

# WEIDMAN MILL POND DAM INSPECTION

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Dam Identification No.: 820  
Hazard Potential: Significant  
Section 18, T. 15 N. – R. 5 W  
Nottawa Township, Isabella County, Michigan  
Coldwater River



Per Part 307 and 315, Act 451 of 1994

PREPARED FOR:

*Isabella County Drain Commissioner  
Robert Willoughby  
200 North Main Street, County Building  
Mt. Pleasant, Michigan 48858  
rwilloughby@isbellacounty.org*

PREPARED BY:

*Spicer Group, Inc.*

INSPECTED BY:

  
Shawn P. Middleton, P. E. #42722

Drew M. Stager, E.I.T.

Date of Inspection: December 13, 2022  
Date of Report: December 2022

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## **INTRODUCTION**

The Weidman Mill Pond Dam was inspected pursuant to the requirements of Part 307 and Part 315, Dam Safety, Natural Resources and Environmental Protection Act, Act 451 of 1994. Spicer Group, Inc. conducted the three-year inspection of the dam on December 13, 2022, as requested by the delegated authority of the dam, the Isabella County Drain Commissioner. The scope of this inspection is to identify conditions that constitute an existing or potential hazard to the dam. The identification of potential hazards is limited to the field visual inspection, review of previous reports, review of previous plans, and general computations. The contents of this report are not to be treated as a detailed engineering evaluation.

This inspection report will serve as a supplement to previous inspections performed on the dam. Previous inspection reports, drawings, sketches, calculations, etc. will be referred to as part of this inspection report. A summary of the design, construction, maintenance, and subsequent inspections of the dam are outlined in the Project Information section of this report. All references regarding the orientation of the dam shall be made as viewed looking downstream. The terms satisfactory, fair, poor, and unsatisfactory will be used to describe the conditions of the dam. The following is a brief definition of each term.

### **SATISFACTORY**

No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines.

### **FAIR**

No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and /or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action.

### **POOR**

Dam safety deficiency is recognized for loading conditions which may realistically occur. Remedial action is necessary. POOR may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency: further investigations and studies are necessary.

### **UNSATISFACTORY**

Dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution. Reservoir restrictions may be necessary until problem resolution.

## CONCLUSIONS AND RECOMMENDATIONS

### A. Overall Condition

Visual inspection of the dam indicates that the dam and its appurtenant structures are in fair overall condition. The primary spillways appeared to be in satisfactory condition and their capacities adequate. The spillway gate was opened during the inspection on December 13<sup>th</sup>, 2022, by the Isabella County Drain Commissioner. The calculated normal freeboard is 1.3 feet for the design event. The earthen embankment along Bridge Street appeared to be sound and structurally stable at the time of the inspection, but the embankment along the east side of Weidman Pond was in poor condition due to the presence of brush, trees, steep slopes, minor sloughing, and seepage at the toe of slope. Observed flow through the embankment was documented. Beaching is present along the upstream slope of the east embankment. Signs of seepage were noted along the downstream slope; however, a thorough inspection was not fully performed due to the vegetation present. The following is a list of observed deficiencies and recommendations.

### B. Observed Deficiencies and Recommendations

- Observation:* Significant seepage was observed along the downstream slope and at the downstream toe of slope for a portion of east embankment. At this time, transport of sand, sediment and flow through the impoundment was observed at Sta. 11+50.

*Recommendation:* Areas of seepage shall be repaired on the Weidman Dam Earthen embankment. Remove all brush and trees from the downstream slope to make monitoring and repair of the seepage areas easier.
- Observation:* Extensive brush and tree growth (up to 36" dia. ) exists along the upstream and downstream faces of the east embankment. Tree and brush growth on dam embankments has a number of negative impacts. Trees may be blown over by high winds resulting in the loss of embankment due to displacement of the root ball. The root structures of trees and brush may lead to piping of internal embankment materials from seepage through the dam and promote burrowing animals. Animal burrows may lead to further piping problems. The presence of brush and trees makes inspection of the dam difficult.

- Recommendation:* Remove all brush and trees from the downstream slope and spray cut stumps with a growth inhibiting herbicide. If the removal of trees and brush leaves the embankment void of vegetation, the embankment shall be seeded and mulched to promote grass growth. Also, if animal burrows are evident, rodents shall be removed, and the burrows filled. After the removal of brush and tree growth, the downstream slope should be monitored for signs of seepage.
3. *Observation:* Void formed under concrete slab on eastern portion of the principal spillway.  
*Recommendation:* Pack void with backfill material and monitor to make sure void does not reform. If void persists further investigation would be needed to determine cause and a designed solution be implemented.
4. *Observation:* The earth embankment located along the east side of Weidman Pond is narrow at some sections, has varying top elevation, and has steep front and back slopes.  
*Recommendation:* Remove trees and brush, obtain cross-sectional survey data of embankment, and evaluate the stability of this embankment. Based on this data the dimensions for a stable and structurally sound cross section that prevents or mitigates seepage should be determined.
5. *Observation:* The overflow spillway located on the north/south embankment, north of Bridge Street, shows signs of separation and multiple cracks throughout.  
*Recommendation:* The separation at the concrete joints should be monitored for any potential movement. Crack monitoring devices can be installed for this purpose. At some point this spillway will have to be considered for replacement or significant rehabilitation.
6. *Observation:* Beaching is evident along the upstream slope of the east embankment, just above the normal water line. The beaching is caused by repetitive wave action eroding vegetation and soil.  
*Recommendation:* Hard armoring such as plain riprap and/or fieldstone should be placed along the shore to protect the embankment from further erosion. Where applicable, the embankment shall be seeded and mulched to promote grass growth.

