



## GUIDANCE DOCUMENT ON ROADWAYS ON OR BELOW IMPOUNDING STRUCTURES

(Approved November 30, 2010)

### **Summary:**

This guidance document specifies the decision process to be utilized in determining the hazard potential classification of an impounding structure solely based on the presence of a roadway(s) on or below the impounding structure.

### **Electronic Copy:**

An electronic copy of this guidance in PDF format is available on the Regulatory TownHall under the Virginia Soil and Water Conservation Board at <http://townhall.virginia.gov/L/GDocs.cfm>.

### **Contact Information:**

Please contact the Department of Conservation and Recreation's Division of Dam Safety and Floodplain Management at [dam@dcr.virginia.gov](mailto:dam@dcr.virginia.gov) or by calling 804-371-6095 with any questions regarding the application of this guidance.

### **Disclaimer:**

This document is provided as guidance and, as such, sets forth standard operating procedures for the Department of Conservation and Recreation in administering the Dam Safety Program on behalf of the Virginia Soil and Water Conservation Board. This guidance provides a general interpretation of the applicable Code and Regulations but is not meant to be exhaustive in nature. Each situation may differ and may require additional interpretation of the Dam Safety Act and attendant regulations.

## **Roadways On or Below Impounding Structures**

### **I. Background:**

Section 4VAC50-20-40 of the Impounding Structure Regulations specifies that hazard potential classification of an impounding structure is dependant on the potential loss of human life or damage to the property of others downstream from the impounding structure in event of failure or faulty operation of the impounding structure or appurtenant facilities. In addition to direct impacts on human life, the classifications are also dependant on impacts to residences, businesses, other occupied structures, or roadways in the dam break inundation zone. In many cases, the existence of roadways and the volume of use of such roadways has an impact on the classification of the impounding structure. This guidance serves to clarify what roadways may trigger a classification of an impounding structure as high, significant, or low hazard potential.

### **II. Definitions (pursuant to § 10.1-604 and 4VAC50-20-30):**

"Dam break inundation zone" means the area downstream of a dam that would be inundated or otherwise directly affected by the failure of a dam.

### **III. Authority:**

The Dam Safety Act in the Code of Virginia contains the following authorities applicable to this guidance:

#### **§ 10.1-605. Promulgation of regulations by the Board.**

A. The Board shall promulgate regulations to ensure that impounding structures in the Commonwealth are properly and safely constructed, maintained and operated.....

C. The Board shall consider the impact of limited-use or private roadways with low traffic volume and low public safety risk that are downstream from or across an impounding structure in the determination of the hazard potential classification of an impounding structure.

The Impounding Structure Regulations contain the following authorities applicable to this guidance:

#### **4VAC50-20-40. Hazard potential classifications of impounding structures.**

A. Impounding structures shall be classified in one of three hazard classifications as defined in subsection B of this section and Table 1.

B. For the purpose of this chapter, hazards pertain to potential loss of human life or damage to the property of others downstream from the impounding structure in event of failure or faulty operation of the impounding structure or appurtenant facilities.

Hazard potential classifications of impounding structures are as follows:

1. High Hazard Potential is defined where an impounding structure failure will cause probable loss of life or serious economic damage. "Probable loss of life" means that impacts will occur that are likely to cause a loss of human life, including but not limited to impacts to residences, businesses, other occupied structures, or major roadways. Economic damage may occur to, but not be limited to, building(s), industrial or commercial facilities, public utilities, major roadways, railroads, personal property, and agricultural interests. "Major roadways" include, but are not limited to, interstates, primary highways, high-volume urban streets, or other high-volume roadways.

2. Significant Hazard Potential is defined where an impounding structure failure may cause the loss of life or appreciable economic damage. "May cause loss of life" means that impacts will occur that could cause a loss of human life, including but not limited to impacts to facilities that are frequently utilized by humans other than residences, businesses, or other occupied structures, or to secondary roadways. Economic damage may occur to, but not be limited to, building(s), industrial or commercial facilities, public utilities, secondary roadways, railroads, personal property, and agricultural interests. "Secondary roadways" include, but are not limited to, secondary highways, low-volume urban streets, service roads, or other low-volume roadways.

3. Low Hazard Potential is defined where an impounding structure failure would result in no expected loss of life and would cause no more than minimal economic damage. "No expected loss of life" means no loss of human life is anticipated.

C. The hazard potential classification shall be proposed by the owner and shall be subject to approval by the board. To support the appropriate hazard classification, dam

break analysis shall be conducted by the owner's engineer. Present and planned land-use for which a development plan has been officially approved by the locality in the dam break inundation zones downstream from the impounding structure shall be considered in determining the classification.

D. Impounding structures shall be subject to reclassification by the board as necessary.

#### **IV. Discussion and Interpretation:**

In accordance with Section 4VAC50-20-40 of the Impounding Structure Regulations, the hazard potential classification of an impounding structure is dependant on the potential loss of human life or damage to the property of others downstream from the impounding structure in event of failure or faulty operation of the impounding structure or appurtenant facilities. Among the downstream factors to be considered in determining the hazard potential classification of an impounding structure are impacts on downstream public and private roadways (including roadways across dams).

