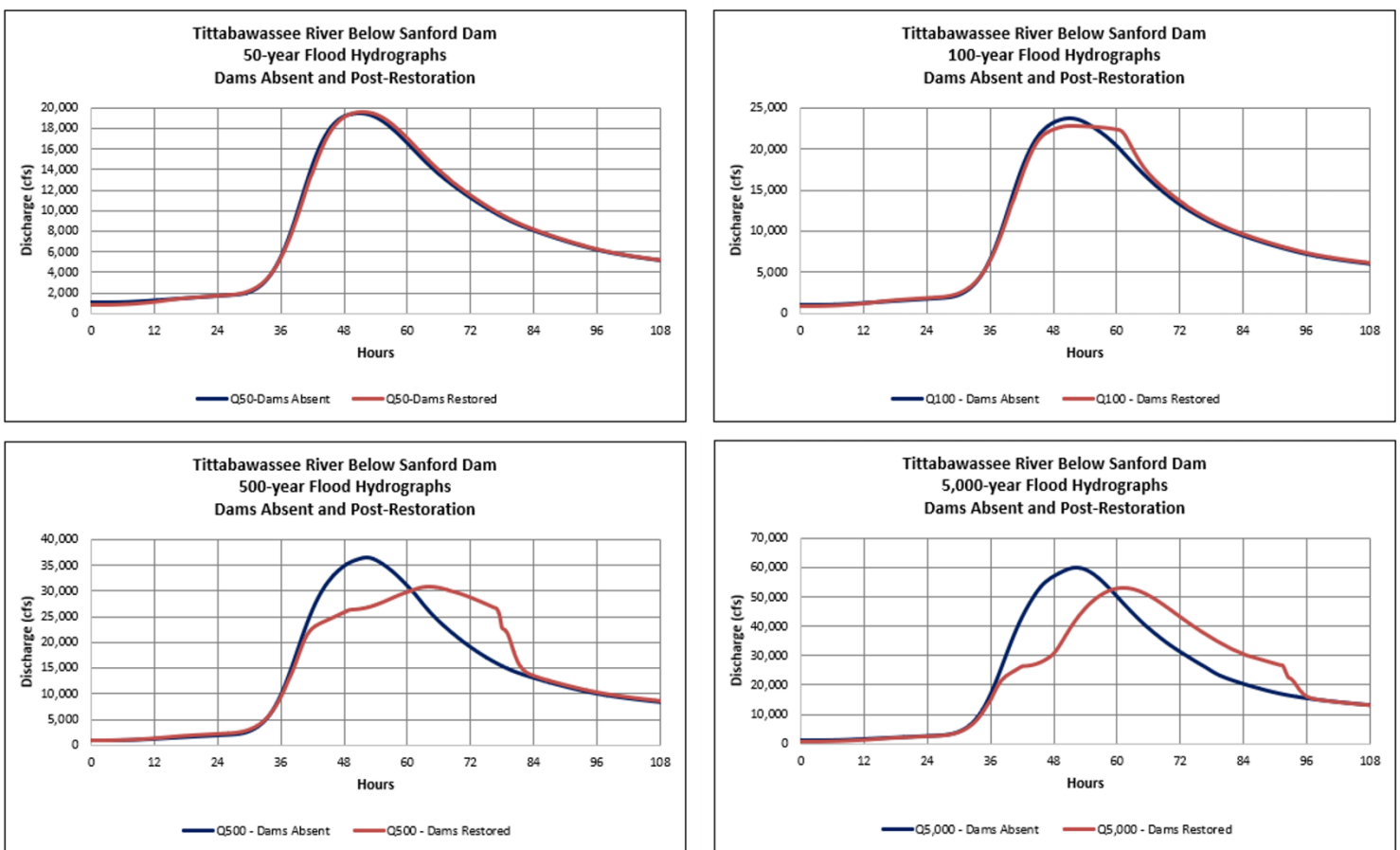


The MDSP is a forward-looking program that provides sound guidance for dam safety that is consistent with the latest national and international industry standards. This includes FEMA P-94 federal guidelines, “Selecting and Accommodating Inflow Design Floods (IDF) for Dams”<sup>17</sup> which FLTF used for the establishment of all four dams’ spillway capacity. Selection of the IDF was the first step in ensuring that operation of the dams did not contribute to downstream flooding or pose an intolerable risk to the public.

To this end, FLTF contracted for precipitation and flood studies to establish design criteria for dam safety and spillway capacity and to better understand the impacts of restoration on the floodplains and shorelines.

The dams are also permitted under Part 31 Water Resources Protection and Part 315 Dam Safety. The river flows out of the Four Lakes system at nearly the same rate as if there were no dams for the 50- and 100-year flood hydrographs while some attenuation of flows occurs at the 500- and 5,000-year flood hydrographs. This is demonstrated in the hydrographs from the GEI Report<sup>18</sup> that summarizes the Ayers probable maximum flood (PMF) Study.

**Figure 3: Sanford Dam Outflow Hydrographs**



<sup>17</sup> See “Selecting and Accommodating Inflow Design Floods for Dams” by the Federal Emergency Management Agency in the Chapter 3 Appendix.

<sup>18</sup> See “Summary of Flood Routing Downstream of Sanford Dam Memo – April 2022” by GEI in the Chapter 4 Appendix.



# Chapter 5: Restoration Design and Construction

Chapter provided by GEI Consulting

## 5a. Introduction and Background

Following the May 19, 2020, storm event that resulted in minor downstream erosion damage to Secord Dam, severe downstream erosion damage to Smallwood Dam, and a catastrophic failure (breach) of the Edenville and Sanford dams, Four Lakes Task Force (FLTF) requested GEI Consultants of Michigan, P.C. (GEI) provide opinions of probable construction costs to reconstruct and/or rehabilitate the four dams, provide preliminary and final construction documents and construction support to repair or reconstruct the damaged structures, and increase the spillway capacity to pass the recommended Inflow Design Flood which is one-half of the Probable Maximum Flood ( $\frac{1}{2}$  PMF) plus the design storm.

## 5b. Basis of Restoration Design

The primary goal of the Secord, Smallwood, Edenville and Sanford Dam Restoration Projects was to construct improvements in accordance with Michigan Department of Environment, Great Lakes, and Energy (EGLE) requirements and restore the legal lake levels. In a letter to FLTF from EGLE, dated June 30, 2021, EGLE outlined the deficiencies identified for the Secord and Smallwood dams and the requirements for reconstruction of Edenville and Sanford dams.<sup>19</sup> The dam restoration projects were intended to achieve these project goals and were included in the Design Drawings by GEI.

### Inflow Design Flood Selection

[Figure 4](#) summarizes the existing (pre-flood) spillway capacity at each of the four dams, the current  $\frac{1}{2}$  PMF and full PMF inflow at each dam, corresponding freeboard (i.e., remaining dam height before the reservoir begins overtopping the dam) and the recommended  $\frac{1}{2}$  PMF plus contingency ( $\frac{1}{2}$  PMF + design storm) based on the results of the flood study completed by Ayres.

**Figure 4: Summary of Existing and Required Spillway Discharge Capacity**

Parameter	Secord Project	Smallwood Project	Edenville Project		Sanford Project
			Edenville Dam	Tobacco Dam	
Total Existing Spillway Capacity (cfs*)	7,695 <sup>(1)</sup>	10,185 <sup>(2)</sup>	10,750	9,920	29,690 <sup>(3)</sup>
$\frac{1}{2}$ PMF Inflow (cfs)	18,075	19,065	41,260		37,695
$\frac{1}{2}$ PMF Freeboard (feet) <sup>(4)</sup>	0.0	2.4	-2.1		-0.4
PMF Inflow (cfs)	43,020	58,640	116,525		116,065
PMF Freeboard (feet) <sup>(4)</sup>	-1.9	-2.7	-4.7		-7.5
<b>Recommended Spillway Design Flood</b>	<b>21,150</b>	<b>24,550</b>	<b>52,275</b>		<b>47,470</b>

(1) Does not include the peak outflow to the Tea Creek Ridgeline or left embankment overtopping.

(2) Does not include the overtopping of the left embankment.

(3) Not including the fuse plug emergency spillway, which was intended to add 6,485 cfs of capacity but did not trigger during the May 2020 flood.

(4) Negative number indicates flow overtopping the dam.

\*Cubic feet per second (cfs)

<sup>19</sup> Read EGLE's letter to FLTF outlining deficiencies identified at each of the dams in the Chapter 5 Appendix.



## Secord Dam

### EGLE-Identified Deficiencies

- The spillway has inadequate capacity to safely pass the ½ Probably Maximum Flood (PMF) as required by Part 315.
- Concrete components of the dam show signs of deterioration and are beyond their design life.
- The existing tainter gates are beyond their design life and exhibit signs of deterioration.
- The hoisting mechanisms are insufficiently sized for the range of design service loads and do not meet current industry design standards.
- The embankment dams are overly steep, have insufficient slope stability, and exhibit excessive amounts of seepage.
- Downstream energy dissipation and erosion protection are inadequate.

### Design Elements

- Partially demolish the existing tainter gate spillway, including selected horizontal concrete struts, fill in the hollow rollways with mass concrete, and replace the existing Tainter gates and hoists with new, deeper crest gates with hydraulic operators located on the center pier. New reinforced concrete overlays will be constructed on the spillway weir, stepped chute, stilling basin, and center pier to increase spillway capacity and accommodate the new crest gates. A new pre-engineered operator's deck will also be provided over the spillway.
- Drive a new line of hot-rolled steel sheet piling along the upstream crest edge, through the dam embankment into the glacial till foundation to reduce seepage through the embankment and foundation soils. The new sheet pile cutoff wall will extend the entire length of both the left and right embankments from the primary spillway to both right and left abutments, including under the upstream side of the auxiliary spillway located at the left embankment.
- Raise the primary spillway training walls and extend the walls downstream to accommodate the increased outflows.
- Construct a new auxiliary spillway across the top of the left embankment to assist in passing the IDF.
- Retrofit the existing powerhouse with a low-level outlet to pass base river flows during the winter.
- Flatten the left and right embankment slopes to improve stability and install internal filter drainage layers with a toe drain to protect against seepage-induced internal erosion.
- Install a sister wall alongside the left and right training walls to provide additional stability to offset the loss of lateral support to the primary spillway and powerhouse side walls currently provided by the horizontal concrete beams that will be demolished to accommodate the new crest gates.



## Smallwood Dam

### EGLE-Identified Deficiencies

- The spillway has inadequate capacity to safely pass the ½ PMF as required by Part 315.
- Concrete components of the dam show signs of deterioration and are beyond their design life.
- The existing tainter gates are beyond their design life and exhibit signs of deterioration.
- The hoisting mechanisms are insufficiently sized for the range of design service loads and do not meet current industry design standards.
- Downstream energy dissipation and erosion protection are inadequate.

### Design Elements

- Partially demolish the existing tainter gate spillway, including selected horizontal concrete struts, fill in the hollow rollways with mass concrete, and replace the existing Tainter gates and hoists with new, deeper crest gates with hydraulic operators located on the center pier. New reinforced concrete overlays will be constructed on the spillway weir, stepped chute, stilling basin, and center pier to increase spillway capacity and accommodate the new crest gates. A new pre-engineered operator's deck will also be provided over the spillway.
- Drive a new seepage cutoff sheet pile line from the dam crest into glacial till foundation. This sheet pile wall will extend from the left edge of the current left embankment sheet pile wall, under the upstream edge of the new auxiliary spillway, extending about 125 feet past the auxiliary spillway. This line of sheet piles will end where the upstream and downstream embankment toe are above the normal headwater elevation (El. 704.3).
- Raise the primary spillway training walls and extend the walls downstream to accommodate the increased outflows.
- Construct an auxiliary spillway across the top of the left embankment to assist in passing the inflow design flood (IDF).
- Retrofit the existing powerhouse with a low-level outlet to pass base river flows during the winter.
- Flatten the left and right embankment slopes to improve stability. The left embankment and abutment overflow area beyond the auxiliary spillway will be raised to crest El. 716.0 and the left embankment extended east to tie into high ground to provide freeboard during the IDF.
- Install a sister wall alongside the left and right training walls to provide additional stability to offset the loss of lateral support to the spillway and powerhouse side walls currently provided by the rollway and concrete beams that will be demolished to accommodate the new crest gates.