7. *Observation:* Ownership of the embankment running along the east side of Weidman Pond needs to be evaluated. It is our understanding this berm is on private property, and it is unclear as to whether easements exist for this part of the dam.

*Recommendation:* Obtain easements and/or clarify ownership and maintenance rights and responsibilities.
  
8. *Observation:* There is some brush and tree growth along the portion of the embankment along Bridge Street. Tree and brush growth on dam embankments has a number of negative impacts. The root structures of trees and brush may lead to piping of internal embankment materials from seepage through the dam and promote burrowing animals. Animal burrows may lead to further piping problems.

*Recommendation:* Remove all brush and trees from the downstream slope and spray cut stumps with a growth inhibiting herbicide. If animal burrows are evident, rodents shall be exterminated, and the burrows filled.
  
9. *Observation:* Multiple hairline cracks were observed on the back face of the right and left downstream concrete walls on the principal spillway with evidence of efflorescence.

*Recommendation:* Continue to monitor the cracks for change in size or separation.
  
10. *Observation:* Animal burrowing or settling of soils were observed along the right downstream spillway trough of the primary spillway.

*Recommendation:* Fill and compact Class II sand in void spaces and continue monitoring areas for disturbance.

### *C. Further Detailed Studies and/or Investigations*

At this time, we recommend that once the earthen embankment has been cleared of brush and tree growth, that portion of the dam be re-inspected, surveyed, and a stability analysis of the embankment performed. However, the concern related to easements and ownership of the east embankment may need to be addressed prior to performing this work. We also recommend that the current schedule of inspections every three years by a registered engineer and periodic inspections by the dam owner be continued.

#### D. *Hazard Potential Classification*

The hazard potential classification of the Weidman Mill Pond Dam is currently listed as “significant” due to potential property damage and the danger to individuals that exists in the event of failure of the dam. It should be understood that the significant hazard potential rating is solely based upon the location of habitable structures or infrastructure downstream of the dam and does not reflect upon the structural integrity of the dam. We do not recommend changing the hazard potential classification at this time.

## **PROJECT INFORMATION**

#### A. *General Description of Dam*

Weidman Mill Pond Dam is located in Section 18, T. 15 N. – R. 5 W. of Nottawa Township, Isabella County, Michigan (See Site Location Map in Appendix B). The dam impoundment known as Weidman Pond has a surface area of approximately 83 acres at normal lake level. The principal spillway and main embankment along Bridge Street was designed by Wilcox Associates and reconstructed in 1999/2000.

Weidman Mill Pond Dam is an earth embankment dam with a concrete and steel sheet pile spillway structure. The earthen embankment consists of one section approximately 600 feet long that runs east and west. This portion of the embankment has at its crest the asphalt surface of Bridge St. The 2<sup>nd</sup> section of the earthen embankment is approximately 900 feet long and extends to the north northeast from the east end of the first embankment. This embankment is best characterized by the heavy growth of trees and brush. There is a secondary spillway located north of Bridge St., on the portion of embankment that runs north and south.

The primary spillway crest consists of a fixed sheet pile weir with an effective length of 150± ft. and sits at an elevation of 885. 3 feet. Located at the center of the spillway is a 2’x3’ sluice gate, the invert of which is located at 877. 8 feet. Access to the gate is via a catwalk structure that extends from Bridge St. The normal tailwater of the receiving waters (Coldwater Creek) is 875. 3 feet, producing a normal head of 10 ft. on the dam. Water cresting the weir from both the east and west sides of the sluice gate flows into concrete channels that direct it underneath the Bridge Street bridge.

The secondary spillway consists of two cold water draw pipes with apparent valves on their lower end approximately 4-6 feet below the east embankment crest. The valves appear to be partially open and are likely inoperable. The size and type of the cold-water tubes was not determined at the time of the inspection. It appears there is several large pieces of broken concrete in front of the outlet pipes that are deflecting flow.

An emergency spillway is present over the top of the cold water draw pipes. This spillway is trapezoidal in shape with a bottom width of 20' and side slopes of approximately 1V:10H. The weir crest elevation is approximately 887'. The dimensions and elevation of this emergency spillway has not been surveyed and are estimated for this report.

#### *B. Purpose of Dam*

The Weidman Mill Pond Dam was originally constructed in 1893 as part of a logging operation. The main purpose of the structure today is for recreation and residential development.

#### *C. Available Design, Construction and Maintenance Information*

Plans of the 1999/2000 dam reconstruction are on file with the EGLE and the Isabella County Road Commission. Additional plans and specifications from the original construction of the dam were unavailable. Maintenance records were not available at the time of the report.

#### *D. Previous Inspection Reports*

- 2007 Safety Inspection Report, Weidman Mill Pond Dam, Dam ID 820, Lapham Associates.
- 2010 Safety Inspection Report, Weidman Mill Pond Dam, Dam ID 820, Spicer Group, Inc.
- 2013 Dam Inspection Report, Weidman Mill Pond Dam, Dam ID 820, Spicer Group, Inc.
- 2016 Dam Inspection Report, Weidman Mill Pond Dam, Dam ID 820, Spicer Group, Inc.
- 2019 Dam Inspection Report, Weidman Mill Pond Dam, Dam ID 820, Spicer Group, Inc.