##### Determination of an "impact"

All impacted public and private roadways shall be considered in determining hazard potential classification. For the purposes of the Regulations, the determination as to whether a road will be "impacted" by a dam failure may be evaluated in accordance with any one of the following criteria. The choice as to the criteria to be utilized is within the discretion of the dam owner's professional engineer:

1. First, the approach to roadways outlined in Section IV, Part D of the United States Department of the Interior, Bureau of Reclamation's ACER Technical Memorandum No. 11 (available from Dam Safety) may be generally utilized. An impact shall be deemed to occur where there are one or more "lives-in-jeopardy" as a result of a dam failure; or
2. Second, an approach to determining impacts to roadways found in any document that is an acceptable reference pursuant to 4VAC50-20-320 may be utilized. The owner's engineer must reference any methodology utilized; or
3. Third, any roadway that would be overtopped (at any depth) by a dam failure under any flood condition (probable maximum flood, spillway design flood, or sunny day) may be considered to be impacted.

##### Classification based upon roadway type and/or traffic volume

Once it is determined that a roadway is impacted, classification of an impounding structure based solely upon potential impacts to roadways depends upon roadway type and/or traffic volume. Considerations for roadway type and/or traffic volume are as follows.

For purposes of determining traffic volumes, the average annual daily traffic (AADT) volumes available in the most recent published Daily Traffic Volume Estimates from the Virginia Department of Transportation for the road segment nearest the impounding structure shall be utilized. This information is available from VDOT at <http://www.virginiadot.org/info/ct-TrafficCounts.asp>. Data developed by a local government may be utilized where the locality

conducts its own traffic counts. Where AADT volumes are not available from VDOT or a locality, an Average Daily Traffic trip rate that meets the standards set forth in the most recent Institute for Traffic Engineers (ITE) ITE Trip Generation information report (available for ordering online at <http://www.ite.org/tripgen/trippubs.asp>) may be utilized if practicable. In all cases, average daily traffic volumes may also be established by a traffic count that meets VDOT standards and is conducted or overseen by the owner's engineer or otherwise approved by the Regional Engineer.

High hazard impounding structures are those that may impact "major roadways". "Major roadways" include, but are not limited to, interstates, primary highways, high-volume urban streets, or other high-volume roadways generally in accordance with VDOT designations. "Interstates" and "primary highways" include those roadways given these designations by VDOT, except that any so designated roadway having an AADT volume of 400 vehicles or less is not required to be considered an "interstate" or "primary highway". The terms "high-volume urban streets" and "other high-volume roadways" are to be defined in the sound judgment of the owner's engineer.

Significant hazard impounding structures are those that may impact "secondary roadways". "Secondary roadways" include, but are not limited to, secondary highways, low-volume urban streets, service roads, or other low-volume roadways generally in accordance with VDOT designations. These roadways include those designated by VDOT as secondary roadways and other public and private roadways that are not "interstates", "primary highways", high volume urban streets", or "other high-volume roadways", but do not include those roadways that qualify as "limited use roadways" (ie those having an AADT volume of 400 vehicles or less) as defined below.

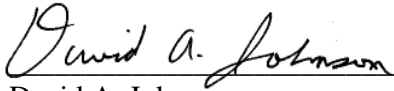
Low hazard potential is defined as where an impounding structure failure would result in no expected loss of life and would cause no more than minimal economic damage. In certain cases, an impounding structure may qualify for low hazard potential classification in spite of a potential impact to a downstream public or private roadway, provided that other factors (such as downstream residences, businesses, or other concerns as set forth in the Regulations) that would raise the hazard potential classification do not exist. Where it can be demonstrated that a public or private roadway has a limited usage, the roadway may be considered to be "limited use" and the impounding structure may be considered a low hazard potential impounding structure despite the presence of the roadway. Such roadways, located either across or below an impounding structure, include those that result in an AADT volume of 400 vehicles or less. Although a roadway may be considered to have a "limited use", the Emergency Preparedness Plan for the low hazard impounding structure shall also clearly outline a reliable and timely approach for notification of the proper local emergency services by the dam owner regarding the hazards of continued use of the road during an emergency condition. Finally, in situations where multiple limited use roadways would be impacted by an impounding structure failure, the traffic volumes of those limited use roadways shall be combined for the purposes of determining the impounding structure's hazard potential classification unless it can be demonstrated that the traffic using each of the roadways is composed of substantially the same vehicle trips, such that the combined number of individual vehicle trips utilizing all of the roadways would result in an AADT of 400 or less. For example, where two secondary roadways would be impacted by an impounding

structure failure and each have an AADT volume of 300 individual vehicle trips, the total AADT volume to be utilized in determining hazard potential classification is 600 vehicles, and the impounding structure would be considered a significant hazard potential. Conversely, where two roadways would be impacted by an impounding structure failure and each have an AADT volume of 150, the total AADT volume to be utilized is 300, and the impounding structure may be considered a low hazard potential so long as other downstream factors would not raise the hazard potential.

Finally, it is of note that the incremental damage analysis permitted in 4VAC50-20-52 remains available for use. While the incremental damage analysis may not be used to reduce hazard potential classification, it may be used to adjust the spillway design flood requirement.

**V. Adoption, Amendments, and Repeal:**

This document will remain in effect until rescinded or superseded.



David A. Johnson  
Director, Department of Conservation and Recreation

November 30, 2010  
Date