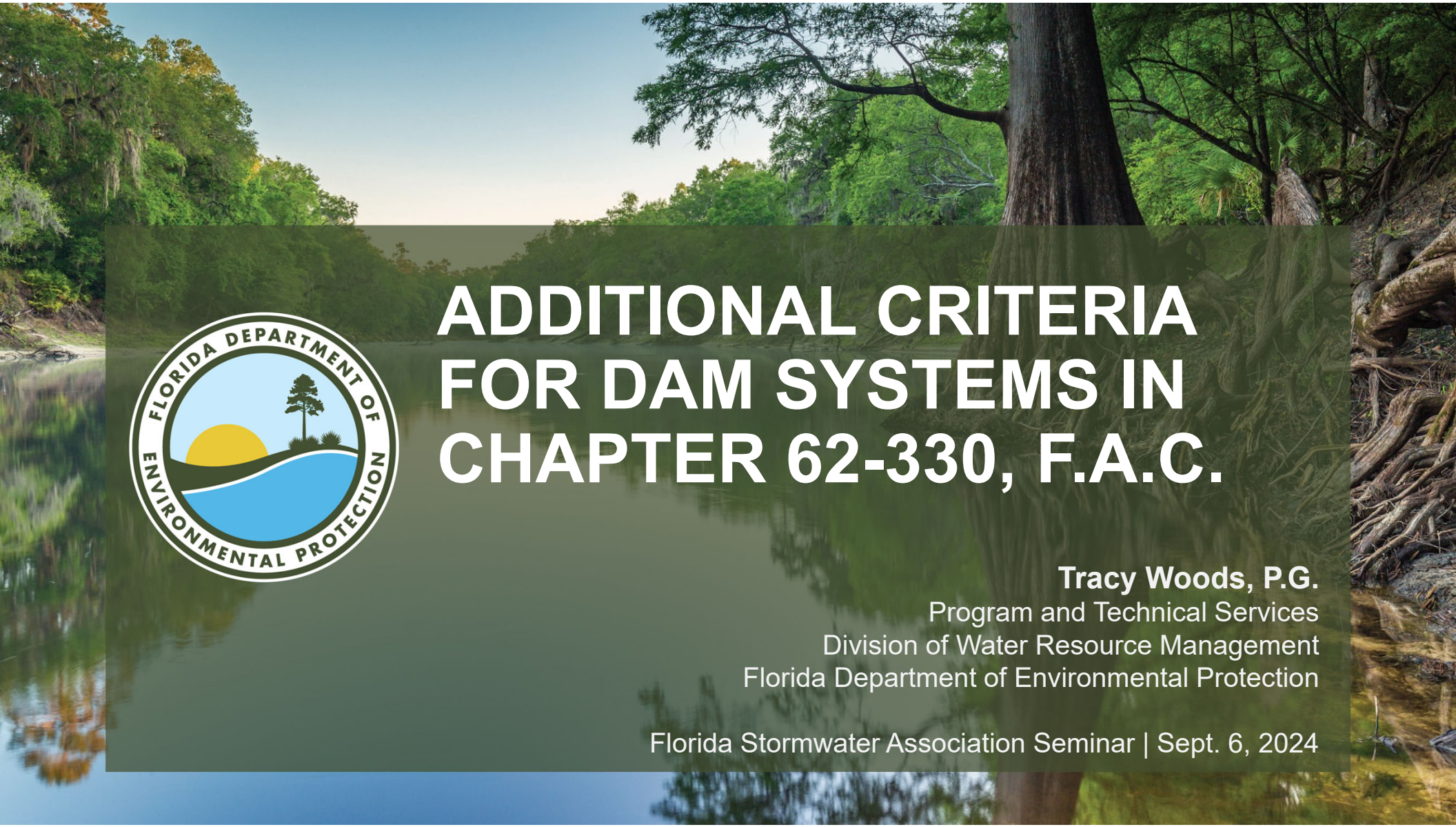

# ADDITIONAL CRITERIA FOR DAM SYSTEMS IN CHAPTER 62-330, F.A.C.

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Florida Stormwater Association Seminar | Sept. 6, 2024

