Dam Safety Inspection Report

Gull Lake Dam No. 565

Ross Township, Kalamazoo County Section 19, T01S, R09W Hazard Potential Classification: Low

Prepared for Gull Lake Association PO Box 104 Richland, MI 49083

Inspected By: Prein&Newhof

Joel G. Morgan, P.E. Michigan Registration No. 62771

Inspection Date:	April 1	3, 201	8
Report Date:	April 1	3, 201	8

Project Number 2170631



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1 Introduction

The Gull Lake Dam was inspected pursuant to the requirements of Part 315, Dam Safety, Natural Resources and Environmental Protection Act, Act 451 of 1994. Prein&Newhof conducted the fiveyear inspection of the dam as requested by the owner of the dam, the Gull Lake Association. 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, and calculations will be referred to as part of this inspection 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.

2 Conclusions and Recommendations

2.1 Overall Condition

Visual inspection of the dam indicates that the dam and its appurtenant structures are in **FAIR** overall condition. The embankment appears to be well maintained. The spillway appeared to be in fair condition and its capacity adequate for passing the design storm. The calculated normal freeboard exceeds 1 foot for the design event. The dam is nearly 100 years old and is deteriorating; therefore, it is critical for the owner to monitor the dam on a regular basis. The following is a list of observed deficiencies and recommendations that we recommend investigating and correcting with the next 5 years.

2.2 Observed Deficiencies and Recommendations

 Observation: Seepage was observed along the exterior of the left inside edge of the old mill foundation wall (See Figure 1 in Field Notes). There is loss of earthen material and concrete at this location. Water appeared to be dripping from an exposed edge of the concrete wall. The seepage was clear at the time of the inspection and no signs of sediment transport were observed. Additional seepage was observed in the inside face of the left spillway wall near the bottom of the tailrace.

Recommendation: Monitor these locations for an increase in seepage flow rate and additional loss of earth or concrete material. Any increase in flow rate or loss of material should be brought to the attention of a qualified engineer and/or MDEQ Dam Safety Unit. Continue to monitor the exterior of the right spillway wall for the seepage observed during the 2013 inspection. A monthly log of observations and photographs should be kept and reviewed as needed.

2. *Observation:* There are two sinkholes on the left embankment crest and upstream face adjacent to the spillway abutment wall. These sinkholes may be the result of surface erosion or animal burrows or may be caused by piping through the embankment along the

spillway wall. The seepage at the downstream toe of this spillway wall and two in-line sinkholes are an indication that piping may be occurring through the embankment at this location.

Recommendation: Fill sinkholes with additional soil material and seed. Monitor locations for additional settling. Any increase in settling should be brought to the attention of a qualified engineer and/or MDEQ Dam Safety Unit. Piping along the spillway wall has the potential to mobilize embankment materials and destabilize the dam. Failure can occur rapidly or take place over several months or years depending on embankment materials and hydraulic loading. The owner should regularly monitor and observations and photographs should be kept and reviewed as needed.

- Observation: There is a tree growing through the south facing wall between the principal and auxiliary spillways. *Recommendation:* Remove this tree and spray the stump with growth inhibiting herbicide. Monitor this location for any further vegetation growth.
- 4. Observation: There is minor brush and tree growth along the downstream face of the right embankment (west side of dam) and on the left downstream toe of slope. 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, displace dam material if trees are overblown, and promote burrowing animals. Animal burrows may lead to further piping problems. *Recommendation*: Remove all brush and trees from the upstream 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. If animal burrows are evident, rodents shall be exterminated and the burrows filled.
- 5. *Observation:* There are various cracks, spalling, and loss of concrete throughout the control structure. The exact locations are shown in the Photographs. The vertical crack observed in the 2013 report does not appear to have increased in size.

Recommendation: At a minimum, monitor these areas for any potential movement. Patch existing cracks and spalls at the top of the spillway walls with grout. Remove any existing loose concrete prior to patching.