## FIELD INSPECTION

Spicer Group performed a visual inspection of the dam on December 13, 2022. Photographs were taken and a field inspection checklist was completed in the field and office summarizing the inspection. The checklist and photographs are included Appendices A and C respectively. The following is a summary of the visual observations made during the inspection.

### *Earth Embankment*

1. The earthen embankment along Bridge Street is in fair condition. The earthen embankment running north and south along the east side of the mill pond is in poor condition. With excessive tree and brush growth and significant seepage through the far eastern portion of the embankment.
2. There is brush and tree growth on the upstream slopes of the embankment along Bridge Street.
3. No horizontal movement of the dam along Bridge Street was evident. The cross-section and profile of the embankment along Bridge Street appears to be consistent throughout. However, there is considerable irregularity in the horizontal and vertical profile of the east embankment. Horizontal movement of the east embankment was observed at Sta. 11+50. The east embankment width and side slopes vary greatly throughout.
4. Evidence of beaching exists on the upstream slope of the east embankment.
5. There is extremely dense brush and tree growth on both the upstream and downstream slopes of the east embankment.
6. Some signs of seepage and horizontal movement were present on the downstream side of the east embankment. Due to the heavy brush, it was difficult to inspect this portion of the dam. It is recommended that the embankment be re-inspected after the removal of the vegetation.

### *Spillways*

1. The steel sheet pile on the primary spillway was in satisfactory condition. Minor leakage was noticed through the seams in some locations. This leakage did not appear to be significant enough to be of any concern. There was rust typical of exposed steel sheeting that does not appear to be having an adverse effect on the structural integrity of the spillway.
2. Overall, the concrete portions of the primary spillway appeared in satisfactory condition. There are no signs of spalling, but some effluence present, though several small cracks were observed on the left and right back concrete wall of the spillway trough.
3. The sluice gate was operated at the time of the inspection and found to be in satisfactory condition. There were no signs of any leakage from the seals. The catwalk access to the gate was in satisfactory condition. The gate should be freed, exercised, and grease should be applied to the gate stem as part of routine maintenance.
4. The concrete secondary spillway located north of Bridge St. was in poor condition. There were signs of cracking and separation between portions of the concrete. These joints should be monitored for any signs of movement. The spillway appears to have a cold-water discharge that outlets at the base of the spillway. A previous inspection report indicates that this outlet consists of 2 separately gated pipes. This could not be verified during the inspection because the inlet pipes are not visible when normal water levels are present. At this time, rocks appear to have been lodged at the outlet of the pipes causing the water to outlet in a vertical direction.

## **STRUCTURAL STABILITY**

Based on this visual inspection, the overall structural stability of the dam is fair and does not appear to be at risk of immediate failure. However, a significant portion of the east earthen embankment was covered in heavy brush and tree growth and is irregular in shape. This growth should be removed to better evaluate the condition of the east embankment and be inspected for signs of seepage. The embankment along Bridge St. would be considered to be in satisfactory condition; however, we would consider the overall condition of the east embankment to be in poor condition. The primary spillways are in satisfactory condition. The secondary spillway is in

poor condition, with cracks across the entire width every 15' and multiple offset and displaced joints.

## HYDROLOGY AND HYDRAULICS

### A. *Available Design Data and Hydrologic Design Data*

Hydrologic Information provided by EGLE has been obtained and is included Appendix A of this report. EGLE calculated the 200-year peak inflow into the Weidman Mill Pond Dam to be approximately 1,050 CFS.

### B. *Contributing Drainage Area*

The area contributing to the Weidman Mill Pond Dam is 45.9 square miles (29376 acres). The ratio of contributing drainage area to the surface area of the Weidman Mill Pond Dam (83 acres) is approximately 354 to 1.

### C. *Design Flood Determination*

The design flood is determined by EGLE classification of the dam. Significant hazard dams are required to convey the 200-year event or maximum observed event, whichever is greater. EGLE determined the 200-year peak inflow into the impoundment to be 1,050 CFS.

### D. *Existing Spillway Capacity*

A hydraulic analysis of the Weidman Mill Pond Dam was conducted by the Lapham Associates as part of the 2007 dam inspection report. The analysis indicated that the primary spillway was capable of passing the 1,050 CFS with approximately 1.6 feet of head at the crest of the weir. The remaining freeboard on the earthen embankment was calculated to be 1.3 feet. This calculation did not include the hydraulic capacity of the 2' x 3' sluice gate nor the capacity of the eastern embankment emergency spillway.

### E. *Routing of Spillway Design Flood*

Due to the capability of passing the inflow design flood event over the primary spillway and the high ratio of contributing area to pond size, routing of the design flood was not performed as part of the hydraulic analysis.

#### F. *Flood of Record*

The largest flood of record was not known at the time the inspection was completed.

### **OPERATION AND MAINTENANCE**

No known written operation and maintenance plan currently exists for the Weidman Mill Pond Dam. This type of dam does not require a full or part time operator; however, an operation and maintenance plan should be developed to help monitor the integrity of the dam and improve its ability to pass significant storm events. This plan should include but not be limited to the operation of the gated spillway, maintenance of embankment slopes, monitoring of seepage through the dam and any settlement on the dam crest outside that of normal traffic loads.

