Dam Inspection Checklist

Inspection of a large dam pursuant to ss. 31.19 (2) and ss.31.19 (4), Wis. Stats, should be conducted using the *Dam Inspection Checklist (Checklist)*. Use of the *Checklist* will provide consistency for inspections and a more efficient and accessible review process. The *Checklist* was designed to take into consideration the wide variety of dams in use in Wisconsin and covers all aspects of a dam inspection for which DNR needs documentation.

DNR Dam Safety is working to continually improve the forms and other information available to the Dam community. Please email any recommendations for changes or additions to the *Dam Inspection Checklist* form to dnrdamsafety@wisconsin.gov.

Instructions

1. **Review the *Dam Inspection Checklist* form before beginning the inspection process.** The *Checklist* was designed to be used with a wide variety of dams. By reviewing the *Checklist* before beginning the inspection process, an inspector can determine what pages from the form are needed, what information will be required and how to structure the inspection.

2. **Print only those pages that apply to the dam being inspected.** The *Dam Inspection Checklist* was designed to be used with a wide variety of dams. Therefore, not all sections of the *Checklist* may apply to the dam being inspected. The appropriate page numbers will need to be added to the document.

3. **Fill out box at top of first page regarding the name of dam, name of inspectors, etc.** Completion of this section is required in order to tracking of the data collected during the inspection.

4. **Check the appropriate boxes to note what was reviewed on site, if photos are attached and what actions are required.** A legend for the boxes can be found at the bottom of each page. Photos must be submitted with the completed *Checklist*. Details for preparing photographs can be found on Page 2 of this instruction sheet.

5. **Questions?** Please email any questions regarding the *Dam Inspection Checklist* form or process to dnrdamsafety@wisconsin.gov.

Dam Inspections
Photograph Instructions

1. On the *Dam Inspection Checklist*, check the appropriate boxes to note if photos were attached.

2. Printed and digital copies of the photographs must be submitted with the final Dam Inspection Report. Please limit the photographs to the following critical shots:
   a. General views of the dam – upstream and downstream sides of the structure *(These should be photos of the dam itself, not the upstream and downstream channel)*
   b. All deficiencies of the structure

3. Digital images must be submitted on a CD or DVD. The disc must be labeled with the official name, key sequence number, and date [mm/dd/yyyy].

4. Digital images must be in .jpg format and should have a resolution (pixel dimensions) of 640 x 480. Label the files with the following naming convention:

Characters 1-5:	Dam Key Sequence Number
Characters 6-7:	Month the photo was taken
Characters 8-9:	Day the photo was taken
Characters 10-11:	Year the photo was taken
Characters 12-13:	Sequence number of photos taken that day
Characters 14-17:	File extension ".JPG"

   For example, the first photo of a dam with a Key Sequence Number of 250, taken on June 10, 2010 would have a file name of 0025006101001.JPG

5. Provide a list of the submitted photographs that includes the file name and a brief description of the photo. Please submit a printed copy and include the list on the disc. For example:

Inspection of Photogenic Dam (Key Seq # 250) June 10, 2010	
File Name	**Description**
0025006101001.JPG	Upstream view of dam
0025006101002.JPG	Downstream view of dam
0025006101003.JPG	Trees on upstream slope of right embankment

6. Label the printed photographs with the file name and a brief description. For example:
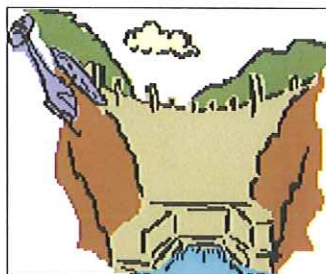
Photogenic Dam
Downstream view
0025006101002.JPG

Certification for Dam Inspection

Local Dam Name (PRINT): _____

DNR Field File #: _____

I certify that I have completed the checklist truthfully and factually:

Certifier's Name (print): _____

Company Name: _____

Signature: _____

Date: _____

Multidisciplinary: I am experienced in the technical disciplines or I am working with other professionals experienced in the technical disciplines to properly inspect this dam and appurtenant works. Technical disciplines, in addition to general civil engineering, may include geotechnical, geological, hydrologic, structural, and mechanical:

Yes   No

Engineer's Wisconsin Registration Number: _____

Expiration Date: _____

Engineer's Seal (optional):

Name of Dam:				Date:	
Inspectors:				F.F #:	
Owner's Name:				Key Seq #:	
Street:					
City, State, Zip Code:					
County:				Phone:	
Weather and Site conditions:				Email:	

GENERAL

Item	N	P	Notes/ Observations	Action M	I	R
1 Monuments/Benchmarks						
Location:						
Elevation:						
Datum:						
2 Pool Level						
Normal/Operating:						
Maximum:						
Minimum:						
Staff Gage						
3 Access Road						
4 Signage/ Security						
Portage/route:						
Dam Warning:						
Downstream Hazard:						
Fencing/Railings/Catwalks:						

Additional Comments:

N= Noted; **P**= Photo; **M**= Monitor
I= Investigate; **R**= Repair
F.F.= Field File; **RT** = Right; **LT** = Left
U/S = Upstream; **D/S** = Downstream

Action Suggestion 1. Requires immediate action
  2. Plan to do soon
  3. Do when convenient

GENERAL (Cont.)

5 Hazard Section

A. D/S Development [ ] [ ]

Density:

Distance:

Type (Residential, Commercial, Industrial):

B. Channel Crossing [ ] [ ]   [ ] [ ] [ ]

Type: Bridge, Ford, Culvert, Trestle, Other (Explain) (Circle One)

Dimensions:

D/S distance:

Traffic Level (Local, CTH, Rail Road, STH, Interstate, etc):

C. Distance to nearest D/S community/impoundment: [ ]

Name:

D. Anticipated Hazard (based on landuse and zoning): [ ]

E. Dam Failure Analysis [ ]

Date Completed/Approved

Is map available? [ ]

Are map & profile adopted? [ ]

List adoption date:

Verify validity of failure mode: [ ]

Verify validity of DFA conclusions: [ ]

F. Emergency Action Plan	Y	N	Comments, Explanation, and Description	M	I	R
1. Current plan posted?						
2. Understood by Operator?						
3. Warning systems?						
4. Certification of last test?						
5. Remote operation?						
6. Revision Date?						
7. Habitable structures?						
8. Recreation areas?						
9. Changed hazard potential?						
10. New development?						
11. Other comments?						

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F.F.= Field File; RT = Right; LT = Left
U/S = Upstream; D/S = Downstream

Action Suggestion 1. Requires immediate action
2. Plan to do soon
3. Do when convenient

Dam Inspection Checklist

Dam Name: F.F. #:   Date: Page ___ of ___

EMBANKMENTS

Description:				Action		
				M	**I**	**R**

	Item	N	P	Location on Embankment and Deficiency	M	I	R
1	**Vegetation:**			No problem			
	A. Trees	☐	☐		☐	☐	☐
	Quantity (<5,sparse,dense):						
	Diameter:						
	Location:						
	B. Brush	☐	☐		☐	☐	☐
	Quantity (sparse,dense):						
	Location:						
	C. Ground cover	☐	☐		☐	☐	☐
	Type (grass, crown vetch,other):						
	Quantity (bare, sparse,adequate, dense):						
	Appearance (too tall, too short, good):						
2	**Erosion**			No problem / Not applicable / Could not inspect			
	A. Wave erosion (Beaching):	☐	☐		☐	☐	☐
	Scarp: Length/ Width:						
	Location:						
	B. Runoff Erosion (Gullies)	☐	☐		☐	☐	☐
	Quantity:						
	Length/ Width/ Depth:						
	Location:						
3	**Instabilities**			No problem / Not applicable / Could not inspect			
	A. Slides	☐	☐		☐	☐	☐
	Transverse:						
	Longitudinal:						
	Scarp: Length/ Width:						
	Crack Length/ Width:						
	B. Cracks:	☐	☐		☐	☐	☐
	Transverse:						
	Longitudinal:						
	Length/ Width/ Depth:						
	Location:						
	Other:						
	C. Bulges/ Depressions	☐	☐		☐	☐	☐
	Size:						
	Height/ Depth:						
	D. Slope (Too Steep) U/S, D/S	☐	☐		☐	☐	☐