## Edenville Dam

### EGLE-Identified Deficiencies

“Edenville Dam was breached on May 19, 2020, after several days of intense rainfall. The damage to the dam was extensive with complete loss of the left embankment, left of the Tittabawassee spillway, damage to the remaining earthen embankments, damage to the Tobacco spillway structure and diversion of the Tobacco and Tittabawassee Rivers. The condition of the remaining dam structures following the failure continued to cause concern of a secondary failure due to limited hydraulic capacity of the Tobacco spillway and insufficient slope stability of the adjacent embankments.....

“... EGLE Dam Safety issued an emergency order and initiated repairs to modify the Tobacco spillway, drawdown the impoundment, stabilize the remaining embankments, modify the Tittabawassee spillway, and restore the rivers to their pre-failure channels. EGLE, in partnership with FLTF and DTMB, has completed the drawdown of the Tobacco impoundment and lowering of the spillway crest. FLTF is moving forward with designs and construction contracting to finish stabilization of the Tobacco spillway, modification of the Tittabawassee spillway, stabilization of the remaining embankments, and diversion of the Tittabawassee River, to fulfill the requirements of the emergency order.”<sup>20</sup>

### Design Elements

Following the stabilization efforts in 2020 and 2021, a design was developed to reconstruct the Edenville Dam to address the following:

- **Inadequate Spillway Capacity** – Prior to the Edenville left embankment dam failure, the Tainter gate spillways could pass approximately 20,670 cubic feet per second (cfs) at the zero- freeboard elevation of 682. According to the latest flood analysis, a total spillway capacity of approximately 50,000 cfs is needed to pass the IDF with freeboard.
- **Embankment Dam Stability** – A significant reach of the embankments right of the Tittabawassee spillway were damaged due to rapid reservoir drawdown caused by the left embankment breach. Remaining sections of embankment that were not breached are overly steep, have narrow crests, insufficient slope stability under normal and flood pool conditions, and no seepage cutoff or internal filters and drains to protect against seepage-induced internal erosion along unfiltered clay drain tiles that showed evidence of silt and sand migration during May 2020 flood event.
- **Lacking Low Level Outlets** – Without hydropower operation and the associated powerhouse, discharge conduit and outlet structures, there is no low-level outlet to pass normal river flows or means to draw down the impoundment below the invert of the spillway sill.
- **MDOT M30 Bridge** – Currently, the Michigan Department of Transportation (MDOT) has a temporary bridge crossing the former reservoir and MDOT is developing designs for a permanent bridge replacement. Since the 30 percent design includes a new auxiliary spillway on the Tittabawassee River (TBW) side, the upstream impoundment will require a new M-30 bridge to equalize flood pool levels between the two sides (Tobacco and TBW) of the impoundment. The spillway design will consider this new bridge and its hydraulic opening.
- **Breached Left Embankment** – The breached left embankment needs to be reconstructed in the original footprint with provisions for an auxiliary spillway to release flood water downstream along a regraded breach channel to the Tittabawassee River.

<sup>20</sup> Read FLTF’s Edenville Restoration overview [here](#).



## Sanford Dam

### EGLE-Identified Deficiencies

“Sanford Dam failed on May 19, 2020, following the failure of the Edenville Dam. The damage to the dam was extensive with complete loss of the right embankment and fuse plug spillway. The current route of the Tittabawassee River through the breach section is causing continued head-cutting through the native substrate and downgrading of the upstream river reaches. Due to the ongoing concerns with impacts to infrastructure and elevated sediment transport downstream impacting natural resources, FLTF is proposing emergency stabilization work at the dam.”

### Design Elements

Following the stabilization efforts completed in 2020 and 2021, a design was developed to reconstruct the Sanford Dam including the following design elements:

- Partially demolish the existing six (6) tainter gates and fill the hollow spillway rollways with mass concrete and replace the Tainter gates with new hydraulically operated crest gates to increase spillway capacity; performed as part of the Sanford Dam Interim Stabilization project.
- Demolish powerhouse units and fill powerhouse with CLSM for increased stability.
- Construct a new auxiliary spillway across the top of the right embankment to assist in passing the IDF. The auxiliary spillway will be constructed as passive roller-compacted concrete (RCC) overflow section.
- Convert the six (6) existing primary spillway bays into lower sill elevation hydraulically operated crest gates.
- Raise the spillway side walls and extend downstream to accommodate the increased outflows.
- Low-level outlet to release 200 to 400 cfs base flows during low flow winter months.
- Flatten the left and right embankment slopes to improve stability, install an upstream sheet pile cutoff into the dam foundation to reduce seepage through the earth embankment, and install internal filter drainage layers with a toe drain to protect against seepage-induced internal erosion.
- Install a sister wall alongside the right training wall to provide additional stability to offset the loss of buttressing that was provided by the existing spillway and concrete beams spanning between the training wall and the powerhouse.



## 5c. Dam Safety and Monitoring

Dam safety monitoring by FLTF occurred post failure, during construction, and will occur on a routine basis once construction is complete. An interim Dam Safety Surveillance and Monitoring Plan covered the period between stabilization and construction; a Temporary Construction and Monitoring Plan was prepared for the construction period; and post construction, an Operation and Maintenance Plan and Surveillance and Monitoring Plan will be created.

### Dam Safety Surveillance and Monitoring Plans

An interim Dam Safety Surveillance and Monitoring Plan (DSSMP) was developed for the period between stabilization and construction for each dam. The DSSMP included guidelines for visual inspections, instrumentation monitoring and response protocol in the event of a dam safety issue.

Part 315, Dam Safety, of the Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451, as amended, requires that dam owners submit an inspection report that evaluates the condition of the dam and is prepared by a licensed professional engineer.

The inspection report is to be submitted to EGLE at least once every three years for high hazard potential dams.

Previously, under Federal Energy Regulatory Commission (FERC) regulation, inspections were completed annually, and a Dam Safety Surveillance and Monitoring Report (DSSMR) was completed. Although FERC no longer regulates the dam, FLTF continued to perform an Annual Dam Safety Inspection with Report in the interim period and will submit a formal inspection report to EGLE every three years, completed by a consultant in accordance with NREPA Part 315 Dam Safety format and requirements.

### Temporary Construction Surveillance and Monitoring Plans

A Temporary Construction Surveillance and Monitoring Plan (TCSMP) was developed to outline the measures taken to monitor and evaluate performance of the existing embankment and spillway structures during reconstruction. The TCSMP summarized all existing and proposed geotechnical instrumentation used to monitor the performance of the Project structures as well as outline inspection requirements, as defined by Risk Reduction Measures associated with Construction Potential Failure Modes developed during a Supplemental Potential Failure Modes Analysis workshop in the design phase. The TCSMP also outlined the activities, responsibilities and communication process for monitoring and reporting data collected under this plan.

The instrumentation data was primarily used to identify increases in pore pressure or vertical/lateral deformation of the existing embankments and spillway structures, resulting from toe drain installation, construction of embankment upgrades, and temporary excavation and cofferdam staging for structural upgrades to the spillway and powerhouse. At Sanford Dam, instrumentation data was also used to monitor for heavy potential due to artesian pressures in excavation areas.

## Post Construction Activities

### Operation and Maintenance Program

An **Operations and Maintenance (O&M)** program is essential for ensuring the long-term safety and functionality of dams. The O&M Plan will include standard operating procedures (SOPs), emergency protocols, and maintenance schedules tailored to the dam's mechanical equipment, embankments and drainage systems, and primary and auxiliary spillways. Routine inspections will be conducted to identify wear, damage, or deterioration in structural components, gates, spillways, and mechanical systems. Preventive maintenance, such as clearing debris, periodic equipment testing, and repairing scour or erosion, helps reduce long-term operational costs and can prevent costly failures and extend the life of the dam.

Training and preparedness of operational staff is critical to the execution of the O&M plan. Personnel will be trained in both normal and emergency procedures, including how to respond to unusual readings from instrumentation or visual indications of developing failure modes during inspections. Coordination with emergency management agencies and regular drills will be scheduled to ensure readiness.



Documentation of all maintenance activities, inspections, and repairs will be maintained and reviewed to support regulatory compliance and inform future decision-making. This proactive, systematic approach to dam O&M not only enhances safety but also builds resilience against evolving environmental and operational challenges.

### Surveillance and Monitoring Plan

A Long-Term Dam Safety and Surveillance and Monitoring Plan (DSSMP) is a cornerstone of dam safety, designed to ensure early detection of potential issues and maintain the structural integrity of the dam over time. According to best practices from FERC, U.S. Army Corps of Engineers (USACE), and Federal Emergency Management Association (FEMA), an effective DSSMP should be tailored to the specific characteristics and risk profile of each dam. The DSSMP for FLTF will include an instrumentation monitoring system of piezometers, inclinometers, and seepage monitors that are integrated into automated data acquisition systems that allow for continuous performance tracking. These tools help detect anomalies like internal erosion, movement, or seepage that could indicate developing failure modes.

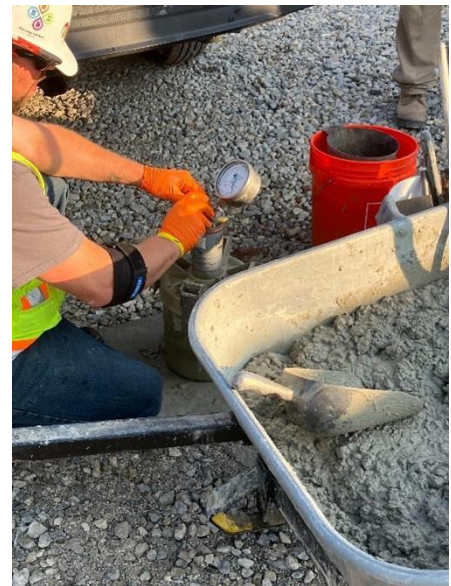
In addition to instrumentation, routine visual inspections are essential. In the year immediately following refill, thorough visual inspections will be completed by a trained dam safety engineer on a quarterly basis. Trained FLTF personnel will conduct daily and more rigorous monthly walkdowns to observe surface conditions noting vegetation growth, spillway functionality, abnormal flow patterns and any other signs of distress. EGLE Part 315 requires high hazard potential dams to be inspected by a licensed professional every three years. The DSSMP will define performance thresholds that prompt further investigation or emergency action, ensuring that even subtle changes are not overlooked. All data, observations, and maintenance actions will be logged systematically, reviewed regularly, and shared with regulatory agencies to support transparency and informed decision-making. This integrated approach helps manage risk proactively and maintain compliance with state safety standards.

## 5d. Construction Quality

### Quality Management

In combination with Fisher Contracting Quality Control program, GEI developed a Quality Management Plan (QMP) to monitor compliance with design and execute work in accordance with specifications. The QMP was developed using best management practices derived from the United States Army Corps of Engineers (USACE) process. The execution of work was performed in three phases:

1. Preparatory Phase – planning and coordination prior to mobilizing a task
2. Initial Phase – the beginning of executing the task or activity where the team evaluates whether the plan needs to be modified
3. Follow-up Phase – quality control and quality assurance representatives monitor progress and task metrics to verify work is in accordance with the specifications



The roles and responsibilities of all parties were clearly defined and agreed upon prior to mobilizing each of the four project sites.

### Testing

In addition to the administrative procedures described above, the quality program involved a third-party testing agency to provide material testing services for quality control during the construction process. The material testing was performed on the installed materials both on site and in the laboratory, at a frequency prescribed in the project specifications. To supplement the testing performed by the third-party testing



agency, GEI also performed its own quality assurance testing in the field and laboratory at an interval of 10 percent, such that for every 10 quality control tests performed by a third-party testing agency, one quality assurance test was performed by GEI to verify that the field testing was representative of the work.

### **Key Performance Indicators**

The quality data generated by the project was distilled into a key performance indicator (KPI). The KPI metric was intended to provide a daily snapshot of the quality performance of the project(s). This value was tracked in real time by the Quality Assurance Manager(s) and resident engineers and was used to monitor the performance of the teams. If defects were identified on site, the field staff reported a lower daily KPI; conversely, when planned work was executed well, ahead of schedule and communication between team members was efficient, the KPI increased. The KPI was shared using a webhosted dashboard in a chart format and updated daily. Leadership and teams across the entire FLTF Dam Restoration Program met monthly to discuss the KPIs and other project metrics, and communicate lessons learned across the program.

