City of Manawa, WI

Manawa Mill Pond Dam Replacement Feasibility Analysis

May 28, 2025

Cedar Corporation

City of Manawa

Manawa Mill Pond Dam

Replacement Feasibility Analysis

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Prepared for:

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Executive Summary

On July 5, 2024, the City of Manawa located in Waupaca County, Wisconsin experienced a catastrophic rainfall event. The City of Manawa received 5.7 inches of rain in a four-hour period, with most of it falling in one hour. The storm event resulted in significant flooding throughout the City and created an emergency at the Manawa Dam.

The City staff, Manawa Rural Fire Department, and Wiscons8, LLC (the licensed dam operator) responded to the emergency at the dam by opening all gates and removing the needle boards. However, due to the amount of rain and debris in the water which plugged the gates, the dam was overtopped and the earthen berm failed. The storm caused significant damage to the 130-year-old dam.

The current concrete dam was constructed over the original dam and the substructure of the dam consists of timber cribs filled with rock extending down to a firm clay base (original dam). The portion of the dam adjacent to the breach has a significant number of voids under the concrete with portions of the dam foundation likely being washed downstream. In addition, several of the pre-breach inspections had indicated the original timber cribbing had significant deterioration with rocks missing.

Regular repair work has been performed since the 1970s to correct piping of water through the dam. Piping in a dam refers to a process where water seeps through cracks from one side of the dam to the other. Piping undermines and erodes soil particles thereby weakening the structural integrity of the dam. This report discusses potential options for the next steps to be taken with the dam along with potential funding opportunities.

1 Introduction

1.1 Purpose and Intent

The purpose and intent of this report is to document the history of the Manawa Dam, the historic flooding event, community impacts, and options for the potential next steps to be taken with the dam, along with identifying potential funding sources.

1.2 Location

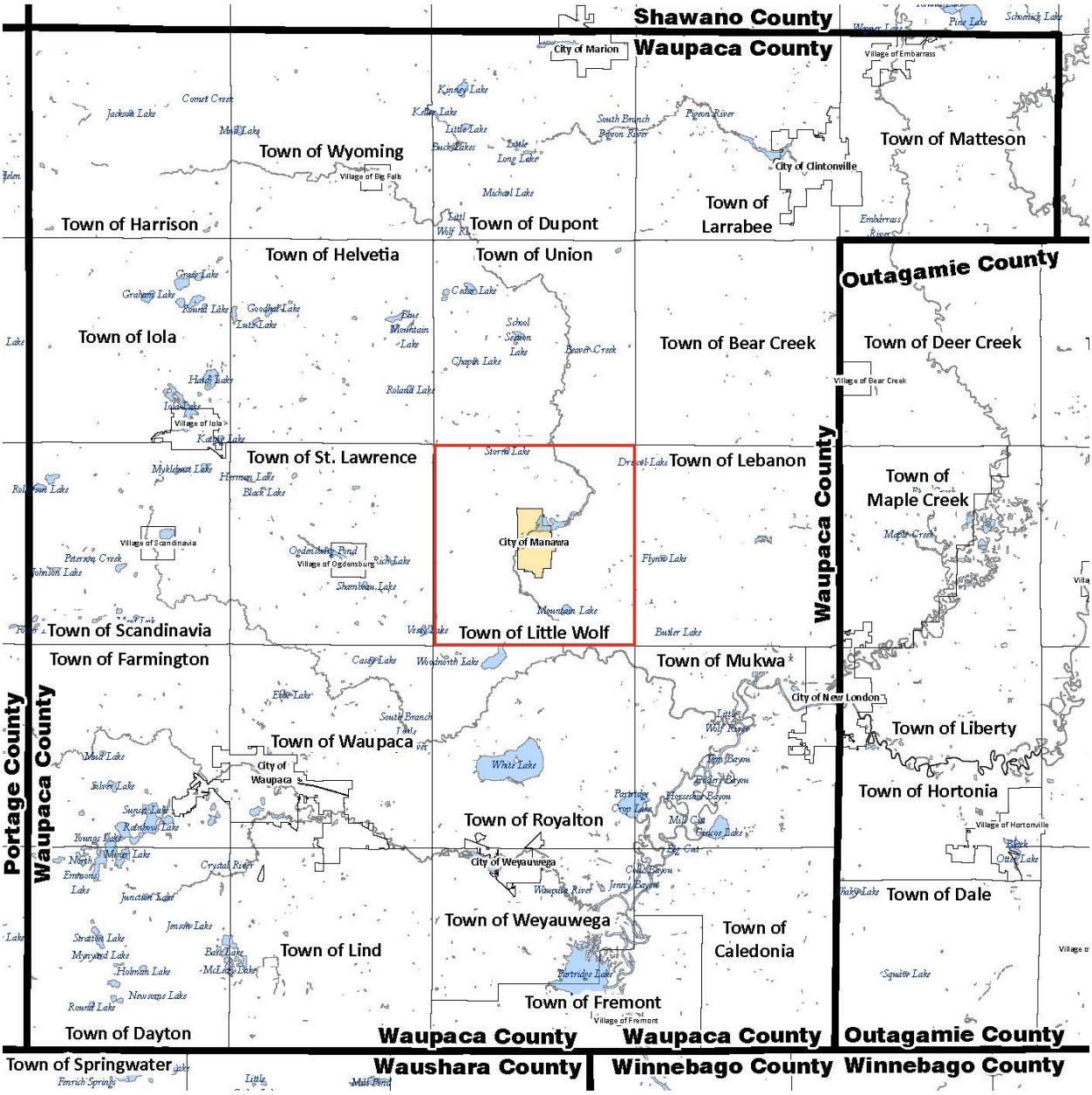
The Manawa Dam is located on the Little Wolf River (WBIC 272400) in section 15 T23N, R13E in the City of Manawa. The City of Manawa is located in central Waupaca County in Northeastern Wisconsin. More specifically, the dam is located east of Bridge Street and south of the City of Manawa Sturm Memorial Library (Figure 1-1). A location map identifying both the City of Manawa and the Town of Little Wolf is shown in Figure 1-2, below. An expanded location map can be found in Appendix A.

Figure 1-1

Manawa Dam Location Map (WDNR Surface Water Viewer)

Figure 1-2

City of Manawa and Town of Little Wolf Location Map



1.3 Community Descriptions

City of Manawa

The City of Manawa is a small City in central Waupaca County as shown in Figure 1-2. It shares its boundaries on all sides with the Town of Little Wolf. According to the 2020 U.S. Census, the City has a population of approximately 1,441 residents. It covers an area of approximately 1.75 square miles, primarily composed of land, with minor water coverage associated with the Little Wolf River and wetlands.

Manawa functions as an urban center within a predominantly rural region, offering residential, commercial, and industrial land uses. The City is intersected by State Highways 22 and 110, providing regional connectivity and supporting local commerce and transportation. The presence of the Little Wolf River through the City contributes to both recreation and stormwater infrastructure.

The population projection data from the Wisconsin Department of Administration suggests that Manawa may have recently reached its peak in terms of population growth and projects a decline of approximately 5% over the next 18 to 20 years. Table 1-1 shows that by 2040, the City's population is projected to be 1,325 residents, or about a 115 person decrease.

Table 1-1. Population Projections, City of Manawa

Year	2010 Census	2020 Census	2025 Projection	2030 Projection	2035 Projection	2040 Projection	Change 2020-2040
Population	1371	1441	1395	1405	1380	1325	-116
No. Change	n/a	70	-46	10	-25	-55	-116
% Change	n/a	5.11%	-3.19%	0.72%	-1.78%	-3.99%	-5.02%

Source: U.S. Census 2010 & 2020, and WDOA, 2013.

Town of Little Wolf

The Town of Little Wolf is a civil Town located in Waupaca County in the central region of Wisconsin (Figure 1-2). As per the 2020 U.S. Census, the Town has a population of 1,404 residents. It encompasses a total area of about 34.5 square miles, of which the vast majority is land, with a small percentage accounted for by surface water bodies.

The Town is characterized by rural land use patterns, with predominant zoning for agricultural, forestry, and low-density residential development. The Little Wolf River, a tributary of the Wolf River, flows through the Town, providing natural resources, recreational opportunities, and influencing land use and environmental planning decisions.

The population projection data from the Wisconsin Department of Administration suggests that the Town of Little Wolf will reach its peak population growth in 2035 and projects an overall increase of 3.3% over the next 15 to 20 years. Table 1-2 shows that by 2040, the Town's population is projected to be 1,455 residents, or about a 5 person decrease from 2020.

Table 1-2. Population Projections, Town of Little Wolf

Year	2010 Census	2020 Census	2025 Projection	2030 Projection	2035 Projection	2040 Projection	Change 2020-2040
Population	1424	1460	1500	1520	1500	1455	-5
No. Change	n/a	36	40	20	-20	-45	-5
% Change	n/a	2.53%	2.74%	1.33%	-1.32%	-3.00%	-3.00%

Source: U.S. Census 2010 & 2020, and WDOA, 2013.

