

# NORTH DAKOTA DAM DESIGN STANDARDS & POLICY UPDATE

Dams are important components of North Dakota's infrastructure, providing essential services such as water storage for irrigation, hydroelectric power generation, flood control, water supply, recreation, and wildlife habitat. However, if the sudden, rapid, and uncontrolled release of impounded water due to dam failure occurs, the lives of downstream residents, their communities, public and private property, and agricultural interests could be in jeopardy.

With an emphasis on safety, the Department of Water Resources (DWR) has been working on updating and clarifying the North Dakota Dam Design Standards. The draft document is currently open for public comment and can be reviewed at [www.dwr.nd.gov](http://www.dwr.nd.gov). The current guidelines were written in 1985 and dam design best practices have notably evolved since that time. At a national level, other states and agencies across the country are continually updating their design standards and practices to ensure that dams are designed using the most up to date methods. To stay current with best practices associated with dam design across the country, in 2018 the DWR Dam Safety Section began to review standards, designs, and requirements that are state of the practice for implementation in North Dakota. This project was funded by National Dam Safety Program grants through the Department of Homeland Security and the Federal Emergency Management Agency. The updated standards will incorporate the January 2023 Administrative Code updates to Hazard Classification Definitions, the 2021 Probable Maximum Precipitation Study and Interim Guidance, and other design changes based on best practices. The following are some of the proposed changes to the standards.

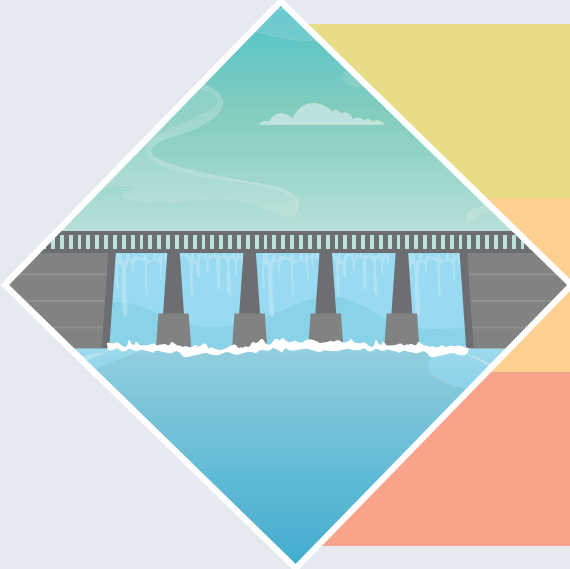
## ADOPTION OF UPDATED PROBABLE MAXIMUM PRECIPITATION DATA

In June 2021, the DWR completed an update of statewide Probable Maximum Precipitation (PMP) data through a two-year PMP study conducted by Applied Weather Associates under contract with DWR. The study relied on up-to-date meteorological processes and data from North Dakota and the surrounding region to ensure the best estimate of a natural maximum rainfall. These new datasets will ultimately replace the Hydrometeorological Reports covering North Dakota that were completed by the National Oceanic and Atmospheric Administration in the 1970s and 1980s and were the previous source of PMP data for North Dakota. The more accurate PMP values provided by this study benefit dam safety in North Dakota by providing a more complete picture of the potential risk posed by extreme PMP events.

Following completion of the PMP study, the DWR released Interim Guidance on Using the PMP Study in February 2022. The Interim Guidance explains the use of the PMP study's data and GIS tools, and discusses the dam design implications of the study. PMP analysis is an essential component of obtaining a dam construction permit through the DWR for certain classifications of dams. Since the PMP study and Interim Guidance were released, they have been utilized by dam owners and the dam design community to help identify appropriate design considerations in the review of potential modifications to existing dams and design of new dams in North Dakota. The interim PMP guidance has been incorporated into the proposed Dam Design Standards.

## REVISED HAZARD CLASSIFICATION DEFINITIONS

Hazard classifications of dams in North Dakota are determined by the DWR Dam Safety Program, and definitions were updated effective January 2023 through Administrative Rules updates. The hazard classification of a dam is based on the potential downstream impacts if the dam were to fail. It is not related to the condition of the dam. In North Dakota, the hazard classification of a dam dictates permitting and design requirements, emergency action plan requirements, and inspection frequency. The updated definitions include:



### **LOW-HAZARD DAM**

A dam with low hazard potential where failure or misoperation results in no probable loss of human life and low economic losses.