### **Deficiencies**

Any identified defects are recorded in the field as deficiencies and are tracked from identification through corrective action. Following identification of defects, the team hosts local site conferences to identify the Root Cause of the deficiency. The deficiency is evaluated against the design and corrective actions are proposed. The corrective action recommendation is reviewed by the Engineer, who either approves the corrective actions or works with the site team to reach an acceptable and resilient solution. To reduce the chances of a recurrence of deficiencies and defects on site, the lessons learned by one site are transmitted to other sites for awareness following the Root Cause investigation. This reduces the likelihood of reoccurrence program wide.



## Chapter 6: Environmental Permitting

### 6a. Introduction

With the end of recovery in 2023, the focus shifted to restoration. The key factors for restoration include enhancing public safety, preserving property values, the local economy and restoring the lake ecosystems, including the environment, natural resources and recreation of the lake system provided.

Four Lakes Task Force (FLTF) worked closely with Michigan Department of Environment, Great Lakes, and Energy (EGLE) for issuance of construction permits, on a dam-by-dam basis, for impacts to regulated resources associated with dam construction. Permits were obtained for construction activities related to each dam and for construction within regulated wetlands, streams, floodplains and lakes. Additionally, for Sanford and Edenville dams, the construction permits included lake refill activities and the associated mitigation projects needed to offset environmental impacts for the reconstruction of the dams and the refill of the lakes.

### 6b. Environmental Permitting

EGLE is the governing body regulating specific activities which take place within regulated wetlands, floodplains, dams and inland lakes and streams and for work associated with regulated dams. Work resulting in temporary and/or permanent impacts to these features requires permits to be issued by EGLE before any work commences.

EGLE and FLTF had extensive conversations and discussions over the past few years to determine the permitting needs related to the construction of each dam. FLTF submitted comprehensive permit applications and received permits to address each of these requirements for the construction of all four dams.

In addition to environmental permitting through EGLE, all construction activities which result in over an acre of disturbance or are within 500 feet of an inland lake or stream require soil erosion and sedimentation control (SESC) permits from the respective county. Sites that disturb greater than five acres require coverage under EGLE's National Pollutant Discharge Elimination System (NPDES) via a Notice of Coverage (NOC). SESC permits require that the applicant design the project to protect natural watercourses, inland lakes, wetlands and offsite properties from sediment deposition due to construction activities.

#### Permitting Summary for Secord Dam

Secord Dam did not fail, but Secord Lake was ordered by Federal Energy Regulatory Commission (FERC) to be lowered. The proposed construction activities at Secord Dam are viewed by EGLE as repair and improvement of an existing serviceable structure.

This simplified the environmental permitting requirements for construction. As part of the permit process a public notice of the application was completed by EGLE and a public hearing was held on September 26, 2022. The permit was issued on November 2, 2022, and was good for two years. An extension was requested and has been approved by EGLE to extend the permit through 2026.

Part 301 (Inland Lakes and Streams) impacts from construction are primarily the placement of fill below the ordinary high-water mark (OHWM). This includes the placement of riprap on the upstream face of the earthen embankment, riprap placement downstream of the dam and at the outlet of the proposed auxiliary spillway. A total cut of 1,074 cubic yards and a total fill of 1,948 cubic yards, resulting in a permanent net fill below the OHWM of 874 cubic yards has been permitted in addition to the installation of a temporary cofferdam resulting in 239 cubic yards of temporary fill in the Tittabawassee River and 54 cubic yards of temporary fill in Secord Lake.

Regarding Part 303 (wetlands), temporary and permanent impacts are included in the permit. These impacts are associated with re-sloping of the embankment, construction of an access road and



construction of the auxiliary spillway. To quantify the amount and type of existing wetlands on the Secord Dam property, a formal wetland delineation was completed. Wetland impacts exceed 0.3-acres of disturbance, so wetland mitigation was required. FLTF purchased wetland mitigation bank credits per the wetland bank credit mitigation process outlined by EGLE to offset the impacts to regulated wetlands. Impacts to 0.61 acres of existing wetlands was permitted. The total wetland impact requires mitigation for 0.44 acres of emergent wetlands and 0.168 acres of forested wetlands. Wetland credits were purchased prior to permit issuance to address the need for mitigation.

Construction activities were permitted to take place within the Part 31 regulated 100-year floodplain. Impacts are to the area immediately downstream of the dam. A total of 52 cubic yards of fill and 57 cubic yards of cut have been permitted for construction of the dam.

Regulatory jurisdiction shifted from the federal government to EGLE after the termination of the FERC license. The Dam Safety Unit within EGLE would need to provide a permit for any construction activities on the dam features including work to the embankments, spillway, tailrace area and powerhouse. EGLE was actively involved during the design and issued a Part 315 Dam Safety permit for the reconstruction of the structure.

During construction, there were changes made to the originally permitted dam design plans to allow for better constructability. These changes were communicated with EGLE through the permit modification process to ensure that any changes in impacts of regulated resources were accounted for. These changes included changes to the dam design, temporary construction access, and water control procedures.

Lastly, the construction activities at Secord Dam required an SESC permit. The Gladwin County Soil Conservation District is the governing office to issue the permit. A SESC permit was obtained and has been renewed throughout the life of the current construction project. Given the size of the overall disturbance, an NOC permit was needed as well. Weekly inspections are conducted by a certified stormwater operator to ensure that the site is compliant with the permit.

## Permitting Summary for Smallwood Dam

Smallwood Dam did not fail because of the May 19, 2020, storm event, however, the dam sustained significant damage to the downstream embankment from severe erosion due to the flood. Since Smallwood Dam did not fail, the proposed construction activities were viewed by EGLE as repair and improvement of an existing serviceable structure. This simplified the environmental permitting requirements. Similar to Secord, as part of the permit process a public notice of the application was completed by EGLE and a public hearing was held on September 26, 2022. The permit was issued on December 20, 2022, and was good for two years.

An extension was requested and has been approval by EGLE to extend the permit through 2026.

Concerning Part 301, impacts from construction include the placement of riprap on the upstream face of the earthen embankment, riprap placement downstream of the dam and at the outlet of the improved auxiliary spillway for erosion protection, all below the OHWM. The proposed activities include excavation of approximately 4,776 cubic yards of material below the OHWM and placement of 5,060 cubic yards of fill below the OHWM.

Regarding Part 303, a formal wetland delineation on the Smallwood Dam property was completed and it was determined that 3.04 acres of regulated existing wetlands would be impacted; 1.56 acres of emergent wetlands and 1.48 acres of forested wetlands. Mitigation of wetland impacts was required prior to permit issuance. Wetland mitigation bank credits were purchased with 2.34 credits of emergent and 2.96 forested credits being required for mitigating the project impacts.

Construction activities were permitted to take place within the Part 31 regulated 100-year floodplain. These impacts are in the area downstream of the dam. Within the issued permit, 8,123 cubic yards of cut and 4,942 cubic yards of fill within the 100-year floodplain is authorized.

With the termination of the FERC license at the Smallwood Dam hydropower facility, regulatory jurisdiction shifted from the federal government to EGLE. The Dam Safety Unit reviewed the proposed plans for the Smallwood Dam and issued a permit for construction activities on the dam features as the design was



determined to meet state standards. EGLE Dam Safety engineers were engaged throughout the design process to ensure compliance and issuance of a permit under Part 315.

Like Secord, during construction, there were changes made to the originally permitted dam design plans to allow for ease of construction. These changes were communicated with EGLE through the permit modification process to ensure that any changes in impacts of regulated resources were accounted for. These changes included changes to the dam design, temporary construction access, and water control procedures.

Construction activities at the Smallwood site also required an SESC permit. SESC best management practices were included in the construction design plans which were used to obtain a permit through the Gladwin County Soil Conservation District office. This permit has been renewed throughout the ongoing construction. Due to the size of the project, a NOC through EGLE was also required. This permit has also been renewed and remains active with all permit requirements continuing to be met.

## Permitting Summary for Edenville Dam

A section of the Tittabawassee embankment failed during the May 19, 2020, storm event, and areas near the Tobacco spillway were significantly damaged. Extensive environmental permitting was required to rebuild the Edenville Dam due to the failure. EGLE determined that the restoration would be treated like the construction of a new dam for permitting. The impacts of the project were broken into impacts from construction, which followed a similar process to Secord and Smallwood, and then impacts from refilling the lake/ flooding the Tobacco and Tittabawassee rivers and tributary streams to the lake.

Given the construction and permitting timeline for Edenville Dam, the project was split into two EGLE permits; one for the pull ahead embankment work and the other for the spillway work and the lake refill. The permit for the pull ahead embankment work was issued on June 30, 2023, after a public notice period. The overall restoration permit that includes lake refill was issued on March 17, 2025. A public hearing was held on January 25, 2024, with public comment opportunities provided through EGLE's standard hearing process. Due to the size of proposed impacts, the application was also reviewed by the U.S. Environmental Protection Agency (EPA).

Impacts on all the environmental resources are proposed for the embankment work. Inland lakes and streams (Part 301) will be impacted by fill below the OHWM. Fill will be placed within the 100-year floodplain (Part 31). Regarding Part 303, permanent impacts are expected within regulated wetlands, which have been delineated on the Edenville Dam property. The pull ahead embankment permit allows for the placement of approximately 6,710 cubic yards of fill material and removal of approximately 519,075 cubic yards of dredged material from within Wixom Lake. The authorized work permanently impacted 0.12 acres of both emergent and forested wetlands with 0.2053 acres of wetland mitigation bank credits secured for the project. Approximately 8,770 cubic yards of fill material and approximately 180 cubic yards of excavation are permitted to occur within the regulated 100-year floodplain.

Impact quantities for the spillway work and lake refill include temporary impacts to 0.1 acres of wetlands and permanent impacts to 447.3 acres of existing wetlands. Fill below the OHWM is split between impacts to the Tittabawassee River, Tobacco River, Wixom Lake and the applicable tributary streams to the lake. Temporary fill of 8,470 cubic yards of fill is permitted below the OHWM along with 367,525 cubic yards of dredging. Work within the regulated 100-year floodplain is also included with 150 cubic yards of fill approved in the permit.

Given the additional environmental impacts associated with the lake refill, additional mitigation was required to obtain a permit. FLFT worked with EGLE to address their concerns with a full summary of the lake refill mitigation approach discussed in the next section, [6c. Wixom Lake and Sanford Lake Mitigation Approach](#).

Edenville Dam is not regulated by FERC since the termination of the license to generate hydropower in 2018. EGLE Dam Safety has regulatory jurisdiction and all plans for construction and improvement were reviewed and ultimately permitted under Part 315.

After permit issuance and throughout the construction process, it was determined that some permit



modifications would be required to ensure that the work was completed efficiently. Modifications included changes to site access, temporary material stockpiling, and water control. These changes were communicated with EGLE through the permit modification process.

As the Edenville Dam is located within two counties, two soil erosion permits were needed for work on the dam: one from the Gladwin County Soil Conservation District office and the other from the Midland County Drain Commissioner's office. These permits have been issued for the pull ahead project as well as the necessary NOC due to the size of the construction site and FLTF is remaining vigilant with maintaining compliance. Prior to construction, similar SESC/NOC permits were secured once the overall restoration permit was issued by EGLE.

Before the dam failures, EGLE and Boyce Hydro had consent orders<sup>21</sup> related to wetlands permitting. FLTF agreed to implement the consent order upon transfer of the property to the counties and has an agreement with EGLE on how to close out the consent order after the construction of the dam is completed.

### Permitting Summary for Sanford Dam

Sanford Dam failed during the May 19, 2020, storm event. Extensive environmental permitting was required to rebuild Sanford Dam due to the failure as EGLE requirements were the same as for a new dam construction project. As part of the permit process a public notice of the application was completed by EGLE and a public hearing was held on July 5, 2023. The permit was issued on October 23, 2023; given the anticipated construction schedule, an extension was requested and has been approved by EGLE to extend the permit through 2027.