N= Noted; **P**= Photo; **M**= Monitor
I= Investigate; **R**= Repair
F.F.= Field File; **RT** = Right; **LT** = Left
U/S = Upstream; **D/S** = Downstream

Action Suggestion
1. Requires immediate action
2. Plan to do soon
3. Do when convenient

Additional Comments:

Dam Inspection Checklist

Dam Name:	F.F. #:	Date:	P ___ of ___

Item	N	P	Notes/ Observations			Action M	I	R
4 Slope Protection			No problem	Not applicable	Could not inspect			
A. Type (none, riprap, wave berm, concrete slabs, loose formed concrete/asphalt):								
B. Condition:								
5 Other			No problem	Not applicable	Could not inspect			
A. Rodent burrows (few, many) Location:								
B. Ruts Length/ Width/ Depth: Location:								
C. Other								
6 Alignment			No problem	Not applicable	Could not inspect			
A. Vertical Low area: Elevation Difference: Location:								
B. Horizontal								
C. Width Too narrow: Location:								
7 Toe			No problem	Not applicable	Could not inspect			
Cracks/Slumps: Embankment drains: Type/Flow: Location: Seepage/ Wetness: Hummocky:								
8 Seepage			No problem	Not applicable	Could not inspect			
Wet area: Boil: Sinkhole: Aquatic vegetation: Rust colored deposits: Other: Sediment in Flow: Flowrate: Location:								

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I= Investigate; R= Repair
F.F.= Field File; RT = Right; LT = Left
U/S = Upstream; D/S = Downstream

Action Suggestion
1. Requires immediate action
2. Plan to do soon
3. Do when convenient

Additional Comments:

			SPILLWAY--PRINCIPAL - FIXED CREST			Action		
Item	N	P	Notes/ Observations			M	I	R
1 Fixed Crest			No problem	Not applicable	Could not inspect			
A. Dimensions Top Width:								
B. Materials								
C. Shape (sharp-crested, broad-crested, ogee, chute, gated, overflow, morning glory, dropbox, labyrinth)								
D. Debris Prevention (racks, booms, etc.):								
E. Concrete Condition *								
F. Flashboards (none, number): Type (Metal, wood): Dimensions: Operability:								
G. Abutments Condition: * Seepage/wetness:								
H. Drains Type: Weep holes, Relief drains, Other:_____ Flow Rate:			No problem	Not applicable	Could not inspect			
I. Other								

N= Noted; **P**= Photo; **M**= Monitor   **Action Suggestion**   1. Requires immediate action
I= Investigate; **R**= Repair   **2.** Plan to do soon
F.F.= Field File; **RT** = Right; **LT** = Left   **3.** Do when convenient
U/S = Upstream; **D/S** = Downstream   **Controlled** = Gated   **Uncontrolled** = Overflow

Additional Comments:

* **Type of Concrete Problems:** Spalling, cracks, exposed rebar, misalignment, joints, bug holes, efflorescence, popouts, honeycombing, scaling, craze/map cracks, isolated crack, disintegration, other

Dam Inspection Checklist
Dam Name:	F.F.#:	Date:	___ of ___

SPILLWAY-PRINCIPAL - GATES					Action		
Item	N	P	Notes/ Observations		M	I	R
1 **Gates**			No problem	Not applicable	Could not inspect			
A. Types (lift/slide, tainter(radial), stoplogs, leaf, roller, flashboards, needles, other): Number and Size:								
B. Stoplogs Dimensions: Condition:								
C. Abutments Condition: * Seepage/wetness:								
D. Piers (number, shape) Condition: *								
E. Operability Type of Operator: Condition(chain, cables,hoists): Security(locked?): Backup Operator:								
F. Access								
G. Condition Rust: Seals (leakage):								
H. Ice protection Type (Heaters, Bubblers, Barriers, Other)								
I. Debris Prevention (Rack, boom, etc.)								
J. Condition of Flowway								
K. Drains Type (Weep holes/ Relief drains/ Other): Flow rate: Location:								
L. Other								

