

INSPECTION, OPERATION AND MAINTENANCE PLAN

UPPER BRUNET DAM
(FORMAL NAME)

LORETTA DAM
(LOCAL NAME)

T39N, R04W, SEC.4, NE ¼, SW ¼, ON BRUNET RIVER
(LOCATION INCLUDING STREET AND STREAM SYSTEM)

57.32
DNR FIELD FILE NUMBER
NUMBER (DNR)

198
DAM KEY SEQUENCE

COUNTY: **SAWYER**

OWNER: **SAWYER COUNTY**

TELEPHONE: **(715) 634-6463**

CELL: **(715) 558-3407**

OWNER MAILING ADDRESS: **10610 MAIN ST.**
SUITE 49
HAYWARD, WI 54843

Plan prepared by: **Tim Seidl** **Asst. Conservationist** **Sawyer County**
Name Title Company

Signature

Date

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I. INTRODUCTION AND DEFINITION OF GENERAL RESPONSIBILITIES

A. Introduction

This document describes a plan of inspection, operation and maintenance for the Upper Brunet Dam. This plan should be periodically reviewed and modified to reflect operational and structural changes. The inspection and maintenance forms and other applicable figures are designed for easy revision.

This plan was prepared for Sawyer County, by Tim Seidl. This plan was prepared to conform to Dam Design and Construction Standards – “Hydraulic Design and Safety Requirements (3) Safety Measures Requirements”, Chapter NR 333.07(3), Wisconsin Administrative Code.

B. Purpose and Intent

The purpose of the Inspection, Operations and Maintenance (IOM) plan is to provide the owner/operator of Upper Brunet Dam and other officials with the following:

- Basic Guidelines which assist the operator/officials to:
 - Perform routine/recommended safety inspections;
 - Properly document the inspections;
 - Define and document normal operation procedures;
 - Define operational procedures during extreme events; and
 - Properly document maintenance requirements and activities.
- Guidelines and checklist items for routine inspections; and
- A series of alterable and reproducible master forms which will assist in documenting inspections.

Inspection, operation and maintenance procedures are needed to ensure the overall integrity of the dam and the public’s safety. The operator can only reasonably maintain the dam in working order through active inspection. The following sections should be used to guide routine inspection, operation, maintenance, and emergency actions.

C. Description

The Upper Brunet Dam is located on the Brunet River. The dam is accessed via Dam Rd. A map showing the location of Upper Brunet Dam and access roads can be found in Appendix A. There are no original as-built plans for Upper Brunet Dam. There are as-built plans for the extensive repairs that were completed in 2000. Those plans are located in the Upper Brunet Dam file in the ZAC office.

Type of dam: **Large – Stop Log**
Location of dam: **T39N, R04W, SEC. 4, NE ¼, SW ¼, Town of Draper**
Height of dam: **Structural Height 17.3 feet**
Max Storage: **1,471 acre-feet**
Number of gates: **4**
Type of gates: **Copolymer Stop Logs**
Use of dam: **Recreation**
Downstream land use: **Forestry/Recreation**
Downstream zoning in place: No ___ Yes **X**
Type of zoning: 100-Year Floodplain ___ Dam Failure **X**
Ordinance Adoption Date: **January 16, 2020**
Ordinance Adoption Approval Date: **January 23, 2020**
Upstream land use: **Forestry/Recreation**
Hazard Rating: **High**

D. Key Personnel and Their Responsibilities

Sawyer County is the Owner of Upper Brunet Dam. It is the Owner's responsibility to operate, inspect and maintain the dam. The Owner may have an operator who manages the dam on a day-to-day basis, but the owner is ultimately responsible and liable for any damages should the dam not be operated correctly or fail. Sawyer County Zoning and Conservation Department (ZAC) has an Operational Agreement with the Town of Draper to have town personnel operator the Upper Brunet Dam.

Only ZAC and Town of Draper personnel as the Upper Brunet Dam Owner/Operator may operate the dam. The operator shall notify adjacent upstream and downstream dam operators about changes to the timing of gate openings and resulting pool levels and flows. High water levels in the impoundment may require the operator to change the operation of the gates or the level of the pool.

