FEMA Region 3 High Hazard Potential Dams: Local and Tribal Mitigation Planning Tips

To access FEMA funding for dam rehabilitation, your Hazard Mitigation Plan (HMP) must address the risks posed by High Hazard Potential Dams (HHPDs). This Region 3 tip sheet walks through what your HMP needs to be eligible for FEMA grant funding.

Local and Tribal Requirements and Considerations

To apply for dam rehabilitation funding, local and tribal governments with jurisdiction over the area of the dam must have a FEMA-approved HMP that includes all dam risk. This must be demonstrated when the State Administrative Agency submits a project scope of work (SOW) package to FEMA and when FEMA approves that package. *Review the "Notable Definitions" section at the end of this guide to learn more about HHPDs, all dam risk, and other terms.*

The "all dam risk" requirements in the April 2022 Local Mitigation Planning Policy Guide supersede those in the June 2020 HHPD Program Guidance and FEMA Policy 104-008-7. All requirements outlined in this document align with the April 2022 Guide.

This resource outlines what your HMP must include to meet the HHPD planning requirements. It also highlights key ideas or content to consider when preparing for your next plan update. Knowing how your plan will address HHPD requirements when developing the HMP SOW will help you better understand project timelines and costs.

Remember! As you review the ways to meet plan requirements, be sure to protect all sensitive and/or personally identifiable information.

Savage River Dam, Maryland. Image: FEMA

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HHPD1: Does the plan describe the incorporation of existing plans, studies, reports and technical information for HHPDs?

To meet this requirement, the HMP must:

- Describe how the local or tribal government worked with the state dam safety agency and/or local dam owners.
- Describe the types of dam-related data the state and/or local dam owners shared that were incorporated in the plan. Examples include the location and size of the Population at Risk (PAR), potential impacts to institutions and critical infrastructure/facilities/community lifelines, Emergency Action Plans (EAPs), Hydrologic Engineering Center's River Analysis System (HEC-RAS), Decision Support System for Water Infrastructure Security (DSS-WISE), Human Consequences Module (HCOM), DSS-WISE Lite, FLO-2D, or more detailed studies.

To meet this requirement, the HMP should:

- Explain limitations to coordinating dam safety and how they can be resolved.
- Remember the planning area may include HHPDs outside of the jurisdiction's political boundaries, like a city that owns a reservoir in a nearby county.

To address this requirement in your HMP SOW, consider including:

- A description of the proposed event, workshop or meeting(s) among the jurisdiction, state dam safety officials, and local dam owners.
- An explicit list of information or data to be collected by or in coordination with the state dam safety agency and/or local dam owners.
    - Information that can be obtained from the state dam safety agency and/or local dam owner may include state dam safety regulations; permit status for specific dams; dam inspection findings; EAPs that may contain the PAR, evacuation plan and recommendations for a specific dam; inundation maps; operations procedures; and information on the possible economic, social and environmental impacts of a dam failure.
- A list of dams that will have inundation maps produced or integrated into the plan. Also list dams that will have dam breach model analyses conducted during the planning process.
- A description of the dam breach modeling software that will be used to enhance dam risk analysis. Notable modeling software include U.S. Army Corps of Engineers HEC-RAS, DSS-WISE HCOM, DSS-WISE Lite, FLO-2D, and other more detailed studies.
    - HEC-RAS is the best tool to model dam failure interdependencies (cascading impacts of dam breaches or other failures) at a watershed or multi-jurisdictional level.

HHPD2: Does the plan address HHPDs in the risk assessment?

To meet this requirement, the HMP must:

- Describe the risks and vulnerabilities to and from HHPDs, including:
  - Potential cascading impacts of storms, seismic events, landslides, wildfire and other hazards that might affect a dam's flooding potential.
  - Potential significant economic, environmental or social impacts.
  - Multi-jurisdictional impacts from a dam incident.
  - Location and size of the PAR from HHPDs.
  - Potential impacts to institutions and critical infrastructure/facilities/lifelines.
  - Methods and/or assumptions for risk data and inundation analyses.
  - Documentation of limitations and the approach to address deficiencies.

To meet this requirement, the HMP should:

- Include maps that convey HHPD-related risk. For instance, include dam-related inundation maps and a map identifying HHPD locations within the planning area.