For the dam reconstruction, impacts to inland lakes and streams (Part 301) include approximately 27,155 cubic yards of fill material and approximately 7,650 cubic yards of dredged material below the OHWM. The proposed work was permitted to impact the 100-year floodplain of the Tittabawassee River with approximately 34,415 cubic yards of fill material and 26,785 cubic yards of excavation. A professional wetland delineation was completed for the Sanford Dam site, and it was determined that the construction of the dam would not impact any regulated wetlands within the dam construction footprint. The refill of Sanford Lake required additional mitigation for the impacts to resources which is discussed in detail in section [6c. Wixom Lake and Sanford Lake Mitigation Approach](#).

FERC had terminated the FERC license at the Sanford Dam hydropower plant with the EGLE Dam Safety unit now having regulatory jurisdiction and responsibility for issuing a permit under Part 315. EGLE Dam Safety engineers were engaged with the design phase and issued the Part 315 permit in October 2023 for the Sanford Dam project.

After permit issuance and throughout the construction process, it was determined that some permit modifications would be required to ensure that the work was completed efficiently. Modifications included changes to site access, temporary material stockpiling, and water control. These changes were communicated with EGLE through the permit modification process.

The SESC permit for the Sanford Dam was issued by the Midland County Drain Commissioner's office. SESC best management practices (BMPs) were included in the construction design plans used for securing the SESC permit after the project was bid, and the contract awarded to a contractor. A NOC through EGLE was also applied for and obtained prior to construction. Both the county permit and NOC remain active and in effect through construction.

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<sup>21</sup> See "State of Michigan Consent Judgment Against Boyce Hydro, Nov. 2019" in the Chapter 6 Appendix.



## 6c. Wixom Lake and Sanford Lake Mitigation Approach

Development of an impact assessment and compensatory mitigation plan was required to address the impacts of the reconstruction of the Sanford Dam and Edenville Dam projects. These documents were submitted to EGLE per EPA request. The direct, secondary, and cumulative impacts to the system were reviewed along with a full review of avoidance and minimization measures and proposed compensatory mitigation for any impacts that could not be avoided. Both the Sanford and Edenville evaluations found that the restoration of the dams and the lakes to their normal (legal) lake levels is the Least Environmentally Damaging Practicable Alternative (LEDPA).

### Part 301 Inland Lakes and Streams Mitigation

Several mitigation project types were identified through discussion with EGLE and FLTF that would be suitable as mitigation for the flooding of the rivers and tributary streams that would result from the lake refill. At this time, the list of projects for Sanford Dam mitigation and Edenville Dam mitigation have been approved by EGLE and reviewed by EPA and were included as conditions in the issued permits to construct the dams.

#### Culvert Replacements

As part of proposed compensation for stream impacts and included within the EGLE permit application, FLTF is proposing to replace four culverts at select road crossings on tributaries entering Sanford and Wixom lakes. These culverts are currently resulting in negative stream impacts. The new culverts are designed to span the bankfull width of the stream, are appropriately sized and will be appropriately placed, with the focus of improving stream function. These culvert replacement plans have been reviewed and approved by EGLE as part of the overall dam reconstruction permits and FLTF will provide “as-built” plans and specifications signed and sealed by a registered surveyor or licensed engineer within 60 days of final grading and construction. Four Lakes will also monitor the three culverts associated with the Edenville Dam permit for a minimum of five years following construction. A progress report shall be submitted annually by FLTF. If all performance standards detailed in the EGLE permit are met by the end of the third year of monitoring, EGLE may waive the final two years of monitoring.



Many of the culverts surrounding the lakes were replaced by other entities after the dam failure. This limited the opportunity for implementation of this measure as the project would not be considered mitigation if it were completed and/or permitted prior to receiving the permit for the lake refill.

#### Shoreline Enhancement Projects

FLTF reviewed public properties around both Wixom and Sanford lakes to identify opportunities for shoreline enhancement/ natural shoreline stabilization projects that could use natural shoreline practices to reduce the impact that hardened shorelines have on the environment. For Sanford, FLTF shall construct a total of approximately 5,040 linear feet of natural shoreline stabilization projects along the upstream face on the northwest corner of Sanford Dam, the south side of US-10 highway, the north side of US-10 highway, and downstream of Edenville Dam in accordance with the final approved mitigation plan. Edenville mitigation projects on public property were limited by available public properties on the shoreline. FLTF shall construct approximately 3,900 linear feet of shoreline enhancement at three public locations on Wixom Lake, including along the upstream face of Edenville Dam, along the M-30 shoreline, and along Dundas Road, to enhance natural shorelines and improve nearshore habitat. In addition to the work on public property, FLTF committed to hosting one virtual and two in-person natural shoreline training workshops for property owners and providing information on how individuals can reduce the impact of their property on the lake.



FLTF shall monitor the shoreline enhancement projects for a minimum of five years following construction. The monitoring will include ensuring that native vegetation is established, ensuring invasive species are not dominant, and repairing any damage to the rocks or shoreline.

### **Fish Habitat and Fish Passage**

FLTF proposed fish spawning improvements downstream of the Sanford Dam with the goal to provide suitable spawning conditions for desirable fish species. It is also understood that the vertical structure present within the lake prior to the dam failure was beneficial aquatic habitat. FLTF will review locations to restore vertical structure, implement other MDNR approved fish habitat projects and dedicate \$150,000 to the implementation of additional fish habitat within Sanford Lake to install various types of vertical structure. This is proposed to occur near US-10, with final plans under review by EGLE. Additionally, the natural shoreline stabilization projects and the rehydration of wetlands will provide shallow water habitat that is crucial for the lifecycle of many fish species.

The bottomlands of Wixom Lake sprouted a dense crop of trees after the May 2020 flood, including cottonwood, willow, and aspen. Prior to the May 2020 flood, the lake had a similar, but less dense, vertical deep-water habitat that was very attractive to some fish species (e.g., crappie and other panfish). FLTF does not have funds or the authority to collect assessments from property owners for control of these trees, which are instead managed by Wixom Lake Improvement Board (WLIB), Wixom Lake Association (WLA), Tobacco Township, and private citizens, typically by mechanical mowing (all) and by herbicide spray (WLIB only). FLTF proposes to coordinate with these entities to leave stands of young trees in deep water areas of the lake bottom as submerged fish habitat and in shallow areas as emergent fish habitat.

In addition to leaving standing trees in deep water, some standing trees in shallow water habitat areas on Wixom Lake were potential additional habitat structures. One goal is to balance the creation of fish habitat for the benefit of anglers with the interests of other lake users who are not anglers. Areas of deep or shallow water standing tree habitats will be chosen to avoid interference with historic navigation and swimming patterns or near-shore views of the lake from residential properties. Sites were reviewed based on shallow water depth and low boat traffic. Locations for these habitat enhancement projects on Wixom Lake have been approved by EGLE and DNR with enhancement projects proposed at M-30, Dundas Road and upstream of the Edenville Dam. FLTF shall restore and enhance shallow and deep-water habitat areas for fish in approximately 198.5 acres of Wixom Lake bottomland, in approximately eight locations. These habitat projects will be reviewed annually with a progress report being submitted to EGLE for five years after installation.

Prior to the dam failure, no fish passage was present at either dam. The high hydraulic head makes it infeasible to successfully design and install effective fish passage within the available footprint of either site. Additionally, the primary species of interest for upstream fish passage in the Tittabawassee River are walleye, suckers, and lake sturgeons. All of which are poor jumpers, relative to trout and salmon, and are notoriously difficult species to pass upstream through technical fishways. Third, creating passage for those desired species, while also blocking upstream movement of invasive spawning sea lamprey, nuisance common carp, and potential future invasive species such as silver carp or bighead carp, would be difficult or impossible.



## J-hooks

FLTF improved riverbank instability and erosion by constructing two j-hooks and any other measures, such as native plantings, necessary to achieve riverbank stability and reduce erosion immediately downstream of the Edenville Dam Tittabawassee River spillway. These j-hooks also provide variable flow for fish and other aquatic organisms to further enhance the habitat. FLTF will monitor these j-hooks for five years to ensure they do not shift, they continue to reduce the bank erosion and they provide functional lift to the stream. An annual report detailing the specific vegetation, substrate characteristics, and stability and performance review will be submitted to EGLE per the issued permit.



*Figure 5: J-hooks in downstream Edenville Dam improve riverbank instability and erosion.*

## Natural Vegetation Buffer

Many of the reviewed public parcels around Sanford Lake and Wixom Lake are vegetated, with many of the MDNR owned lands being untouched vegetated properties with native vegetation to the shoreline with no need for additional planting. Along the Sanford Lake Park shoreline north of the public beach, there is an approximately 200-foot-long section of grass abutting the lakeshore that FLTF is proposing to work with the Midland County Parks department to review options for replacing with native vegetation. Education on the benefits of native vegetation buffers and recommendations for implementation are proposed to be posted on the FLTF website and will provide guidance for how private property owners can create these buffers. No locations for natural buffer vegetation were identified on public properties around Wixom Lake.

## Low Impact Design

For BMPs, FLTF agrees that, to the extent practical, low impact development (LID) techniques will provide water quality benefits to the restored lakes, as well as provide an offset to adverse impacts associated with the basin refill process and dam reconstruction. The EPA defines the term LID as “systems and practices that use or mimic natural processes that result in the infiltration, evapotranspiration or use of stormwater to protect water quality and associated aquatic habitat.” Stormwater, in a mixed-use watershed such as the one that drains to the lakes, is comprised of a variety of pollutants from agricultural land uses, as well as urban land uses. These pollutants range from nutrient loading associated with use of fertilizers,



hydrocarbons associated with automobile use, and bacteria loading associated with manure application, failed or poorly functioning onsite wastewater systems, and natural background loads.

With the acknowledgement that Four Lakes Task Force, as the Delegated Authority, and the Special Assessment District (SAD) have extremely limited powers to directly influence land use changes within the impacted watershed, change or promulgate rules/regulations governing land use, or expend funds outside of its jurisdiction, FLTF will promote, partner, and assist stakeholders with education and activities that embody LID principles and have the primary purpose improving water quality and dedicate \$400,000 of funding for projects. Specific projects are being reviewed for implementation of LID BMPs on public properties adjacent to both Sanford and Wixom lakes.

### Part 303 Wetland Mitigation

A detailed wetland report identified that the failure of the Edenville and Sanford dams resulted in the loss of existing wetlands and the development of new wetlands. The development of wetlands within the drained lakebeds, in the interim period until lakes are restored, mostly consists of low- quality wetlands. The loss of wetlands are in the forests and other natural communities adjacent to the lakes. Much of the wetland lost due to the draining of the lakes was of the highest quality and value to the lake ecosystem. Upon restoration of the lakes, the high-quality wetlands adjacent to the lakes will be rehydrated.

EGLE has indicated that wetlands developing in the drained lakebeds, although not expected to develop into high-quality systems, will be required to be mitigated. EGLE has also determined that the wetlands which will be rehydrated can offset the impacts to the bottomland wetlands once the hydrology is restored.

Based on the results of studies conducted by FLTF, it is estimated that the amount of wetlands negatively impacted by the disaster are greater than those developing on the Wixom Lake and Sanford Lake bottomlands. Impacted wetlands are historically intact ecosystems of higher floristic quality than the degraded, low-quality wetlands forming on the lake bottomlands. A summary of wetland impacts related to the draining of the Sanford and Wixom lake impoundments is provided below in [Figure 6](#). Please note that these values have been revised following the results of studies completed to date and follow-up agency correspondence.