# NEW RULES APPLICABLE TO DAM SAFETY

## EFFECTIVE JUNE 28, 2024

- **Section 62-330.010(4)(a), Florida Administrative Code (F.A.C.).**
  - Incorporates Appendix L, "Additional Criteria for Dam Systems," into Applicant's Handbook (AH) Volume I.
  - Incorporates "The Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures" (Federal Emergency Management Agency [FEMA] P-946, July 2013) into Appendix L.
- **Section 62-330.301(2), F.A.C.** – Requires the "Dam System Information" form to be completed for every dam in a proposed project that requires an individual environmental resource permit (ERP).
- **Section 62-330.301(9), F.A.C.** – Compels submission of the "Certification of Financial Capability for Perpetual Operations and Maintenance Entities" form to demonstrate financial capability through the operation and maintenance phase.

# NEW RULES APPLICABLE TO DAM SAFETY (2)

## EFFECTIVE JUNE 28, 2024

- **Section 62-330.311(2), F.A.C.** – Provides that the "Operation and Maintenance Inspection Certification" form be submitted within 30 days of an inspection, failure or deviation from the permit.
- **Section 62-330.311(3), F.A.C.** – States that the information required on the "Inspection Checklists" form must be provided.
- **Section 62-330.311(7), F.A.C.** – Mandates that the "Condition Assessment Report" form be completed for existing High Hazard Potential (HHP) and Significant Hazard Potential (SHP) dam systems that require an individual permit.

# DAM SYSTEM DEFINITIONS

## AH VOLUME I, SECTION 2

- **"Dam"** means any artificial or natural barrier, with appurtenant works, raised to obstruct or impound, or which does obstruct or impound, any of the surface waters of the state [section 373.403(1), Florida Statutes (F.S.)].

- **"Downstream Hazard Potential"** (DHP) means the category of a dam that indicates its potential adverse impact on the downstream areas should the dam or its appurtenant structures fail or be mis-operated. The DHP reflects probable loss of human life or adverse impacts on economic, environmental or lifeline interests, or other concerns such as water quality degradation.

- **"Emergency Action Plan"** (EAP) means a plan of action to be taken to reduce the potential for loss of human life and impacts to economic, environmental and lifeline interests, and other concerns such as water quality degradation, from failure or mis-operation of a dam or its appurtenant structures.

# DAM SYSTEM DEFINITIONS (2)

## AH VOLUME I, SECTION 2

- **"Levee"** means an embankment with the primary purpose of furnishing flood protection from seasonal high water and which is therefore subject to water loading for periods of only a few days or weeks a year.

- **"Levee system"** is composed of one or more levee segments and associated structures and may include stormwater treatment areas, flow equalization basins that are less than four feet in water depth and levees that bound water conservation and wildlife refuge areas.

- **"Lifeline"** means systems that enable the continuous operation of critical business and government functions and is essential to human health and safety or economic security, e.g., evacuation roads, power stations and drinking water treatment and supply facilities.

# ADDITIONAL CRITERIA FOR DAM SYSTEMS

## AH VOLUME I, SECTION 8.4.5

- Design and operation standards in AH Volume I and Volume IIs are essential to manage water quality and quantity effectively and safely.
- These additional dam system standards are intended to reduce the risk of dam failure, improper operation and consequences from flooding.
- There are approximately 1,200+ dams in Florida, and roughly half of these were constructed prior to 1980 (pre-rule dams without operation and maintenance requirements).
- Appendix L, “Additional Criteria for Dam Systems,” only applies to the proposed construction of new dams and alteration of existing dams that meet the thresholds specified in the applicable AH Volume IIs and require an individual ERP.
- Appendix L criteria are not applicable to levees and levee systems.

# ADDITIONAL CRITERIA FOR DAM SYSTEMS

## AH VOLUME I, APPENDIX L

- There are four criteria to be addressed in the permit application:
  1. Provide dam system information for a central repository maintained by the Florida Department of Environmental Protection (DEP).
  2. Establish a DHP.
  3. Develop an EAP for high-risk dams.
  4. Provide a Condition Assessment for existing high-risk dams.
- These criteria are intended to reduce potential damage from floods, to reduce degradation of water resources from uncontrolled releases of stormwater, and to otherwise promote the safety of dams regulated under Chapter 62-330, F.A.C.
- The applicant is required to send the information to both the permitting agency and the State Dam Safety Officer (at DamSafety@FloridaDEP.gov or by U.S. mail).
- Applicants are encouraged to request a pre-application meeting to discuss the applicability of these criteria and best approaches to meet the requirements.