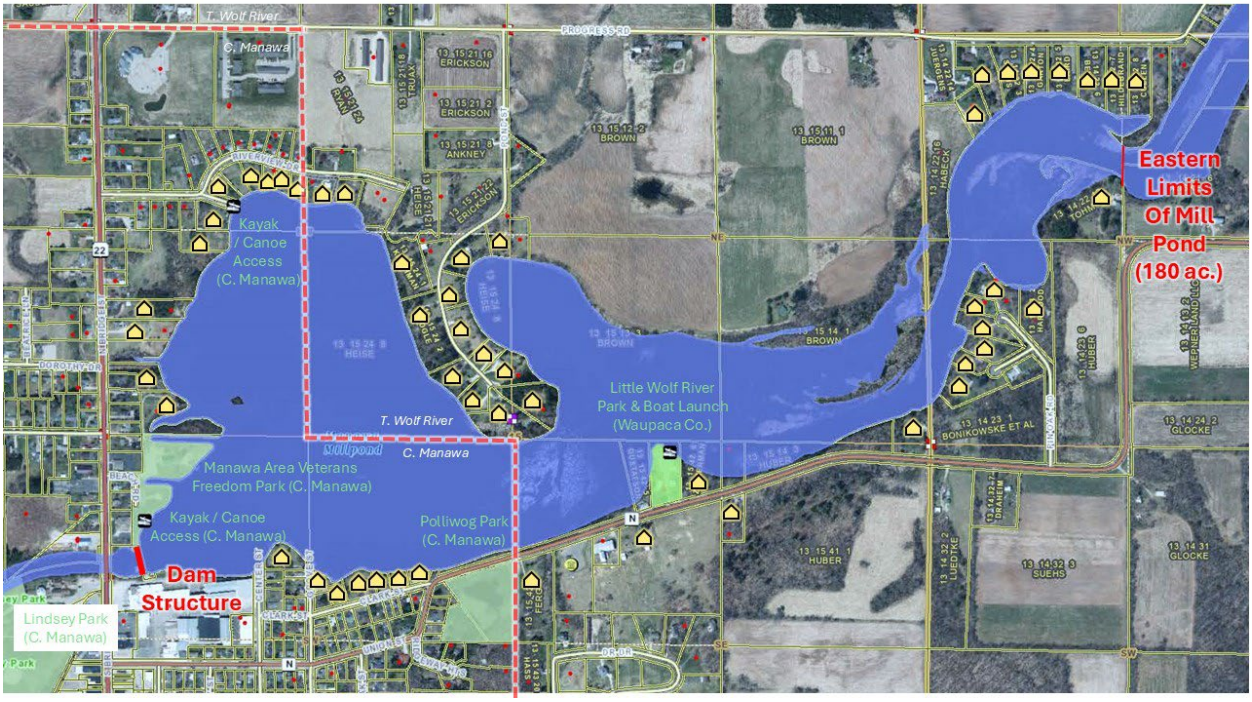
1.4 Manawa Mill Pond

The Manawa Mill Pond is a 180-acre lake with 4.9 miles of shoreline located on the Little Wolf River created as a result of the Manawa Mill Pond Dam. It has a maximum depth of 12 feet with an average depth of 6 feet. The Millpond offers year-round recreational opportunities including boating (canoes, kayaks, and small motorized boats), fishing and ice fishing, walking trails and nature observation, as well as community events. There are three public boat landings on the Millpond. The pond supports a diverse warm-water fish community, making it a popular site for recreational fishing. Largemouth Bass, Northern Pike, Bluegill, Black Crappie and Yellow Perch are commonly found.

A significant amount of the Mill Pond shoreline is developed, mostly with single-family residential uses as shown in Figure 1-3. Approximately 70 acres (39%) of the 180-acre Mill Pond is located in the City of Manawa. There are 22 parcels abutting the pond within the City, of which 18 are developed with homes. Approximately 110 acres (61%) of the 180-acre Mill Pond is located in the Town of Little Wolf. There are 44 parcels abutting the pond within the Town, of which 35 are developed with homes. The remaining parcels are in agricultural or woodland use, with one exception being the Sturm Foods property located immediately south of the dam.

Figure 1-3

Land Use and Development Status of the Manawa Mill Pond



1.5 Flood Event (July 5, 2024)

An area of low pressure slowly tracked east across east-central Wisconsin to central Lake Michigan through the day on July 5, 2024. Showers and thunderstorms developed shortly after daybreak and then became more concentrated during the mid-morning into the early afternoon. Particularly, a cluster of showers and storms became slow moving over Waupaca County. Between four inches and six inches of rain fell in Waupaca County. The City of Manawa measured approximately 5.7 inches of rain in a four-hour period.

This rain, coupled with the impacts from around 6 inches of recent rain from the two weeks prior, led to the overtopping of the Manawa Dam along the Little Wolf River around 12:30 p.m. The excessive water flow caused significant erosion, resulting in the failure of the dam's earthen embankment. Approximately a 50-foot-wide section of the dam washed out, leading to the draining of the Manawa Mill Pond.

The dam breach prompted the evacuation of residents and businesses in Manawa along with areas downstream. A boil water advisory was issued for Manawa and surrounding areas due to potential contamination from floodwater. Following the storm event, the Governor declared a state of emergency for four northeastern Wisconsin Counties.

1.6 Summary of Damages

Dozens of homes were evacuated, and emergency shelters were established at the local high school and Masonic Center. Approximately 100 residents were evacuated due to the rising floodwaters.

Floodwaters damaged two local roads, inundated the City's wastewater treatment plant, prompted a boil-water advisory, as well as flooding of Lindsey Park. The recovery and response costs (debris removal, protective services, and road systems) for this incident was calculated to be $56,021. The City was reimbursed $40,357 (70%) from the Wisconsin Disaster Fund for these costs.

Aside from evacuations, a total of $100,000 in damage was paid out on 24 separate properties associated with sewer backups related to the flooding event. These payments ranged from $500 to $13,000 and were covered by the City's insurance.

The breach caused significant erosion, particularly on the dam's north bank, and left a muddy lakebed with exposed tree stumps from the early 1900s.

1.7 Initial Response to the Dam Failure

The City of Manawa, Town of Little Wolf, Waupaca County, numerous State leaders and agencies, as well as others, have been involved in the immediate emergency flooding response efforts, including the short and long-term recovery planning for the physical, social, and economic needs for the community. The City is committed to finding a long-term, collaborative solution for the dam and has made this issue a priority.

The City of Manawa has also initiated efforts to stabilize the shoreline near the dam. On September 16, 2024, the Manawa Common Council voted to pursue a grant from the United States Department of Agriculture to aid in these stabilization efforts. As a result, the City of Manawa in collaboration with Cedar Corporation secured $462,310.20 of grant funding from the United States Department of Agriculture Natural Resources Conservation Service (USDA-NRCS) to conduct emergency shoreline stabilization. The funding was awarded to stabilize the north bank of the Little Wolf River protecting the Sturm Memorial Library parking lot, City of Manawa owned lift station, Kobussen Buses, and prevent further damage to aquatic species including the Snuff Box Mussel which is a state and federal listed endangered species.

Following the award of the USDA-NRCS grant, the City of Manawa retained Cedar Corporation in December 2024 to prepare plans and specifications for the Little Wolf River Shoreline Stabilization project for bidding purposes, obtain the required permits from the Wisconsin Department of Natural Resources and United States Army Corps of Engineers, as well as to

provide construction administration services. The City of Manawa received four bids on the project with Michels Construction, Inc. being the lowest bidder and was awarded the project. The project includes removal of nonstable bank materials, installation of rip rap and a sheet pile wall through the breached area, along with seeding the bank. Restoration is scheduled for completion in the spring of 2025.

These initial activities have mitigated potential risks to private and public property. This also allows the City time to conduct this study, review potential long-term solutions for the dam that are identified in this report, and investigate funding sources.

City officials continue to collaborate with state and federal agencies to develop a comprehensive restoration plan, however timelines and funding remain uncertain. Despite the challenges, the community is actively working towards recovery and the eventual restoration of the Manawa Mill Pond.

1.8 Climate Change Impact on Existing Dams

The dam failure in Manawa is part of a broader trend in Wisconsin, which has experienced an increasing number of dam failures in recent years. Since 2018, the state has reported 28 dam failures, with 18 occurring since 2020. While most of these incidents did not result in property damage exceeding $100,000, the Manawa event is noted as an exception, indicating a higher level of economic impact.

2 Manawa Dam Description

2.1 General History

The dam was first authorized by the State in Chapter 186, Laws of 1891. It authorized two private citizens to maintain a dam on the Little Wolf River for log driving, boomage, hydraulic and manufacturing purposes. The law was repealed and replaced by Chapter 177, Laws of 1899. Both the 1891 and the 1899 laws are worded similar. In addition, both publications state the private citizens shall “maintain” a dam, it is therefore likely that the dam was constructed prior to 1891.

Around 1915, the dam was used by a lumber company and grist mill for power. Inspection reports indicate that the dam was rebuilt several times with the concrete section of the dam constructed around 1913.

In 1928, the Wisconsin Power and Light Company filed with the Railroad Commission an application for a certificate of public convenience and necessity. The application discusses the transfer of ownership and the dam being connected with the new owner’s business to produce electricity. The powerhouse portion of the dam was constructed around 1929.

The Manawa Dam Corporation purchased the dam in 1958 when Wisconsin Power and Light discontinued the generation of hydroelectric power. By 1967, the dam was in dire need of immediate repairs. The City of Manawa became the owner of the dam in 1968 and began work on temporary repairs to the dam.

The City also started to pursue possible funding opportunities with the Wisconsin Department of Natural Resources and Waupaca County in 1971. In 1976, the Mayor of Manawa sent a letter to the Governor requesting funding assistance. It was stated in the letter that dam reconstruction was determined to be ineligible for funding from various sources. An emergency order to draw down the impoundment was issued in May of 1977 due to the condition of the dam. The order documented the results from numerous inspections. The inspections indicated that the concrete was in poor condition. There was seepage under the dam and some of the cracks were piping. One report indicated that there were signs of failure. Due to community concerns, the drawdown was delayed to August of 1977.

The City hired a structural engineer to inspect the dam in September 1977. The report noted that the dam was in critical condition requiring immediate repair or replacement. The primary recommendation was to replace the dam. The second recommendation if funds were not available was to repair the dam. The dam was repaired in 1979. In the early to mid-1980s, the City came to an agreement with a private firm to generate electricity at the Manawa Dam once

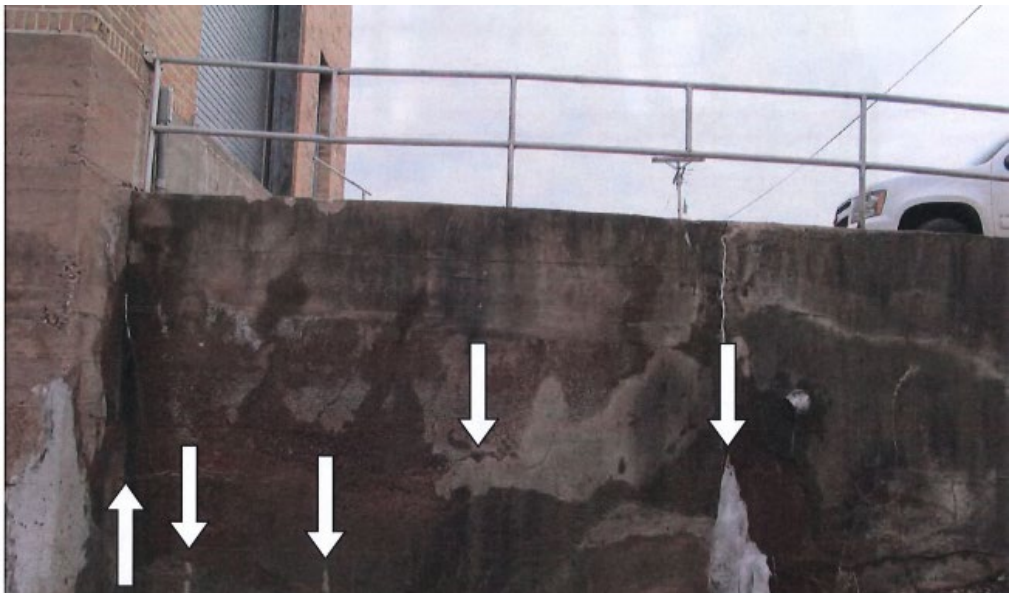
again. Upgrades were made at the powerhouse, and the private firm took over operational responsibilities of the dam.

The WDNR inspected the dam in 1987 and identified required repair work. Seeping water on the left abutment was noted as well as additional concrete repairs. The concrete near gate #6 cracked and was piping water from the upstream side of the dam to the downstream with a noticeable vortex occurring at the upstream side of the dam. Additional repair work was completed in the mid-1990s.