**Figure 6: Summary of Wetlands Impacts**

Impoundment Watershed	Total (Acres)	Wetland Type (Acres)				
		PEM	PSS	PFO	PUB	Submergent
Created Wetlands						
Wixom Lake	447	165	282	0	0	0
Sanford Lake	165	70	95	0	0	0
<b>Totals</b>	<b>612</b>	<b>235</b>	<b>377</b>	<b>0</b>	<b>0</b>	<b>0</b>
Impacted Pre-Disaster Wetlands						
Wixom Lake	1,483	120	93	1,263	8	278
Sanford Lake	980	70	83	819	8	74
<b>Totals</b>	<b>2,463</b>	<b>190</b>	<b>176</b>	<b>2,082</b>	<b>16</b>	<b>352</b>

Refill of the lakes associated with the construction of the Sanford and Edenville dam projects will result in the permanent flooding of 612 acres of wetland present on the current day Wixom Lake and Sanford Lake bottomlands. At the same time, the refill of the lake will return hydrology to approximately 2,463 acres of historically intact wetlands. This includes return of hydrology and ecosystem function of those wetlands adjacent to the lakes while also creating suitable habitat for submergent wetland vegetation along its shallow water shorelines. Wetlands will continue to be monitored following the lake refill to assess continued changes to these environments. Overall, impact on wetlands associated with the projects are expected to be a net benefit to this resource.



## Threatened and Endangered Species

FLTF must also comply with other federal and state laws such as the federal Endangered Species Act (ESA), the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA) and state statutes related to state-protected species and resources. In 2022, Central Michigan University (CMU) completed extensive mussel survey efforts. During these efforts, the snuffbox mussel was identified within Wixom Lake. In accordance with the circuit court order, Wixom Lake's water level will be returned to the pre-disaster lake level. Based on our engineering modeling, this action is reasonably certain to result in the "take" of the endangered Snuffbox mussel. It was determined that FLTF would need to apply for an Incidental Take Permit (ITP) from the United States Fish and Wildlife Service (USFWS). FLTF followed the Section 10 ESA compliance pathway by developing a Habitat Conservation Plan (HCP) and went through the NEPA process with the USFWS as the lead federal agency.

HCPs are planning documents<sup>22</sup> required as part of an application for an incidental take permit. They describe the anticipated effects of the proposed taking; how those impacts will be minimized or mitigated; and how the HCP is to be funded.

FLTF developed an HCP, to quantify the impacts of restoration of the normal (legal) lake level of Wixom Lake and operations of the lake on snuffbox mussels, and the conservation measures that must be incorporated into project activities to minimize and mitigate take of this species, as well as identifying the funding necessary to implement the conservation program.

The HCP and NEPA process was completed as a condition of the issued EGLE permit for Edenville Dam. FLTF was issued an ITP on February 20, 2025, and the ITP is effective through February 20, 2055. The HCP includes FLTF's proposed Conservation Measures for the project over the 30-year term of the ITP. These Conservation Measures include actions and reporting that must be completed on an annual basis. FLTF will be responsible for several actions. These include, but are not limited to:

- Oversight of physical construction and maintenance activities associated with Edenville Dam and Wixom Lake.
- Following prescribed water elevation change requirements.
- Installation and maintenance of an FLTF-installed or USGS-installed water level gage at Dale Road. Monitoring of this gage and the existing USGS Glidden Road gage weekly for the term of the permit.
- Development and oversight of a public information campaign, which includes a dedicated \$200,000 fund for Low Impact Development efforts in accordance with EGLE permit conditions.
- Development and oversight of a Lake Management Plan that may be used to inform strategies for grant-funded opportunities.
- Development and oversight of grant-funded opportunities with a value of \$280,000, and if unable to identify such projects, provision of the balance to the USFWS in support of alternative mitigation projects.
- Provision of a surety bond to USFWS in the amount of \$280,000 to ensure that the HCP's proposed mitigation actions are implemented, appropriately monitored, and that the adaptive management processes are followed if warranted as required to comply with the permit.
- Provision of an initial letter of credit to USFWS in the amount of \$46,450 to cover the cost of specialized contractor and equipment requirements that are necessary to implement and appropriately monitor actions required to comply with the permit. The letter of credit would be updated annually as costs are reassessed.
- Provision of an annual FLTF SAD budget, future assessment budgets, hearing documents, and approved assessment notices to USFWS.
- Reporting to federal and state agencies in compliance with permit conditions.

<sup>22</sup> Read the U.S. Fish & wildlife Service "Habitat Conservation Plans Under the Endangered Species Act" in the Chapter 6 Appendix.



Photo by Dr. Chris Barnhart, Missouri State University

*The logperch is a host fish for snuffbox mussels. In this photo, a logperch approached the female mussel, which then snapped shut. Oftentimes, the mussel will snap closed on a fish's head or snout, ensuring that glochidia are released into the fish's gills.*



## Chapter 7: Operations Excellence

Four Lakes Task Force (FLTF) is committed to demonstrating excellence in all facets of its operations for the benefit of its stakeholders. Operations excellence is achieved through the execution of well-thought-out objectives created from the organization's shared vision that reflects its stakeholder interests.

There are three key principles associated with excellent operations:

- 1) Safe operations for both the public and FLTF employees
- 2) Regulatory compliant operations to meet public performance standards
- 3) Environmental excellence as stewards of the natural resources at hand.

These principles formed the path forward for FLTF in its operations and are further described below.

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**1. Safe Dams/Safe Public:** FLTF developed a state-of-the-art Dam Safety Program (DSP) consistent with the dam safety requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) and following the guidelines of the Federal Emergency Management Agency's (FEMA) Model Dam Safety Program (MDSP). The MDSP is a forward-looking program that provides sound guidance for dam safety that is consistent with the latest national and international industry standards. FLTF created a well-founded set of processes to ensure its dam and public safety programs are successful. Thorough Public Safety Plans (PSP) were created to take actions that protect the public from facility hazards; these include but are not limited to new barrier floats upstream of the spillway intakes, safety signage in and around dams and emergency alert systems. The DSP and PSPs are reviewed annually for improvements.

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**2. Emergency Action Plans:** FLTF worked with Gladwin and Midland counties' emergency directors to create new Emergency Action Plans (EAPs) for notifying the public of emergency conditions from abnormally high river flows, impending dam failures, or actual dam failures. The new EAPs are organized to give FLTF operations personnel clear instructions for responding to emergency conditions at the sites and provide additional needed information that they can refer to during emergencies and for training purposes. EAP implementation drills will be coordinated with emergency managers from Gladwin and Midland counties as part of their emergency preparedness. A more in-depth functional test of the EAPs will be determined as FLTF engages with the two counties and Michigan EGLE. The EAPs are reviewed on an annual basis and updated as changes are required.

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**3. River Operations & Gauging:** FLTF reviewed the extent of available river flow and weather information for the Four Lakes and found that additional equipment was needed to properly operate the river system. This information is not only critical to FLTF operations, but also for better flood flow prediction, early notification of impending high river flows and evacuation of residents. FLTF worked with United States Geographical Survey (USGS), the National Weather Service, Gladwin and Midland counties and others to identify key locations for river flow gauges and weather stations (rainfall, barometric pressure, etc.). River gauging and weather stations were installed.

Additionally, FLTF developed a Supervisory Control and Data Acquisition (SCADA) system to provide real-time and historical data to dam operators, site security, as well as important information about the maintenance of lake levels. Operations staff have access to this information on a real-time basis, thereby enabling them to understand evolving flood, security, or dam safety situations while maintaining compliance with monitoring, reporting, regulatory and operating requirements.

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**4. Employee Safety:** A quality safety program is essential to the well-being of FLTF employees. Therefore, a safety consultant worked with FLTF Operations to develop critical safety procedures and policies. Weekly training sessions and monthly safety committee meetings are regularly conducted. Facility safety assessments and upgrades have been made to protect employees from hazards. A quality safety program will lead to a valued safety-based culture and good working practices.

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**5. Regulatory Compliance:** FLTF Operations developed a Commitments Management System to ensure compliance with all regulatory requirements including dam safety, environmental monitoring, operations monitoring, equipment, facilities maintenance management and administrative requirements. Achieving complete and timely compliance with its requirements is essential in maintaining good relations with the regulatory agencies and helps them meet their regulatory program objectives.

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**6. Cost Management:** FLTF is sensitive to its operating costs being borne by the Special Assessment District and works to minimize its costs. The use of technology to organize and improve work process efficiencies allows FLTF to achieve operations excellence. The use of contractors to perform peak or specialized work instead of bringing on additional specific full-time staff also helps minimize costs.

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**7. Monitoring and Maintenance:** Key activities to achieving operational excellence and dam safety revolve around an effective monitoring and surveillance program for a dam. FLTF Operations, in conjunction with dam safety experts, developed dam safety surveillance and monitoring programs for interim and long-term conditions. The execution of the dam safety surveillance and monitoring program (DSSMP) was comprised of daily, weekly, monthly and annual maintenance activities, operational checks, field readings and observations on the dams. The execution of this program and follow up on any identified issues are central to FLTF operations.

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FLTF and its stakeholders are best served by one centralized operations entity that fulfills the responsibilities of each of the four individual lakes and facilities. A single management team can operate efficiently, creating cost savings by avoiding the duplication of efforts that would occur if there were four independent lakes with their own management structures and resources. The aggregation of management responsibilities better assures consistent and thorough policies, procedures and performance across the four lakes system. Specifically, Operations staff can assist one another to complete work issues and betterment projects without having to rely on outside contractors for frequent assistance. Also, having one management team allows for a broader watershed perspective of situations and opportunities and enables the team to address them more optimally.



## Chapter 8: Funding and Financing

### 8a. Operations

Four Lakes Task Force (FLTF), as the Counties' Part 307 Delegated Authority, is responsible for operating and maintaining the dams in accordance with the requirements of the State of Michigan – Dam Safety:

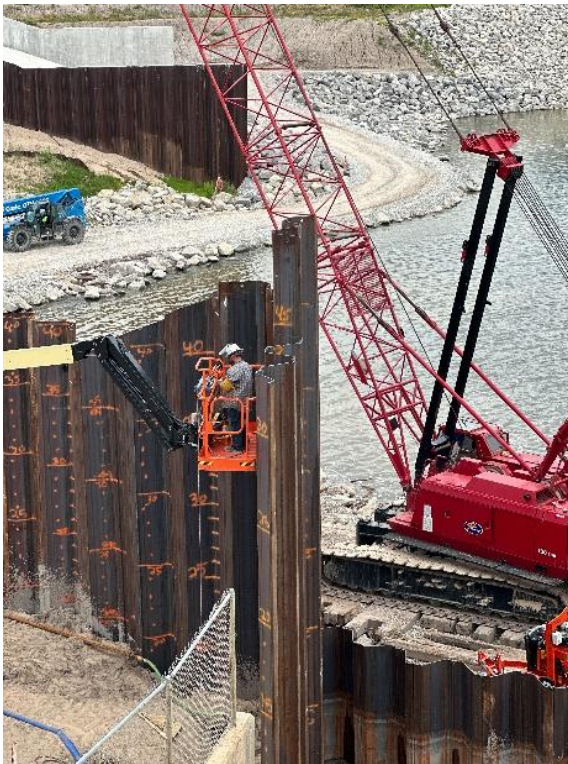
“[o]perate and maintain the dams in a safe manner consistent with current industry standard practices. FLTF should develop an Operation, Maintenance and Surveillance Plan which outlines operational procedures (if any) and type, frequency and reporting of monitoring and maintenance at each dam.

Emergency action plans are required to be developed for each dam in coordination with the County Emergency Managers. The plans must be submitted to EGLE for review and should be reviewed annually by FLTF and updated accordingly as modifications are made to the dams.”

Accordingly, the operational costs account for the operations and management of the lakes during the transition to their normal levels, emergency repairs, the development of operational plans and long-term, ongoing operations. The primary source of revenue to fund operation and maintenance costs comes from lake level special assessments. This is the process consistently used throughout Michigan to fund lake level projects and maintenance. The Four Lakes Special Assessment District (FLSAD) was judicially established to fund both the Restoration Project and ongoing operation and maintenance to ensure sustainability of the infrastructure for future generations.

Currently there is an assessment for operations and maintenance in place for 2025-2029.<sup>23</sup>

### 8b. Dam Repair and Lake Restoration



FLTF received a \$200 million State of Michigan grant appropriated in March 2022, of which \$180 million offset restoration costs. This grant did not cover the total project cost and had a 20 percent match requirement. Therefore, capital improvement funds were needed to cover a portion of the construction and repair costs.

After completing designs, acquiring all permits, and resolving legal appeals, a Capital Improvement Assessment was put in place starting with the winter 2025 tax bill. More detail on the specifics of the assessment can be found in [Chapter 9c](#).

