

FEMA National Dam Safety Program Overview

Dams play a vital role in the nation’s overall infrastructure. They contribute to the economic development of the United States and the social welfare of the American public.

National Dam Safety Program Information

The Importance of Dams

Other benefits of dams include flood protection, water supply reservoirs, hydroelectric power, irrigation, and recreation. However, dam infrastructure can be compromised by natural hazards, man-made threats, as well as an imbalance between resources invested and a dam’s age.

The National Inventory of Dams classifies approximately [15,600 dams](#) in the United States as high-hazard potential (HHP), meaning that their failure could result in loss of life. Approximately [11,300 of those dams](#) have a significant potential classification, meaning there is no probable loss of human life but probable economic loss including environmental damage and disruption of lifeline facilities.



Figure 1. Facts on dams in the United States

The National Dam Safety Program (NDSP) aims to prevent dam failures and reduce the impacts on lives and property that would be impacted by a dam failure.

The National Dam Safety Program Partnership

Led by FEMA, the program is a partnership of states, territories, federal agencies, and other stakeholders that encourage and promote the establishment and maintenance of effective federal and state and territorial dam safety programs to reduce the risk to human life, property and the environment from dam related hazards. The program



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educates the public, dam owners and assists decision makers using multiple databases, tools, and other materials. Two advisory committees oversee the program:

- **The Interagency Committee of Dams (ICODS)** was founded in 1980 to encourage the establishment and maintenance of effective federal programs and policies, and guidelines to enhance dam safety and security. ICODS serves as the permanent forum for the coordination of federal activities in dam safety and security.
- The **National Dam Safety Review Board (NDSRB)** advises FEMA's Administrator in setting national dam safety priorities and considers the effects of national policy issues affecting dam safety.

For more information, visit the Advisory Committee [webpage](#) on FEMA.gov.

Components of the National Dam Safety Program

FEMA works with its federal, state, territorial and private sector partners to develop technologies to help provide for improved dam safety. FEMA also provides financial assistance to state and territorial dam safety programs under the Water Resources Reform and Development Act (WRRDA) of 2014. The program supports dam safety through:

- [Grants](#)
 - State Assistance Grants support state dam safety programs in implementing dam safety activities.
 - Rehabilitation of High Hazard Potential Dam (HHPD) Grants provide technical, planning, design, and construction assistance in the form of grants for rehabilitation of eligible high hazard potential dams.
- [Training](#)
 - Promotes training for dam owners and professionals through federal, state, and local initiatives.
- [Research](#)
 - Addresses a cross-section of issues and needs, all in support of ultimately making dams in the United States safer.
- [Public Safety and Awareness](#)
 - Assists in preparing for, mitigating against, responding to, and recovering from incidents.



Figure 2. National Dam Safety Program Resource Allocations

Grants Overview

State Assistance Grant

State Assistance Grants provide financial assistance to the states for strengthening their dam safety programs.

The program funding supports state activities that include the following:

- Dam safety training for state and territorial personnel
- Increase in the number of dam inspections
- Increase in the submittal and testing of Emergency Action Plans
- More timely review and issuance of permits
- Improved coordination with state emergency preparedness officials
- Identification of dams to be repaired or removed
- Conduct dam safety awareness workshops and creation of dam safety videos and other outreach materials

High Hazard Potential Dam Grant



Figure 3. High Hazard Potential Eligible Activities

In 2016, the Rehabilitation of High Hazard Potential Dam (HHPD) Grant Program was added as a new initiative in National Dam Safety Program. High Hazard Potential is a classification standard for any dam whose failure or mis-operation will cause loss of human life and significant property destruction. Grants provide technical, planning, design, and construction assistance in the form of grants for rehabilitation of eligible high hazard potential dams. A state or territory with an enacted dam safety program, the state administrative agency, or an equivalent state agency is eligible for the grant.

More information can be found at: <https://www.fema.gov/emergency-managers/risk-management/dam-safety/grants>

Training Overview

The National Dam Safety Program (NDSP) Training Program is designed to help state, local and tribal governments obtain the knowledge, tools, and support needed to plan and implement effective dam safety strategies. Resources available through the program include instructor-led courses, web-based courses, and videos.