# DAM SYSTEM INFORMATION

## AH VOLUME I, APPENDIX L

- The first criterion requires the applicant to complete the “Dam System Information” form with the specific characteristics of each dam in the proposed project.
  - The form contains 62 parameters that match those used in the National Inventory of Dams (NID); the definitions and hyperlinks for the terms are provided in the form.
  - The five sections in the form are: (1) general information, (2) specific dam parameters, (3) supplemental information, (4) condition assessment rating, and (5) the applicant’s or applicant’s authorized agent’s signature.
- DEP will maintain the data in a central inventory for dissemination as needed in the event of an emergency.
- Dams that meet the NID will be entered into the NID that is maintained by the U.S. Army Corps of Engineers (USACE).

# DAM SYSTEM INFORMATION FORM

## AH VOLUME I, APPENDIX L

### DAM SYSTEM INFORMATION

#### Applicability and Instructions

**Applicability**

This form must be completed to provide information and parameters describing the characteristics of the dam system. This information shall be submitted in the permit application to construct a new dam or alter an existing dam, in accordance with Rule 62-330.301(2), Florida Administrative Code, and Section 8.4.5, *Dam Systems*, and Appendix L, *Dam Systems*, in the Applicant's Handbook Volume I. The applicant or applicant's authorized agent, as provided in Form 62-330.060(1), *Application for Individual and Conceptual Approval Environmental Resource Permit, State 404 Program Permit, and Authorization to Use State-Owned Submerged Lands*, must sign this form.

**Instructions**

Each parameter is hyperlinked to its definition, listed alphabetically at the bottom of this form. See the definitions for a range of acceptable answers and units of measurement. Do not leave any parameters blank. If a response is unknown, enter "UNK," or if a parameter is not applicable, enter "N/A".

Submit the completed form to the permitting agency in the application submittal and preferably email it to DamSafety@FloridaDEP.gov or mail it to the State Dam Safety Officer, Florida Department of Environmental Protection, 2600 Blair Stone Road, Mail Station 3595, Tallahassee, Florida 32399.

#### Dam Parameters

Part 1: General Information

1. Dam Name: 2. Other Dam Names:
3. Former Dam Name(s):
4. State Agency / Permit Number: 5. NID ID:
6. Number Separate Structures: 7. Other Structure ID:
8. Longitude: 9. Latitude:
10. Section: Township: Range:
11. County: 12. River or Stream:
13. Nearest Downstream City/Town:

# DOWNSTREAM HAZARD POTENTIAL

## AH VOLUME I, APPENDIX L

- A DHP determination is required for each dam included in the application submittal.
- The DHP does not reflect the current safety, structural integrity or flood routing capacity of a dam and its appurtenant structures.
- The original DHP of an existing dam may have increased due to downstream development.
- For dams in a series, each upstream dam must have a DHP equal to or greater than the next downstream dam.
- Expected consequences for each DHP.

| Downstream Hazard Potential | Loss of Human Life | Economic, Environmental, & Lifeline Losses |
|---|---|---|
| High | Probable | Yes, but not necessary |
| Significant | None expected | Yes |
| Low | None expected | Low and generally limited to owner's property |

# OBVIOUS LOW HAZARD POTENTIAL DAMS

## DHP EVALUATION

- The Photo-Based Mapping method may be used to provide inundation maps without engineering analysis for dams that are less than 10 feet in dam height and less than or equal to 1,000 acre-feet maximum storage, with no downstream structures and roads at or below the elevation of the dam crest within the inundation area.
- This methodology is described in the “Emergency Action Plan Template for Florida Dams Instruction Manual” (DEP, January 2023).
- Requires the submittal of an aerial map(s), elevation contour or digital elevation map, field survey (if available), dam geometry, reservoir capacity, locations and types of downstream structures, a depiction of the flood extent, and a discussion of the DHP determination.
- Certification by a registered professional is not required.