To address this requirement in your HMP SOW, consider including:

- If and how the plan will address all dam risk in terms of incremental, non-breach and residual risk. *Note: In the plan, a summary description is acceptable.*
- A description of how the plan will analyze:
  - Impacts of cascading hazards. For example, the plan can describe:
    - How documented landslides affected transportation infrastructure (such as specific roads and railways) in an HHPD inundation zone.
    - How the structural damage from a seismic event can degrade and lead to the potential failure of a dam's internal and external components.
  - Economic impacts of HHPD-related flooding. For example, the plan can describe:
    - How many local businesses and community assets are in the HHPD inundation zone and estimate potential economic impacts of dam failure in U.S. dollars. You can use available data such as building replacement cost or structure-specific appraisals.
  - Environmental impacts of HHPD-related flooding. For example, the plan can describe:
    - How many wetlands, parks, green/open spaces, streams, rivers, lakes or other natural features are located in an HHPD inundation zone and could be affected by dam failure.

  - Social impacts of HHPD-relating flooding. For example, the plan can describe:
    - Populations in an HHPD inundation zone that could be affected by dam failure. *Populations could include those with access or functional needs, limited English proficiency, annual household incomes below the national average, infants and youth, elderly, or those in geographically isolated or rural areas.*
  - Multi-jurisdictional impacts of HHPD-related flooding. For example, the plan can describe:
    - Infrastructure under multiple political jurisdictions that falls within specific HHPD inundation zones and the estimated share of authority.
  - Location and size of the PAR and critical infrastructure/facilities/lifelines at risk from HHPDs. For example, the plan can include:
    - Map(s) showing the location of HHPDs, their inundation zones, and the location of the PAR in the event of an HHPD failure.
    - A table or narrative describing the number of homes or people that could be affected by how close they are to the specific HHPDs within the planning area.
    - A narrative describing HHPD impacts on critical infrastructure, facilities, and lifelines

- A list of maps that will be included in the plan to enhance analyses. For example, the plan could include a map overlaying HHPD dam inundation zones, environmental assets, and populations.
- A description of methods and data to be used for inundation modeling and risk assessment.
  - Consider using information from dam failure mode (i.e., dam performance) analyses based on static/sunny day dam conditions (non-breach or normal lake level loading), hydrologic conditions (extreme rainfall events), and seismic conditions (earthquake events).
  - Consider including a range of flood recurrence interval (flood frequency) analyses in addition to the 100-year flood (such as 1-, 2-, 5-, 10-, 25-, 50-, 500- and 1,000-year flood events).
- A description of how you will identify and address limitations. This could include providing:
  - Documentation of structural integrity issues (such as seepage or erosion).
  - Inspection results that describe dam-related deficiencies that could be addressed by specific mitigation actions in the HMP (e.g., an action to develop a dam-related data system, rehabilitate a specific dam, or more).
  - Condition assessments or reports that show dam-specific deficiencies such as an undersized dam spillway relative to the dam's intended design flood.

HHPD3: Does the plan include mitigation goals to reduce long-term vulnerabilities from HHPDs?

To meet this requirement, the HMP must:

- Address reducing vulnerabilities related to HHPDs in the plan's goals or with other long-term strategies. Mitigation goals can satisfy the planning requirement without mentioning specific actions or dams or using the term "high hazard potential."
- Link proposed HHPD-related actions to HMP goals. Examples include:
  - A description of how projects submitted for HHPD funding align with the goals and objectives identified in the current, FEMA-approved HMP.
  - A table that aligns specific HHPD-related mitigation actions with HMP goals.

To address this requirement in your HMP SOW, consider including:

- A statement describing the methods you will likely use to identify and develop HHPD-related goals.
  - *You are encouraged to develop goals that address dam rehabilitation or removal, as well as goals that acknowledge the structural and non-structural nature of dam risk. An example would be a goal that promotes building codes and floodplain management ordinances that reduce development in or around dam inundation zones.*
- A description of how you will link proposed HHPD mitigation actions to the plan goals. See examples in the blue box above for potential approaches.

HHPD4: Does the plan include actions that address HHPDs, and prioritize mitigation actions to reduce vulnerabilities from HHPDs?

To meet this requirement, the HMP must:

- Describe a range of specific actions such as:
  - Rehabilitating and/or removing dams.
  - Adopting and enforcing land use ordinances in identified flood zones.
  - Acquiring and/or elevating structures, and/or acquiring easements within identified flood zones.
  - Implementing flood protection measures such as berms, floodwalls or floodproofing within identified flood zones.
- Describe the criteria used for prioritizing HHPD actions.
- Identify the position, office, department or agency responsible for implementing and administering HHPD-related actions.

To address this requirement in your HMP SOW, consider including:

- A description of quantitative or qualitative criteria that will be used to prioritize HHPD-related mitigation actions. Unique criteria could include:
  - How a proposed action directly reduces HHPD-related risk.
  - If a proposed action directly reduces the risks of dams having a documented structural or non-structural deficiency.
  - The degree to which a proposed action will reduce the PAR.
  - How a proposed action reduces risk based on a model analysis of failure modes and potential cascading consequences from a dam incident.
  - How a proposed action offers co-benefits such as clean drinking water and flood control.