6. Observation: There is leakage at the stop log in the auxiliary spillway that may make it difficult to maintain higher water levels during summer conditions. This leakage however does not appear to present a structural threat to the integrity of the dam. *Recommendation:* If higher summer water levels are desired, then a more watertight stop log system could be considered.

2.3 Further Detailed Studies and/or Investigations

No additional investigations outside of the normal inspections once every five years are recommended at this time.

2.4 Hazard Potential Classification

The hazard potential classification of the dam is currently listed as "low" which means a failure of the dam may cause damage limited to agriculture, uninhabited buildings, structures, or township or county roads, where environmental degradation would be minimal, and where danger to individuals is slight or nonexistent. It should be understood that the low hazard potential rating does not reflect upon the structural integrity of the dam.

At this time we recommend the "low" hazard classification remain in place.

3 Project Information

3.1 General Description of Dam

The Gull Lake Dam acts as the outlet control structure for Gull Lake. It is located approximately 1 mile south of the community of Yorkville in Ross Township, Kalamazoo County. The dam was originally constructed between the early 1830's and provided power a mill for the Price Cereal Food Co until 1906. In 1921, the Gull Lake Association was formed to acquire the dam, make repairs, and regulate the lake water level.

The dam is comprised of an earthen embankment on each side of a concrete outlet structure and spillway. The left embankment is approximately 110 feet long with a top width that varies between 20 and 40 feet wide. The downstream slope of the left embankment consists of an approximately 10 foot tall concrete wall that used to be part of the old mill foundation. The right embankment is approximately 60 feet long with a top width that is approximately 12-20 feet wide.

The spillway structure is constructed of concrete over cobbles with two spillway bays. The principal spillway is located on the right side of the structure and is approximately 5.75 feet wide with a fixed crest elevation of 876.32. Flow is controlled by an adjustable gate that is raised or lowered via control hoists in an enclosed gate house on top of the structure. The auxiliary spillway is located on the left side of the structure and is approximately 7 feet wide with a fixed crest elevation of 879.53. A 12" tall manually operated stop log was in place during the inspection. The principal spillway gate is adjusted seasonally to maintain a consistent lake level. The auxiliary spillway spillway stop log is removed during the winter for drawdown.

The dam height is approximately 21 ft, while the head is approximately 18 ft. The sill elevation of the flood sluice (Auxiliary spillway) is 879.2 ft.

3.2 Available Design, Construction and Maintenance Information

Original plans of the dam were not available during the inspection. Sketches drafted by Granger Engineering for the 1978 Dam Safety Inspection Report were available. Maintenance information outside of that obtained through conversation with the dam owner representative do not exist.

3.3 Previous Inspection Reports

2013	Dam Safety Inspection Report, Gull Lake Dam, Prein&Newhof
2008	Dam Safety Inspection Report, Gull Lake Dam, Prein&Newhof
2003	Dam Safety Inspection Report, Gull Lake Dam, Wade-Trim, Inc.
1978	Dam Safety Inspection Report, Gull Lake Dam, Granger Engineering

Copies of these inspection reports and relevant information are on file with the dam owner and/or the Michigan Department of Environmental Quality.

4 Site Investigation

The following discussion of the physical condition of the dam and appurtenances is based on observations and photographs obtained on the date of the dam safety inspection. Excerpts of sketches included in the 1978 Granger Engineering Dam Safety Report are in the Appendix.

4.1 Earth Embankment

The earth embankment appears to be in Fair to Poor condition. The presence of two sinkholes with seepage immediately downstream results in a downgrading of the embankment condition.

- The embankment appears to be stable with adequate surface cover. Woody vegetation on the left embankment appears to be well-maintained. There is woody vegetation present on the right embankment.
- 2. Two sinkholes exist adjacent to the left spillway wall on the embankment crest and upstream slope. There were no additional signs of settlement or depressions along the embankment crest.
- 3. There is no evidence of sloughing, erosion, beaching, or other deficiencies on the upstream face of either embankment. Riprap erosion protection was observed below the water's surface. Due to the relatively small size of the channel immediately upstream of the dam, the potential size and impact of wave action on the upstream slope is minimized.
- 4. Multiple cracks and spalls were observed in the vertical concrete wall at the left downstream toe of slope. A 1.75" wide crack running the entire height of the wall was observed but does not appear to have changed since the 2013 inspection.