# PROBABLE LOW HAZARD POTENTIAL DAMS

## DHP EVALUATION

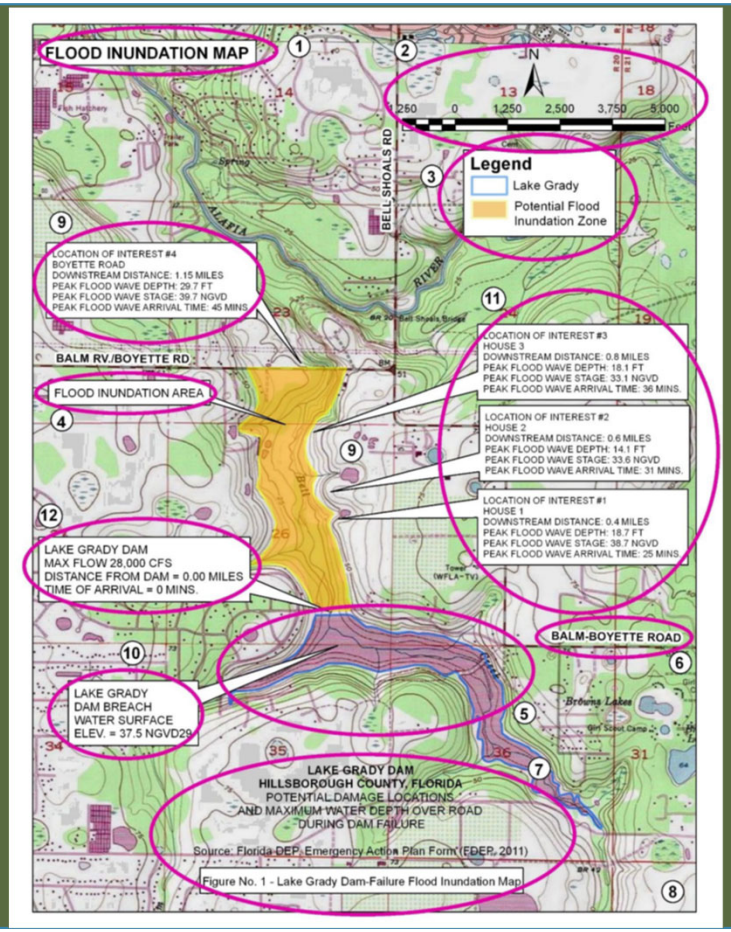
- Simplified inundation maps (SIMS) may be created through a Simplified Engineering Analysis for dams with few structures or roads below the dam crest and downstream terrain that is relatively flat and constant.
- The methodology to create SIMS is described in the “Emergency Action Plan Template for Florida Dams Instruction Manual” (DEP, January 2023).
- Submit an inundation report that includes an aerial map(s), elevation contour or digital elevation map(s), field survey (if available), dam and downstream geometry, reservoir capacity, locations and types of downstream structures, engineering calculations, and inundation and evacuation maps, input and output parameters and DHP determination.
- The report and the DHP determination must be certified by a registered professional.
- If the DHP determination is not low hazard potential (LHP), perform dam break computer modeling.

# SIMS SUMMARY

## DHP EVALUATION

- Determine a Dam Breach Peak Discharge (flow rate) at the dam using a reasonable, conservative estimate calculated from empirical equations.
- Estimate the peak discharge at locations of interest downstream of the dam by applying the "Generalized Flood Attenuation Curves" (Washington State Department of Ecology, 2007) to the dam breach peak discharge.
- Evaluate the peak flood wave depth, peak flood wave stage and peak flood wave arrival times at the locations of interest downstream of the dam.
- Create SIMS using topographic or aerial maps showing the extent of inundation, peak flood wave depth, stage and peak flood wave arrival time for each location of interest within the inundation area, the dam breach elevation, and points of interest, such as structures within the inundation area and area landmarks.

# SIMS EXAMPLE WITH TOPOGRAPHIC MAP



# SHP AND HHP DHP EVALUATION

## COMPUTER MODELING

- For all other dams, the DHP must be determined using hydrologic-hydrodynamic modeling software with two-dimensional unsteady state flow capability, preferably HEC-RAS 2D Version 6 or equivalent.

