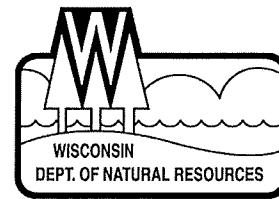


State of Wisconsin
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July 5, 2018

Bob Berry, Chairman
Friendship Lake District
404 Hillwood Lane
Friendship WI 543934

Subject: Administrative Order #2013-WCEE-017
February 2018 Dam Inspection
Inspection, Operation, and Maintenance (IOM) Manual
Emergency Action Plan (EAP)
Field File 1.01 – Friendship Dam

Dear Bob:

The permit for the Friendship Dam has now been assigned to the Lake District. You should have received a copy, but if not, let me know and I will send you a copy. With the permit now issued and with the Lake District now the owner of the dam we can finish and complete some outstanding items concerning the dam.

The administrative order had items from an earlier inspection that needed to be completed. Some of these items have been completed. The February 2018 inspection by Ayres Associates repeated some of the items from the administrative order and added some additional items. The IOM and EAP have been submitted and need a few additional items prior to approval.

Here is a summary of the items completed, the items that the February 2018 inspection report indicated would be completed with dates of completion, and the items that still need to be addressed.

Administrative Order

The following are the items that were listed in the administrative order issued for the dam.

DIRECTIVE

DUE DATE

1. *Bench Marks*

March 31, 2015

There needs to be at least three bench marks established for the dam. Two are off the dam and one on the dam. The bench marks need to be tied to the datum used in the Adams County FIS. Enclosed is Form 3400-48 for submitting the bench mark data.

The bench mark data according to inspection report is to be submitted by:

December 31, 2019

-
2. *Staff Gauge* *March 31, 2015*
Submit photos of new staff gauge mounted to the face of the dam set to the Adams County FIS datum.
- The staff gauge is illegible according to inspection report and is to be installed by: December 31, 2019
-
3. *Signs* *September 30, 2014*
Submit pictures of repainted or new dam warning sign and portage route signs. The portage route signs should indicate where the take out point is, show a safe portage route across the dam and a safe place to put in.
- The dam warning sign is in place. It is unclear if the portage route signs are in place. Outstanding
-
4. *Dam Failure Analysis (DFA)* *April 1, 2015*
It is estimated that this is a high hazard dam, meaning a potential loss of life exists if the dam fails. It is important that a DFA be prepared so that those potentially in harms-way can be identified. The DFA elevations need to be tied to the datum that was used in the Adams County FIS.
- This has been completed. The final submittal was on: March 2018.
-
5. *Spillway capacity evaluation* *April 1, 2015*
The spillway does not appear to meet any of the hazard ratings for a dam, low, significant or high hazard. Provide a plan for a proposed spillway to meet the requirements of Wisconsin Administrative Code NR 333 based on the hazard rating expected for the dam in the DFA.
- This has been completed. It is part of the dam failure analysis and was submitted on: March 2018
-
6. *Emergency Action Plan (EAP)* *September 30, 2015*
EAP needs to be based on the findings of the DFA.
- The EAP was submitted on: April 23, 2018
An additional item needs to be added prior to approval.
-
7. *Inspection, Operation and Maintenance Plan* *June 30, 2015*
The IOM should include a method of determining flow.
- The IOMP was submitted on: April 16, 2018
Additional items need to be added prior to approval.
-
8. *Dam Repair Report* *March 31, 2015*
Submit a report from an engineer that describes methods to correct or monitor the following items:
- a. *Embankment*
 - i. *Amount of seepage at north end of downstream embankment*
 - ii. *Cause of the depression across the crest of the dam.*
 - iii. *Upstream embankment protection and slope stability.*
 - iv. *Cleaning/repair of the toe drain system.*
 - b. *Gate – a description of the condition of the Tainter gate, pinions, and gate operator and any repairs needed.*
 - c. *An evaluation of any scour beneath or below the outlet apron and a description of corrective measures.*

d. Concrete – a description of all of the concrete areas that are spalling or cracked and a method to repair.

The report should include time frames for correcting the areas that are in need of repair.

The inspection report and application for the Municipal Dam Grant is addressing these items and they are expected to be completed by December 31, 2019.

The order has been substantially completed with only one item related to dam safety not having been addressed, the portage route. This item can be included with the other sign work needed at the dam. The major items of concern in the administrative order from a dam safety stand point have been met so the order has been complied with.

February 2018 Dam Inspection

The following are additional items that need follow up according the dam inspection completed by Ayres Associates.