4.2 Spillway/Outlet Structure

- 1. The control structure appears to be in fair condition with no significant failing features.
- 2. The control hoists for the principal spillway gate are uniformly covered with surface rust; however, there doesn't appear to be any section loss in any of the members.
- 3. The principal spillway gate and the auxiliary spillway stop log appear to have some leakage. The auxiliary stop log appears to have been augmented with a rubber gasket on the bottom held in place with duct tape.
- 4. The 1978 plans indicate a drawdown pipe exists. This was not observed during the inspection.
- 5. The concrete features throughout the control structure have numerous cracks, spalling, and loss of concrete. Of note:

- a. Longitudinal crack in principal spillway tailrace
- b. Considerable section loss in principal spillway cross-beam
- c. Section Loss on the downstream end and exterior of right spillway wall
- 6. Some efflorescence was observed throughout along hairline cracks. A patch was observed adjacent to active seepage on the south face of the concrete wall on the left downstream embankment (old mill foundation).
- 7. There is loss of concrete on the upstream faces of the left and right spillway walls at the water's surface.

5 Structural Stability

The embankment and spillway appear to be in fair and stable condition and do not appear to be at risk of immediate failure. The overall structural stability of the dam is fair.

6 Hydraulics and Hydrology

6.1 Available Design Data and Hydrologic Design Data

Hydrologic information provided by the MDEQ has been included in Appendix A. The MDEQ has calculated the 100-year peak flow rate to be 70 cfs.

6.2 Contributing Drainage Area

The Gull Lake Dam has a total drainage area of 26.1 square miles and a contributing drainage area of 15.4 square miles. The ratio of contributing drainage area to surface are of Gull Lake is 4.8 to 1.

6.3 Design Flood Determination

The design flood is determined by the MDEQ classification of the dam. Low hazard dams are required to convey the 100 year event or maximum observed event, whichever is greater. The MDEQ determined the 100 year peak flow rate at the dam to be 70 cfs.

6.4 Existing Spillway Capacity

The 2013 report includes a calculation of the spillway capacity. No additional calculations are provided in this report.

Gate Operation	Capacity (cfs)
Left bay closed	5
Right bay at summer level	
Left bay closed	172
Right bay dropped	
Left bay open	189
Right bay dropped	
Left bay open	347
Right bay open	
	Gate Operation Left bay closed Right bay at summer level Left bay closed Right bay dropped Left bay open Right bay dropped Left bay open Right bay open

6.5 Routing of Spillway Design Flood

Level pool routing calculations were not performed for this inspection as the spillway has adequate capacity to pass the design flood with adequate freeboard.

7 Operation and Maintenance

A report "Operation Plan – Gull Lake Dam" (Prein%&Newhof, 2013) was reviewed. No other written operation and maintenance plan currently exists for the dam. This type of dam does not require a full time operator. The owner has been regularly inspecting, monitoring, and correcting any problems encountered. We recommend that the owner continue these practices in the future.

8 Emergency Action Plan

There is not an EAP for the dam and one is not required by the MDEQ since it is a low hazard dam.

Appendix A

Dam Inspection Worksheet

MDEQ Dam Inventory Sheet

MDEQ Hydrologic Information

GULL LAKE DAM NO. 0565 – APRIL 13, 2018

DAM INSPECTION CHECKLIST

General Information

Name of Dam: Gull Lake Dam Dam ID Number: 0565 Hazard Potential Classification: Low Project Number: 2170631 County: Kalamazoo Township: Ross Town-Range-Section: T01S, R09W, 19 Name of Impounded Lake, Stream, River:

Gull Lake

Height of Dam: See Proventary Normal Head of Dam: Impoundment Size: Maximum Storage Capacity: Normal Storage:

Owner: Gull Lake Association Contact Name: Owner Phone Number: Owner Cell: Owner Address:PO Box 104, Richland MI 49083

Operator: Contact Name: Operator Phone: Operator Address:

12 2

Joel Morgan Jeff (larehospoc)

Dam Inspection Preparedness Checklist

Requested from MDEQ/MDNR

Previous Inspection Report Flow Summary Construction Plans Operation and Maintenance Records Design Calculations

Requested from Owner

Previous Inspection Report Flow Summary Construction Plans Operation and Maintenance Records Design Calculations

Jeff to determine nay recent construction

Set Date of Inspection with Owner

Equipment to Bring Piezometer Alignment Markers Benchmarks Survey Equipment Measuring equipment (tapes, rulers, sounding lines) Marking Paint Paper/pencil Calculator Scale Map Measuring Wheel Seepage (Bucket and timer)

Camera Binoculars Probe / level rod Rubber boots, Waders Boat Shovel Hammer Crack Measuring Device Life Jacket Hard Hat Steel toed shoes Lights

Interview with Owner:

Comments / Date:

Duner world like recommendations on remaining useful lite, polatical relacto or replace projects and actimated costs.

General Information

GULL LAKE DAM NO. 0565 - APRIL 13, 2018

Date of Inspection: $u / \frac{13}{10.18}$ Tie down stationing along top of dam: $V/_{4}$

EARTH EMBANKMENT

A. Settlement

a. Depressions Minor Variations in vertical probile (left side)

- b. Sinkholes Two sinkholes observed adjacent to left sike of control shuckure Nine observed on night enbankant
- c. Ruts and Paths None vlosure &
- B. Slope Stability

Look for:

Irregularity in horizontal and vertical alignment, Movement, Sloughing, Cracks, Slides, Slumps, Beaching

a. Left Upstream Embankment

Herizontal 2 500 d no cracks, slides, Blumps, or beaching

b. Left Downstream Embankment

Concrete well

c. Right Upstream Embankment

- No crossian or beaching
- d. Right Downstream Embankment
 - Fronto good cardidion
- C. Slope and Crown Protection

Look for:

Vegetative cover, trees and brush, erosion from surface runoff, wave protection.

a. Left Upstream Embankment

food grass growth broody vegetation wall maintained

b. Left Downstream Embankment

woody vegetation well Maintainet

GULL LAKE DAM NO. 0565 – APRIL 13, 2018

c. Right Upstream Embankment

lent cover & small plants. no crossian observed

d. Right Downstream Embankment

Some wordy vegetation theers ment

- D. Seepage, Boils, Piping
 - a. At contact points with all concrete structures D/s left abotment. See photos. Seepise into surface would pokedially consing loss of mak-rol.

b. Along downstream slopes

c. Along downstream toe None obs, though right dis toe is a wetland / week win.

d. Potential Seepage Areas

I tree noted on loft dls toe Saver thes on right slipe & toe ii. Animal burrows i. Trees None observed, though two sinkholes obs on left crust

e. Drainage systems

i. Toe Drains

Vone

- ii. Filters
 - None
- iii. Ditches

None

GULL LAKE DAM NO. 0565 - APRIL 13, 2018

SPILLWAY AND OUTLET WORKS

- A. Hydraulic Capacity
 - a. Principal Spillway

b. Auxiliary Spillway

> Adequate based on 2013 report

- c. Powerhouses N/A
- d. Other diversions, outlets, or withdrawals
- B. Control Gates and Operating Mechanisms
 - a. Structural Members surface rust on cushed members but no apparent loss of metal section. Lake Assac, oportes logs in b. Connections right channel senie regularly. Work aperated during inspection. c. Hoists All appear in fair condition
 - d. Cables
 - e. Power Supply
 - f. Gate Seals $N |_{A}$
- C. Stoplogs and Stoplog Channels
 - a. Leakage some leakage absorved through left oppehannel stop logs. below and wound sides.
 - b. Deterioration
 - c. Corrosion Wine observed
- D. Obstruction to Flow
 - a. Approach Channel Nore

NA

- b. Trash Racks
- c. Outlet Channel <u>some</u> fuller logs/brancles but no apparent restriction to
- d. Sedimentation None obs.