- The inundation report, including inundation and evacuation maps, for the EAP must meet the “Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures” (FEMA P-946, July 2013).

- FEMA P-946 presents different dam breach analysis study approaches, hydrologic analyses, downstream routing analyses, breach parameter estimates, analysis tools for dam failure modeling and dam breach mapping guidance.

- The inundation study, including DHP determination, must be certified by a registered professional qualified in the evaluation of dams.

**Inundation reports are considered confidential under section 119.071, F.S.**

# EXAMPLE EVACUATION MAP

## FEMA P-946, 2013

**Florida Dam Safety Program standard practice.**

- Show the extent of inundation for dam failures in three scenarios: Sunny Day and 100-Year and Probable Maximum Precipitation (PMP) design storms.
- Annotate the maps at selected points of interest for each scenario with the time of flood wave arrival, peak flood wave velocity, impacted homes/structures, PMP maximum flooding above ground at the structures and downstream distance from dam for each scenario.

**Evacuation maps are considered confidential under section 119.071, F.S.**

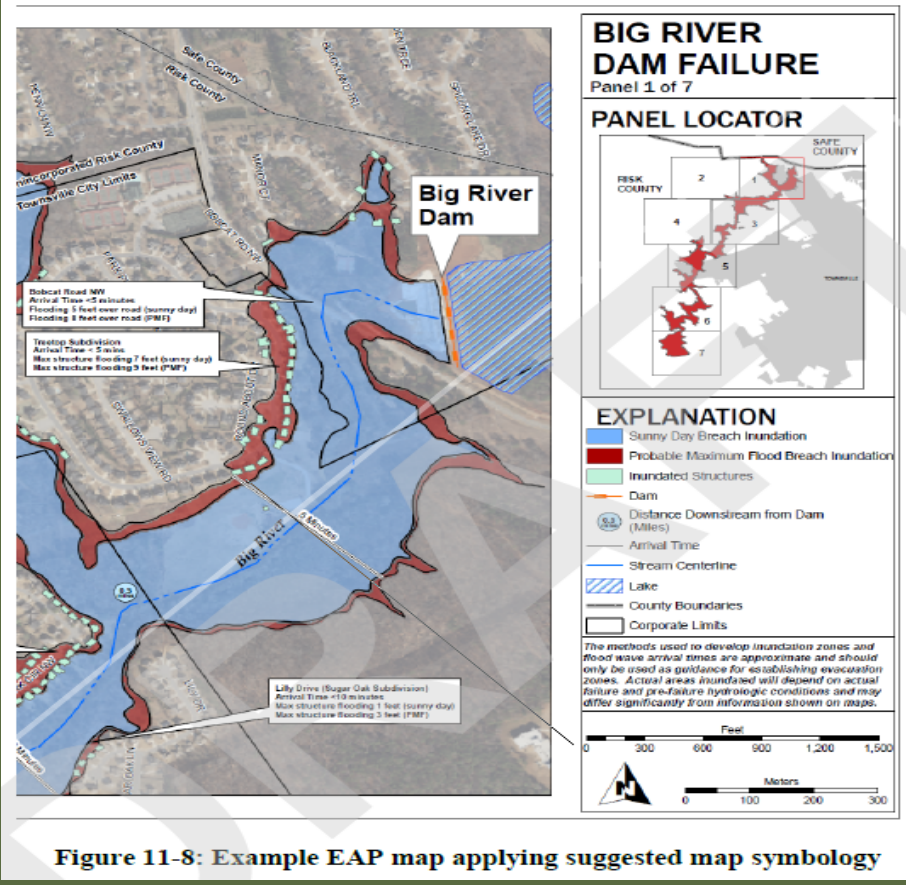



Figure 11-8: Example EAP map applying suggested map symbology

# INUNDATION STUDY EXAMPLE

## NO DAM BREAK SIMULATIONS

# INUNDATION STUDY EXAMPLE

## DAM BREAK SIMULATIONS

- Dam break simulation scenario results.
- Comparison between the no dam break and dam break inundation extents and elevations.
- Use the most conservative results to determine the DHP.