### **EMERGENCY ACTION PLAN**

Previous inspection reports indicate that an emergency action plan (EAP) exists for the Weidman Mill Pond Dam and is kept on file with the Isabella County Emergency Services. An updated Notification Call List was prepared in 2010 and has been included in Appendix D. This EAP Notification List should be reviewed and updated as necessary. Because of the significant hazard classification of this dam an EAP is required by Part 315, Dam Safety, Natural Resources and Environmental Protection Act, Act 451 of 1994.

# APPENDIX A

*EGLE INVENTORY OF DAM  
EGLE HYDROLOGIC INFORMATION*

**Michigan Dam Inventory - Dam Inventory:  
Weidman Mill Pond Dam**

ConditionAssessment	Fair	LLLYear	1987
ConditionAssessmentDetail		LockWidth	
County	Isabella	Longitude	-84.96
CountyNumber	37	MaximumDischarge	
DamID	820	MaximumStorage	300.00
DamLength		NextInspection	December 30, 2022
DamName	Weidman Mill Pond Dam	NIDID	MI00820
DamType	Earth	NormalFreeboard	
DelegatedAuthority	Isabella County Drain Commissioner	NormalStorage	240.00
DesignFlood	100 Year	OtherDamNames	Weidman Dam
DesignFlowrate		OwnerName	Rob Morse
DownstreamHazardPotential	Significant	OwnerType	Private
DrainageArea	47.60	PondName	Weidman Mill Pond
EAPUpdated	November 7, 2007	PublicAccess	No
EmergencyActionPlan	Yes	Purposes	Recreation Other
FishPassage	No	Quad	P23NW
Head	10.00	QuarterSection	SW
HydraulicHeight	11.00	Range	05W
InspectionDate	July 17, 2019	RegulatoryAuthority	Part 307/Part 315
InspectionFrequency		ReplyDate	April 15, 2020
Inspector	Shawn P. Middleton, P.E.	ReportDate	December 30, 2019
LampreyBarrier	No	ReportReceived	December 30, 2019
Latitude	43.69	River	Coldwater River
LLLDatum		RoutedOutflow	
		Section	18
		SpillwayType	Uncontrolled

SpillwayWidth	
StructuralHeight	12.00
SummerLevel	885.40
SurfaceArea	65.00
Township	15N
TroutStream	No
WatershedNumber	32E
WinterLevel	
YearCompleted	1,900



## Flood Discharge Request Record 20190329

12/30/2022

[Home](#) | [Water Management](#) | [Lowflows](#) | [Discharge Requests](#) | [Watersheds Map](#) |