E. Drawdown Facilities

Neve 165

- F. Energy Dissipation
 - a. Stilling Basin

NA

b. Plunge Pools

NA

c. Baffles

NA

- d. Sills and Spillway Aprons Frint to Good contrition
- G. Pipes
 - a. Joint Separation
 - b. Leakage

NA

c. Protective Coating

NA NA

- d. Settlement
- e. Displacement
- NA
- H. Include sketch or plans of outlet works

See Attracted.

GULL LAKE DAM NO. 0565 - APRIL 13, 2018



GULL LAKE DAM NO. 0565 – APRIL 13, 2018

OPERATION AND MAINTENANCE

- A. Operation
 - a. Seasonal or fluctuating pond levels 1'ft 1/- flughting throughout year.
 - b. Operation records
 - c. Periodic drawdowns Lourshin winter
 - d. Instrumentation
- B. Maintenance
 - a. Repairs
 - b. Periodic Maintenance
 - i. Wood
 - ii. Metal
 - iii. Concrete
 - iv. Soils
 - v. Electrical
 - vi. Mechanical
 - c. Operation and Maintenance Plan
 - d. Site Security
- C. Emergency Action Plan
 - a. Warning Systems 🛛 🕅 🗛
 - b. Notification Networks

GENERAL AREAS

- A. Reservoir
 - a. Unique Features Jour d
 - b. Dead trees, debris in reservoir
- B. Shoreline
 - a. Erosion
 - b. Vegetation Shareline protection
 - c. Wave Protection
- C. Upstream Watershed
 - a. Historic development
 - b. Present development None relevant
 - c. Proposed development
- D. Downstream Floodplain
 - a. Flood protection water low flood plain starge wers
 - b. Historic, present, proposed development
 - c. Channel Restrictions New obs

GULL LAKE DAM NO. 0565 - APRIL 13, 2018

NIA

POST INSPECTION CHECKLIST

Interview with Owners Review Inspection Checklist

n kir w

Call Emergency Coordinator (if needed) $\mathcal{N}_{\mathcal{A}}$ What is needed in EAP for the County? $\mathcal{N}_{\mathcal{A}}$ Schedule a meeting with Owner and coordinator $\mathcal{N}_{\mathcal{A}}$

Prepare project letter agreement for EAP preparation N/A

Prepare preliminary EAP Inundation map List of possible flooded facilities, structures, etc. Time frame of flood wave

Meeting with Emergency Coordinator and Owner MA

Final EAP Make revisions per results of meeting

Preliminary Dam Inspection Report

Submit Preliminary Dam Inspection Report to Owner

Final Dam Inspection Report Make Revisions per Owners Request, if any.

Submit to MDEQ.