### **MEDIUM-HAZARD DAM**

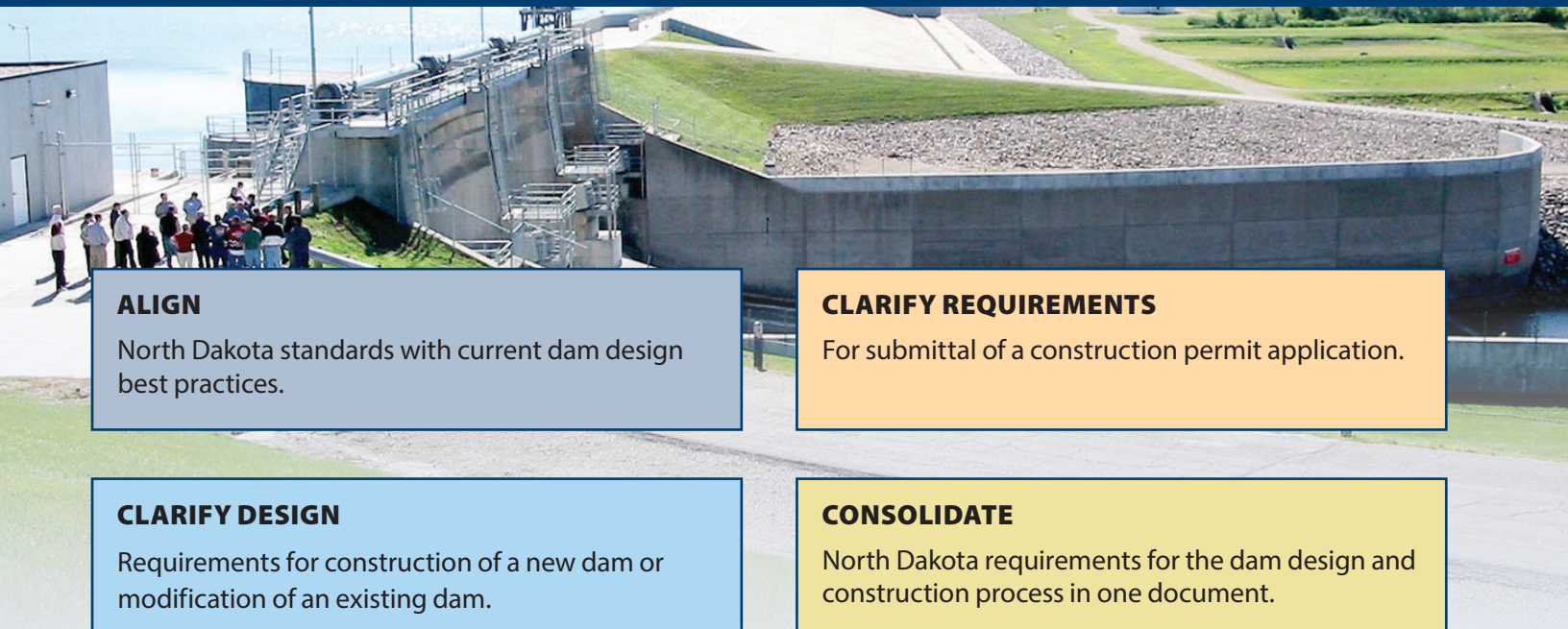
A dam with medium hazard potential where failure or misoperation results in no probable loss of human life but can cause economic loss, disruption of lifeline facilities, or can impact other concerns.

### **HIGH-HAZARD DAM**

A dam with high hazard potential where failure or misoperation will probably cause loss of human life.

The main distinction between the newly adopted definitions and the previous definitions is that under previous definitions, a dam where failure can result in the potential for loss of “a few lives” is classified as medium hazard, while the potential for loss of “more than a few lives” is classified as high hazard. Under the new definitions, any probable loss of human life would result in a high hazard classification. In June 2023, DWR released the Hazard Classification and Legacy Dams Policy, detailing how dams that changed hazard classifications due to these definition changes would be handled. That policy can be found on the Dam Safety section of the website.

## DAM DESIGN STANDARDS GOALS & OBJECTIVES



### **ALIGN**

North Dakota standards with current dam design best practices.

### **CLARIFY REQUIREMENTS**

For submittal of a construction permit application.

### **CLARIFY DESIGN**

Requirements for construction of a new dam or modification of an existing dam.

### **CONSOLIDATE**

North Dakota requirements for the dam design and construction process in one document.