ZAC personnel as owner/operator of Upper Brunet Dam is responsible for routine daily, monthly and annual inspections, for routine maintenance (e. g. mowing or burrowing animal removal) and other preventative maintenance (e. g. painting or seal repair) of the dam. The Town of Draper is responsible for operation of the dam during normal or low flows and especially during periods of high flows or flooding. Town of Draper personnel are also responsible for day by day monitoring when high or low flow conditions exist. More thorough inspections are required after high river flow conditions or other emergency conditions have subsided.

The Upper Brunet Dam does not have an "Early Warning System Device". The operators from ZAC and the Town of Draper have been trained to identify potentially dangerous flow conditions. Potential flood conditions at the Upper Brunet Dam are characterized by the following:

- Extended periods of greater than average precipitation or combined melting periods with greater than average precipitation;
- Rapidly increasing headwater levels (greater than 2" increase per hour) or other water level issues specific to the dam; or
- Other site specific conditions such as ice jams, etc.

The operator for the Upper Brunet Dam has been trained to identify other conditions indicating a possible emergency situation and the potential for dam failure. These include, but are not limited to:

- Serious rain events with the water level above the dam rising quickly;
- Slumping or sloughing of the dam's embankment;
- Excessive erosion on the embankment below the spillway or at the abutments;
- Excessive seepage or cloudy seepage through the abutments or the embankments;
- Settlement or cracking in the embankment;
- Piping or boils in the embankment or immediately downstream;
- Noticeable movement of any portion of the outlet structure;
- Vandalism activity in the vicinity of the dam;
- Floating bog lodged in spillway;
- Ice build-up at the dam inlet.

During an emergency, the dam operator will follow the procedures outlined in the Upper Brunet Dam Emergency Action Plan as approved by the DNR on February 28, 2020.

Staff Contact Information

Name/Title:	Jay Kozlowski ZAC Administrator	Tim Seidl/ Asst. Conservationist	Pat Brown/ZAC Specialist	David Zett/ Draper Town Chairman
Office:	(715) 634-8288	(715) 634-6463	(715) 634-8288	(715) 266-8441
Home:	N/A	(715) 766-3011	N/A	(715) 266-4262
Cell:	(715) 558-3407	(715) 699-3401	(715) 475-9933	N/A

II. INSPECTION

A. Inspections

Routine inspections are a necessary part of owning and operating a dam since early detection of gradual changes can reduce maintenance and repair costs. Routine inspections provide a way to monitor a dam's performance and identify changed conditions at the dam. All routine inspections shall be performed by properly trained persons. Records of completed inspections will be kept on file at the ZAC Department.

Listed below are the categories of routine inspections and documentation that shall be conducted by the dam owner/operator:

- Daily /Weekly
 - River flow observations
 - Precipitation records
 - Water level readings
 - Gate operation
 - Seepage monitoring (if present)
- Monthly
 - Operating equipment
 - Safety equipment
 - Performance and superficial structure
- Yearly or post flooding
 - Structural
 - Operating and safety equipment

Periodic detailed inspections of large dams are required under Chapter 31.19 (2)(ag) *Regulation of Dams and Bridges Affecting Navigable Waters*, Wis. Stats. At a frequency determined by the dam's hazard rating as well as after any emergency. All of these required inspections must be performed by a professional

engineer licensed in Wisconsin. Copies of these inspections will be submitted to the assigned DNR Water Management Engineer for concurrence. The following detailed inspections shall be conducted by Morgan & Parmley or equivalent engineering firm.

- Department of Natural Resources required owner inspections under ch. 31.19 (2)(ag), Stats.
- After all emergencies as per the Emergency Action Plan.

If anything unusual is noted during a post-flood self-inspection, contact should be made with the owner's consultant and the Department Water Management Engineer for the county in which the dam is located.

B. Inspection Equipment

The Dam Owner/Operator and qualified persons should/shall be adequately equipped for inspection. The following are recommended inspection related equipment items:

- Camera with flash.
- Ruler with graduations large enough to be identified on photos
- Knives for prying cracks and removing materials
- Copy of site map to note locations of problems and changing conditions.
- Life jacket
- Radio
- Crack gauges
- Inspection forms
- Other tools or equipment specifically needed to inspect dam

C. Inspection Procedures

Inspections of the Upper Brunet Dam should use the following procedure:

- Work in methodical pattern (all upstream faces end to end, then crest end to end, then all downstream faces end to end, e. g). Use same pattern each time.
- Fill in checklist as you go.
- Survey periodically to determine settlement or movement.
- Photograph apparent deficiencies from several different locations and at a distance as well as close up.
- Measure cracks and holes periodically.
- Measure seepage volumes periodically (if necessary).
- Inspect concrete for new cracks, holes, spalling, etc.
- Inspect earthen sections for holes, slumps, slides, cracks, vegetation.
- Inspect stop logs and hold downs.

