



VIRGINIA SOIL AND WATER CONSERVATION BOARD GUIDANCE DOCUMENT ON ROADWAYS ON OR BELOW IMPOUNDING STRUCTURES

(Approved **XXXXXX**, 2010)
Working Draft Version January 14, 2010

Summary:

This guidance document specifies the decision process to be utilized by the Virginia Soil and Water Conservation Board in determining the hazard classification of a dam based on the ownership, use, and location of a roadway on or below an 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 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 Virginia Soil and Water Conservation Board and the Department of Conservation and Recreation that administers the program on behalf of the 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 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 dependant on the ownership, use, and location of the roadway.

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.

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

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.

4VAC50-20-52. Incremental damage analysis.

A. When appropriate, the spillway design flood requirement may be reduced by the board in accordance with this section.

B. The owner's engineer may proceed with an incremental damage analysis. Once the owner's engineer has determined the required spillway design flood through application of Table 1, further analysis may be performed to evaluate the limiting flood condition for incremental damages. Site-specific conditions should be recognized and considered. This analysis may be used to lower the spillway design flood. In no situation shall the allowable reduced level be less than the level at which the incremental increase in water surface elevation downstream due to failure of an impounding structure is no longer considered to present an additional downstream threat. This engineering analysis will need to present water surface elevations at each structure that may be impacted downstream of the dam. An additional downstream threat to persons or property is presumed to exist when water depths exceed two feet or when the product of water depth (in feet) and flow velocity (in feet per second) is greater than seven.

C. The spillway design flood shall not be reduced below the minimum threshold values as determined by Table 1.

D. The required spillway design flood shall be subject to reclassification by the board as necessary to reflect changed conditions at the impounding structure and in the dam break inundation zone.

IV. Discussion and Interpretation:

In accordance with Section 4VAC50-20-40 of the Impounding Structure Regulations, the hazard 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. Classification of an impounding structure based upon potential impacts to roadways depends upon roadway type. 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. 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. Finally, 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.

Most of the difficulty in making a proper classification of an impoundment whose hazard classification is solely dependant on the presence of a downstream roadway or a roadway across the dam is based on determining the risk to the public associated with the use of a low volume roadway. Risk can be shown to be minimal associated with these roadways in accordance with the following scenarios. In these cases, such impounding structures shall qualify as a low hazard dams unless other factors exist to increase the hazard classification.

1. Where it can be demonstrated that the roadway is privately owned and utilized solely for traffic associated with residential uses. Such private roadways located either across or below a dam would not constitute a public risk to those gaining access to their residences or other private occupied structures by way of these private roadways, as the occupants are aware of the hazards associated with the use of such private roadways. Periodic use of the roadway by commercial or other interests (for example, delivery services, lawn services, etc.) will be considered traffic associated with residential uses; however, regular or daily use of the roadway by commercial or other interests shall not be considered traffic associated with residential uses. The use of the roadway by school buses would preclude the use of this scenario.
2. Where it can be demonstrated that a public roadway has a low usage through the use of numbers of structures served, traffic counts, or other proof of usage as outlined below. Such public roadways, located either across or below a dam, would include those that serve no more than ten residential structures (year round or seasonal) or those that result in a peak traffic usage of the road less than 30 vehicles per hour utilizing the roadway during typical peak usage times. Such peak volume vehicle counts shall reflect an average of a minimum of 10 peak hour data points collected on separate typical peak travel days. The owner shall provide documentation to the Department, including the data collected and calculations made, explaining the rationale for the determination and how the results represent typical peak traffic usage. [Information regarding state traffic counts and for some peak usage may be found on VDOT's website at <http://www.virginiadot.org/info/ct-TrafficCounts.asp>.] Additionally, in this situation, 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 public use of the road. The use of the roadway by school buses would preclude the use of this scenario.
3. Where it can be demonstrated through an incremental damage analysis performed in accordance with 4VAC50-20-52 (see other Board guidance) that the dam poses no additional threat to the roadway, the dam may not qualify for classification as a low hazard dam, but may qualify for a reduced spillway design flood requirement.

V. Adoption, Amendments, and Repeal:

This document was adopted by the Board on **XXXX**, 2010 and may be amended or repealed as necessary by the Board.