Training Programs Offered

- Technical Seminar
 - The annual [National Dam Safety Program Technical Seminar \(NDSPTS\)](#) is held as a resource for dam and levee safety professionals, as well as those responsible for responding to dam and levee safety incidents.
- Community Dam Safety
 - A course outlining how to reduce risks and mitigate the consequences resulting from a dam failure and recover more effectively in the event of a failure.
- Seepage and Internal Erosion Course

- A course focused on presenting a summary of current Federal practices for monitoring and measuring seepage, identifying potential failure modes (PFMs) related to internal erosion, assessing risk related to internal erosion, and remediating internal erosion.
- Decision Support System for Water Infrastructure Security™ Lite (DSS-WISE™ Lite)
 - [DSS-WISE™ Lite](#) is a web-based, automated two-dimensional dam-break flood modeling and mapping capability. A workshop was created to teach dam safety professionals, dam safety regulators, community officials, and emergency managers how to rapidly identify the potential flood hazard areas downstream of dams as well as what steps can be taken before a dam failure incident to mitigate flood risk and manage the risk that remains.
- ASDSO (Association of State Dam Safety Officials) Technical Training
 - ASDSO offers a [training program](#) that is comprised of conferences, technical classroom courses, and webinars aimed at providing dam and levee safety professionals with the opportunity to expand their professional knowledge.
- Collaborative Technical Assistance (CTA)
 - The [Collaborative Technical Assistance \(CTA\)](#) series helps communities at risk of dam-related flooding. The CTA program helps communities at risk for flooding due to operational discharge or dam-related infrastructure failure to gain a better understanding of the consequences of dam-related emergencies and to develop risk-informed plans.

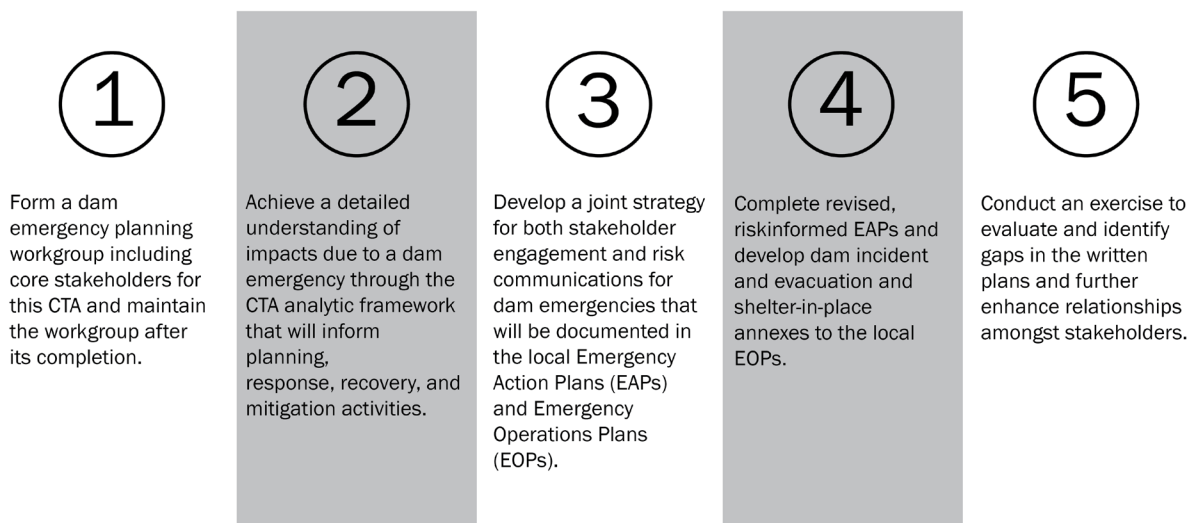


Figure 4. Collaborative Technical Assistance Objectives

More information can be found at: <https://www.fema.gov/emergency-managers/risk-management/dam-safety/training>

Public Safety and Awareness Overview

Information Needs Within Dam Safety

With over 94,000 dams in the U.S. with an average age of more than 53 years, dam safety is important for the security and well-being of the communities they support. Information needs for dam safety extend from those in Congress who set national priorities and allocate fiscal resources to those of the dam owner and engineer involved in inspections, operations and maintenance, dam safety modifications, and other day-to-day activities of maintaining safe, economically viable facilities, and environmentally responsible structures.

If they are not maintained and operated correctly, dams can pose risks to those living downstream. When dams age, deteriorate, or malfunction, they can release sudden, dangerous flood flows. Dam failures can pose safety risks to an often-unaware public. Many communities in the United States are near at least one dam. In many cases, large populations, vital elements of our infrastructure, jobs, and businesses are located downstream of dams. Dam failure floods are almost always more sudden and violent than normal stream, river, or coastal floods. They often produce damage that looks like tornado damage.

Dams are owned and operated by many different types of owners. Sometimes they serve a limited purpose—for instance, a neighborhood association that wants its homes built around a lake—and sometimes they serve larger interests—for instance, a water supply utility. Downstream development increases the potential consequences of a dam's failure. As a result of both new dam construction and development downstream of existing dams, the number of dams that could pose a risk to human life if they fail is steadily increasing.