N= Noted; P= Photo; M= Monitor
I= Investigate; R= Repair
F.F.= Field File; RT = Right; LT = Left
U/S = Upstream; D/S = Downstream

Action Suggestion   **1.** Requires immediate action
2. Plan to do soon
3. Do when convenient
Controlled = Gated   **Uncontrolled** = Overflow

Additional Comments and/or Sketch:

* Type of Concrete Problems: Spalling, cracks, exposed rebar, misalignment, joints, bug holes, efflorescence, popouts, honeycombing, scaling, craze/map cracks, isolated crack, disintegration, other

Dam Inspection Checklist

Dam Name:	F.F.#:	Date:	Page ___ of ___

SPILLWAY--PRINCIPAL - WHISTLE TUBES							Action		
Item	N	P	Notes/ Observations				M	I	R
1 Whistle Tubes			Full circle/Whistle tube	Half circle riser	Glory hole (Drop Inlet)				
A. Inlet Riser Diameter									
B. Outlet pipe * Dia: Type:									
C. Low level draw /Inlet Pipe What kind & Size:									
D. Debris/Trash Rack									
E. Antivortex									
F. Material									
G. Alignment									

N= Noted; **P**= Photo; **M**= Monitor   **Action Suggestion**   **1**. Requires immediate action
I= Investigate; **R**= Repair   **2**. Plan to do soon
F.F.= Field File; **RT** = Right; **LT** = Left   **3**. Do when convenient
U/S = Upstream; **D/S** = Downstream   **Controlled** = Gated   **Uncontrolled** = Overflow

Additional Comments and/or Sketch:

* Type of Concrete Problems: Spalling, cracks, exposed rebar, misalignment, joints, bug holes, efflorescence, popouts, honeycombing, scaling, craze/map cracks, isolated crack, disintegration, other

Dam Inspection Checklist
Dam Name: F.F.#:   Date: Page __ of __

SPILLWAY--PRINCIPAL - OUTLET EROSION CONTROL & UNDERMINING

	Item	N	P	Notes/ Observations			Action M	I	R
1	**Outlet Erosion Control**			No problem	Not applicable	Could not inspect			
	A. Type (none, endwall, plunge pool, energy dissipation structure rock lined channel, apron)								
	B. Scour								
	C. Material a. **Riprap**: Avg Diameter: Condition (adequate, sparse, displaced, weathered): Bedding fabric- (Yes/ No): b. **Concrete *** Dimensions/Location:								
	D. Sidewall/Headwall Misalignment: Location: Description:								
	E. Separated Joint / Loss of Joint Material: Location: Description:								
	F. Natural								
2	**Undermining**			No problem	Not applicable	Could not inspect			
	Location: Description:								

N= Noted; **P**= Photo; **M**= Monitor   **Action Suggestion**   1. Requires immediate action
I= Investigate; **R**= Repair   **2.** Plan to do soon
F.F.= Field File; **RT** = Right; **LT** = Left   **3.** Do when convenient
U/S = Upstream; **D/S** = Downstream   **Controlled = Gated**   **Uncontrolled** = Overflow

Additional Comments:

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* Type of Concrete Problems: Spalling, cracks, exposed rebar, misalignment, joints, bug holes, efflorescence, popouts, honeycombing, scaling, craze/map cracks, isolated crack, disintegration, other