- Inspect signage.
- Inspect guage and document water level.

A Dam Inspection Checklist can be found in Appendix B.

III. OPERATIONAL PROCEDURES

A. General Surveillance Provisions

Dams are part of a dynamic system composed of the river, the dam and precipitation. In order to operate a dam correctly, a dam owner/operator needs to monitor flow conditions and precipitation rates. Under certain conditions some dam owners will need to notify downstream dams of changes in operation.

The Upper Brunet Dam is checked monthly at a minimum to ensure the dam's pool level is at required or customary levels for summer vs. winter and that minimum flow levels are being met. The dam's levels and flows are also checked in response to precipitation. The required pool levels for the Upper Brunet Dam are:

Maximum: **2.0 - (99.5)**

Minimum: **1.0 - (98.5)**

Normal: **1.5 - (99.0)**

Levels are based on the water level gage located on wing wall.

The Upper Brunet Dam is routinely observed each month and inspected once a year. Thorough inspections also occur after high flow conditions have subsided. Flow conditions are monitored weekly and day by day when high flow conditions exist. Routine and required preventive maintenance is performed by the ZAC personnel. Site inspection, operation and flow monitoring records are kept on file at the Town of Draper and submitted to the ZAC Department.

1. Gate Operation

The Upper Brunet Dam has four stop log spillways. The stop logs have lift pins which are used to lift the stop logs using a lift beam and overhead rail system. The lifting mechanism is kept at the Town of Draper Shop. During times of high water stop logs are removed and stored at the town shop. Once the water level has subsided the logs are reinstalled.

2. Upstream Dam: None

3. Downstream Dam: Price Dam

The Price Dam is owned by Sawyer County and operated by the Town of Winter. The contact person for the Price Dam is:

Town of Winter
P.O. Box 129
Winter, WI 54896
715-266-3131 (Townhall)

4. Early Warning System: There is no early warning system for the Upper Brunet Dam.

B. Response during Periods of Darkness

Normal dam operation during periods of darkness can be done with the illumination of vehicle headlights. In the case of more extensive dam operation/emergency repairs Sawyer County Maintenance and Sawyer County Highway Departments have portable generators and lights that can be used to illuminate the dam structure and embankments.

C. Identification of Emergency

A flood emergency may exist if the water level is above the Maximum and rising even after stop logs have been removed. Conditions that may lead to a flood emergency are:

- Water levels above maximum and a minimum of two stop logs removed.
- Spring thaw following winter of above average snowfall.
- Several days of above average rainfall.
- Existing high water and predicted heavy precipitation.

D. Emergency Repair Supplies and Resources

Sawyer County Highway Department has heavy equipment and dump trucks available if emergency repairs to the earthen embankment are necessary. Additionally The Town of Winter also has heavy equipment and dump trucks available if needed. The Sawyer County ZAC Administrator is responsible for coordinating repairs.

E. Coordination of Flows

The Price Dam is located approximately 12 miles downstream of the Upper Brunet Dam. The Town of Draper shall notify the Town of Winter whenever they operate the Upper Brunet Dam so that the Price Dam can be operated accordingly.

F. Winter Drawdown

To prepare the Upper Brunet Dam for winter ice conditions and spring thaws, the water level is drawn down to minimum water level (1.0 on gauge) prior to freeze up.

G. Mechanical Equipment and Vehicles

The Town of Draper stores the stop log lift mechanism in their town shop. In the event the lift mechanism fails the town has a front end loader capable of hoist the stoplogs. Also the ZAC department has several full size pickup trucks equipped with logging tongs and 12,000+ pound winches mounted on them. The trucks and winches are professionally maintained by Sawyer County Maintenance Mechanic. Equipment is tested regularly to ensure it is operational.

IV. MAINTENANCE

Maintenance should be performed regularly. Routine, annual, and post storm inspection results will dictate how often and to what degree maintenance is required. A record should be kept of all maintenance activities. A maintenance log for Upper Brunet Dam can be found in Appendix C.