An inspection of the dam was completed in 2010 and 2011. Several deficiencies were identified including cavitated spillways, deteriorated piers, a seven square foot cavity in the downstream training wall, a 17 square foot void in a retaining wall and audible seepage flowing underneath an apron. Some immediate repairs were completed in 2011 however a drawdown of the impoundment was needed for the remainder of the repairs. Phase 2 of the repairs were made to the dam in 2012. In 2016, it was noted that there were slight leaks to the left retaining wall (Figure 2-1). It is not known whether the cracks were repaired or it was recommended to monitor.

Figure 2-1

Retaining Wall Cracks (March 7, 2016)



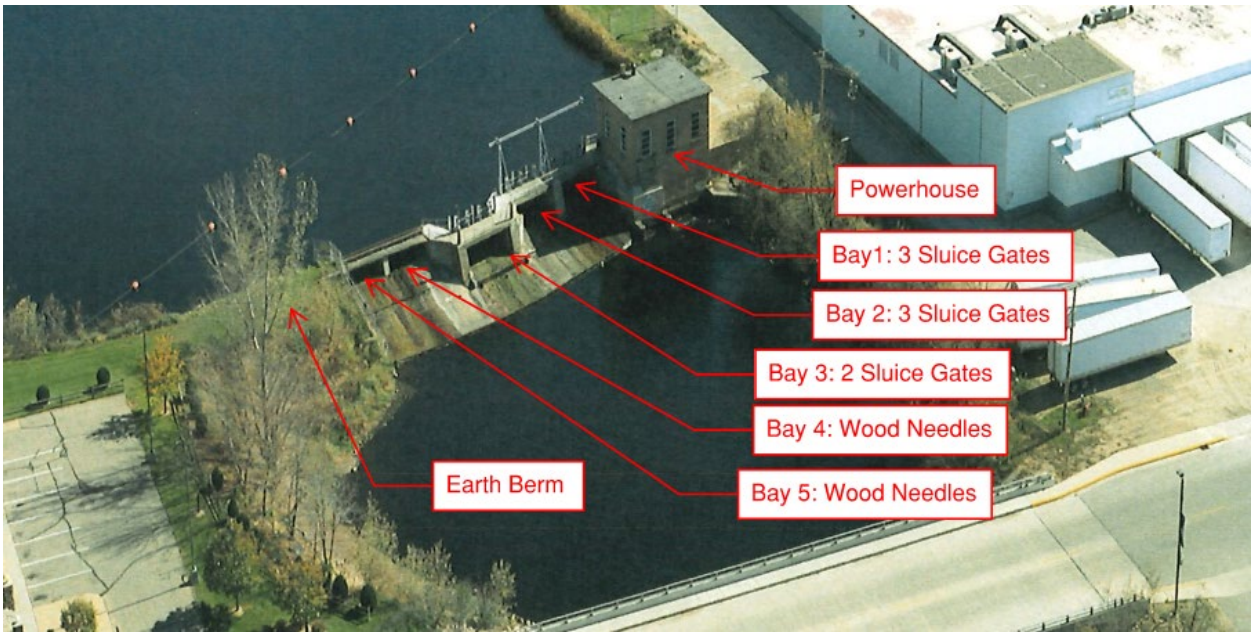
Source: Eagle Creek Renewable Energy Inspection Report (March 7, 2016).

2.2 Existing Structure Prior to Breach

The dam is orientated in the north south direction. Starting on the south side, the dam includes a privately owned powerhouse used to generate electricity. The powerhouse consists of a reinforced concrete substructure with a brick superstructure. The structure houses a single vertical-shaft propeller-type turbine. The turbine has a capacity of 192 kilowatts (kW) and the maximum hydraulic capacity of the turbine is 269 cubic feet per second (cfs). Water is conveyed to the turbine through two steel lift gates. The powerhouse is followed by two identical bays with 3 sluice gates in each. The twin bays are followed by another bay with two sluice gates, twin bay wood needle gates and an earthen berm. The substructure of the dam consisted of timber cribs filled with rock extending down to a firm clay base. The existing concrete dam was constructed over the dam substructure.

Figure 2-2

Aerial Photo Pre-Breach, circa 2017



2.3 Hydroelectric Power Generation

Hydroelectric Dams are regulated by the Federal Emergency Regulatory Commission (FERC). The design, construction, and operational phase of a dam project requires approval from FERC. Wiscons8, LLC is the current license holder and owns the powerhouse portion of the dam. The City of Manawa has a lease agreement with Eagle Creek Renewable Energy Holdings, LLC.

It is understood that Wiscons8, LLC purchased the powerhouse and FERC license from Eagle Creek. Wiscons8, LLC is required to pay the City six percent of the gross revenue generated from electricity generation. The City received $3,811.82 in 2024 for electricity generated in 2023. The agreement was signed in 2014 and is set to expire May 31, 2029. The lease may be terminated with 30 days' notice in the event of casualty loss exceeding three times the gross revenue generated. Based on the 2024 payment to the City, the gross revenue generated is approximately $63,530 therefore the casualty loss amount in the lease is approximately $190,590.

2.4 Existing Structure Following the Breach

The earthen berm (embankment) was overtopped on July 5, 2024. An inspection report indicated that the earthen berm overtopped once before in 1970 with no damage. The recent breach washed out the earthen berm and exposed two parallel concrete walls. The southern wall partially collapsed but did not fall into the river. A plan from 1920 identifies the grist mill as being on the north side of the river. The concrete walls appear to be a previously abandoned concrete flume to the grist mill. The following figure documents the status of the dam following the breach.

Figure 2-3

Streetview Photo Post-Breach, October 2024

3 Structural Assessment

Since the breach, Cedar Corporation has been evaluating the condition of the dam and most recently performed an inspection on May 2, 2025. Since the powerhouse is privately owned, it was not a part of the evaluation process.

3.1 Inspection Findings (May 2, 2025)

For the May 2025 assessment, left and right refer to the direction as you are looking downstream from the dam. Bays 1 through 5 are as shown in the photo in the section 2.2 Existing Structure Prior to Breach. A photo log can be found in Appendix B.

Bay 1 and Bay 2. (Photos 3 through 12)

These bays have three sluice gates each that are 6-foot wide by 7.5-feet high. To the left side of Bay 1 is the powerhouse; Bays 1 and 2 are separated by a 3-foot-wide concrete pier. The concrete at the base of the gates in both bays is deteriorated with concrete spalling present. The downstream apron of the bays is spalling and cracking. The underside of the concrete walkway exhibits spalling with exposed reinforcement. The left abutment of Bay 1 shows diagonal cracking with efflorescence.

Bay 3. (Photos 13 through 19)

This bay consists of two 10-foot wide by 7.5-foot-high sluice gates. The left concrete pier is approximately 7-foot wide at the upstream side; the right concrete pier is approximately 3.5-foot wide at the upstream side. The concrete at the base of the gates is spalling and cracked. The upstream base consists of stone with a thin concrete overlay. This stone and concrete overlay is deteriorated and cracked. The underside of the concrete walkway is showing severe spalling with exposed reinforcement. The downstream edge of the walkway is also severely spalled. The left concrete pier has a large vertical crack. The apron is also cracked and spalled.

Bay 4 and Bay 5. (Photos 20 through 27)

These bays consist of two 16-foot wide by 4.2-feet high needle board spillway sections. Bay 4 and Bay 5 are separated by a 2-foot-wide concrete pier. The right concrete abutment is approximately 2-feet wide and formerly abutted the earthen berm. The upstream side of these bays show a major loss of material from behind and below the concrete apron. There is leaking and separation between the apron and right abutment. The concrete walkway over these bays is noticeably sagging. Where the walkway intersects the right abutment, there are serious vertical cracks and significant spalling. The downstream apron is also cracked and spalled throughout.

3.2 Inspection Conclusions

The dam is showing significant concrete deterioration. The concrete walkway is also showing significant spalling and has exposed reinforcement from Bays 1 through 3. In Bays 4 and 5 the concrete walkway is noticeably sagged. The gates in Bays 1 through 3 utilize the walkway as a support for gate operation. Bays 4 and 5 also utilize the walkway for the upper support for the needle boards. The inspection indicates that the walkway would need to be replaced in its entirety. Repairing does not appear to be feasible. Since the gates utilize the walkway for support, the gate mechanisms will also need to be replaced.

The piers are in fair condition but would require significant concrete repairs. The left abutment would require a more thorough inspection with the powerhouse but appears that it would require crack repairs. The intermediate piers are showing cracking and spalling that would require repairs. The right abutment of Bay 5 is undermined and is showing water leakage between the pier and downstream apron. The right abutment is also severely cracked and spalled at the walkway support.

The spillway of the dam is showing spalling and cracking throughout. The concrete below the gates is uneven and will not provide a good seal.

The foundation of the dam, from review of the existing plans, is timber cribbing and rock fill to a hard clay layer below. Previous reports indicate that this foundation has been compromised in the past and has been somewhat remedied with grout injections. Previously, pilings were driven on the downstream side of the dam through the apron most likely to alleviate a dam sliding concern.

As a result of the July 2024 breach, the foundation of the dam has been severely compromised. This is most evident in Bays 4 and 5 where the timber cribbing and rock foundation are visible. A portion of the timber cribbing and rock foundation was washed out under Bay 5 and severely compromised in Bay 4.

Given the severity of the foundation condition in Bays 4 and 5, complete reconstruction of these bays would be required including a new foundation. Repairing this section of the dam is not feasible. The foundation condition of Bays 1 thru 3 would require further investigation to determine what repairs would be required. Previous history would indicate that grout injections would most likely be required to prevent seepage below the dam.

To repair the dam, significant effort would be required. Total reconstruction of Bays 4 and 5 would be required including the foundation. The walkway would require replacement in its entirety along with resetting and remounting the gates in Bays 1 through 3. Significant concrete repairs would be required of the piers and concrete spillway.

In conclusion, a rehabilitation project to repair the Manawa Dam would be significant. Not only would the breached area require reconstruction from the foundation up, but Bays 4 and 5 would require complete reconstruction as well. Many other major repairs are also required to bring this dam back to operating condition. Due to the extent of the damage that occurred in the July 2024 breach along with the existing condition of the remaining dam, and the history of previous repair to the foundation of the dam, repair of the dam is not feasible and complete replacement is recommended.

4 Dam Alternatives

The City of Manawa is committed to finding a long-term solution for the dam and has made the issue a top priority. City officials have stated they intend to restore the Mill Pond. The Town of Little Wolf has also indicated the same desire as well. The goal for both communities is to recreate the recreational and aesthetic environment that existed prior to the breach and draining of the Mill Pond.

This section of the report is intended to discuss possible options for the dam.