| Point of Interest (POI) | 100-yr Dam Break - El | 100-yr No Dam Break - El | 100-yr Flood Increase (ft) | ½ PMP Dam Break - El | ½ PMP No Dam Break – El | ½ PMP Flood Increase (ft) | PMP Dam Break - El | PMP No Dam Break- El | PMP Flood Increase |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 43.60 | 42.10 | +1.50 | 44.4 | 44.4 | + 0.00 | 44.7 | 45.2 | - 0.5 |
| 2 | 31.30 | 29.90 | +1.40 | 37.0 | 34.3 | + 2.70 | 41.8 | 37.7 | + 4.1 |
| 3 | 22.10 | 21.80 | +0.30 | 28.5 | 26.9 | +1.60 | 31.2 | 30.2 | + 1.0 |
| 4 | 15.00 | 14.94 | +0.06 | 17.30 | 16.5 | +0.80 | 19.2 | 18.6 | + 0.6 |
| | | | | | | | | | |

**Inundation studies are considered confidential under section 119.071, F.S.**

# EMERGENCY ACTION PLAN

## REQUIRED FOR SHP AND HHP DAMS

- May include multiple dams that are owned by the same owner(s) if the dams are near each other or in succession.
- A specific EAP format is not mandated, but an EAP must address the following elements:
  - Detection and classification.
  - Roles and responsibilities.
  - Notification flow charts and contact information.
  - Response procedures.
  - Inundation and evacuation maps.
  - Appendices for training, exercises and updates.
- The “Emergency Action Plan Template for Florida Dams” (DEP, January 2023) and instruction manual are available to facilitate EAP development, provide consistency and reduce costs.
- Abnormal occurrences are categorized into three types of events: “Unusual” (slowly developing), “Watch” (rapidly developing) and “Warning” (imminent or ongoing dam failure).

# EAP TEMPLATE
## (NOT A REQUIRED FORMAT)



**Emergency Action Plan (EAP)**

**Dam Name**

**National Inventory of Dams Identification Number:**

**County Name County, Florida**

**Water Management District**

**Permit Type/Number**

**Downstream Hazard Potential**

**Month and Year**

| Insert Regional or County map showing location of dam | Insert local area map showing specific location of dam and GPS coordinates |
|---|---|

Dam Owner or Dam Owner's Representative:

Name:

Signature:

Date:

Copy of

# EAP INSTRUCTION MANUAL

## STEPS TO FILL IN THE EAP TEMPLATE

1. Obtain the geographic and technical information the dam and downstream areas. Perform a field reconnaissance to verify the information.
2. Prepare inundation and evacuation maps that clearly depict the estimated flooded areas from a dam break.
3. Identify the situations or triggering events that could result in a condition in the dam and its appurtenant structures that requires action.
4. Identify the jurisdictions, agencies and individuals who will be involved in the EAP.
5. Identify primary and auxiliary communication systems.
6. Prioritize the order of notification for persons to be listed in the Notification Charts.
7. Develop a draft EAP. Request key persons to review and comment on the draft.
8. Hold at least one coordination meeting with key person and go over the draft EAP.
9. Finalize the draft and distribute it to key persons. DEP is required to redact confidential information prior to public distribution.

# CONDITION ASSESSMENT

## EXISTING HHP AND SHP DAMS

- Requires a completed “Condition Assessment Report for Florida Dams” form for existing SHP and HHP dams.
- New and historical inspection reports (within the most recent five years) may be used to complete the form if the data represent the current dam condition.
- Provides general information for dam identification and location and contact information for the dam owner and engineer.
- Reports the crest, upstream slope, downstream slope, plunge pool, principal and emergency spillways, instrumentation, outlet pipe, stilling basin, waterbody structures, downstream hazard issues, drawings and photographs and underwater video.
- Provides an overall condition assessment (as defined in the form) of “Satisfactory,” “Fair,” “Poor” or “Unsatisfactory.”
- Provides certification by a registered professional who is qualified in the evaluation of dam systems.