Dam Safety Tools

- [National Dam Safety Program Annual Year in Reviews](#)
 - The Year-in-Review highlights key accomplishments yearly to advance awareness and understanding of the important role the program plays to reduce risk, promote benefits, and enhance safety surrounding our Nation's dams.
- [National Dam Safety Program Strategic Plans](#)
 - Strategic Plans are developed to present the goals and objectives established by FEMA and its partners in the NDSP to reduce the hazards from dam failures and demonstrate the benefits of dams in the United States.
- [National Inventory of Dams \(NID\)](#)
 - A computerized database of U.S. dams used to track information on our water control infrastructure, land use management, floodplain management, risk management, and emergency action planning.

About the National Inventory of Dams

- Maintained by the U.S. Army Corps of Engineers
- Used for risk and emergency management, general planning, inventorying, and other purposes
- Contains information on over 91,000 dams nationwide
- The average age of dams in the NID is 57 years
- 69 percent of the dams in the NID are state-regulated
- Access the National Inventory of Dams: <http://nid.usace.army.mil>

Dam Safety Awareness Day

FEMA encourages communities, states, and private sector dam owners across the country to help promote dam safety and the benefits of dams either on or around May 31 each year. Here are some activities you can do to get involved and act:

- Contact your State Dam Safety Programs.
- Seek information about dams in your area and their emergency action plans.
- Learn about local government evacuation plans and organize an evacuation drill.
- Work with your local school systems to set up a field trip to a local dam.
- Start an outreach campaign to raise dam safety awareness.
- Host a Dam Safety Awareness Day community event.
- Visit FEMA, ASDSO, and other dam safety-related websites to learn more about dams.

For more information on how you can participate, visit the National Dam Safety Awareness Day page: <https://www.fema.gov/event/national-dam-safety-awareness-day>

Facts About Dams

Purpose

Dams play a vital role in the nation's overall infrastructure. They contribute to the economic development of the United States and the social welfare of the American public. The purpose of a dam is to store water or other liquid-borne materials for several reasons, including human water supply, irrigation, livestock water supply, energy generation, containment of mine tailings, recreation, pollution, or flood control. Many dams fulfill a combination of the above functions.

Ownership

Dams are unique components of the nation's infrastructure. About 64% of dams are privately owned. Dam owners are solely responsible for keeping their dams safe and financing expensive maintenance, repairs, and upgrades. Maintaining dams can be a heavy burden on dam owners. Dam safety is a shared responsibility among dam owners, dam operators, dam regulators, state, local, tribal and territorial governments, federal government, private sector, non-governmental organization, and individuals.

Regulation

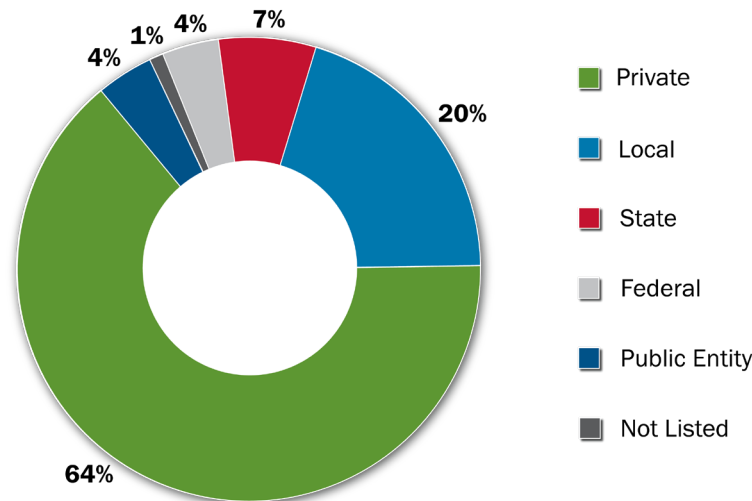


Figure 5. Dams by Owner Type

Maintaining a safe dam is a key element in preventing failure and limiting the liability that an owner could face. The extent of an owner's liability varies from state to state and depends on statutes and case law precedents. Federally owned and regulated dams are subject to federal regulations and guidelines and applicable federal and state laws. Owners can be fiscally and criminally liable for any failure of a dam and all damages resulting from its failure. States regulate about 70% of dams in the nation. The federal government regulates all other dams.

For a general overview of dams, visit: https://www.fema.gov/sites/default/files/2020-08/fact-sheet_dam-awareness.pdf

Reducing Risk

Know Your Risk

Although thousands of lives have been lost and substantial property damage has occurred because of dam failure, good planning and improved dam safety programs have reduced loss of life and property damages dramatically. Dam failures or partial failures are not usually caused by storm events. Most failures fall into one or more of the following categories: structural failures, mechanical failures, or hydraulic failures.