Dam Inspection Checklist

Dam Name: F.F.#:   Date: Page __ of __

SPILLWAY--AUXILIARY

Description:						Action		
Item	N	P	Notes/ Observations			M	I	R
1 Dimensions	☐	☐				☐	☐	☐
Length/ Width:								
Outfall Slope:								
2 Type (turf, reinforced turf, riprap, block, concrete):	☐	☐				☐	☐	☐
3 Signs of usage (debris, bent grass, etc.):	☐	☐				☐	☐	☐
4 Vegetation:			No problem					
A. Trees	☐	☐				☐	☐	☐
Quantity (<5, sparse, dense):								
Diameter:								
Location:								
B. Brush	☐	☐				☐	☐	☐
Quantity (sparse, dense):								
Diameter:								
Location:								
C. Ground cover:	☐	☐				☐	☐	☐
Type (grass, crown vetch, other)								
Quantity (bare, sparse, adequate dense):								
Appearance (tall, short, good):								
5 Slope protection			Not applicable					
A. Type (none, riprap, wave berm, concrete slabs, other):	☐	☐				☐	☐	☐
Condition:								
6 Erosion			No problem	Not applicable	Could not inspect			
A. Wave erosion (beaching):	☐	☐				☐	☐	☐
Scarp: Length/ Width:								
Location:								
B. Runoff erosion (Gullies)	☐	☐				☐	☐	☐
Quantity:								
Length/ Width/ Depth:								
Location:								
7 Instabilities			No problem	Not applicable	Could not inspect			
A. Slides	☐	☐				☐	☐	☐
Transverse Length:								
Longitudinal Length:								
Scarp: Length/ Width:								
Location:								
Crack Length/ Width:								
Location:								

N= Noted; **P**= Photo; **M**= Monitor
I= Investigate; **R**= Repair
F.F.= Field File; **RT** = Right; **LT** = Left
U/S = Upstream; **D/S** = Downstream

Action Suggestion
1. Requires immediate action
2. Plan to do soon
3. Do when convenient

Additional Comments:

* Type of Concrete Problems: Spalling, cracks, exposed rebar, misalignment, joints bug holes, efflorescence, popouts, honeycombing, scaling, craze/map cracks, isolated crack, disintegration, other

Dam Inspection Checklist

Dam Name:	F.F.#:	Date:	Page: ___ of ___

Item	N	P	Notes/ Observations				M	I	R
SPILLWAY--AUXILIARY (Cont.)							**Action**		
B. Bulges: (Depressions, Hummocky):									
Size:									
Height/ Depth:									
8 Other			No problem		Not applicable		Could not inspect			
A. Rodent burrows (few, many)									
Location:									
B. Ruts									
Location:									
Length/ Width/ Depth:									
C. Other (debris):									
9 Outlet erosion control			No problem		Not applicable		Could not inspect thoroughly			
A. Type (none, endwall, plunge pool, energy, dissipation structure rock-lined channel, apron):									
Condition (Scour?):									
B. Material									
Riprap: Avg. diameter:									
Condition (adequate, sparse, displaced, weathered):									
Bedding fabric (Yes/No):									
C. Concrete *			Not applicable						
a. Condition *									
b. Cracking *									
Dimensions/Location:									
c. Sidewall/ Headwall*									
Misalignment:									
Location:									
Description:									
d. Joints									
Separated:									
Loss of material:									
Location:									
Description:									
D. Natural									
10 Undermining			No problem		Could not inspect thoroughly					
Location:									
Description:									

N= Noted; **P**= Photo; **M**= Monitor   **Action Suggestion**   1. Requires immediate action
I= Investigate; **R**= Repair   2. Plan to do soon
F.F.= Field File; **RT** = Right; **LT** = Left   3. Do when convenient
U/S = Upstream; **D/S** = Downstream

Additional Comments:

* Type of Concrete Problems: Spalling, cracks, exposed rebar, misalignment, joints bug holes, efflorescence, popouts, honeycombing, scaling, craze/map cracks, isolated crack, disintegration, other

Dam Inspection Checklist

Dam Name:	F.F.#:	Date:	Page: ___ of ___

LAKE DRAINS
(Low level outlet, not a principle or aux. spillway)

Item	N	P	Notes/ Observations		M	I	R
1 General			None found	Does not have one			
A. Type of lake drain (isolated control/intake tower, valve vault with outlet conduit valve in riser/drop inlet siphon): Size:							
B. Operated (Yes/ No)							
2 Lake drain components							
A. Concrete structure Location: Description:* Condition:*							
B. Valve control (operating device): No operating device; No stem Bent/Broken Stem; Access Other: Operability:							
C. Valve/Sluice gate Quantity: a. Metal deterioration (surface rust, minor, moderate, extensive, other): Location: Flow rate: b. Misalignment c. Leakage - Flow rate							
D. Outlet conduit Size: Material: Condition:							
E. Energy dissipater Type (endwall, plunge pool impact basin, stilling basin, rock-lined channel, none): Condition:*							