4.1 Concept 1: Natural/Dam Removal

The first option is to remove the dam and allow the Little Wolf River to return to its natural condition. A glimpse of what this would look like is already possible since the breach of the dam. The natural course of the river has largely returned. The lakebed has been exposed and is largely muddy. Vegetation has started to reestablish itself and would continue to do so over time. A bathymetric map of the Mill Pond can be found in Appendix C of this report. The deepest part of the lake is understood to be the historic river channel and has been highlighted on the map. A cost to remove the existing dam can also be found in Appendix D of this report. Coordination with the owner of the powerhouse would be required.

Several meetings have taken place in the City of Manawa and the Town of Little Wolf with most attendees expressing a desire to restore the Mill Pond as soon as possible. However, some have stated they would like to see the dam removed, allowing the river to go back to its natural state.

Removing the dam would impact those who reside on the Mill Pond. It could create an economic impact on the community from lost recreational opportunities for local residents and tourism.

4.2 Concept 2: Dam Repair

Portions of the Manawa Dam are over 130 years old. The dam has been repaired and reconstructed several times over the years. The Manawa Dam had deteriorated to a point in the 1970's that the dam posed a safety risk to the public. An emergency court order was issued requiring a drawdown of the Mill Pond. Several residents at the time also expressed concerns with restoring the Mill Pond as soon as possible.

An inspection was conducted in 1977 recommending the replacement of the dam. The report states that sections of the dam have been repaired and replaced but there is no indication that any extensive repairs have been made to the substructure of the dam. The report also states

the substructure of the dam is in critical condition. Funding was the main issue which delayed restoring the Mill Pond. The dam was repaired and grout was added to the timber cribbing. There have been numerous reports of the original timber cribs and stone substructure washing out causing several voids in the foundation and additional piping and numerous repairs.

The July 5, 2024, breach exposed the north end of the dam. The original foundation of the dam under the concrete has been completely washed out. Due to the damage caused by the historic flooding and the history of the foundation of the dam washing out, the dam is no longer repairable.

4.3 Concept 3: Dam Replacement – No Hydroelectric

Demolition of the existing dam would be required. The powerhouse is located on its own parcel and it is privately owned. There are several options regarding what could happen with the powerhouse. The dam could potentially be reconstructed with removing the powerhouse and the abutments, or the water channel under the powerhouse could be filled with concrete. Additional repairs are needed at the powerhouse as it is not known whether the piping leaks shown in section 2.1 have been repaired or not. It is believed that the powerhouse and the surrounding concrete abutments were constructed around 1929. A more detailed structural evaluation may be required prior to finalizing the decision on the powerhouse. Coordination will be required with the current powerhouse owner, Wiscons8, LLC. The property would need to be purchased from the current powerhouse owner.

4.4 Concept 4: Dam Replacement – Hydroelectric

As with Concept 3 the existing dam would need to be demolished. The powerhouse owner currently operates the dam. With this option there are two possibilities, the City operates the dam and takes control of the powerhouse. This would require the City to purchase the powerhouse and the FERC license from the current powerhouse owner. This option is not recommended as a good portion of additional proceeds generated would most likely be used to comply with FERC requirements.

The powerhouse owner continues in the current roll. The powerhouse owner complies with all the FERC licensing requirements, inspections and reports. The powerhouse owner has previously indicated a willingness to perform some repairs at the powerhouse. The extent of the repairs is not known at the time of this report. A rendering and estimate can be found in Appendix D of this report. (The rendering assumes repair of the powerhouse.)

4.5 Potential Cost Summary

In addition to the costs associated with each option being located in Appendix D, the potential costs for the previously discussed options are summarized in the following table.

The dam removal costs include removing the existing dam structure, timber cribbing, and powerhouse. Removal and decommissioning the powerhouse should be the responsibility of Wiscons8, LLC (but costs were included for estimating purposes).

The dam replacement costs include demolition of the existing dam, a new spillway section to control the release of water downstream as well as establishing the elevation of the mill pond, and a crest gate to further control the flow of water and release large volumes under flood conditions. Removable stop logs that allow the mill pond to be drained for maintenance are also included in the cost.

Table 4-1. Potential Cost Summary

Storm Event	Potential Cost
Concept 1: Natural/Dam Removal	$700,000
Concept 2: Dam Repair	Not Viable
Concept 3: Dam Replacement – No Hydroelectric	$8,400,000
Concept 4: Dam Replacement – Hydroelectric	Not Recommended*

* It is not recommended for the City to be the FERC license holder. Repair or reconstruction costs for the powerhouse are understood to be the responsibility of Wiscons8 LLC.

5 Funding Opportunities

Due to its high cost, infrastructure projects are typically funded by municipalities using a variety of methods and approaches. Typically, a blend of funding may be needed to capitalize on interest rates or to leverage grant funding which may be available.

Both the City and the Town have expressed the desire to restore the Millpond. This will require either Concept 3 or Concept 4. These alternatives for reconstruction of the Manawa Mill Pond Dam were estimated to be $8.4M. This is a significant cost for a community the size of the City of Manawa. It would be very difficult to fund such a project using typical tax authorities and budgets. The City of Manawa will therefore need to look for additional revenue and funding sources to achieve this vision for the Manawa Mill Pond Dam Reconstruction.

5.1 Town of Little Wolf

Members of the Manawa Common Council have been communicating with residents and officials of the Town of Little Wolf to discuss potential joint efforts to restore the Manawa Mill Pond. As previously discussed, a number of Town of Little Wolf citizens reside on the Millpond. The Town of Little Wolf acknowledged and signed the original 1984 Power Generation Agreement. However, a cursory review of the document does not indicate what responsibilities the Town of Little Wolf has toward the maintenance or replacement of the Manawa Mill Pond Dam.

During the December 16, 2024, City of Manawa Common Council Meeting, Alan Moede, Little Wolf Town Chairman, requested a new joint dam agreement between Manawa and Little Wolf. The City of Manawa and Town of Little Wolf agreed that the Manawa Mill Pond and dam provide value to both communities, including their residents and visitors. Following the discussion, the Manawa Common Council approved moving forward to negotiate a new agreement with the Town of Little Wolf.

5.2 General Tax Levy/Bonding

Infrastructure and community facilities can be paid for directly using the City's property tax levy as determined by the Council. This can be done with direct fund allocations or through general obligation bonding whereby monies are borrowed and paid back overtime. State and local governments issue bonds to pay for large, expensive, and long-lived capital projects, such as roads, bridges, schools, water treatment facilities and other public facilities. Borrowing allows the costs to be spread across multiple generations. Future project users bear some of the cost through higher taxes or tolls, fares, and other charges that help service the debts.

To aid in the planning, the City utilizes its Capital Improvement Plan (CIP) which is updated annually. As of 2023, the City had an allowable debt of $5,312,240, and with $1,624,976 of actual debt, had a borrowing capacity of $3,687,364. Due to a plethora of municipal projects being funded in 2024 and 2025, the City of Manawa is now at or near its maximum borrowing capacity. The Town of Little Wolf had a 2023 allowable debt margin of $7,659,955 and had no outstanding debt as of that year.

5.3 Referendum

Municipal spending is limited by a combination of levy limits and the Expenditure Restraint Program (ERP). Levy limits restrict how much property tax revenue a municipality can collect, while ERP provides financial incentives for communities to limit spending growth. Due to recent municipal projects, the City of Manawa is at or near its maximum borrowing capacity. If desired the City may choose to go to a referendum in order to fund a significant project such as the reconstruction of the Manawa Mill Pond Dam.

Under state law (sec. 66.0602(4), Wis. Stats.), all counties, cities, villages or towns may exceed their levy limit after adopting a resolution to exceed the levy limit, which is then approved in a referendum. To do this, the governing body must adopt a resolution specifying the amount and purpose of the increase, and whether it's a one-time or ongoing increase. The referendum must be held at the spring primary or general election, or the fall partisan primary or general election.

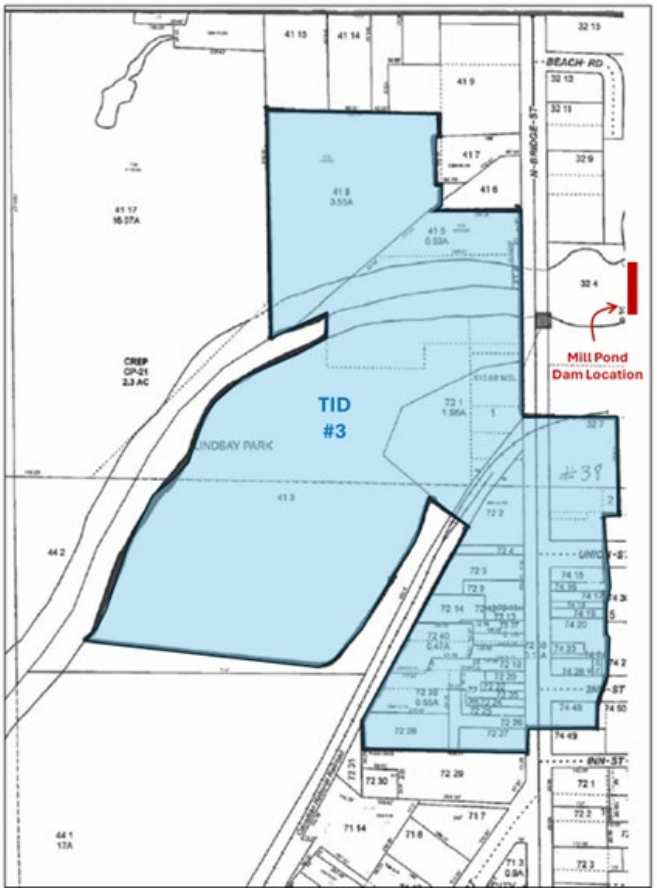
5.4 Tax Increment Financing

Tax Increment Financing is a commonly used tool when new or improved infrastructure is critically tied to new development or redevelopment opportunities. Using a variety of methods, a community can create a Tax Increment District (TID) to generate funds for infrastructure improvements.

When a TID is created, the municipality and other taxing jurisdictions agree to support their normal operations from the existing tax base within the district. Property taxes for the school, county, technical college, and municipality are based on the taxable value of the TID at the time it is created. The municipality funds development through the increases to the property values in the TID. The taxes on the TID value increment (the difference between the TID's current value and the TID's base value), results in additional revenues collected for the district's fund. The municipality must use the funds to pay eligible TID costs. When costs are paid and the municipality closes the TID, the increased tax base is shared with all taxing jurisdictions.

Figure 5-1

City of Manawa TID #3 Location



The City currently has two active TIDs with one of them – TID #3 – being located in close proximity to the current dam site. TID #3 consists of approximately 27 acres centered on downtown, including Lindsay Park. TID #3 was created in 2018 as a Mixed Use TID and will expire in 2039. According to the WDOA, the base value of the TID was established at $2,362,600 with the current (2023) value being $3,864,700 – generating a total tax increment of $1,502,100 to date. As of December 31, 2023, the TID fund balance was $195,596. The TID 3 Project Plan identifies total project expenditures of approximately $800,000 to undertake a set of phased projects.