### Discharge Information

**Watercourse:** COLDWATER RIVER

**Location:** Weidman Mill Pond Dam (Bridge Street)

**Drainage Area:** 46.38 mi<sup>2</sup>
**Basin Name:** 32E - Chippewa

**Contributing Area:** 45.35 mi<sup>2</sup>
**County:** Isabella

**Tn/Rng/Sec:** 15N05W/18

**Township:** Nottawa

**Latitude:** 43.688333

**Quad Name:** Weidman

**Longitude:** -84.963333

**Quad ID:** P23NW

**Requested By:** Spicer Group, Inc.

**Received Date:** 5/29/2019

**Request Type:** Dam

**Issued Date:** 6/6/2019

**File Number:** 20190329

**Reference Number:** U20000279-13

#### Discharge Frequencies:

**10%: 410 cfs**
**2%: 750 cfs**
**1%: 850 cfs**
**0.5%: 1050 cfs**
**0.2%: 1300 cfs**

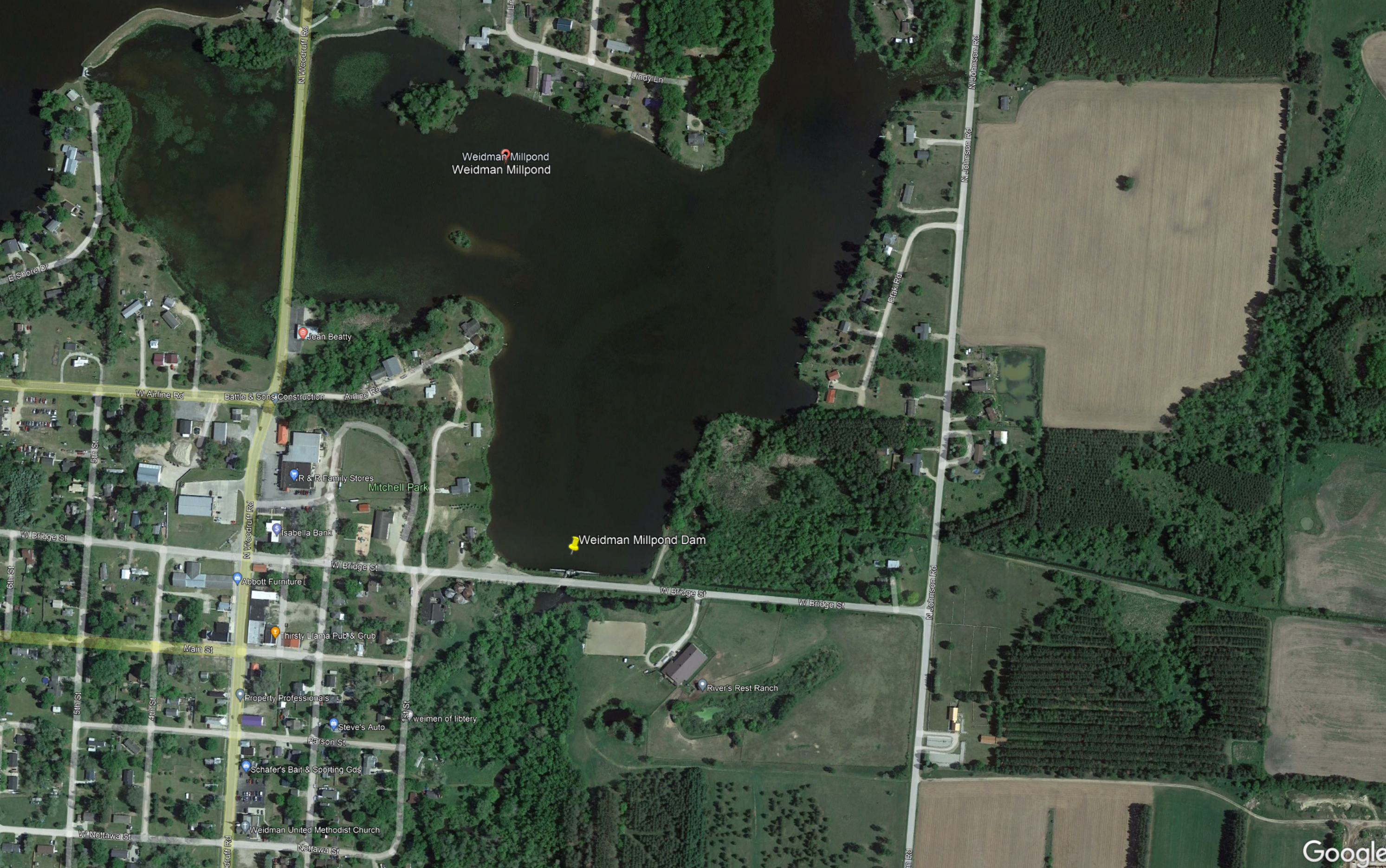
#### Volume Frequencies:

**1%:**
**0.5%:**

Access to the Flood Flow Database is provided as a service to allow you to check the status of your flood flow requests or to view discharges from previous requests for preliminary design purposes. The discharges values are only valid for the original requestor and for one year after the original request date. To obtain discharge information from the Hydrologic Studies Program, a flood flow [discharge request form](#) may be submitted electronically to EGLE. A written or email response to your request will be returned to you and must accompany your permit application.