N= Noted; **P**= Photo; **M**= Monitor
I= Investigate; **R**= Repair
F.F.= Field File; **RT** = Right; **LT** = Le
U/S = Upstream; **D/S** = Downstream

Action Suggestion   1. Requires immediate action
2. Plan to do soon
3. Do when convenient

Additional Comments:

* Type of Concrete Problems: Spalling, cracks, exposed rebar, misalignment, joints bug holes, efflorescence, popouts, honeycombing, scaling, craze/map cracks, isolated crack, disintegration, other

Dam Inspection Checklist

Dam Name:	F.F.#:	Date:	Page: ___ of ___

Powerhouse/ Mill Building

Item	N	P	Notes/ Observations	Action M	I	R
1 Est. Capacity (Kw):						
Date last used:						
Current Use:						
2 Item:						
A. Headrace general						
Gates/ Trashracks:						
Vegetation/ Erosion:						
Sloughs/Slides/Cracks:						
Seepage Wetness:						
Rodent Burrows:						
Concrete:						
B. Tailrace						
Scour:						
Vegetation/Erosion:						
Sloughs/Slides/Cracks:						
Seepage wetness:						
Rodent burrows:						
Concrete:						
C. Foundation: general						
Concrete:						
Seepage:						
Integrity:						
D. Superstructure						
Condition:						

N= Noted; **P**= Photo; **M**= Monitor
I= Investigate; **R**= Repair
F.F.= Field File; **RT** = Right; **LT** = Le
U/S = Upstream; **D/S** = Downstream

Action Suggestion   1. Requires immediate action
2. Plan to do soon
3. Do when convenient

Additional Comments:

Dam Inspection Checklist

Dam Name: F.F.#:   Date: Page: __ of __

FIELD BOOK

Profile Leveling For:			Instrument Person:			

Original Notes in Field Book #			Rod Person:			

Instrument Used:			Note Taker:			

Weather Conditions:

STATION	B.S. +	H.I.	F.S. -	ELEV.	DIST.	REMARKS

Bench Mark Information (Location, Elevation, Datum):

Comments:

Suggested Survey points:

HW	Sill	Low Embankment
TW	Crest	Lt. Groin
D/S Channel (at toe)	Abutments	Rt. Groin
Aux. Crest LT	Aux. Crest RT	Outlet Pipe Invert

Dam Inspection Checklist

Dam Name:	F.F.#:	Date:	Page ___ of ___

STATION	B.S. +	H.I.	F.S. -	ELEV.	DIST.	REMARKS

Note:

Survey data is a valuable dataset to document the constant or changing condition of your dam. It is often the best method to document changes, deficiencies and past construction or survey errors. In most instances, the decision to conduct a field survey will be based on the professional opinion of the consultant engineer and the responsibility of the dam owner. Based on the inspection report results, the Department may determine that a survey is required.

Examples of scenarios where survey is recommended by the Department:

1. To establish a baseline if the dam has no previous survey, an insufficient survey, or no current as-built plans on file
2. If evidence of an instability is documented during the inspection. Instabilities could include embankment settling, cracking, or slumping, cracking concrete, or noticeable miss-alignment.
3. For dams where the last survey on record is greater than 10 years old.
4. When new benchmarks or a new staff gage are installed.

Survey Standards:
• The Dam Datum must be the same as the Flood Insurance Study Datum for the County
• Survey may require both horizontal and vertical data collection and control
• Any Benchmarks or Staff Gages must be tied to the Dam Datum
• Survey Points noted on this page of the Dam Inspection Checklist are the minimum points suggested for a dam survey
• Use the appropriate level of accuracy consistent with Land Surveying standards to document the data being collected

Suggested Survey points:

HW	Sill	Low Embankment
TW	Crest	Lt. Groin
D/S Channel (at toe)	Abutments	Rt. Groin
Aux. Crest LT	Aux. Crest RT	Outlet Pipe Invert

Dam Inspection Checklist			
Dam Name:	F.F.#:	Date:	Page __ of __

SKETCH