These problems can lead to dam failure:

- Inadequate design criteria
- Malfunction of dam components
- Spillway damage or malfunction
- Seepage problems
- Embankment stability problems
- Damage from vandalism
- Improper operation

Dam safety is a shared responsibility. You are encouraged to know your risk, know your role, know the benefits of dams, and take action.

Dam Failure Inundation Zones

The area downstream of a dam that would be impacted in the event of a failure or uncontrolled release of water is called the dam failure inundation zone. Before buying a home or business, it is the buyer's responsibility to determine whether it is in an inundation zone.

If you determine that your property is in an inundation zone, contact your county emergency management coordinator or state dam safety program office to find out who owns the dam and which agencies regulate it.

Some questions to ask about the dam include:

- What is the dam's hazard potential classification?
- When was it last inspected?
- What is its condition?
- Where are community emergency shelters located?
- Is there an updated Emergency Action Plan for the dam?
- What types of warning systems are in place to warn residents of a dam incident?

To learn more about dam failure inundation zones, visit: https://www.fema.gov/sites/default/files/2020-08/fema_living-with-dams_p-956.pdf

Emergency Action Plans

One of the most important questions to ask State dam safety officials or dam owners is whether there is an up-to-date Emergency Action Plan (EAP) for the dam in question. An EAP is a formal document that identifies potential

emergency conditions at a dam and specifies actions to reduce property damage and loss of life. The EAP includes actions the dam owner should take to mitigate problems at the dam and issue warnings to responsible emergency management authorities. If you live or work in a dam breach inundation zone, find out your evacuation route so that you can quickly get out of harm's way in the event of a dam incident. To obtain this information, contact your State and local emergency management officials, who are responsible for evacuation planning and implementation.

An Emergency Action Plan Should Include:

- Actions the dam owner will take to moderate or alleviate a problem at the dam.
- Actions the dam owner will take in coordination with emergency management authorities to respond to incidents or emergencies related to the dam.
- Procedures dam owners will follow to issue early warning and notification messages to responsible downstream emergency management authorities.
- Inundation maps to help dam owners and emergency management authorities identify critical infrastructure and population-at-risk sites that may require protective measures, warning, and evacuation planning.
- Delineation of the responsibilities of all those involved in managing an incident or emergency and how the responsibilities should be coordinated.

Most states require Emergency Action Plans (EAP) for areas around dams. To find out if a plan is in place, contact your state or emergency management agency, or visit the [National Inventory of Dams website](#).

Reducing Risk from Dam Failures

To reduce the chances of a dam failing from an extreme rainfall event as a dam owner:

- Know/identify dams of highest risk (conduct risk informed prioritization)
- Design to industry, state, and Federal Guidelines
- Practice situational awareness and preparedness
- Have your dam inspected routinely
- Ensure proper construction, maintenance, and operation
- Adhere to regulations, no short cuts or random exemptions
- Invest in repair and routine maintenance
- Be in contact with your state dam safety office
- Have an up-to-date emergency action plan and inundation maps



Inform your family of dam failure flood risks, and make sure each family member knows what to do in the event of an emergency.



Elevate your furnace, water heater and electrical panel if they are susceptible to flooding.



Install “check valves” in sewer traps to prevent floodwater from backing up into drains.



Seal basement walls with waterproofing compounds to avoid seepage.



Keep valued possessions and important papers on an upper level of your home or in a safety deposit box.



Prepare an emergency kit.

Figure 2. How to Prepare for a Dam Failure

If You Have to Leave Your Home

- Do not walk through moving water. Six inches of moving water can make you fall. If you must walk in water, walk where the water is not moving.
- Do not drive into flooded areas. If floodwaters rise around your car, abandon it and move to higher ground if you can do so safely. You and the vehicle can be quickly swept away.

For more information on how to reduce your risks, visit https://www.fema.gov/sites/default/files/2020-08/fema_living-with-dams_p-956.pdf

Dams are vital to the infrastructure of our country. Though dam failures and other hazards have the potential to cause significant risk to human life, property, and the environment, the NDSP is working with dam owners and decision makers to prevent such tragedies from occurring.

Resources and References

- FEMA’s Dam Safety program: www.fema.gov/dam-safety

- Association of State Dam Safety Officials: www.damsafety.org
- National Inventory of Dams: <https://nid.usace.army.mil>
- National Dam Safety Program Publications: <https://www.fema.gov/emergency-managers/risk-management/dam-safety/publications>
- National Dam Safety Program Annual Year in Review: <https://www.fema.gov/emergency-managers/risk-management/dam-safety/year-in-review>
- National Performance of Dams Program: <http://npdp.stanford.edu>
- National Dam Safety Awareness Day: <https://damsafety.org/NDSAD>
- Living with Dams Publication: https://www.fema.gov/sites/default/files/2020-08/fema_living-with-dams_p-956.pdf