# **APPENDIX B**

## *SITE LOCATION MAP*



Weidman Millpond  
Weidman Millpond

Weidman Millpond Dam

Jean Beatty

R & R Family Stores

Isabella Bank

Abbott Furniture

Thirsty Llama Pub & Grub

Property Professionals

Steve's Auto

Schafer's Bait & Sporting Gds

Weidman United Methodist Church

Mitchell Park

River's Rest Ranch

# APPENDIX C

## *PHOTOGRAPHS*

# Weidman Pond Dam



Weir Alignment Looking West



Sluice Gate Operational



Concrete Condition through Outlet Channel



Weir Alignment Looking East



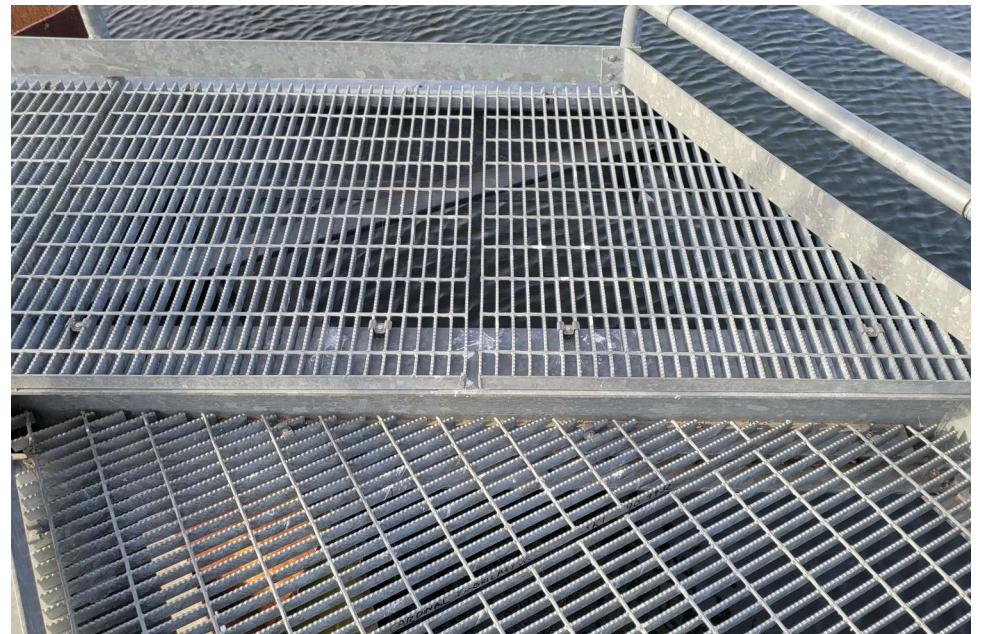
Looking West Along Western Embankment



Concrete Cracking and Efflorescence Along East Wall



Looking West at Dam Structure



Catwalk and Railing in Good Condition



Vortex from Cold Water Discharge through Auxiliary Spillway



Void Underneath Slab on Eastern End of Structure



Cold Water Discharge Downstream of Auxiliary Spillway



Looking South at Brush and Tree Growth Along Embankment



Cold Water Outlet Channel



Approx. 2.5" Gap between Downstream Headwall and Wingwall on Auxiliary Spillway



Tree Growing Next to Auxiliary Spillway



Cold Water Discharge Valve



Looking Southwest on Eastern Embankment



Concrete Cracking in Auxiliary Spillway



Rodent Hole in Embankment



Looking North from Auxiliary Spillway



Seepage through Embankment



Existing Embankment



Upstream Side of Seepage Location



Seepage through Embankment at Eastern End of Embankment



Farthest Eastern Part of Embankment



Eastern Portion of Embankment

## **APPENDIX D**

*2019 INSPECTION REPORT  
APPENDICES AVAILABLE UPON REQUEST*

# WEIDMAN MILL POND DAM INSPECTION

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Hazard Potential: Significant  
Section 18, T. 15 N. – R.5 W  
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Coldwater River



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PREPARED FOR:

*Isabella County Drain Commissioner  
Robert Willoughby  
200 North Main Street, County Building  
Mt. Pleasant, Michigan 48858  
rwilloughby@isabellacounty.org*

PREPARED BY:

*Spicer Group, Inc.*

INSPECTED BY:

  
Shawn P. Middleton, P.E. #42722

  
Charles Smith, P.E. #6201064634

Date of Inspection: July 18, 2019  
Date of Report: December 2019

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### **UNSATISFACTORY**

Dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution. Reservoir restrictions may be necessary until problem resolution.

## CONCLUSIONS AND RECOMMENDATIONS

### A. Overall Condition

Visual inspection of the dam indicates that the dam and its appurtenant structures are in fair overall condition. The primary spillways appeared to be in satisfactory condition and their capacities adequate. The spillway gate was opened during the inspection on December 13<sup>th</sup>, 2022, by the Isabella County Drain Commissioner. The calculated normal freeboard is 1.3 feet for the design event. The earthen embankment along Bridge Street appeared to be sound and structurally stable at the time of the inspection, but the embankment along the east side of Weidman Pond was in poor condition due to the presence of brush, trees, steep slopes, minor sloughing, and seepage at the toe of slope. Observed flow through the embankment was documented. Beaching is present along the upstream slope of the east embankment. Signs of seepage were noted along the downstream slope; however, a thorough inspection was not due to the vegetation present. This dense tree and brush growth is a cause for concern. The following is a list of observed deficiencies and recommendations.

### B. Observed Deficiencies and Recommendations

- Observation:* Significant seepage was observed along the downstream slope and at the downstream toe of slope for a portion of east embankment. At this time, transport of sand, sediment and flow through the impoundment was observed at Sta. 11+50.

*Recommendation:* Areas of seepage shall be repaired on the Weidman Dam Earthen embankment. Remove all brush and trees from the downstream slope to make monitoring and repair of the seepage areas easier.
- Observation:* Extensive brush and tree growth (up to 36" dia.) exists along the portion of the dam that runs north and south on the up and downstream embankment faces. Tree and brush growth on dam embankments has a number of negative impacts. Trees may be blown over by high winds resulting in the loss of embankment due to displacement of the root ball. The root structures of trees and brush may lead to piping of internal embankment materials from seepage through the dam and promote burrowing animals. Animal burrows may lead to further piping problems. At the time of the inspection, the dense vegetation also made the inspection of seepage along the entire embankment difficult. The presence of brush and trees makes inspection of the dam difficult.

- Recommendation:* Remove all brush and trees from the downstream slope and spray cut stumps with a growth inhibiting herbicide. If the removal of trees and brush leaves the embankment void of vegetation, the embankment shall be seeded and mulched to promote grass growth. Also, if animal burrows are evident, rodents shall be removed, and the burrows filled. After the removal of brush and tree growth, the downstream slope should be monitored for signs of seepage.
3. *Observation:* Void formed under concrete slab on eastern portion of dam structure.  
*Recommendation:* Pack void with backfill material and monitor to make sure void does not reform. If void persists further investigation would be needed to determine cause and a designed solution be implemented.
4. *Observation:* The earth embankment located along the east side of Weidman Pond is narrow at some sections, has varying top elevation, and has steep front and back slopes.  
*Recommendation:* Remove trees and brush, obtain cross-sectional survey data of embankment, and evaluate the stability of this embankment.
5. *Observation:* The overflow spillway located on the north/south embankment, north of Bridge St., shows signs of separation and multiple cracks throughout.  
*Recommendation:* The separation at the concrete joints should be monitored for any potential movement. Crack monitoring devices can be installed for this purpose.
6. *Observation:* Beaching is evident along the upstream slope of the east embankment, just above the normal water line. The beaching is caused by repetitive wave action eroding vegetation and soil.  
*Recommendation:* Hard armoring such as plain riprap and/or fieldstone should be placed along the shore to protect the embankment from further erosion. Where applicable, the embankment shall be seeded and mulched to promote grass growth.
7. *Observation:* Ownership of the embankment running along the east side of Weidman Pond needs to be evaluated. It is our understanding this berm is on private property and it is unclear as to whether easements exist for this part of the dam.  
*Recommendation:* Obtain easements and/or clarify ownership and maintenance rights and responsibilities.