Since dams hold back water under pressure, repairs often need to be done differently than at other types of structures. Most items can be repaired by the Dam Owner/Operator. Larger repair items may need to be completed by qualified contractors. Large repairs may also require the submittal of plans and specifications to the Department for approval prior to starting any work. Generally, questionable repair items should be inspected by a qualified engineer and if required, repaired by contractors. All proposed repairs must be presented to the regional DNR water regulation engineer for a determination if any formal approval is required.

A. Maintenance Frequency

The Upper Brunet Dam is a stop log type dam and is constructed of reinforced concrete.

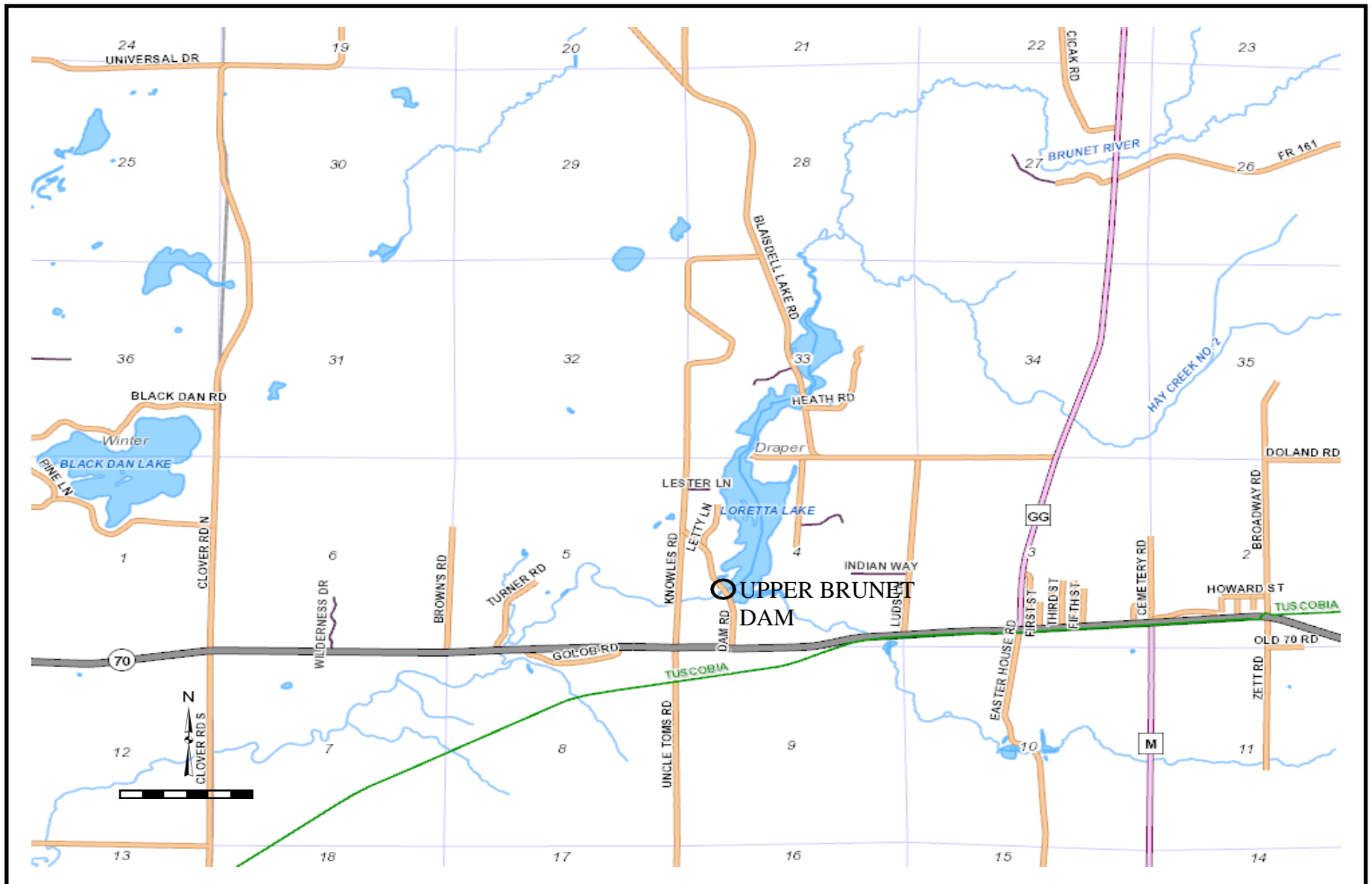
Periodic maintenance and item replacement are expected and preventative maintenance activities will increase with time. Maintenance should be routinely performed. Some items require more frequent attention than others. Routine maintenance includes activities such as mowing, tree removal, filling rodent holes, replacing boards and patching concrete. Waterproof filler materials can be removed from construction joints by flood waters, differential settling of the structure or freeze/thaw action. Waterproof filler materials should be maintained as outlined by the contractors or product suppliers' specifications.