Region 3 Hazard Mitigation Plan Amendment Guidance

FEMA advises that your local or tribal HMP address all dam risk, whether in an HMP amendment or in the five-year plan update. Local and tribal governments that want to amend their HMP to meet the planning requirements outlined above can follow FEMA Region 3's established amendment process. Figure 1 provides an overview of this process. Please note that the Plan Owner (county or regional planning agency) and the state must agree with the request before it is sent to FEMA.

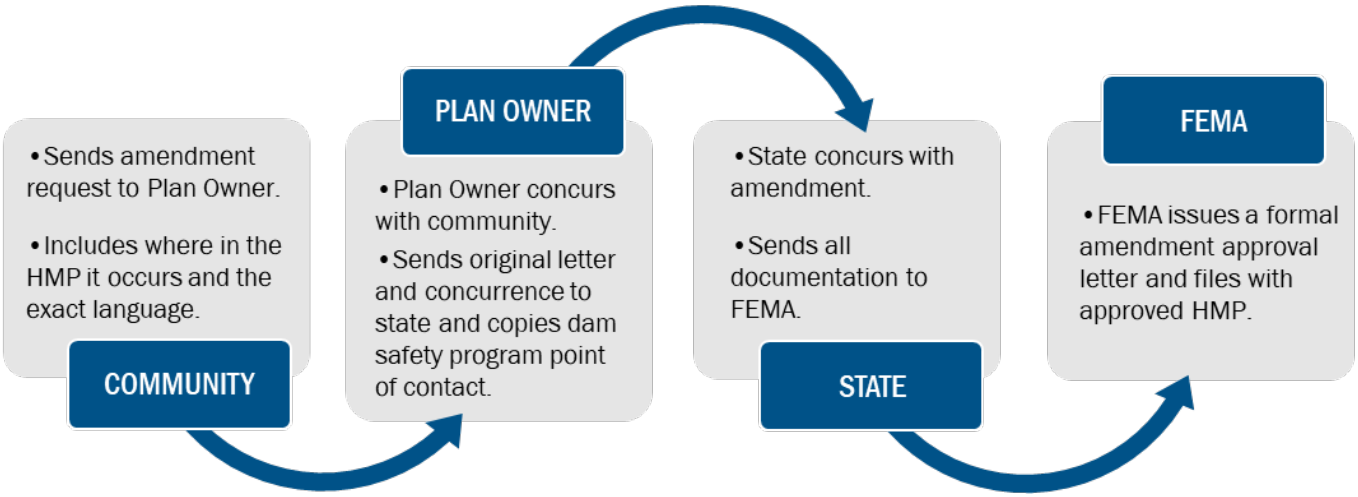

Figure 1: FEMA Region 3 HMP Amendment Process

Requests for amendment approval must clearly state:

- What community is making the request.
- The location in the HMP where the amendment occurs.
- The exact language that is being amended.

Notable Definitions

Hazard Potential Classification for Dams

Source: April 2004, Federal Guidelines for Dam Safety, Hazard Potential Classification System for Dams, pages 3 to 6

A system that categorizes dams according to the degree of adverse incremental consequences of a failure or misoperation of a dam. The hazard potential classification does not reflect in any way on the current condition of the dam (e.g., safety, structural integrity, flood routing capacity).

Table 1: Hazard Potential Classification for Dams

Hazard Potential Classification	Loss of Human Life	Economic, Environmental, Lifeline Losses
Low	None expected	Low and generally limited to owner
Significant	None expected	Yes
High	Probable. One or more expected.	Yes (but not necessary)

High Hazard Potential Dams

Source: April 2004, Federal Guidelines for Dam Safety, Hazard Potential Classification System for Dams, page 6

Dams assigned the high hazard potential classification are those where failure or mis-operation will probably cause loss of human life.

Eligible High Hazard Potential Dams

Source: FY24 HHPD Notice of Funding Opportunity (NOFO), pages 13 and 14; 33. U.S.C. § 467(4)(A)

A. A non-Federal dam that—
   i. is located within a state with a state dam safety program and regulated under that state dam safety program;
   ii. is classified as high hazard potential by the relevant state dam safety agency;
   iii. has an emergency action plan that—
      I. is approved by the relevant state dam safety agency; or
      II. is in conformance with state law and pending approval by the relevant state dam safety agency;
   iv. fails to meet minimum dam safety standards of the state in which the dam is located, as determined by the state dam safety agency;
   v. and has a condition assessment rating of POOR or UNSATISFACTORY as identified in the National Inventory of Dams (NID) no later than 09/15/2023.

B. Exclusion: The term “eligible high hazard potential dam” does not include—

i. a licensed hydroelectric dam under a hydropower project with an authorized installed capacity of greater than 1.5 megawatts; or

ii. a dam built under the authority of the Secretary of Agriculture.