The City may wish to consider the utilization of existing TID #3 as a potential funding mechanism to cover portions of project costs. It is the municipality's responsibility to determine if a project cost is eligible under state law (sec. 66.1105(2)(f)1. & 2., Wis. Stats.). The municipality should consult its attorney for assistance on whether a specific cost is eligible. The Wisconsin Department of Revenue does not review project costs or determine cost

eligibility. If the project is determined to be eligible, note that a municipality may revise the boundaries of a TID to add or remove property up to four times during the TID's life. Additionally, a municipality may amend the project plan to revise any of the topics covered in the most recently approved project plan. A project plan amendment does not alter the expenditure period or the TID maximum life. With respect to project construction, no expenditure may be made later than 5 years before the un-extended termination date of the TID. There is no limit on the number of project plan amendments during a TID's life.

5.5 State and Federal Budget Requests

During an October 30, 2024, meeting with Senator Rachel Cabral-Guevara (District 19) and Representative Kevin Peterson (District 57) an estimate for total project costs including demolition of the existing dam and construction of a new alternative was requested. This would provide a basis for submitting the project to the State Joint Finance Committee in March 2025 in an attempt to have costs allocated in the state's 2025–2027 biennial budget cycle.

Each year, the Appropriations Committee writes the legislation allocating federal funds for local projects and national programs. A funding request for fiscal year 2026 was submitted to Senator Tammy Baldwin's office on behalf of the City of Manawa in March 2025 for replacement of the Manawa Dam. Congress will not be able to fund every program or project due to the number of requests, but the City felt it would be remiss if it did not seek this source of funding.

5.6 State and Federal Grant Programs

State and federal grants or loans are often used for part of the financing of infrastructure. In fact, many programs exist to possibly leverage local dollars. Cedar Corporation has identified a number of potential federal, state, foundation/non-profit grant and loan programs which may be applicable to this project. A list of potential grants and the basic provisions of each program can be found in *Table 4-1 (Potential Grant and Loan Funding Programs)* contained in Appendix E. It should be noted that a detailed assessments regarding this project's eligibility and/or competitiveness have not been conducted at this time for each potential grant.

5.7 Recommended Funding Strategy

Based on the project needs and available funding opportunities outlined in this section, Cedar Corporation has created a recommended funding strategy which includes several components. The City should note that grant funding opportunities routinely change and the sources indicated should be verified prior to any action occurring.

The City of Manawa will need to be diligent in terms of planning for the funding of this project which will likely require the coordination of multiple funding sources and mechanisms to achieve the intended outcomes. Local contributions to the recommended project will need to be considered, but the opportunity to leverage those local dollars should be a priority.

In Wisconsin, municipalities cannot borrow more than 5% of the value of their taxable property (TID in) as equalized for state purposes. This debt limit, established by Wisconsin Statutes, applies to general obligation indebtedness, meaning debt backed by property taxes. Currently (2024), the City of Manawa has a total debt limit of $5,750,510 and the Town of Little Wolf has a debt limit of $8,471,775. To aid in project development and construction, the City and Town may need to look at several possible borrowing options, including:

- **General Obligation Bonding**
  These bonds are backed by the "full faith and credit" of the municipality, meaning they are backed by the municipality's taxing power.

- **Board of Commissioners of Public Lands (BCPL)**
  This program offers loans to municipalities, schools, lake districts, metropolitan sewerage districts and town sanitary districts for a wide variety of purposes. Deadline: Continuous / Terms: varies.

- **Community Facility Guaranteed Loans (USDA)**
  These loans provide funding for essential community facilities, i.e., village/town halls, libraries, hospitals, clinics, adult/childcare centers, assisted living facilities, nursing homes, homeless shelters, police stations, fire halls, fire, police and emergency vehicles, private schools and colleges, museums, and airports. This program also may be used to fund recreational facilities. Applicants must be public bodies, federally recognized Indian Tribes, or non-profit organizations. Cities and villages must have a population of 50,000 or fewer. Deadline: Continuous / Max Funding: Based on $ available / Loan Terms: 40 yrs. max., interest rate negotiated.
  Current term of 20 years at 4.375% based on recent correspondence with USDA.

Based on the information collected, there appear to be two major funding programs which could offer some financial assistance should the project meet eligibility requirements:

- **USACOE CAP §14 Emergency Streambank Erosion and Shoreline Protection**
  The U.S. Army Corps of Engineers (USACOE) can study and construct certain water resource projects of limited size, cost, scope, and complexity without project-specific congressional authorization. USACOE typically requires a nonfederal sponsor (e.g., local government or nonprofit entity with local government consent) to send a letter to the local USACOE district describing the water resource problem and requesting assistance

with a project. USACOE determines whether there is federal interest in a project, if the project fits under CAP authority, and whether funding is available. Once funded, CAP projects generally take two to three years for the study phase. The construction phase often takes two to five years.

Deadline: Continuous / Max Funding: Initial study for federal interest is 100% up to $100k. All planning costs after the first $100,000 shared at 50%. All design and implementation costs req. 35% non-federal.

- **Municipal Dam Grant Program (WDNR)**

  An applicant must own the entire dam or have permanent legal access for operation and maintenance to the specific piece of land on which the dam is physically located. Private dam owners are not eligible to apply. This grant is not available to dams that are inspected, approved and licensed by a federal agency under 18 CFR Part 12 (i.e. Federal Energy Regulatory Commission, or FERC, regulated dams). Most dams that produce power are regulated by FERC. Specific to Manawa, the Manawa Dam is under FERC's jurisdiction and is, therefore, not eligible for the Municipal Dam Grant at this time.

  If the City were to work with FERC to cease hydroelectric operation and get it removed from FERC's jurisdiction, they would then become eligible. Eligible projects include dam repair, reconstruction or modification to improve the safety of the dam, or abandonment and removal. The owner must have the inspection directives or an administrative order that requires the dam safety project. Dam repair / reconstruction / modification project grant awards will cover:

  - 50 percent of the first $1,000,000 of eligible project costs;
  - 25 percent of the next $2,000,000 of eligible project costs; and
  - Dam abandonment and removal project grant awards will cover 100 percent of the first $1,000,000 of eligible project costs.

  Deadline: Application Dates TBD / Max. Funding: $1M / Local Match: 50%

The City of Manawa should also continue to monitor and advocate for the direct allocation of funds through both the State and Federal budget processes, as well as explore other funding opportunities:

- Follow up with State officials regularly to seek inclusion of the Dam Reconstruction Project into the 2025–2026 Biennial State Budget.

- Follow up with Sen. Tammy Baldwin's office regularly to check on the status of the March 2025 Congressional Funding Allocation request.

- Continue to evaluate the legal requirements and responsibilities of the current hydro facility owner for potential financial contributions to the project. In addition, the City should consider project costs and responsibilities in its upcoming re-negotiation of the current contract which expires in 2026.

5.8 Funding Strategy Timeline

Based on the three major categories of funding, the City will need to consider and coordinate the timing of efforts related to establishing budgets and securing grant funds. As shown in Table 5-2, the annual budgeting process for this project may need to extend over multiple years and includes a combination of general funds, general obligation bonding, low-interest loan applications, and perhaps the incorporation of a referendum if desired.

The two most applicable grant programs have different application timelines (as shown in Table 5-2). The USACOE program has a continuous application cycle, while the WDNR Municipal Dam Grant Program states that future application periods are yet to be determined. The previous deadline for the 2023–2024 fiscal years was March 1, 2024. Therefore, this program — if approved in the 2025–2026 Biennial Budget — could possibly have an application deadline of March 1, 2026. Again, it should be noted that the WDNR Municipal Dam Grant Program is only eligible to facilities that do not have hydroelectric operations.

Table 5-2. Funding Strategy Timeline

Funding Method	2025		2026			
	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
Annual Budgeting						
BCPL Loans						
USDA CFG Loans						
Project Referendum						
Grant Seeking						
USACOE CAP Sec. 14						
WDNR Municipal Dam Grant						
State Funding Request	*Monitoring and Advocacy*					
Federal Funding Request	*Monitoring and Advocacy*					

6 Time Frame and Permitting

6.1 Design Time Frame

This report presented several options for the Manawa Dam. The proposed design and construction of the dam will need to comply with Chapter NR 333 of state statues. The minimum time frame to create plans and specifications for bidding is six months. Once the plans are created, several permits will be required. The approval time frame is discussed in each permit section below.

6.2 City of Manawa – Chapter 300 Floodplain

The City of Manawa is required to have a floodplain ordinance to allow its constituents to participate in the National Flood Insurance Program (NFIP). The dam reconstruction plans are required to comply with local, State and Federal requirements.

A hydrologic and hydraulic analysis will need to be performed as part of design for a new dam. This study will need to be in compliance with Chapter NR 116 of state statues. Per NR 116, the impact of the proposed project cannot increase the backwater base flood elevation (BFE) as compared to the original dam condition.

The analysis will be completed during the design process and will take approximately one month. The review is completed by the WDNR on behalf of the City and could take up to six months for approval. The dam plans cannot be finalized until the analysis is concurred with by the WDNR.

6.3 FEMA – Floodplain

A Conditional Letter of Map Revision (CLOMR) and a Letter of Map Revision (LOMR) will be required. A CLOMR is completed before the project is constructed. It is intended to be a tool where FEMA can approve the proposed floodplain modifications before a project is constructed. This helps to avoid potential costly changes after the project is constructed.

A LOMR is needed after the project is completed and it officially changes the floodplain.

A CLOMR cannot be submitted to FEMA until after the hydrologic and hydraulic analysis is approved by the City of Manawa and the WDNR. The process for a CLOMR is roughly three months.

6.4 WDNR – Waterway and Wetland Permit

The dam is located on a navigable waterway. Any work in and around a river requires a Waterway and Wetland permit in compliance with Chapter 30 State Statues. A dam will fall under the requirements of an induvial permit. An individual permit requires a 90-day public comment period. In total, final approval of the permit from the WDNR could take up to six months. This permit cannot be started until the plans are near completion.

6.5 FERC – Hydroelectric Power Generation

The permitting approvals whether the dam is decommissioned for power generation or reconstructed are not known at the time of this report.

6.6 Timeline Summary

The design, permitting, and bidding timeline is therefore approximately a year and a half with the majority of the time designated for permit reviews and approvals. It is estimated that construction of the new dam would be approximately 9 to 12 months.

7 Recommendations

As previously stated in the structural assessment of this report, the condition of the dam is such that it is not repairable. Based on conversations with the City of Manawa and the Town of Little Wolf, the goal is to restore the Millpond which Concepts 3 and 4 would allow.