The 2025 Lake Level Capital Assessments were necessary to provide funding for project restoration. The special assessment revenue was needed to finance the final phase of the project. FTLF continues to search for alternative sources of funding to offset the assessment costs. Local units of governments, such as a county, city, township, village, or other statutory authorities (e.g., lake level Special Assessment District), cannot borrow money from conventional lenders under loan agreements, or pledge municipal property or assets as collateral to secure loans unless expressly provided by law. To finance public infrastructure, governmental entities will issue long-term

municipal bonds.

<sup>23</sup> See the Operations and Maintenance Assessment Memo for more detail including the computation of cost in the Chapter 8 Appendix.



Pursuant to Part 307, the Four Lakes SAD can issue municipal bonds with a term of up to 40 years. The approved capital improvement special assessment is proposed to finance the remaining project costs over the next 40 years.


FLTF leveraged State of Michigan funds along with two Four Lakes Special Assessment District municipal bond issuances to fund the Four Lakes Restoration.<sup>24</sup>

## 8c. Grants and Donations

To date, FLTF has received \$247.5 million in grants and donations. See [Figure 7](#) below for an itemized breakdown. All grants and donations received alleviate the financial burden on the Four Lakes Special Assessment District.

FLTF continues to seek other grant opportunities to minimize the costs that fall to lake property owners. FLTF regularly reviews grants and communicates with local foundations to seek funding wherever it may be available and when an organization's purpose matches the goals of FLTF. In addition, FLTF is engaged in an active advocacy program and seeks federal and state grants and funding to reduce the overall burden on the county and lake property owners.

**Figure 7: Funding Sources**

 Four Lakes Task Force	
<b>Funding Sources - Post May 2020</b>	
<b>State of Michigan</b>	
SOM \$15M Interim	\$ 15,000,000.00
SOM \$2.5M Interim	\$ 2,500,000.00
EGLF Funds	\$ 3,000,000.00
\$200M Restoration	\$ 200,000,000.00
<b>USDA NRCS</b>	
EWP Grants	\$ 20,413,449.62
<b>FEMA HHPD</b>	
FY '21 & FY '22	\$ 702,615.00
<b>USDA Community Facilities</b>	
Boom Grant	\$ 795,000.00
<b>Private Donations</b>	
Just under \$5 million in private donations raised	
<b>Total</b>	<b>\$ 247,411,064.62</b>

Not included in these numbers is an additional \$9.8 million provided in a grant to Four Lakes Task Force by the State of Michigan in October 2025.

<sup>24</sup> The Capital Assessment Memo shares the plan of financing in detail in the Chapter 8 Appendix.



## 8d. Lake Level Special Assessment

The Four Lakes SAD was judicially established and consists of lakefront and backlot (with lake access) properties along or near the Four Lakes. As with other lake improvement districts, properties within the SAD share financial responsibility by paying an annual assessment on each property's tax bill. The lake level special assessments provide the security required to finance costs associated with the acquisition, operation, maintenance, repairs and improvements to the dams to ensure that they meet State of Michigan dam safety standards, per Part 315 "Dam Safety" of NREPA, MCL 324.31501 et seq. (Part 315).

### Special Assessment Legal Process

Part 307 "Inland Lake Levels" of the Michigan Natural Resources and Environmental Protection Act, authorizes a county board of commissioners to petition a local circuit court and request that it establish the appropriate (or normal) lake level for inland lakes located within the county.<sup>25</sup> Once the lake level(s) are established, Part 307 also grants the circuit court "continuing jurisdiction."<sup>26</sup> Realizing that there are costs associated with maintaining the court-ordered lake level, the legislature sensibly determined that the county can petition the circuit courts to establish a lake level special assessment district for the express purpose of allowing the county to defray the administration, design, construction, operation, maintenance, repair and improvement costs by distributing the costs to those in the judicially-established special assessment district.<sup>27</sup> Those who benefit from the lake, such as the private property owners adjacent (i.e., waterfront) or with deeded access (i.e., backlots), political subdivisions, and state owned lands, are typically included in the special assessment district and are subject to the lake level special assessments levied by the delegated authority.<sup>28</sup>

Part 307 provides for the control and maintenance of inland lake levels for the benefit and welfare of the public, to preserve the natural resources of the state, and to best preserve and protect the value of property around a lake.<sup>29</sup> Part 307 "authorizes counties to make policy decisions as to the levels of their inland lakes, and build and finance dams as necessary to maintain the desired lake levels."<sup>30</sup> To this end, the lake level special assessment district is authorized to issue municipal bonds, notes and lake level orders in anticipation of special assessments.<sup>31</sup>

To pay costs associated with a lake level project, Part 307 requires the "delegated authority" compute the costs of the lake level project(s), and prepare a lake level special assessment roll.<sup>32</sup> In levying the lake level special assessments, the delegated authority prepares a special assessment roll in accordance with the Michigan Drain Code.<sup>33</sup> The lake level special assessment roll is based on the delegated authority's apportionment of all costs required to maintain the court-ordered lake level, and if the revenues raised are insufficient to meet the computation costs as provided in Section 30712, the "special assessment district may reassessed without hearing using the same apportioned percentage used for the original assessment."<sup>34</sup> Lake level special assessments, similar to drain assessments under the Michigan Drain Code, are based on the delegated authority's methodology that apportions the lake level project costs on the benefits derived to the properties, public corporations and state lands within the lake level special

<sup>25</sup> MCL 324.30702, MCL 324.30707.

<sup>26</sup> MCL 324.30707(5).

<sup>27</sup> MCL 324.30704, MCL 324.30711, MCL 324.30712.

<sup>28</sup> MCL 324.30711.

<sup>29</sup> See MCL 324.30701(h), "Normal level" mean the level or levels of the water of an inland lake that provide the most benefit to the public; that best protect the public health, safety, and welfare; that best preserve the natural resources of the state; and that best preserve and protect the value of property around the lake...[.] See also *In re Van Ettan Lake*, 149 Mich App 517, 525; 386 NW2d 572 (1986) ("[T]he purpose of the Inland Lake Level Act is to provide for the control and maintenance of inland lake levels for the benefit of the welfare of the public.")

<sup>30</sup> *In re Van Ettan Lake*, 149 Mich App at 525–26.

<sup>31</sup> MCL 324.30705.

<sup>32</sup> MCL 324.30711(1); MCL 324.30712.

<sup>33</sup> MCL 324.30705(3) "[A]ll proceedings relating to the making, levying, and collection of special assessments authorized by this part ... shall conform as nearly as possible to the proceedings for levying special assessments... as set forth in the drain code of 1956"

<sup>34</sup> MCL 324.30711(1) and (2).



assessment district.<sup>35</sup>

Before submitting the special assessment roll to the county board of commissioners for final approval, there must be a public hearing to discuss the project costs and the special assessment roll.<sup>36</sup> The Part 307 lake level special assessment hearing is akin to a “day of review” under the Michigan Drain Code, where property owners may have their apportionment reviewed and object to the special assessment. Part 307 requires that a mailing of the notice of hearing to each property owner in the special assessment district and the publication of the hearing notice twice in a newspaper that circulates in the special assessment district with the “first publication to be at least 10 days prior to the hearing.”<sup>37</sup> The notice mailed to each property owner must comply with Michigan Public Act 162 of the Public Acts of 1962.<sup>38</sup> Public Act 162, among other things, provides that the hearing notice shall be mailed to the property owner of the property to be assessed (and whose name appears on the tax records) at least 10 days before the hearing and contain a statement that appearance and protest at the hearing is required in order to appeal the amount of the special assessment or may file an objection in writing, “in which case his or her personal appearance shall not be required.”<sup>39</sup> Accordingly, before or at the hearing, property owners may review their lake level assessment, present evidence or other information that may affect the apportionment percentage, object to the special assessments and the costs of the project.

After the hearing, the costs of the lake level project and the lake level special assessment roll may be approved (or revised) by the delegated authority.<sup>40</sup> The final step in the process requires the costs of the project and the special assessment roll to be approved by the county board of commissioners.<sup>41</sup> A property owner subject to the assessment may then challenge the special assessment roll by appealing to the circuit court within fifteen days after approval of the special assessment roll and computation of cost by the county board.<sup>42</sup>

## Background on the Four Lakes Special Assessment District Rolls

FLTF was transparent with the SAD process for the 2022-2024 Operations and Assessment Roll, 2025-2029 Operations and Maintenance Assessment Roll and Capital Improvement Assessment Roll. Publications and information are readily available on the [FLTF website](#), and footnoted.

After significant communications throughout 2023, on January 15, 2024, FLTF conducted a Special Assessment Hearing. On February 6, 2024, Midland and Gladwin Counties approved the Project Computation of Cost and the Special Assessment Roll, as well as the 2025-2029 Operations and Maintenance assessment roll and computation of cost.

A claim of appeal was filed in Midland County Circuit Court challenging the Gladwin and Midland County Boards of Commissioners’ approval of the special assessment rolls required to restore Smallwood, Secord, Wixom, and Sanford lakes. The claim of appeal was submitted to the circuit court by the Heron Cove Association, formed in January of 2024 which seeks on behalf of its members to set aside the special assessment roll. On June 20th, 42nd Circuit Court Judge Michael Beale issued an opinion and order to confirm Gladwin and Midland counties’ February 6<sup>th</sup> approved lake level special assessment rolls to restore and maintain the legal lake levels in the Four Lakes Special Assessment District:

<sup>35</sup> Id.

<sup>36</sup> MCL 324.30714(2).

<sup>37</sup> MCL 324.30714(2)

<sup>38</sup> Id.

<sup>39</sup> MCL 211.741(1), (2), & (3).

<sup>40</sup> MCL 324.30714(3).

<sup>41</sup> Id.

<sup>42</sup> MCL 324.30714(4); MCL 324.30701(c). Note: the Michigan tax tribunal lacks subject-matter jurisdiction to hear lake-level appeals. See *In re Project Cost and Special Assessment Roll For Chappel Dam*, 282 Mich App 142, 145 & 147; 762 NW2d 192 (2009); see also *USL Improvement Assoc v Oceana County Drain Commissioner*, unpublished per curiam opinion of the Court of Appeals issued Mar 13, 2012 (Docket Nos 297157 & 298080) (Held: Circuit court—not the Tax Tribunal—has jurisdiction to hear lake-level special assessment appeals).



*"The Court finds, from the record before it, Appellants [Heron Cove Association] have failed to carry their burden and show the special assessments are not supported by competent, material and substantial evidence due to lack of credible evidence rebutting the presumption of validity for a special assessment district apportionment determination... Appellants' appeal seeking relief from the FLTF Special Assessment District apportionment is DENIED."*

On July 11, 2024, Heron Cove Association (HCA) filed a request asking the Michigan Court of Appeals to review Judge Beale's decision. HCA filed both a "Claim of Appeal" and an "Application for Leave to Appeal" in the Michigan Court of Appeals. HCA was granted a Claim of Appeal. On January 6, 2025, the Michigan Court of Appeals affirmed the decision of the Midland County Circuit Court. On February 15, 2025, HCA proceeded to file an "Application for Leave to Appeal" in Michigan Supreme Court. On April 11, 2025, the Michigan Supreme Court denied HCA's "Application for Leave to Appeal."

In March 2024, while the administrative appeal of the lake level special assessments were pending, HCA also filed two separate lawsuits against the counties and FLTF. The counties removed them to federal court, and the cases were assigned to Judge Ludington of the United States District Court, Eastern District. Judge Ludington recused himself from these cases and the cases were assigned to U.S. District Judge Matthew Leitman. On March 21, 2025, Judge Leitman issued an order dismissing all of HCA's complaints in the two separate lawsuits against Gladwin and Midland counties and FLTF.

### **Municipal Bonds and Notes Background**

Local units of governments, such as a county, city, township, village, or other statutory authorities (e. g., lake level SAD), do not have the authority to borrow money from conventional lenders under loan agreements, or pledge municipal property or assets as collateral to secure loans unless expressly provided by law.<sup>43</sup> This follows the basic understanding that local units of government have only those powers to borrow as expressly granted by Michigan law. The power to raise revenue and incur debt depends on the statutory powers granted to the specific governmental unit.