C. Note: Dams that meet the NID criteria of FAIR and with a PAR greater than or equal to 1000 may be eligible for the HHPD program. Dams with a SATISFACTORY or NOT RATED condition assessment in the NID are not eligible for the HHPD program.

FAIR

Source: NID Condition Assessment definition

No existing dam safety deficiencies are recognized for normal operating 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. Note: Rare or extreme event is defined by the regulatory agency based on their minimum applicable state criteria. Other Circumstances:

- Lack of maintenance requires attention to prevent developing safety concerns.
- Maintenance conditions may exist that require remedial action greater than routine work and/or secondary studies or investigations.
- Interim or permanent risk reduction measures may be under consideration.

POOR

Source: NID Condition Assessment definition

A dam safety deficiency is recognized for normal operating 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. Investigations and studies are necessary. Other circumstances:

- Dam has multiple deficiencies or a significant deficiency that requires remedial work.
- Lack of maintenance (erosion, sinkholes, settlement, cracking, unwanted vegetation, animal burrows, inoperable outlet gates) has affected the integrity or the operation of the dam under normal operational conditions and requires remedial action to resolve.
- Critical design information is needed to evaluate the potential performance of the dam. For example, a field observation or a review of the dam's performance history has identified a question that can only be answered by review of the design and construction history for the dam. Uncertainty arises when there is no design and/or construction documentation available for review and additional analysis is needed to better understand the risk associated with operation under normal operational conditions.
- Interim or permanent risk reduction measures may be under consideration.

UNSATISFACTORY

Source: NID Condition Assessment definition

A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution. Typical circumstances:

- A critical component of the dam has deteriorated to unacceptable condition or failed.
- A safety inspection indicates major structural distress (excessive uncontrolled seepage, cracks, slides, sinkholes, severe deterioration, etc.), advanced deterioration, or operational deficiencies which could lead to failure of the dam or its appurtenant structures under normal operating conditions.
- Reservoir restrictions or other interim risk reduction measures are required.
- A partial or complete reservoir drawdown may be mandated by the state or federal regulatory agency. Lack of maintenance (erosion, sinkholes, settlement, cracking, unwanted vegetation, animal burrows, inoperable outlet gates) has affected the integrity or the operation of the dam under normal operational conditions and requires remedial action to resolve.

All Dam Risk

Source: FY24 HHPD NOFO (page 12)

For the purposes of the HHPD grant program, all dam risk includes the incremental risk, non-breach risk, and residual risk associated with each eligible high hazard potential dam, as well as the reason(s) the state has determined the dam is an eligible high hazard potential dam.

Types of Risk

Sources: "Rehabilitation of High Hazard Potential Dams Grant Program Guidance," June 2020.

Incremental Risk

The risk (likelihood and consequences) to the pool area and downstream floodplain occupants that can be attributed to the presence of the dam should the dam breach prior or subsequent to overtopping, or undergo component malfunction or misoperation, where the consequences considered are over and above those that would occur without dam breach. The consequences typically are due to downstream inundation, but loss of the pool can result in significant consequences in the pool area upstream of the dam.

Non-Breach Risk

The risk in the reservoir pool area and affected downstream floodplain due to 'normal' dam operation of the dam (e.g., large spillway flows within the design capacity that exceed channel capacity) or 'overtopping of the dam without breaching' scenarios.

Residual Risk

The risk that remains after all mitigation actions and risk reduction actions have been completed. With respect to dams, FEMA defines residual risk as "risk remaining at any time" (FEMA, 2015, p A-2). It is the risk that remains after decisions related to a specific dam safety issue are made and prudent actions have been taken to address the risk. It is the remote risk associated with a condition that was judged to not be a credible dam safety issue.

Official Regulatory Notice

Source: FY24 HHPD NOFO (19. Definitions, page 65)

A specific Dam Safety Deficiency (meeting the NID definition) is recognized and cannot be resolved with routine maintenance. The state dam safety agency has issued an official regulatory notice to the dam owner that includes all the following elements:

1. The dam owner is notified of the specific deficiency and a regulatory requirement to immediately implement risk-reduction measures. (Required risk-reduction measures may include activities such as hiring an engineer to conduct risk-based failure mode studies, design of risk-reduction measures, construction of risk-reduction measures, or other actions.)
2. The regulatory notice indicates whether temporary risk-reduction measures (such as reservoir restrictions) are required.
3. The regulatory notice indicates a specific time allowance for the completion of the risk-reduction measures.
4. The regulatory notice includes a statement of the state dam safety's authority to issue regulatory actions and/or specific regulatory enforcement actions for failure to comply.