The powerhouse portion of the dam is privately owned and is approximately 100 years old. According to Water Power Magazine, the service life of a well-designed, well-constructed, and well-maintained concrete dams can easily reach 100 years. Hydromechanical elements such as gates and their motors have to be replaced after 30 to 50 years. According to this, it is possible that the powerhouse could be near the end of its service life. A structural assessment of the powerhouse portion of the dam is recommended to determine the feasibility of this portion of the dam remaining as is with the required repairs. The electricity generated each year is approximately $65,000. Any type of significant reinvestment in repairing or replacing the powerhouse could be a negative return on investment. A significant investment is required to restore the Millpond and the lifespan of the new dam should be 100 years. It is likely that a significant investment will be required in maintaining the powerhouse now and again in the next 50 years. Therefore, it is recommended to have discussions with the powerhouse owner to get an understanding of their long-term plans for the powerhouse. Depending on the conclusion from that discussion, purchasing the powerhouse and reconstructing the entire dam as one complete unit should be evaluated. In addition, there would be additional expenses in maintaining the FERC licensing. Therefore, it is not recommended that the City assumes the responsibilities for hydroelectric power generation. Furthermore, eliminating the hydroelectric function from the dam facility would make the project eligible for the WDNR's Municipal Dam Grant Program as a reconstruction project.

It is recommended to further investigate and pursue funding from identified grant programs as appropriate. The City's attorney should be consulted on dam re-construction costs as an eligible TID project cost and determine whether any TID contributions are feasible.

It is further recommended to hold a Public Hearing on the dam to seek input from the community regarding replacing the dam, potential funding sources including the resulting potential timelines as well as the possibility of a referendum to shorten the timeline.

Given the similarities in number of properties impacted by the dam between the City of Manawa and the Town of Little Wolf, it is recommended to continue discussions on future joint ownership of the new dam. A new ownership agreement should be negotiated between the City and Town which more comprehensively addresses items such as costs associated with re-construction, operations, and maintenance.

It is recommended to share this report with State and Federal agencies and officials in support of current budget funding requests. Maintain contact with State and Federal officials to monitor and request continued support for project costs to be included in their respective budgets.

Lastly, based on the findings of this report along with the desire to restore the Millpond, it is recommended that the City of Manawa proceed with Concept 3 or Concept 4. If the powerhouse owner does not intend to make long-term investments to the powerhouse, it is recommended to proceed with Concept 3. Cedar Corporation is prepared to begin the design and permitting phases upon authorization from the City.

8 References

The WDNR is required to maintain a file on all dams in Wisconsin. The City of Manawa obtained a copy of the file. The documents in the file are the main source of information for the general history portion of this report. A copy of the 1977 inspection report referenced in this document was provided by the powerhouse owner and can be found in Appendix F.

List of Appendices

The following appendices are referenced in this report and are included in this section, as follows:

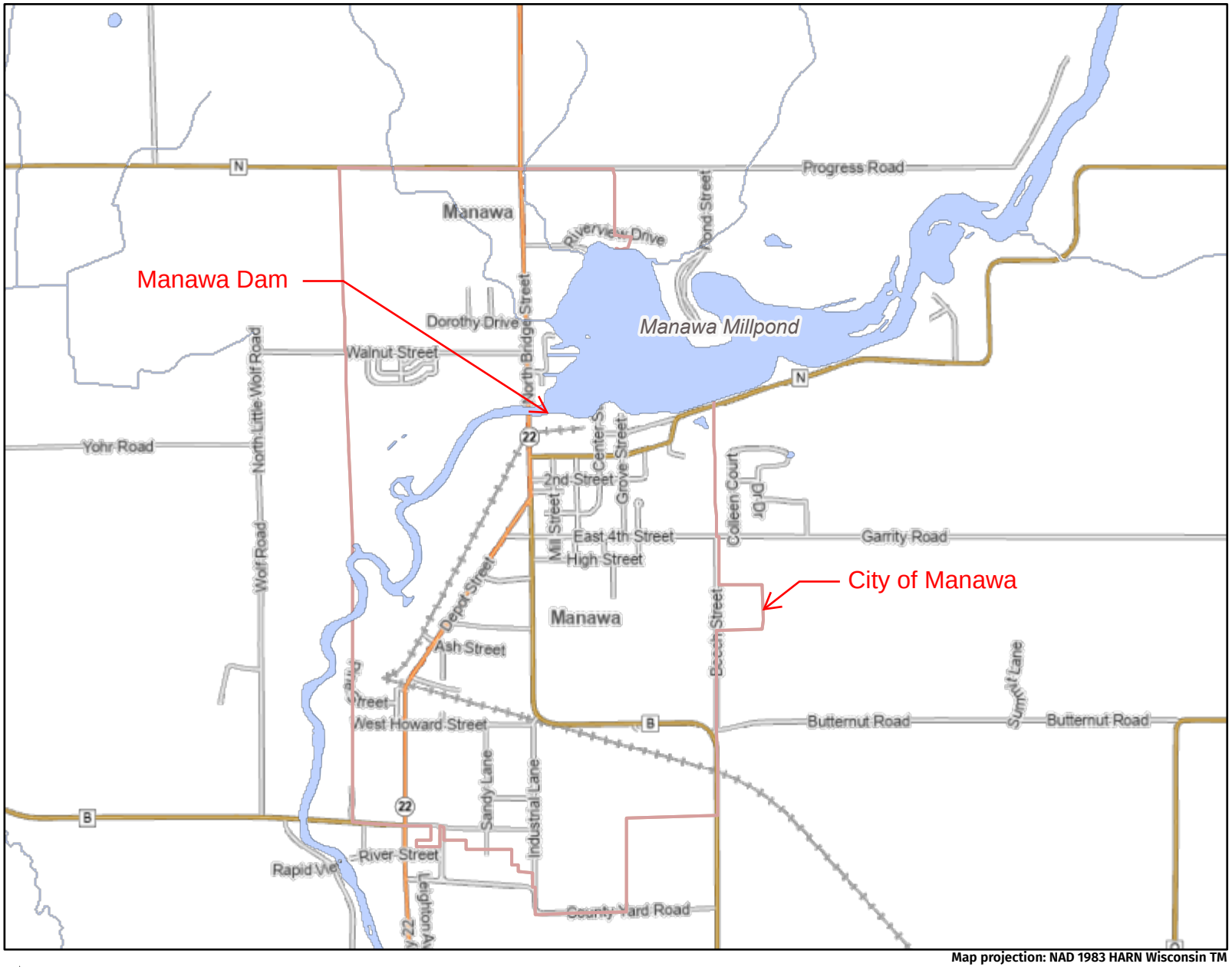
- Appendix A: Expanded Location Map
- Appendix B: Manawa Mill Pond Dam Photo Log
- Appendix C: Manawa Mill Pond Bathymetric Map
- Appendix D: Cost Estimates
- Appendix E: Potential Grant Information
- Appendix F: 1977 Inspection Report

Appendix A: Manawa Dam Location Map

Appendix A contains an expanded location map of the City of Manawa and the Town of Little Wolf.

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Manawa Dam Location Map



Legend: (some map layers may not be displayed)

- Rivers and Streams
- Intermittent Streams
- Open Water
- 24K Intermittent Streams
- 24K Lakes and Open Water

Cities, Towns & Villages

- City
- Civil Town
- City or Village
- County Boundaries

Major Roads

- State Highway

County and Local Roads

- County HWY
- Local Road
- Railroads

Notes:

Map projection: NAD 1983 HARN Wisconsin TM

N

Map: 0 1,000 2,000 Feet
0 575 1,150 Meters

Service Layer Credits:
Cities, Roads & Boundaries: , Surface Water (Cached): WiDNR, USGS, and other data

Date Printed: 5/13/2025 10:06 AM

Appendix B: Manawa Mill Pond Dam Photo Log

Appendix B includes a photo log of the Manawa Mill Pond Dam. These photos were taken on May 2, 2025, by Cedar Corporation staff.

PHOTOGRAPH LOG

Client Name: City of Manawa	Site Location: Manawa Dam	Project No. M4921-052

Photo No.	Date:
1	5-2-25

Direction Photo Taken:

Description:

Inlet at powerhouse

Photo No.	Date:
2	5-2-25

Direction Photo Taken:

Description:

Right side of powerhouse

PHOTOGRAPH LOG

Client Name: City of Manawa.	**Site Location: Manawa Dam**	**Project No.** M4921-052

Photo No.	**Date:**
3	5-2-25

Direction Photo Taken:

Description:

Bay 1 & 2 Upstream

Photo No.	**Date:**
4	5-2-25

Direction Photo Taken:

Description:

Bay 1 Concrete condition at sluice gates

PHOTOGRAPH LOG

Client Name: City of Manawa	**Site Location: Manawa Dam**	**Project No.** M4921-052

Photo No.	**Date:**
5	5-2-25

Direction Photo Taken:

Description:

Bay 1 Concrete condition at sluice gates

Photo No.	**Date:**
6	5-2-25

Direction Photo Taken:

Description:

Bay 1 & 2 spillway concrete deterioration

PHOTOGRAPH LOG

Client Name: City of Manawa	**Site Location: Manawa Dam**	**Project No.** **M4921-052**

Photo No.	**Date:**
7	5-2-25

Direction Photo Taken:

Description:

Bay 1 & 2 spillway concrete deterioration

Photo No.	**Date:**
8	5-2-25

Direction Photo Taken:

Description:

Underside of walkway at bay 1

PHOTOGRAPH LOG

Client Name: City of Manawa.	**Site Location: Manawa Dam**	**Project No.** M4921-052

Photo No.	**Date:**
9	5-2-25

Direction Photo Taken:

Description:

Left abutment at bay 1

Photo No.	**Date:**
10	5-2-25

Direction Photo Taken:

Description:

Lt abutment and walkway at bay 1. deterioration

PHOTOGRAPH LOG

Client Name: City of Manawa	**Site Location: Manawa Dam**	**Project No.** M4921-052

Photo No.	**Date:**
11	5-2-25

Direction Photo Taken:

Description:

Bay 2 walkway deterioration

Photo No.	**Date:**
12	5-2-25

Direction Photo Taken:

Description:

Bay 2 walkway deterioration

PHOTOGRAPH LOG

Client Name: City of Manawa	**Site Location: Manawa Dam**	**Project No.** M4921-052

Photo No.	**Date:**
13	5-2-25

Direction Photo Taken:

Description:

Bay 3 walkway deterioration

Photo No.	**Date:**
14	5-2-25

Direction Photo Taken:

Description:

Bay 3 sluice gates - upstream

PHOTOGRAPH LOG

Client Name: City of Manawa	Site Location: Manawa Dam	Project No. M4921-052

Photo No.	Date:
15	5-2-25

Direction Photo Taken:

Description:

Right pier of bay 3 deterioration.