A REAL PROPERTY AND A REAL

Dam ID 565	National ID	MI00565	County	Kalamazoo	County #	39
Dam Name	Gull Lake Dam			File	Yes State	Michigan
Popular Name	Yorkville Dam			Plan		
Pond Name	Gull Lake			Quad U	21SW	Print
1/4 Section	Sec 19 T	own 01S R	ange 09W	DEQ District	Kalamazoo	Record
City Yorkville		Distance (n	ni) 1	Population	100	
Additional Information Summer and winter levels noted below were not established per Part 307 proceedings (or one of its predecessors) Levels are from records in Kalamazoo District Office (Kam Jordan) JCH, 9/25/2003. Inspection report received in 2004 is incomplete since it does not contain a current design flood discharge from HSU However, the discharge was reduced significantly. Freeboard was barely adequate with the old discharge of 190 cfs. With the new peak estimate of 90 cfs, spillway capacity and freeboard are now greatly improved. The consultant was advised on 4/2/04. He promised revised report by 4/23/2004, but it was never received JCH						
No plan liles		1 -		Phase I (PL92-367) Inspection	Yes
1 Inspec	ction Report	0 Emerger	ncy Action	Plans C	Correspondence (5	Files)
EAP Not Req	uired	AP Last Updated		Jurisc	liction Kalamazoo Cour	ıty
Hazard Low		Compliance	Activity		[
Owner ID 606	Owner Gu	I Lake Association	ı		Owner Type Pri	vate
Authority Pa	rt 315	Del	I. Authority			
Inspection Date	06/25/2013	Inspector	James R. Heg	arty, P.E.		Close
Report Date	06/26/2013	Next Inspecti	ion Date	12/31/2018		Inventory
Report Received	11/24/2013	Report Reply	Date 2	/27/2014	Action Requested	03/15/2009
Condition F	air	Condition	Detail			
Year Built 19	920 Type E	arth	Purpo	se Recreatio	on	
Top Of Dam To	Streambed (ft)	21		Design Floor	d ElevationTo Streambe	ed (ft) 21
Head {Headwate	er - Tailwater At Nor	nal Flow (ft)}	18	B N	lormal Freeboard (ft)	
Pond Acres At N	lormal Flow 20	50 Max. Stora	ge (ac-ft)	5393 N	lormal Storage (ac-ft)	0
River Gull La	ke Outlet		Watershed	17 C	Drainage Area (sq. mi)	29
Design Flood	100 Year	Design Ir	nflow Discharg	je (cfs)	2600	
Max. Spillway Capacity (cfs) 450 Design Outflow Discharge (cfs) 90						
Spillway Control Uncontrolled Spillway Width (ft) 13 Crest Length (ft) 260						
Permit No.	Repa	ir Permit No.			Permit Expiration Date	•
DEQ/DNR Const	truction Approval		Prope	rty ID 3904	19260090	
Year Legal Lake	Level Established	N N	vinter Level (ft	879.52	Summer Level (f	t) 880.52
State Assessed	No	SCS/NRCS	None			
Public Access	No	FERC No.			Latitude 42.36	39659
Trout Stream		Installed Capa	city (kw-hr)	0	Longitude -85.4	03499
Lamprey Barrier		Regulatory Age	ency Michig	gan DEQ	Locate in Bing M	laps
Fish Passage	No				AnoMaria	
Private on Fede	ral No				Агсімар	

Morgan, Joel

From:	deq-wrd-qreq <deq-wrd-qreq@michigan.gov></deq-wrd-qreq@michigan.gov>		
Sent:	Wednesday, March 14, 2018 06:34 PM		
То:	Morgan, Joel		
Subject:	RE: flood or low flow discharge request (ContentID - 168812)		

We have estimated the flood frequency discharges requested in your email of March 2, 2018 (Process No. 20180180), as follows:

Gull Creek at Gull Lake Dam, Dam ID 565, Section 19, T1S, R9W, Ross Township, Kalamazoo County, has a total drainage area of 26.1 square miles and a contributing drainage area of 15.4 square miles. The design discharge for this dam is the 1% chance (100-year) flood. The 50%, 20%, 10%, 4%, 2%, 1%, 0.5%, and 0.2% chance peak outflows are estimated to be 10 cubic feet per second (cfs), 15 cfs, 20 cfs, 35 cfs, 50 cfs, 70 cfs, 90 cfs, and 120 cfs, respectively. (Watershed Basin No. 17 Kalamazoo).

Please include a copy of this letter with your inspection report or any subsequent application for permit. These estimates should be confirmed by our office if an application is not submitted within one year. If you have any questions concerning the discharge estimates, please contact Ms. Susan Greiner, Hydrologic Studies and Dam Safety Unit, at 517-284-5579, or by email at: <u>GreinerS@michigan.gov</u>. If you have any questions concerning the hydraulics or the requirements for the dam safety inspection report, please contact Mr. Luke Trumble of our Dam Safety Program at 517-420-8923, or by email at: <u>TrumbleL@michigan.gov</u>.