8. *Observation:* There is some brush and tree growth along the portion of the embankment along Bridge Street. Tree and brush growth on dam embankments has a number of negative impacts. The root structures of trees and brush may lead to piping of internal embankment materials from seepage through the dam and promote burrowing animals. Animal burrows may lead to further piping problems.  
*Recommendation:* Remove all brush and trees from the downstream slope and spray cut stumps with a growth inhibiting herbicide. If animal burrows are evident, rodents shall be exterminated, and the burrows filled.
  
9. *Observation:* Multiple hairline cracks were observed on the back face of the right and left downstream concrete walls on the principal spillway with evidence of efflorescence.  
*Recommendation:* Continue to monitor the cracks for change in size or separation.
  
10. *Observation:* Animal burrowing or settling of soils were observed along the right downstream spillway trough of the primary spillway.  
*Recommendation:* Fill and compact Class II sand in void spaces and continue monitoring areas for disturbance.

#### C. *Further Detailed Studies and/or Investigations*

At this time, we recommend that once the earthen embankment has been cleared of brush and tree growth, that portion of the dam be re-inspected, surveyed, and a stability analysis of the embankment performed. However, the concern related to easements and ownership of the east embankment may need to be addressed prior to performing this work. We also recommend that the current schedule of inspections every three years by a registered engineer and periodic inspections by the dam owner be continued.

#### D. *Hazard Potential Classification*

The hazard potential classification of the Weidman Mill Pond Dam is currently listed as “significant” due to potential property damage and the danger to individuals that exists in the event of failure of the dam. It should be understood that the significant hazard potential rating is solely based upon the location of habitable structures downstream of the dam and does not reflect upon the structural integrity of the dam. We do not recommend changing the hazard potential classification at this time.

## PROJECT INFORMATION

### A. *General Description of Dam*

Weidman Mill Pond Dam is located in Section 18, T. 15 N. – R.5 W. of Nottawa Township, Isabella County, Michigan (See Site Location Map in Appendix B). The dam impoundment known as Weidman Pond and has a surface area of approximately 83 acres at normal lake level. The principal spillway and main embankment along Bridge Street was designed by Wilcox Associates and reconstructed in 1999/2000.

Weidman Mill Pond Dam is an earth embankment dam with a concrete and steel sheet pile spillway structure. The earthen embankment consists of one section approximately 600 feet long that runs east and west. This portion of the embankment has at its crest the asphalt surface of Bridge St. The 2<sup>nd</sup> section of the earthen embankment is approximately 900 feet long and extends to the north northeast from the east end of the first embankment. This embankment is best characterized by the heavy growth of trees and brush. There is a secondary spillway located north of Bridge St., on the portion of embankment that runs north and south.

The primary spillway crest consists of a fixed sheet pile weir with an effective length of 150± ft. and sits at an elevation of 885.3 feet. Located at the center of the spillway is a 2'x3' sluice gate, the invert of which is located at 877.8 feet. Access to the gate is via a catwalk structure that extends from Bridge St. The normal tailwater of the receiving waters (Coldwater Creek) is 875.3 feet, producing a normal head of 10 ft. on the dam. Water cresting the weir from both the east and west sides of the sluice gate flows into concrete channels that direct it underneath the Bridge St. Bridge.

The secondary spillway consists of two cold water draw tubes approximately 4-6 feet below the east embankment crest. The size and type of the cold water tubes was not determined at the time of the inspection. It appears there is several large pieces of broken concrete in front of the outlet pipes that are deflecting flow. No erosion was observed below or around the secondary spillway.

*B. Purpose of Dam*

The Weidman Mill Pond Dam was originally constructed in 1893 as part of a logging operation. The main purpose of the structure today is for recreation and residential development.

*C. Available Design, Construction and Maintenance Information*

Plans of the 1999/2000 dam reconstruction are on file with the Michigan Department of Environmental Quality and Environment and the Isabella County Road Commission. Additional plans and specifications from the original construction of the dam were unavailable. Maintenance records were not available at the time of the report.

*D. Previous Inspection Reports*

- 2007 Safety Inspection Report, Weidman Mill Pond Dam, Dam ID 820, Lapham Associates.
- 2010 Safety Inspection Report, Weidman Mill Pond Dam, Dam ID 820, Spicer Group, Inc.
- 2013 Dam Inspection Report, Weidman Mill Pond Dam, Dam ID 820, Spicer Group, Inc.
- 2016 Dam Inspection Report, Weidman Mill Pond Dam, Dam ID 820, Spicer Group, Inc.
- 2019 Dam Inspection Report, Weidman Mill Pond Dam, Dam ID 820, Spicer Group, Inc.

## FIELD INSPECTION

Spicer Group performed a visual inspection of the dam on July 18, 2019. Photographs were taken and a field inspection checklist was completed in the field and office summarizing the inspection. The checklist and photographs are included Appendices A and C respectively. The following is a summary of the visual observations made during the inspection.