A municipal bond is a debt security used to finance the construction of public infrastructure such as roads, bridges, water systems and sewer systems. Most governmental units and many non-profit organizations are authorized to issue municipal securities in the form of a bond or note to raise funds for capital improvements. Municipal securities are generally issued on a tax-exempt basis, which means that the interest on the security paid by a governmental unit is tax-free, making the bonds attractive to investors.

The Four Lakes SAD must operate within a restrictive set of rules in financing specific projects. Part 307 authorizes this district to issue bonds, notes, or lake level order in anticipation of the collection of special assessments.<sup>44</sup> Bonds and notes issued by a lake level SAD must comply with Michigan's Revised Municipal Finance Act<sup>45</sup> and may have a final maturity date not exceeding 40 years. As additional and secondary security, the county board of commissioners by a vote of two-thirds of its members may pledge the full faith and credit of the county for payment of the bonds or notes issued by the SAD.<sup>46</sup> Finally, proceedings relating to the making, levying and collection of special assessments authorized by Part 307 and "the issuance of bonds, notes, or lake level orders in anticipation of the collection of the special assessments shall conform as nearly as possible to the proceedings for levying special assessments and issuing special assessment bonds as outlined in the drain code of 1956, 1956 PA 40, MCL 280.1 to 280.630."<sup>47</sup>

<sup>43</sup> MCL 141 .2301.

<sup>44</sup> MCL 324.30705.

<sup>45</sup> 2001 PA 34, MCL 141.2101 to 141.2821.

<sup>46</sup> MCL 324.30705(4).

<sup>47</sup> MCL 324.30705(3).



## 8e. Use of Special Assessment District for Financing

FLTF is using special assessment revenue to fund the operations costs and capital improvements costs. The operations costs account for the operations and management of the lakes during the transition to their normal levels, emergency repairs, the development of operational plans and long-term, ongoing operations. Utilizing lake level special assessments was part of the financing plan since the projects began pre-dam failure. The capital improvement costs cover the cost of restoration of the dams, less the grants that were received as outlined in [Chapter 9c](#). The computation of costs and individual assessments are available in [Chapter 9c](#).

Municipal bonds are typically sold on a tax-exempt basis and therefore interest rates are typically much lower than borrowing rates to a commercial entity. The interest rate for the first series of tax-exempt municipal bonds was 5.94 percent. Municipal financing is the fastest way to obtain funds to

complete the construction of a project which can happen in a few months. With this alternative, the counties agreed to pledge their full faith and credit, which provides additional security for the purchasers of the municipal bonds, and along with an adequate bond approval rating, lowers the overall true interest cost of the bonds issued for the project.

## 8f. Financing Conclusion

The FLTF plan of financing accounted for many variables surrounding permitting, timing and restricted funding sources. Based on all variables, FLTF is leveraging State of Michigan funds and funding from two FLSAD municipal bond issuances to fund the entirety of the Four Lakes Restoration. An \$80 million bond was secured in June 2025 to fund the Sanford, Secord, Smallwood and Edenville projects through 2025. In 2026, FLTF intends to utilize the remainder of State of Michigan funds prior to their expiration in September 2026. In the summer of 2026, FLTF will go out for a second bond issuance for the remainder of project costs less any additional prepayments or grants received.



# Chapter 9: Lake Level Project Special Assessments

## 9a. Introduction

A Capital Assessment of property owners within the Four Lakes Special Assessment District (SAD) was approved to restore and maintain the lakes. It is the foundation of funding required to restore the lakes and attract supplemental funding. There are two separate assessment rolls to restore and sustain the lakes: Operations and Maintenance Assessment Roll and a Capital Assessment Roll.

Four Lakes Task Force (FLTF) developed a consistent methodology for the assessment of benefits to restore and maintain the lakes. FLTF presented its methodologies for establishing benefit factors on the website and during informational webinars. FLTF implemented substantial outreach programs,<sup>48</sup> which were effective, as it received a substantial amount of input from property owners regarding the SAD benefit factors. The methodology<sup>49</sup> was finalized and approved by the Four Lakes Task Force board on January 15, 2024 and the Midland and Gladwin County Boards of Commissioners on February 6, 2024.

## 9b. Operations and Maintenance

The four dams and lakes restoration will be managed, as it has been, as a total system. The acquisition, restoration and long-term maintenance of the lakes are more effectively managed and operated as one project in one SAD. These lakes are hydraulically linked in their operations and managing this as one project brings economic scale and expertise beyond what one lake community could manage. Property owners have the option to pay the assessment off in less than 40 years, should they choose.

There is also an Operations and Maintenance (O&M) Assessment for all property owners in the Four Lakes Special Assessment District. This assessment will be updated frequently and will fund operations and maintenance. There was an initial O&M Assessment before the dams were reconstructed, which was referred to as the “transition assessment.” As the dams and lakes are restored, the assessment amount will be updated to reflect post-restoration operations and maintenance costs. The transition assessment from 2022- 2024 covered the costs to operate the dams even before the dams were restored. This assessment was allocated among all properties based on the benefit derived. The next Operations and Maintenance Assessment<sup>50</sup> begins in 2025 and lasts through 2029. There will always be an Operations and Maintenance Assessment to fund sustainable dams into the future.

<sup>48</sup>Prior to approval of the Capital Assessment, FLTF held 304 one-on-one meetings with property owners to review the assessment methodology, parcels and cost.

<sup>49</sup> See the January 2024 “Four Lakes Special Assessment District Assessment Methodology” in the Chapter 9 Appendix.

<sup>50</sup> See the Operations and Maintenance Assessment Memo in the Chapter 8 Appendix.



## 9c. Capital Assessment

### Capital Assessment Computation of Cost

The Capital Assessment amount was based on the total restoration project cost less grants received. The computation of cost is itemized below. The computation of cost contains a 9.5 percent contingency, necessary to address unanticipated project costs and legal challenges as well as to manage the obligations set forth in Part 301 for the Edenville and Sanford permits.

The Capital Assessment computation of cost<sup>51</sup> includes a total project cost of \$364 million with a 9.5 percent contingency of ± \$34 million. The total project costs are offset by the remaining State of Michigan funds in the amount of \$180 million leading to a not-to-exceed assessment estimate of \$217.7 million. The total assessment amount may be adjusted based on total project costs including contingency utilization or additional grants received which will not be final until 2026 when confidence in remaining costs is high. These numbers have been refined and are in line with expectations set at public webinars on October 12, 2023, and December 6, 2023

<sup>51</sup> A description of items in the Computation of Costs are referenced in the [Capital Assessment Memo](#) in the Chapter 8 Appendix.



## Figure 8: Capital Improvement Computation of Costs

**Four Lakes Task Force Special Assessment District  
COMPUTATION OF COST  
Capital Improvement of Secord, Smallwood, Edenville and Sanford  
January 15, 2024 Special Assessment Hearing**

Be It Known, that the Four Lakes Task Force, acting as the delegated authority on behalf of Midland and Gladwin Counties on part 307 Legal Lake Levels, in accordance with the statute in such case, made the following computation of the entire cost of said lake level, to-

### 1 Establishment of Special Assessment District

Establishment of Special Assessment District and Legal Lake Level were set as a result of the May 2019 Court Order, all costs associated with the hearing, land acquisition and design engineering were either private or public grants and no Special Assessment District funds were required

\$0

Preparation of Assessment Roll and Levying Assessments for Capital Roll

\$50,000

### 2 Construction Administration - Quality Assurance, Quality Controls, Surveying, Project Controls

Secord	\$10,200,000
Smallwood	\$7,800,000
Edenville	\$15,800,000
Sanford	\$13,200,000

### 3 Estimated Cost of Construction

All lakes: site safety, booms, Electrical services	\$7,200,000
Secord	\$57,000,000
Smallwood	\$42,400,000
Edenville	\$127,000,000
Sanford	\$76,800,000

### 4 Estimated Cost of Appeal

\$100,000

### 5 Cost of Mailing, Publishing Notices and Administration

\$9,500

### 6a Loan & Bond Issuance Costs

USACE Loan Fee	\$250,000
Rating Fees	\$75,000
MAC Fee	\$900
Printing notice of sale and official statement	\$3,250
Michigan Department of Treasury Filing for bond	\$1,100
Michigan Department of Treasury Filing for loan	\$1,100
Bond Counsel and Financial Advisor for loan	\$180,000
Bond Counsel and Financial Advisor for bond	\$220,000

### 6b Cost of Capitalized Interest

\$6,000,000

*Gross Sum of Expenses* \$364,290,850

*Contingent Expenses (9.5 ±%)* \$34,584,150

*Total project computation of cost* \$398,875,000

Less State of Michigan Grant -\$180,000,000

Less USDA Boom Grant, MDOT Settlement -\$1,175,000

*Total amount to be assessed* \$217,700,000

Filed in the office of the Four Lake Task Force as the Delegated Authority for Midland and Gladwin County with other papers pertaining to the within-mentioned lake level. Dated at \_\_\_\_\_, Michigan, this \_\_\_\_\_ day of \_\_\_\_\_, 2024.

## Annual Capital Assessment Payments

Based on the Capital computation of cost and the plan of financing the Capital Assessment will run for a total of 40 years (2025 – 2065). Interest will be capitalized on the bond. As a result, the first Capital Assessment will not appear on tax bills until Winter 2025.



## Annual Assessment Amounts

The annual payment amounts vary due to the principal repayment structure on the bond and loan. This information is explained in more detail in the Capital Assessment Memo found on the [Special Assessment District page of the FLTF website](#) or in the Chapter 8 Appendix.

One of the most frequent questions FLTF gets asked is the annual payment amount for homeowners based on the total assessment amount. Below is a table illustrating the average annual payment amounts with principal and interest at \$217.7 million, the not-to-exceed amount. Also incorporated is the 2025-2029 O&M Assessment, to define the total annual payment homeowners can anticipate.

**Figure 9: Average Annual Assessment Payment for O&M and Capital Assessments**

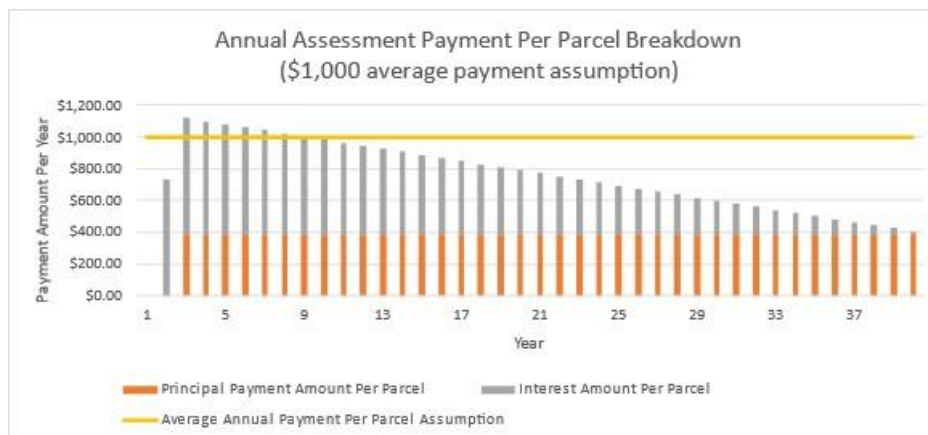
Benefit Factor Assigned	2025-2029 O&M Annual Assessment Payment	Capital Assessment Annual Payment (Principal + Interest on \$217.7M)	Total Average Annual Payment (O&M + Capital)
1 (High Residential Lot)	\$ 320	\$ 2,560	\$ 2,880
0.75 (Typical Front Lot)	\$ 240	\$ 1,920	\$ 2,160
0.5 (Lowest Front Lot)	\$ 160	\$ 1,280	\$ 1,440
0.25 (Typical Backlot)	\$ 80	\$ 640	\$ 720

## Variation in Annual Assessment Amounts

The annual payment for the Capital Assessment will not be the same dollar amount year after year. Each year, homeowners will experience a slight change in the annual amount due. This is due to the equal principal payment model that will be utilized for repayment of municipal bonds. The principal amount will remain the same year-to-year, but the interest amount will decrease as the principal balance is reduced. This leads to the highest annual payment in year one and the lowest annual payment in year 40.