- | | |
|---|-------------------|
| 1. Install fence along tail race walls | December 31, 2019 |
| 2. Increase flow capacity of dam | December 31, 2019 |
| 3. Add rip rap | December 31, 2019 |
| 4. Restore embankment height | December 31, 2019 |
| 5. Items to have in IOM | |
| a. Monitor rodents | |
| b. Monitor seepage at toe | |
| c. Monitor crack in powerhouse wall | |
| d. Monitor embankment movement | |
| e. Deice gate each spring | |
| f. Clean trash rack | |
| 6. Paint gate | December 31, 2019 |
| 7. Consider repairing the operator for the lake drain | December 31, 2019 |
| 8. Powerhouse items | |
| a. Clean wicket gate | |
| b. Replace trash rack | |
| c. Check roof for leakage | |
| d. Check need for tuckpointing building | |
| e. Fix broken windows and doors | |
| f. Evaluate electrical service and distribution | |

The Department concurs with the findings of the February 2018 inspection report and the proposed dates for addressing these items. The Department does not make recommendations or concur with the items related to the hydroelectric plant. It is best if the Lake District seek input from a consultant on these items that are not related to dam safety.

Inspection Operation and Maintenance Plan

The IOM submitted covers the basic items in a generic approach. The IOM should be detailed enough so that if a relief operator was needed at the dam they could read the manual and understand what they should do.

The inspection checklist should include the frequency of the inspections and monitoring; the method of monitoring, such as measure the crack with a ruler at a given location or survey the displacement at a given location, how and where to record the results, how to determine if a change took place, and what to do if a change has taken place. The date of the inspection or monitoring and the person who completed the monitoring should also be recorded.

The operation checklist should include the gate settings; when they were changed; by who and any available weather data to go along with it. The operation portion of the manual should describe how to operate the dam prior to high flows, during high flows, during normal flows and low flows. The inspection checklist or log book provides documentation of the operation. This operation checklist or log book shows that the dam is being properly operated. This becomes an important item if there are high flows and there are claims that lack of operation of the dam took place and caused flooding of properties.

The maintenance checklist should include the frequency of required maintenance or indicators to be used to determine if maintenance is required. Mowing, painting, lubrication, and other maintenance items should be listed.

So submit a better explanation on how one would operate the dam under various conditions, what and how to inspect and monitor the dam components, and the maintenance items needed to keep the dam in good condition and to extend its life. Again, anyone on the board should be able to read the IOMP and understand what they would need to do if they get called in the early morning hours to operate the dam. The completed checklists also shows the board that the dam is being properly cared for. This is your document for your dam. Make sure this tool works for you.

Emergency Action Plan

The emergency action is good. It should list any properties that would be affected downstream if the dam failed. The dam failure analysis lists one property that would be inundated if the dam failed. The address of this property should be included in the EAP.

Based on the administrative order, the February dam inspection, the IOM and EAP the Department has the following directives:

DIRECTIVE

DATE

1. Submit plans, specifications, and a design report for dam repairs

March 31, 2019

This should cover concrete repairs to the gated section of the dam; gate repairs; any proposed additional gates to increase hydraulic capacity; fencing and railings to improve safety; embankment restoration; addition of rip rap; repair or cleaning of toe drain system; scour repairs and protection; signing and staff gauge; additional bench marks; repair of the lake drain; and any other items needed to make the dam safe. Items related to the powerhouse should not be included.

DIRECTIVE

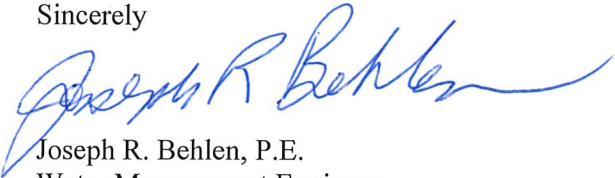
DATE

2. Complete approved repairs and additions in the plans, specs, and design report December 31, 2019

The Department recommends that if the Lake District anticipates operating the hydroelectric portion of the dam that you contract with a consultant that specializes in hydroelectric plants to help determine what work is needed with the powerhouse, the power equipment, and electrical system. These items are not eligible for funding through the Municipal Dam Grant program.

In closing, I want to thank you for being proactive in moving ahead and addressing the concerns at the dam. Addressing concerns early typically prevents larger problems down the road. Thank you. If you have any questions on the permit, the administrative order, the February 2018 inspection, the dam failure analysis, the IOM, the EAP or this letter please feel free to contact me at 715 421-9940 or e-mail at joseph.behlen@wisconsin.gov.

Sincerely



Joseph R. Behlen, P.E.
Water Management Engineer

- C: Meg Galloway – Dam Safety via e-mail
Mark Herman – WDNR via e-mail
Steve Sisbach- WDNR via e-mail
Deb Dix – WDNR via e-mail
Scott Provost – WDNR via e-mail
Jennifer Bergman – WDNR via e-mail
Village of Friendship via e-mail
Peter Haug- Ayres Associates via e-mail