### *Earth Embankment*

1. The earthen embankment along Bridge Street is in fair condition. The earthen embankment running north and south along the east side of the mill pond is in poor condition. With excessive tree and brush growth and significant seepage through the far eastern portion of the embankment.
2. There is brush and tree growth on the upstream slopes of the embankment along Bridge Street.
3. No horizontal movement of the dam along Bridge Street was evident. The cross-section and profile of the embankment along Bridge Street appears to be consistent throughout. However, there is considerable irregularity in the horizontal and vertical profile of the east embankment. Horizontal movement of the east embankment was observed at Sta. 11+50. The east embankment width and side slopes vary greatly throughout.
4. Evidence of beaching exists on the upstream slope of the east embankment.
5. There is extremely dense brush and tree growth on both the upstream and downstream slopes of the east embankment.
6. Some signs of seepage and horizontal movement were present on the downstream side of the east embankment. Due to the heavy brush it was difficult to inspect this portion of the dam. It is recommended that the embankment be re-inspected after the removal of the vegetation.

### *Spillways*

1. The steel sheet pile on the primary spillway was in satisfactory condition. Minor leakage was noticed through the seams in some locations. This leakage did not appear to be significant enough to be of any concern. There was rust typical of exposed steel sheeting that does not appear to be having an adverse affect on the structural integrity of the spillway.
2. Overall the concrete portions of the primary spillway appeared in satisfactory condition. There are no signs of spalling, but some effluence present, though several small cracks were observed on the left and right back concrete wall of the spillway trough.
3. The sluice gate was operated at the time of the inspection and found to be in satisfactory condition. There were no signs of any leakage from the seals. The catwalk access to the gate was in satisfactory condition. The gate should be freed, exercised, and grease should be applied to the gate stem as part of routine maintenance.
4. The concrete secondary spillway located north of Bridge St. was in poor condition. There were signs of cracking and separation between portions of the concrete. These joints should be monitored for any signs of movement. The spillway appears to have a coldwater discharge that outlets at the base of the spillway. A previous inspection report indicates that this outlet consists of 2 separately gated pipes. This could not be verified during the inspection because the inlet pipes are not visible when normal water levels are present. At this time, rocks appear to have been lodged at the outlet of the pipes causing the water to outlet in a vertical direction.

## **STRUCTURAL STABILITY**

Based on this visual inspection, the overall structural stability of the dam is fair and does not appear to be at risk of immediate failure. However, a significant portion of the earthen embankment was covered in heavy brush and tree growth. This growth should be removed to better evaluate the condition of the embankment and be inspected for signs of seepage. The primary spillways are in satisfactory condition. The secondary spillway is in poor condition, with cracks across the entire width every 15' and multiple offset and displaced joints.

## HYDROLOGY AND HYDRAULICS

### A. *Available Design Data and Hydrologic Design Data*

Hydrologic Information provided by the EGLE has been obtained and is included Appendix A of this report. The EGLE calculated the 200-year peak inflow into the Weidman Mill Pond Dam to be approximately 1,050 cfs.

### B. *Contributing Drainage Area*

The area contributing to the Weidman Mill Pond Dam is 45.9 square miles (29376 acres). The ratio of contributing drainage area to the surface area of the Weidman Mill Pond Dam (83 acres) is approximately 354 to 1.

### C. *Design Flood Determination*

The design flood is determined by the EGLE classification of the dam. Significant hazard dams are required to convey the 200-year event or maximum observed event, whichever is greater. The EGLE determined the 200-year peak inflow into the impoundment to be 1,050 cfs.

### D. *Existing Spillway Capacity*

A hydraulic analysis of the Weidman Mill Pond Dam was conducted by the Lapham Associates as part of the 2007 dam inspection report. The analysis indicated that the primary spillway was capable of passing the 1,050 cfs with approximately 1.6 feet of head at the crest of the weir. The remaining freeboard on the earthen embankment was calculated to be 1.3 feet. This calculation is based on the gate being closed.

### E. *Routing of Spillway Design Flood*

Due to the capability of passing the inflow design flood event over the primary spillway, routing of the design flood was not performed as part of the hydraulic analysis.

#### F. *Flood of Record*

The largest flood of record was not known at the time the inspection was completed.

### **OPERATION AND MAINTENANCE**

No known written operation and maintenance plan currently exists for the Weidman Mill Pond Dam. This type of dam does not require a full or part time operator; however, an operation and maintenance plan should be developed to help monitor the integrity of the dam and improve its ability to pass significant storm events. This plan should include but not be limited to the operation of the gated spillway, maintenance of embankment slopes, monitoring of seepage through the dam and any settlement on the dam crest outside that of normal traffic loads.

### **EMERGENCY ACTION PLAN**

Previous inspection reports indicate that an emergency action plan (EAP) exists for the Weidman Mill Pond Dam and is kept on file with the Isabella County Emergency Services. An updated Notification Call List was prepared in 2010 and has been included in Appendix D. This EAP Notification List should be reviewed and updated as necessary. Contact Information for the Isabella County Emergency Services Coordinator is located below. Because of the significant hazard classification of this dam an EAP is required by Part 315, Dam Safety, Natural Resources and Environmental Protection Act, Act 451 of 1994.

Isabella County Emergency Services

Marc Griffis

2008 E. Preston

Mt. Pleasant, MI 48858

(989)-773-6116