From: jmorgan@preinnewhof.com [mailto:jmorgan@preinnewhof.com]
Sent: Friday, March 02, 2018 8:26 AM
To: deq-wrd-qreq <<u>deq-wrd-qreq@michigan.gov</u>>
Subject: flood or low flow discharge request (ContentID - 168812)

Requestor: Joel Morgan Company: Prein and Newhof Address: 3355 Evergreen Drive NE City: Grand Rapids Zip: 49525 Phone: 616-364-8491 Date: 2018-03-02 F50percent: Yes F20percent: Yes F10percent: Yes F4percent: Yes F2percent: Yes F1percent: Yes F0.5percent: Yes F0.2percent: Yes ContactAgency: None Selected ContactPerson: Watercourse: Gull Lake Dam No. 565 LocalName: Gull Lake CountyLocation: Kalamazoo CityorTownship: Ross Township Section: 19 Town: 01S Range: 09W

Location: Gull Lake Dam No. 0565 FFR1: Dam

Appendix B

Location Map

GULL LAKE DAM DAM I.D. 0565

Hopkins n 3 Nashville Gun Bedford Shelbyville (79) Lake 601 5 Wallake Rd Lawrence Hwy W 1.00 131 20 Orangeville 583 Kala Martin Watson (222) 420 222) Dowling Delton Lacy Clean that Doster Banfield Assyria (89) Guil Lake Dr W Richpion Rd **Hickory Corners** Plainwell Battle Eaton Barry Calhoun Calhoun Midland Park 37 Cooper Alamo W Michigan Ave Kendall Richland A45 Nazareth (43)Springfield BR 96) **Battle Creek** 131 BR (131) Parchment -11 BUS W Main St Kalamazoo E Michigan Ave 94 (37) (43) 94 194(66) Ceresco Comstock BUS 375 94 69 Climax 94 Mattawan Daver Ra 4 Portage Scotts 6 (66) Pine Creek East Leroy (131) 0 652 4 131

LOCATION MAP

APPENDIX 1

GULL LAKE DAM DAM I.D. 0565

CLOSE-UP LOCATION MAP



Appendix C

Photographs



Downstream channel



Downstream face of spillway



Locked access gate



Upstream channel on the south side of Gull Lake



Upstream face of left embankment



Crest of left embankment



Upstream face of left embankment



Fence at left embankment. Some settlement or loss of embankment behind fence.



Locked gate to control structure



Cracks and spalling in left upstream spillway wall



Sinkhole adjacent to left upstream spillway wall



Auxiliary spillway stop log bay



Right face of auxiliary stop log bay



Right face of auxiliary spillway tailrace



Auxiliary spillway tailrace



Loss of concrete on upstream end of left spillway wall



Crack in upstream end of left spillway wall



Cracks and spalling in downstream end of left spillway wall



Cracks, efflorescence, and loss of concrete in center spillway wall



Cracks, efflorescence, and loss of concrete in center spillway wall



Downstream face of spillway bays



Right downstream face of principal spillway. Note crack



Standing on dam, looking downstream



Interior of gate house



Left side of spillway gate (looking down)



Right side of spillway gate (looking down)



Right upstream spillway wall.



Loss of concrete at right upstream spillway wall



Exterior of right downstream spillway wall



Downstream face of spillway. Note loss of concrete in foreground and seepage in background.



Center spillway wall



Right downstream spillway wall



Right downstream spillway wall (location of 2013 seepage)



Right downstream embankment slope



South end of right downstream spillway wall. Note loss of concrete.



Inside face of auxiliary spillway tailrace



Crest of right embankment



Right upstream embankment slope



Inside face of right spillway wall



Downstream face of spillway wall. Note tree at base of wall.



Left downstream embankment



Vertical crack in left downstream embankment wall



Vertical crack in left downstream embankment wall



Spalling and loss of concrete in left downstream embankment wall



Left downstream embankment wall



Left downstream embankment wall



Right downstream spillway wall



Seepage at base of left downstream spillway wall



Seepage at base of left downstream spillway wall



Seepage and efflorescence at base of left downstream spillway wall