Photo No.	Date:
16	5-2-25

Direction Photo Taken:

Description:

Upstream condition of bay 3

PHOTOGRAPH LOG

Client Name: City of Manawa	**Site Location: Manawa Dam**	**Project No.** M4921-052

Photo No.	**Date:**
17	5-2-25

Direction Photo Taken:

Description:

Below walkway of bay 3. Concrete deterioration and exposed reinforcement

Photo No.	**Date:**
18	5-2-25

Direction Photo Taken:

Description:

Apron and left pier deterioration of bay 3

PHOTOGRAPH LOG

Client Name: City of Manawa	**Site Location: Manawa Dam**	**Project No.** **M4921-052**

Photo No.	**Date:**
19	5-2-25

Direction Photo Taken:

Description:

Downstream walkway deterioration bay 3

Photo No.	**Date:**
20	5-2-25

Direction Photo Taken:

Description:

Upstream condition at bays 4 and 5. Section is undermined. Timber cribbing and rock fill have been washed away.

PHOTOGRAPH LOG

Client Name: City of Manawa	**Site Location: Manawa Dam**	**Project No.** M4921-052

Photo No.	**Date:**
21	5-2-25

Direction Photo Taken:

Description:

Right abutment of bay 5 is undermined.

Photo No.	**Date:**
22	5-2-25

Direction Photo Taken:

Description:

Right abutment of bay 5 is undermined and leaking between apron and abutment.

PHOTOGRAPH LOG

Client Name: City of Manawa	**Site Location: Manawa Dam**	**Project No.** M4921-052

Photo No.	**Date:**
23	5-2-25

Direction Photo Taken:

Description:

Walkway over bays 4 and 5 is sagging

Photo No.	**Date:**
24	5-2-25

Direction Photo Taken:

Description:

Concrete deterioration of the right abutment of bay 5 at walkway

PHOTOGRAPH LOG

Client Name: City of Manawa	**Site Location: Manawa Dam**	**Project No.** M4921-052

Photo No.	**Date:**
25	5-2-25

Direction Photo Taken:

Description:

Concrete deterioration of the right abutment of bay 5 at walkway

Photo No.	**Date:**
26	5-2-25

Direction Photo Taken:

Description:

Sagging walkway between pier and right abutment of bay 5

PHOTOGRAPH LOG

Client Name: City of Manawa	**Site Location: Manawa Dam**	**Project No.** M4921-052

Photo No.	**Date:**
27	5-2-25

Direction Photo Taken:

Description:

Bay 4 and 5 apron condition

Appendix C: Manawa Mill Pond Bathymetric Map

Appendix C includes a map of the Manawa Mill Pond which illustrates its bathymetry. This map was sourced from the Wisconsin Department of Natural Resources.

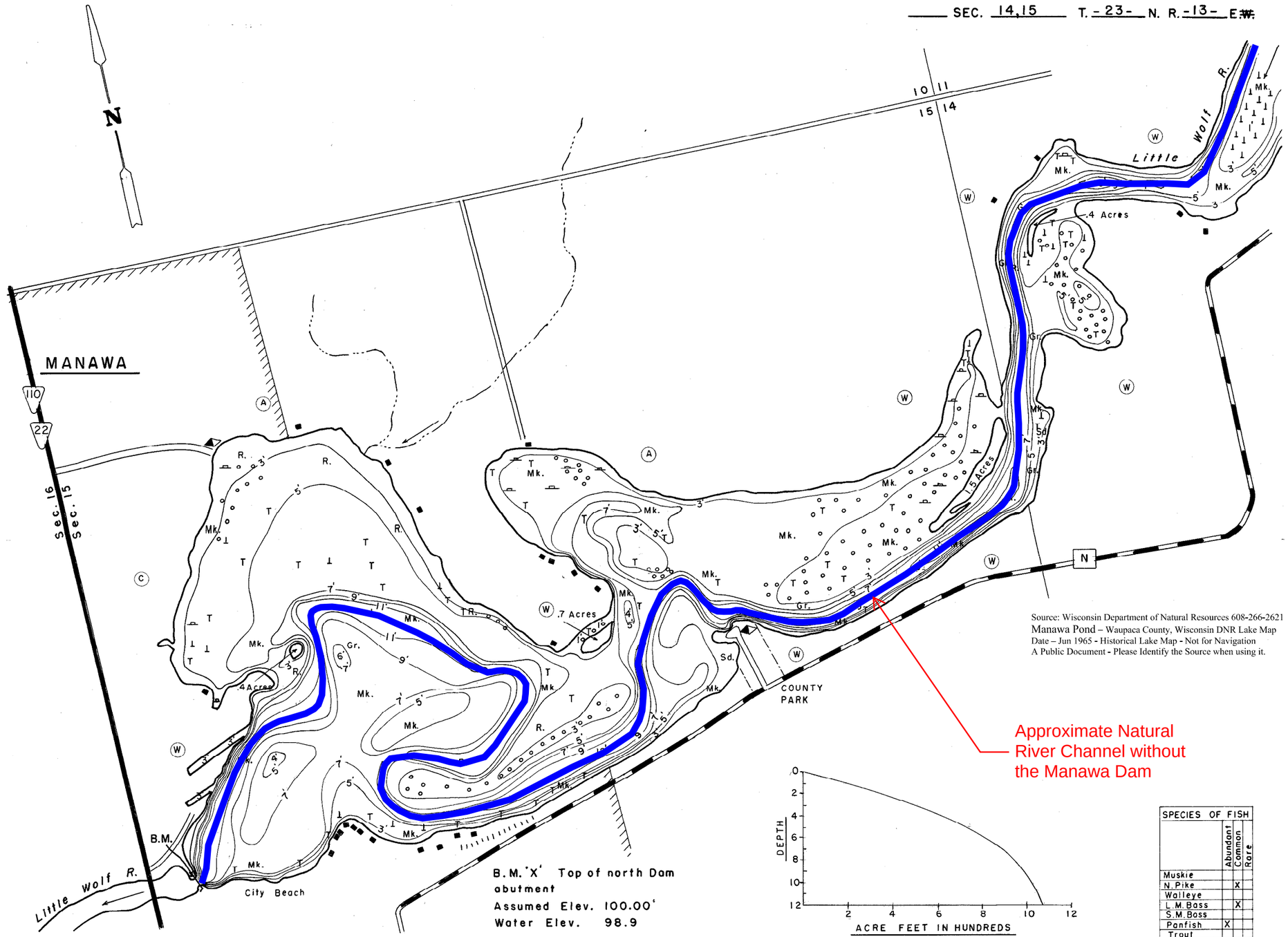
WISCONSIN CONSERVATION DEPARTMENT

LAKE SURVEY MAP

MANAWA POND — LAKE

WAUPACA — COUNTY

SEC. 14,15 T. -23- N. R. -13- E. W.



B.M. 'X' Top of north Dam abutment
Assumed Elev. 100.00'
Water Elev. 98.9

SPECIES OF FISH	Abundant	Common	Rare
Muskie			
N. Pike		X	
Walleye			
L.M. Bass		X	
S.M. Bass			
Panfish	X		
Trout			

EQUIPMENT SONAR MAPPED JUNE (MO.) 1965 (YR.)

WATER ELEV. 98.9

TOPOGRAPHIC SYMBOLS

- (B) Brush
- (PW) Partially wooded
- (W) Wooded
- (C) Cleared
- (P) Pastured
- (A) Agricultural
- B.M. Bench Mark
- Dwelling
- Resort
- Steep slope
- Indefinite shoreline
- Marsh
- Spring
- Intermittent stream
- Permanent inlet
- Permanent outlet
- Dam

LAKE BOTTOM SYMBOLS

- P. Peat
- Mk. Muck
- C. Clay
- M. Marl
- Sd. Sand
- St. Silt
- Gr. Gravel
- R. Rubble
- Br. Bedrock
- Stumps & Snags
- T Submergent vegetation
- ⊥ Emergent vegetation
- Floating vegetation

◇ Access ◆ Access with Parking ◆ Boat Livery

Field work by: H. Schmude, T. Corbett Drawn by: E. Eaton

194.5 WITH ISLANDS

AREA 191.5 ACRES

UNDER 3FT. 23 %

OVER 20FT. 0 %

VOLUME 1,078.3 ACRE FT.

TOTAL ALK. 158 P.P.M.

SHORELINE 5.5 MILES

MAX. DEPTH 12 FEET

Source: Wisconsin Department of Natural Resources 608-266-2621
Manawa Pond – Waupaca County, Wisconsin DNR Lake Map
Date – Jun 1965 - Historical Lake Map - Not for Navigation
A Public Document - Please Identify the Source when using it.

Appendix D: Cost Estimates

Appendix D includes cost estimates (opinion of probable project costs) for Concepts 1 and 3.

A rendering of the Manawa Dam is attached.

OPINION OF PROBABLE PROJECT COST

Community Infrastructure • Architecture • Environmental Services

Client	City of Manawa
Project	Mill Pond Dam Reconstruction
Prepared By	Brandon Strelow

Project No.	4921-0052
Date	5/22/2025
Revised Date	

Project Details: Demolition and removal of existing dam.

Item				Cost
Dam				
Mobilization				
Installation and removal of construction access				
Install security fencing				
Demolition and removal of existing structure				
Restoration				
Subtotal Construction				**$550,000**
Contingency				
Engineering				
Permitting				
Construction Administration				
Subtotal				**$150,000**
TOTAL PROJECT COST				**$700,000**

NOTES:

1. Based on Concept 1.
2. Assumes 2027 construction cost. Escalation factors will range depending on market conditions.
3. Estimate includes demolition of powerhouse.
4. Demolition of powerhouse will need to be coordinated with Wiscons8, LLC (the licensed dam operator).
5. Opinions of Probable Cost prepared by Cedar Corporation are supplied for general guidance only. Cedar Corporation has no control over competitive bidding or market conditions, thus we cannot guarantee accuracy of such opinions as compared to contract bids or actual costs to the owner.

OPINION OF PROBABLE PROJECT COST

Community Infrastructure • Architecture • Environmental Services

Client	City of Manawa
Project	Mill Pond Dam Reconstruction
Prepared By	Brandon Strelow

Project No.	4921-0052
Date	5/22/2025
Revised Date	

Project Details: Demolition and removal of existing dam. Construction of new spillway with flow control.

Item				Cost
Dam				
Mobilization				
Installation and removal of construction access				
Install security fencing				
Demolition and removal of existing structure				
Construction on new foundation and dam				
Install crest gates				
Install stop logs				
Install security fencing				
Install steel walkway				
Restoration				
Subtotal Construction				**$6,500,000**
Contingency				
Engineering				
Permitting				
Construction Administration				
Subtotal				**$1,900,000**
TOTAL PROJECT COST				**$8,400,000**

NOTES:

1. Based on Dam Replacement Concept 3.
2. Assumes 2027 construction cost. Escalation factors will range depending on market conditions.
3. Estimate includes demolition of powerhouse.
4. Demolition of powerhouse will need to be coordinated with Wiscons8, LLC (the licensed dam operator).
5. Opinions of Probable Cost prepared by Cedar Corporation are supplied for general guidance only. Cedar Corporation has no control over competitive bidding or market conditions, thus we cannot guarantee accuracy of such opinions as compared to contract bids or actual costs to the owner.