To illustrate this concept more clearly, the first-year annual payment will be approximately 15 percent higher than the average payment and the last payment will be approximately 15 percent lower than the average annual payment. The graph below summarizes how the annual assessment payment varies year after year per \$1,000 average assessment assumption due to the variation in annual payment over the life of the assessment. This assumes a 40-year payment term and five percent interest rate over a single borrowing.

**Figure 10: Annual Capital Assessment Payment Per Parcel**





## 9d. Capacity to Pay (Affordability)

The loss of the Four Lakes, associated flooding and resulting property damage, created and continues to place a burden on many families. After a disaster of this size, a community is impacted, and the recovery puts a financial cost on local government, the victims of the disaster, and the community. FLTF continues to keep this in mind as we look for solutions to recover the overall system.

The Four Lakes SAD covers nine townships with great economic diversity in lake owners' household incomes and home values. The economic diversity includes:

- Income from poverty levels to households earning in the top 1 percent of the country.
- Home structures ranging from undeveloped cottages to homes over 6,000 square feet.
- Homestead percentages by lake vary from less than 50 percent to greater than 80 percent.

A 2021 Study analyzed the demographics of the Four Lakes Special Assessment District. The median household income for each township and the total population was captured. This was compared to the lake population. Poverty rates and Asset Limited, Income Constrained and Employed (ALICE) population rates were documented as well. This was primarily used to compare the homestead properties for houses below \$60,000 to determine if the assessment would create a critical cost of living issue.

The ability to pay was generally not relevant in the context of apportioning costs and imposing a special assessment. Nonetheless, in addressing the restoration of the Four Lakes system, FLTF and the counties were mindful that there were significant costs that would impact landowners, leaving them with difficult choices. FLTF believes that it is important to assist homesteaders in the SAD who (for a variety of reasons) are economically disadvantaged.

FLTF remained committed to developing a plan outside the context of its role as delegated authority, to assist those living with an income below the basic cost of living in the recovery of the normal lake levels. FLTF explored ways through local charitable foundations or other similar means to assist landowners. The result of this was the establishment of a Four Lakes Housing Support Fund.

The **Four Lakes Housing Support Fund** is a low-income assessment support fund for residents in the FLSAD that provides grants to qualified homeowners to help pay their Capital Assessment for three years. It is designed for low-income seniors and disabled veterans who own homestead properties. The fund is held by Midland Area Community Foundation and administered by Mid Michigan Community Action.

In addition, there is pending legislation in the State of Michigan, known as the Deferral of Special Assessment on Homestead Act that allows for the deferment of assessments until the time of sale of a property for certain economically disadvantaged populations. We are advocating for the reinstatement of this benefit. It should be noted that funds will be difficult to obtain for those that own more than one home.

## 9e. Midland and Gladwin Lake Community Economics

In response to flooding that devastated the community, Four Lakes Task Force surveyed property owners within the Four Lakes Special Assessment District (SAD) to better understand their preferences for rebuilding and replacing the dams and how restoring the lakes may impact their decisions. Public Sector Consultants was tasked with drafting an accompanying report to provide additional demographic information for Gladwin and Midland counties as well as the townships in those counties within the Four Lakes Special Assessment District (SAD) to provide comparison data for survey results.<sup>52</sup>

Of the 31 townships in Gladwin and Midland counties, 11 are located within the SAD. These townships vary drastically in terms of population and employment. For example, population figures range from 417 residents in Bourret Township to 4,630 in Jerome Township; unemployment rates range from 2.7 percent in Secord Township to 6.9 percent in Hay Township; and labor force participation rates range from 32.8

<sup>52</sup> PSC analyzed Billings, Bourret, Buckeye, Clement, Gladwin, Hay, Secord and Tobacco townships in Gladwin County and Edenville, Hope and Jerome townships in Midland County, however there are no FLSAD properties located in Buckeye Township.



percent in Secord Township to 61.4 percent in Hope Township. This variance is likely due to underlying socioeconomic and demographic factors, such as income level and age.<sup>53</sup>

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<sup>53</sup> Please review the detailed study in the Chapter 3 Appendix.



## Chapter 10: Preparing for Post-Lake Fill

### 10a. The Path to Restoring the Lake Levels

The effort to transfer the lakes to public ownership began with the Federal Energy Regulatory Commission issuing a proposal to revoke the Edenville Dam hydropower license in 2018. The effort was significantly impacted by the failure of Edenville Dam in 2020. The counties were able to acquire the four dams and related lake properties following this. FLTF was a sponsor for the flood recovery effort with help from federal and state agencies to protect homes and the environment. At the same time, a dam restoration plan was developed and implemented. The dams are all permitted, and construction is underway. As dam restoration projects end, the lakes will be refilled.

Refilling the lakes will not be the end of work to restore the dams and lakes. The dams will require ongoing maintenance to realize the longest possible return on investment from the dams. Refilling the lakes is essential to restoring the lakes' environment, but it is not the end of environmental restoration.

### 10b. Final Phase Construction

The four dams are designed to manage normal (legal) lake levels<sup>54</sup> and function in run-of-river mode. When the dams are completely restored, their spillway capacities will be significantly greater than the pre-2020 capacities. Spillways protect the dams against failure during a flood event. Spillway capacity is the amount of water that can safely flow through a dam. The May 2020 flood was estimated to be between a 100- to 200-year storm frequency which caused Edenville Dam to fail.<sup>55</sup> The restored dams are designed to withstand a 5,000-year storm frequency event.

With construction work underway on all dams, FLTF resumed [monthly construction update newsletters](#) for the public and continues to share updated estimated dam substantial construction completion dates.

Below are the substantial completion dates that are in the construction plans. Please note these dates can change based on how construction progresses and the weather.

**Figure 11: Estimated Dam Substantial Completion Dates**

Dam	Estimated Dam Substantial Completion Date <i>As of July 14, 2025</i>
Secord	September 2026
Smallwood	June 2026
Edenville	September 2027
Sanford	December 2025

Note that substantial completion does not equal lake fill which is permitted to be done between April 15 and October 1. Fill estimates are based on normal annual rainfall.

<sup>54</sup> Part 307, Inland Lakes, under the Natural Resources and Environmental Protection Act is the legal process for establishing a normal lake level. A court order in April 2019 established legal lake levels for the Four Lakes.

<sup>55</sup> An Independent Forensic Team report sites "static liquefaction (flow) instability of saturated, loose sands in the downstream section of the embankment" as the most plausible cause for the failure of Edenville Dam. Read the report and FLTF's analysis of the findings in the Chapter 10 Appendix.



## 10c. Watershed Management

A comprehensive watershed Management Improvement program is being established for the Four Lakes System to ensure environmental restoration and recreation facilities continue to improve. The first step was to create a Four Lakes Watershed report<sup>56</sup> of the progress made to date over the past five years, and the plans going forward to continue to improve and increase environmental capacity and improve quality of life for the community.

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<sup>56</sup> See the “2025 Four Lakes Watershed Management” report in the Chapter 10 Appendix.



## Acronyms

ALICE: Asset Limited, Income Constrained and Employed

Ayres: Ayres Associates

BMP: best management practice

Boyce: Boyce Hydro Power

CFS: cubic feet per second

CLOMAR: Conditional Letter of Map Revision

CMU: Central Michigan University

DSP: dam safety program

DSSMP: dam safety surveillance and monitoring program

EAP: emergency action plan

EGL: Michigan Department of Environment, Great Lakes, and Energy

EPA: Environmental Protection Agency

ER: environmental report

ESA: Endangered Species Act

EWP: Emergency Watershed Protection (program)

FEMA: Federal Emergency Management Agency

FERC: Federal Energy Regulatory Commission

FLSAD: Four Lakes Special Assessment District

FLTF: Four Lakes Task Force

GEI: GEI Consultants of Michigan

HCA: Heron Cove Association

HCP: Habitat Conservation Plan

IDF: inflow design flood

ITP: Incidental Take Permit

KPI: key performance indicator

LEDPA: least environmentally damaging practicable alternative

LID: low-impact development

LLO: low-level outlet

MDNR: Michigan Department of Natural Resources

MDOT: Michigan Department of Transportation

MDSP: Model Dam Safety Program

NEPA: National Environmental Policy Act

NFIP: National Flood Insurance Program

NHPA: National Historic Preservation Act

NOC: Notice of Coverage

NPDES: National Pollutant Discharge Elimination System

NRCS: Natural Resources Conservation Service

NREPA: Natural Resources and Environmental Protection Act

O&M: operations and maintenance

OHWM: ordinary high-water mark

OPCC: opinion of probable construction costs

Part 301: Inland Lakes and Streams

Part 303: Wetlands

Part 307: State of Michigan inland lakes of the Natural Resource and Environmental Protection Act 451 of 1994

PER: preliminary engineering report

PMF: probable maximum flood

PMP: probable maximum precipitation

PSC: Public Sector Consultants

PSP: public safety plan

QMP: Quality Management Plan

RCC: roller compacted concrete

RD: rural development

SAD: Four Lakes Special Assessment District

SCADA: Supervisory Control and Data Acquisition

SESC: soil erosion and sedimentation control

SEV: state equalized value

SFHA: special flood hazard area SGI: Spicer Group, Inc.

T&E: threatened and endangered (species)

TCSMP: Temporary Construction Surveillance and Monitoring Plan

USACE: United States Army Corps of Engineers

USDA: United States Department of Agriculture

USFWS: United States Fish and Wildlife Service

USGS: United States Geographical Survey

WLA: Wixom Lake Association

WLIB: Wixom Lake Improvement Board

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# Appendix

## Chapter 1 Appendix

[Four Lakes Survey Report](#) by Public Sector Consultant, 2022

[Decommissioning Report for Secord, Smallwood, Edenville and Sanford Dams](#) by The Essex Partnership, May 2021

[Desktop Study - Restoration of Hydroelectric Generation at Secord, Smallwood, Edenville and Sanford Dams](#) by The Essex Partnership, November 2021

[EGLE leadership affirms support of FLTF's plan to rebuild the dams](#), July 2021

## Chapter 2 Appendix

[Letter from EGLE to FLTF acknowledging that Midland and Gladwin counties are the owners of the dams and the regulatory authority now falls under the State of Michigan](#), June 2021

## Chapter 3 Appendix

[Sanford Lake - Economic Analysis Report](#) by Public Sector Consultants, December 2013

[Four Lakes Task Force Demographic Assessment](#) by Public Sector Consultants, March 2024

[Fishing Economic Activity](#) by Streamside Ecological Services

[Letter to FLTF expressing support for restoring the Four Lakes](#) by the Michigan Department of Environment, Great Lakes, and Energy (EGLE), June 2021

[Selecting and Accommodating Inflow Design Floods for Dams](#) by the Federal Emergency Management Agency, August 2013

## Chapter 4 Appendix

[Flood Control on the Tittabawassee River at Midland, Michigan](#) by the U.S. Army Corps of Engineers, July 1980

[Amended Order for the Sanford Dam Project](#) by the Federal Energy Regulatory Commission, October 1998

[EGLE's Report to Governor Whitmer](#) by the Michigan Dam Safety Task Force, February 2021

[Summary of Flood Routing Downstream of Sanford Dam Memo](#) by GEI, April 2022

## Chapter 5 Appendix

[Letter to FLTF outlining the deficiencies identified at each dam](#) by EGLE, June 2021

## Chapter 6 Appendix

[State of Michigan Consent Judgment Against Boyce Hydro](#), November 2019

[Habitat Conservation Plans Under the Endangered Species Act](#) by U.S. Fish & Wildlife Service, October 2021



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## Chapter 8 Appendix

[Operations and Maintenance Assessment Memo](#) by Four Lakes Task Force, December 2023

[Capital Assessment Memo](#) by Four Lakes Task Force, May 2025

## Chapter 9 Appendix

[Four Lakes Special Assessment District Assessment Methodology](#) by Four Lakes Task Force, January 2024

## Chapter 10 Appendix

[Four Lakes Watershed Status Report](#) by Four Lakes Task Force, November 2025

[Investigation of Failures of Edenville and Sanford Dams](#) by the Independent Forensic Team (IFT), September 2021

[Response to IFT Report](#) by Four Lakes Task Force, May 2022



## Get in Touch

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