B. Budget Considerations

Funding for routine maintenance is annually determined and placed in ZAC dam maintenance budget. Emergency funds are kept in the Sawyer County Resource Development Fund.

APPENDIX A

Location Map



APPENDIX B Inspections

Dam Inspection Checklist

UPPER BRUNET DAM INSPECTION CHECKLIST
DNR FIELD FILE NUMBER: 57.30

OWNER: **Sawyer County**

OWNER'S REPRESENTATIVE: _____

DATE: _____

WEATHER/SITE CONDITIONS: _____

INSPECTOR(S): _____

OTHERS: _____

CHECK ITEM AS INSEPECTED <input checked="" type="checkbox"/>	NOTE CONDITIONS AND OBSERVATIONS	NOTE ACTIONS REQUIRED
---	-------------------------------------	--------------------------

___ Benchmark
• Check for disturbance/vandalism
• Condition: _____

___ Headwater Gage

• Condition: _____
• Reading: _____

___ Stop Log Lock
• Check for damage/vandalism
• Condition: _____
• Action: _____

___ Walkway and Railing
• Check for broken welds or other damage.
• Condition: _____
• Action: _____

APPENDIX B Inspections

CHECK ITEM AS INSPECTED <input checked="" type="checkbox"/>	NOTE CONDITIONS AND OBSERVATIONS	NOTE ACTIONS REQUIRED
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___ Signage

- Condition and Visibility:

- Action: _____

___ Stoplogs

- Condition: _____

- Action: _____

___ Concrete Drop Inlet and Headwall

- Check concrete surfaces for cracks and spalls. Note location and crack widths on sketch.
- Concrete deterioration may be patched through maintenance procedures.
- Extreme deterioration should be examined by an engineer.
- Severe cracking or rapid changes require immediate notification to State Dam Safety Engineer.
- Condition: _____
- Action: _____

___ Upstream Riprap

- Elevation/location/extent of riprap _____
- Condition: _____
- Action: _____

___ Downstream Riprap

- High flow can cause underwater erosion (scour). Check for stream erosion and for scour hole at outlet of pipe. Use probe to check depth of scour hole.
- Condition: _____
- Action: _____

___ Earth Embankment

- Check vegetative cover. The embankment should have a suitable cover of grass with no woody vegetation such as brush, shrubs and trees. Mow regularly to maintain a 6-inch grass stand.
- Check for animal burrows. Remove animals and backfill holes with soil.
- Check for surface erosion on grassed slopes
- Replace riprap as required and topsoil and re-seed eroded areas as required.

APPENDIX B Inspections

CHECK ITEM AS INSEPECTED <u>√</u>	NOTE CONDITIONS AND OBSERVATIONS	NOTE ACTIONS REQUIRED
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- Check for slumps (slides or sloughs). Slow or sudden movement of earth embankment is an indication of instability and requires immediate response. Contact State Dam Safety Engineer for advice.
- Check for settlement of embankment. Settlement may be uniform or at isolated depressions. Settlement indicates loss of material or compression of material either within the dam embankment or the foundation. Settlement should be documented and evaluated by an engineer.
- Check for seepage on the downstream slope. If present, monitor for presence of soil particles. If soil is moving, a piping condition (internal erosion) may exist and requires immediate contact with the State Dam Safety Engineer.
- Condition:

•Action: _____

—

APPENDIX C

Maintenance

Maintenance Log Upper Brunet Dam				
Activity	Date	Person	Action Taken	Comments
Mowing				
Debris Removal				
Trees/Woody Vegetation Removal				
Rodent Removal/Hole Repair				
Concrete Patching				
Riprap Replacement				
Painting				
Stop Log Replacement				