Manawa Mill Pond
Dam Rendering
Cedar
CORPORATION
Celebrating 50 Years
2025

Appendix E: Potential Grant Information

Appendix E consists of *Table 4-1. Potential Grant and Loan Funding Programs*.

Table 4-1. Potential Grant and Loan Funding Programs

Project Type	Ref #	Application Deadline	Entity	Funding Type	Program Name	$ Max	Match Requirement	Loan Terms / Interest Rates	Project Component Applicability
Reconstruction or Removal	**1**	Continuous	USACOE	Grant	**CAP Section 14 - Emergency Streambank and Shoreline Protection**	$10M	Initial study for federal interest is 100% up to $100k. All planning costs after the first $100,000 shared at 50%. All design and implementation costs req. 35% non-federal.	n/a	Plan, design, and construction for sites endangered by flood-caused bank or shoreline erosion.
Reconstruction or Removal	**2**	Continuous	USACOE	Grant	**Planning Assistance to States and Tribes**	$2M	50% non-federal / no in-kind allowed	n/a	Typical studies are completed at a planning level; they do not include detailed design for project construction. The studies generally involve the analysis of existing data for planning purposes using standard engineering techniques, although some data collection may be necessary.
Reconstruction or Removal	**3**	Continuous	BCPL	Loan	**Board of Commissioners of Public Lands Loans**	None listed	n/a	Variable	Nearly any public improvement.
Reconstruction or Removal	**4**	Continuous	USDA	Loan	**Community Facility Guaranteed Loans**	None listed	n/a	Max 40 yr. Term. Current Term 20 yr. 4.375% current rate	Can also be used to fund recreational facilities.
Reconstruction or Removal	**5**	TBD (possible March, 2026?)	WDNR	Grant	**Municipal Dam Grant Program**	$1M	50% of first $1M / 25% of next $2M / Dam abandonment and removal is 100%of the first $1M	n/a	Eligible projects include dam repair, reconstruction or modification to improve the safety of the dam, or abandonment and removal. Hydroelectric facilities are NOT eligible for this program.

Table 4-1. Potential Grant and Loan Funding Programs, Continued

Project Type	Ref #	Application Deadline	Entity	Funding Type	Program Name	$ Max	Match Requirement	Loan Terms / Interest Rates	Project Component Applicability
Removal	**6**	Continuous (?)	Foundation	Grant	**Waupaca Area Community Foundation / Community Vision Fund**	$1k - $20k	None	n/a	Can fund Community and Neighborhood Development and Environment Projects.
Removal	**7**	Continuous	USACOE	Grant	**CAP Section 206 - Aquatic Ecosystem Restoration**	$10M	Initial study for federal interest is 100% up to $100k. All planning costs after the first $100,000 shared at 50%. All design and implementation costs req. 35% non-federal.	n/a	Plan, design, and construct projects to restore and protect aquatic ecosystem restoration projects. Such projects generally include modification of the hydrology in and along bodies of water, including wetlands and riparian areas. ***Per call with USACOE, only applicable if the dam is removed.***
Removal	**8**	3/15/2025	USF&W	Grant	**Fox River/Green Bay Natural Resource Damage Assessment (NRDA)**	Varies	None listed	n/a	Low potential as site is in Wolf River Basin vs. Fox River Basin.
Removal	**9**	3/31/2025 (also June, Sept, and Dec.)	Private	Grant	**T-Mobile Hometown Grants**	$ 50,000	None	n/a	The program funds projects to build, rebuild, or refresh community spaces that help foster local connections in your town. Projects should be shovel-ready, physical builds or improvements that can be completed within 12 months of receiving Hometown Grants funding.
Removal	**10**	4/15/2025	WDNR	Grant	**Targeted Runoff Management Grant**	$225k - $600k	30% min.	n/a	Can be used for streambank protection projects.
Removal	**11**	9/1/2025	Private	Grant	**Alliant Energy Community Grant**	$ 2,500	None	n/a	Possible use for a design charrette?
Removal	**12**	9/1/2025	Private	Grant	**C.D. Besadny Conservation Grant Funds**	$ 2,000	50%	n/a	Projects that build climate resiliency of Wisconsin's natural resources through natural climate solutions or climate adaptation. Total project budget not to exceed $10k.

Table 4-1. Potential Grant and Loan Funding Programs, Continued

Project Type	Ref #	Application Deadline	Entity	Funding Type	Program Name	$ Max	Match Requirement	Loan Terms / Interest Rates	Project Component Applicability
Hydro	**13**	2025 (TBD)	DOE	Incentive Payment	**Hydroelectric Efficient Improvement Incentives**	$5M	70%	n/a	Incentive payments to the owner or authorized operator of a hydroelectric facility at an existing dam for capital improvements directly related to improving facility efficiency by at least 3%. (see guide here: https://www.energy.gov/gdo/hydroelectric-incentives-guide)
Recreation / Amenities	**14**	2025 (TBD)	Private	Grant	**Fish America Foundation**	$ 25,000	None	n/a	Fish Habitat Improvements
Recreation / Amenities	**15**	5/1/2025	WDNR	*Grant**	**Stewardship Program: Land & Water Conservation Fund**	None listed	50%	n/a	Public outdoor recreation improvements.
Recreation / Amenities	**16**	5/1/2025	WDNR	*Grant**	**Stewardship Program: Urban Rivers Grant**	None listed	50%	n/a	Improved quality of waterway/riverfront (restoration, recreation expansion, trails)
Recreation / Amenities	**17**	10/1/2025	WDNR	Grant	**Sport Fishing Restoration - Fishing Pier**	Varies	50%	n/a	Fishing Pier Addition

**WDNR Stewardship Program requires a current and adopted Comprehensive Outdoor Recreation Plan (CORP).*

Appendix F: 1977 Inspection Report

Appendix F includes an Inspection Report dated September 29, 1977.

Attachment outlines a preliminary report of condition of Manawa Dam on the Little Wolf River, City of Manawa, Waupaca County, Wisconsin.

DE GELLEKE & ASSOCIATES, CONSULTING ENGINEERS
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Sept. 29, 1977

Mr. Thomas Falck
Foth & Van Dyke and Associates Inc.
Consulting Engineers
2737 Ridge Road
Green Bay, Wis. 54304

Re: Preliminary Report of condition of
Manawa Dam on the Little Wolf River,
City of Manawa, Waupaca County, Wis.

Dear Mr Falck,

The following is my report and recommendations on the condition of the above dam, which I have prepared at your request. Basically, I have considered two possibilities; 1. a new structure and 2. repair of the existing structure.

On Aug. 30, 1977, I, along with Mr. Bob Mommaerts of your office, made a cursory examination of the existing structure. On Sept. 14, 1977, I met with Mr Stan Nestigen, Dam Safety Engineer with the Wis. D.N.R. At that time, I was able to review the D.N.R. report file and some of the history of this structure. I also had available for my reference, a copy of your report dated Nov. 1976 and which contained a copy of a report of soil borings taken 1n 1975. I have tried, in my report, not to duplicate the imformation documented in these reports but some of the data was used to confirm my opinion of the conditions which are not now visible.

CONDITION

The original substructure consisted of log cribs, filled with rock, extending down to a firm clay base. This base is about 16 feet below lake level or at about elev. 83.5 using B.M. 387A as elev. 100.00. Over the years, the log cribs have deterio rated, the rock has washed out and the underside of the concrete base has badly eroded. The seepage thru the rock cribs has been extensive and damaging. H-piles were added to reinforce the timber cribs and later sheet piling had been added about 15 feet down stream from the dam. A new concrete spillway slab had been added between the sheet piling and the dam. The sheet piling and this new slab appear to be in fair condition, however it is not know to the writer what kind of top anchorage is provided for the sheet piling and it is questionable how long this piling will function with the continued seepage under the dam. Although some of the washed out rock had been replaced before the new spillway slab was poured, there is still evidence of extensive seepage thru the rock cribs and in my opinion the concrete foundation has not been

restored to a satisfactory condition. On the upstream side of the dam, there are extensive hollowed out areas under the concrete base. The concrete base slab is in a very serious condition. Repair of the dam would require a cut off wall extending down to firm bearing. This wall could be either of concrete or steel sheet piling. The top of the wall should be anchored to the dam foundation and the rock crib below the foundation slab should be pressure grouted and sealed to stop seepage. The real bad sections of the foundation should be broken out and replaced. The downstream sheet piling may need to be tied back to the new upstream wall.

Practically all of the piers need some kind of repair or replacement. they are either cracked or badly spalled or eroded. Reinforcing is exposed and deteriorating. The cracks and spalls lead to unusual turbulence in the stream which will usually cause increased deterioration of some other areas.

The north and part of the west wall of the power house is badly deteriorated and will require extensive patching and replacement.

The decks are still in fair condition with relatively minor repairs required. The railings could use some repairs and most of the gates need some repairs.

RECOMMENDATIONS

My primary recommendation if at all financially possible, would be to construct a new dam. Inspection reports date this dam back to 1915 and it probably was built in the late 1800's. This would make the structure some 60 to 80 years old. Sections of the dam have been repaired and replaced but there is no indication that any extensive repair has been done to the substructure which I believe is now in very critical condition. The sheet and H-piling added has helped to stabilize the condition but I believe this to be a temporary or stopgap measure and extensive work would now be required behind the dam. The original structure was designed and built to power a grist mill and a planning mill and these functions no longer exist. A new structure, designed for recreational and flood retainage could probably be designed for a higher head which would give the pond a greater storage capacity. I recommend a preliminary figure of about $500,000 be budgeted for a new structure.

My secondary recommendation is to repair the existing structure. This would include a complete and minute inspection of the structure. A structural and hydrological analysis would be required for each cross section of the structure. Consideration should be given to eliminating the Power House raceway unless study would indicate it could be used for a new generator, however I believe the cost of remodling the powerhouse will

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likely be prohibitive and a new generator should only be considered with a new dam.

The gates would have to be examined completely. Some of the lifting mechanisms no longer function properly and some of the gates need repairs. As stated earlier, a cut off wall would be required behind the dam, the substructure pressure grouted and the concrete repaired. The dividing line between what will be repaired and what will be replace will be hard to determine.

The cost of the repairs could be less than a new dam but the best that could be hoped for is a repaired dam in reasonably good condition but not really designed for its present use. Its final repaired condition will of course depend on how much money is spent on it but I recommend a preliminary figure of about $300,000 be budgeted for repairing the structure.

Please feel free to contact me if there are any questions on this report or if I can be of any further service to you.

Respectfully submitted,

Armin H. De Gelleke

Armin H. De Gelleke P. E.

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