

DAM FAILURE

DEFINITION – A dam is a barrier across flowing water that obstructs, directs, or slows down water flow. Dams provide benefits such as flood protection, power generation, drinking water, irrigation, and recreation. Failure of these structures results in an uncontrolled release of impounded water. Failures are relatively rare, but immense damage and loss of life is possible in downstream communities when such events occur. Aging infrastructure, hydrologic, hydraulic and geologic characteristics, population growth, and design and maintenance practices should be considered when assessing dam failure hazards. The failure of the South Fork Dam, located in Johnstown, PA, was the deadliest dam failure ever experienced in the United States. It took place in 1889 and resulted in the Johnstown Flood which claimed 2,209 lives (FEMA, 1997). Today there are approximately 3,200 dams and reservoirs throughout Pennsylvania (Pennsylvania Department of Environmental Protection, 2009).



MITIGATION ACTIONS FOR RESIDENTS

- ▶ **Personal Preparedness** – It is important to plan for disasters. Families may not be together or at home. Consider completing the following to be prepared.
 - **Family Emergency Communication Plan** (FEMA) serves as a comprehensive checklist for household disaster preparedness. [FEMA Family Emergency Communication Plan Checklist](#)
 - **Family Disaster Plan** (American Red Cross) – Communication networks and electricity could be disrupted. Planning in advance will help ensure that all the members of your household know how to reach each other and where to meet up in an emergency. [American Red Cross Family Disaster Plan Template](#)
 - **Emergency Kits** – It is always a good idea to have an emergency kit on hand. Consider basic items as well as special needs.
 Build a Kit (Ready.gov) [ready.gov Build-a-Kit](#)
 Survival Kit Supplies (American Red Cross) [American Red Cross Survival Kit Supplies Checklist](#)
- ▶ **Emergency Alerts and Warnings** – To receive emergency alerts and warnings, refer to the following websites, mobile apps, and other resources.
 - **American Red Cross Mobile Apps** (Apple App Store, Google Play, or text to “90999” [Mobile Apps - The American Red Cross](#)
 - **South Central Alert** – This service allows residents and businesses in an eight county area to be notified of an emergency situation and important alert messages in a variety of ways, including on their cell phones, home and work phones, by text messaging and e-mail. [South Central Alert - Sign Up](#)
 - Monitor police news feeds, weather, and news on social media or websites. Receiving periodic updates is vital.

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- ▶ **Mitigate Structures** – Voluntarily move, remove, or elevate structures in the dam failure inundation zone.
- ▶ **Dam Emergency Action Plan** – Dam owners and operators are responsible for preparing an EAP for their dams. Dam owners should consider performing periodic dam evaluations regularly and should conduct regular dam inspections and the required operations and maintenance. Dam owners and operators should also undertake preparedness activities such as securing appropriate emergency contracts with specialty vendors and providing a comprehensive and targeted training program to their staff, inclusive of regularly scheduled refresher sessions.
- ▶ **Wet Floodproofing** – Wet floodproofing makes uninhabited portions of a structure resistant to floods by allowing water to enter and flow through the structure during a flood event and relocates items such as hot water heaters, air conditioners, washing machines and dryers to higher elevations.



MITIGATION ACTIONS FOR MUNICIPALITIES

- ▶ **Adopt the York County Hazard Mitigation Plan** by resolution or develop and implement a municipal hazard mitigation plan. [York County Hazard Mitigation Plan](#)
- ▶ **Prepare a Continuity of Operations Plan** to ensure that essential functions continue to be performed under a broad range of circumstances, protecting residents and minimizing business interruption. Consider what capital improvements are needed to adequately protect business or properties. [FEMA Continuity of Operations Brochure](#)
- ▶ **Prepare an Emergency Operations Plan** which describe who will do what, as well as when, with what resources, and by what authority – before, during, and immediately after an emergency. [FEMA Guide for All Hazards Emergency Operations Planning Guide](#)
- ▶ **Coordination** – Develop pre-disaster Memorandums of Agreements or Memorandum of Understanding with adjacent jurisdictions. Build partnerships (neighborhoods, emergency management/first responders, businesses, utility service providers, and local government agencies to strengthen response and recovery.
- ▶ **Public Education and Outreach** – Educate residents regarding risk and impact of hazards, how to prepare and protect themselves and their property. Facilitate funding for mitigation measures and technical assistance programs that address measures that citizens can take.
 - Raise awareness of dam safety issues, facilitate cooperation, and provide a forum for the exchange of information.
 - Provide information on the potential risks of living downstream of a dam and what actions have been taken to mitigate the risks.

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- Help communities upstream and downstream of dams and communities that could be impacted by dam failure (e.g., loss of water for firefighting activities if they rely on a reservoir) to better understand their risk in order to be better prepared during an emergency.

- ▶ **Critical Infrastructure** – Relocate critical infrastructure or critical functions outside the failure inundation zone, elevate above anticipated flood levels, or protect infrastructure that cannot be relocated or elevated (e.g., pipelines, water, sewage, natural gas, pump systems).

- ▶ **Structure Relocation** – Voluntarily move, remove, or elevate structures and restrict development in the dam failure inundation zone.

- ▶ **Increase Dam Resilience and Reduce Dam Failure** – Implement mitigation projects that can increase dam resilience and reduce dam failure consequences:
 - Adding redundant or improved operational systems for complex dams.

 - Adding interim risk reduction measures to reduce risk until permanent solutions can be funded.

 - Decommissioning and removing the dam to eliminate dam-related hazards if the dam is no longer needed or outlives its benefit.

- ▶ **Zoning and Land Use Planning** – Communities should consider the possibility of a dam failure when determining their zoning and land use planning policies.