# CONDITION ASSESSMENT FORM

## AH VOLUME I, APPENDIX L

**Condition Assessment Report for Florida Dams**

6. Purpose of Dam/Waterbody:
7. Total Surface Area:
8. Crest Elevation:
9. Crest Width:
10. Crest Length:
11. Upstream Water Depth:
12. Downstream Ground Elevation:
13. Upstream Water Elevation:
14. Crest Material:
15. Upstream Slope:
16. Downstream Slope:

Dam Owner's Information (add sections for each additional dam owner)

1. Name(s):
2. Address:
3. Phone Numbers: a. (landline) b. (cell)
5. Email Address:

Dam Owner's Representative Information

1. Name:
3. Phone Numbers: a. (landline) b. (cell)
4. Email Address:

Dam Owner's Engineer

1. Name of Engineering Firm or Engineer:
2. Florida Professional Engineer License Number:
3. Mailing Address:
4. Phone Numbers: a. (landline) b. (cell)

# CHANGES TO AH VOLUME IIs

- The five water management districts' (WMDs') AH Volume IIs reference Section 8.4.5 and Appendix L of AH Volume I.
  - The nomenclature, DHP and classifications are consistent.
- Northwest Florida WMD, Suwannee River WMD and Southwest Florida WMD will have the same requirements for dams.

| Hazard Rating | Principal Spillway | Combination of Spillways |
|---|---|---|
| Low | 25-year, 24 hour | 25-year, 24 hour |
| Moderate | 25-year, 24 hour | 100-year, 24 hour |
| High | 100-year, 24 hour | Probable Maximum Precipitation (PMP) |

A dam over five feet in height with 50 acre-feet storage capacity or a dam equal to or greater than 10 feet in height must have an individual ERP that meets generally accepted engineering practices and the minimum storm routing design spillway capacities.

# CHANGES TO AH VOLUME IIs (2)

- Suwannee River WMD included updates to definitions, general design and performance criteria, design criteria and guidelines, embankment slope stability, construction standards, water level control, principal spillways, emergency spillways and reservoir regulation.
- South Florida WMD modified major impoundments (dams) to be defined by the DHP classifications of SHP and HHP dams, or LHP dams with greater than four feet of water and minor impoundments as LHP dams.
    - An LHP dam may be classified as a minor impoundment if the dam break analysis estimates the inundation will be confined to the permittee's property, without risk to others.

# CHANGES TO AH VOLUME IIs (3)

- St. Johns River WMD changed the spillway system capacity to be based on the DHP.

| DHP | Design Storm (24-hour) |
|---|---|
| Low | 100-Year |
| Significant | ½ PMP |
| High | PMP |

# OPERATION AND MAINTENANCE ENTITIES

- **Section 12.3** – Operation and maintenance entities must submit documentation in the application to demonstrate they are acceptable entities with the ability to ensure the dam system will be operated and maintained in perpetuity, unless revoked or abandoned, in compliance with the regulatory requirements.

- **Section 12.3.5** – A cost estimate and the "Certification of Financial Capability for Perpetual Operations and Maintenance Entities" form must be submitted at the time of application to demonstrate financial, administrative, and legal capability to access, monitor, operate and maintain the permitted project in perpetuity.

# MINIMUM OPERATION AND MAINTENANCE STANDARDS

- **Section 12.4** – Operation and maintenance of the dam system must agree with the designs, plans, calculations and other specifications in the application, approved by DEP and incorporated in the permit.
- **Section 12.4.1** – An applicant for construction or alteration of a dam must submit an operation and maintenance plan at the time of application.
  - The plan must describe the overall inspection criteria, operation and maintenance requirements, and future capital (including replacement costs) and maintenance expenses to ensure the system will operate as designed and permitted.

# INSPECTIONS AND REPORTING

## SECTIONS 12.5 AND 12.6

- Operation and maintenance entities for dam systems must by default conduct inspections once a year to ensure design functionality of the dam system.
  - An applicant may request a longer inspection frequency (not to exceed five years) at the time of application.
- Reports due within 30 days of an inspection:
  - The inspection report, including any updates to the operation and maintenance costs estimates and plan.
  - The "Operation and Maintenance Inspection Certification" form.
  - The "Condition Assessment Report" may be considered an equivalent to the *Inspection Checklists* form that is also required.
- Within 30 days of a dam system failure or deviation from the permit, the permittee must submit the "Operation and Maintenance Inspection Certification" describing the failure or deviation and remedial actions taken.

# THANK YOU

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Florida Department of Environmental Protection

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