



# **Dams, Emergency Plans, and Disasters – How It All Fits Together in an Integrated Approach**

**By: Mark Killgore, PE & Justin Deel, PE**

**Division of Dam Safety and Floodplain Management  
Department of Conservation & Recreation**

**2021 Virginia Emergency Management Symposium**

## Virginia Dam Safety Enabling Legislation

### Virginia Dam Safety Act

- Code of Virginia, Title 10.1 Conservation, Chapter 6 Flood Protection and Dam Safety (§§ 10.1-600 through 10.1-659), Article 2. Dam Safety Act

### Virginia Impounding Structure Regulations

- Virginia Administrative Code, Title 4. Conservation and Natural Resources, Agency 50. Virginia Soil and Water Conservation Board, Chapter 20. Impounding Structure Regulations (4VAC50-20-10 et. seq.)

## Introduction

- Purpose: to provide for proper and safe design, construction, operation and maintenance of dams to protect public safety.
- Authority: The Virginia Soil and Water Conservation Board has statutory authority to administer the Virginia Dam Safety Program
- Implementation: The Virginia Department of Conservation and Recreation, Division of Dam Safety and Floodplain Management, carries out the regulatory requirements of the Dam Safety Act and Impounding Structure Regulations

## Impounding Structures = Dams

### What is a State Regulated Dam?

- Dams Subject to State Law and Regulations:

All dams in Virginia are subject to the Virginia Dam Safety Act and the Virginia Impounding Structure Regulations unless specifically excluded. A dam is excluded if it:

- is regulatory size exempt;
- is used primarily for agricultural purposes and meets one of these parameters - is less than 25 feet high **or** has a maximum impounding capacity of less than 100 acre-feet;
- is owned or licensed by the federal government;
- is operated for mining purposes consistent with the Code of Virginia;
- is an obstruction in a canal used to raise or lower water levels; and
- is used for the storage of treated water (Virginia Department of Health)



## **Impounding Structures = Dams**

### **What is a State Regulated Dam?**

A regulated impounding structure is:

- Six (6) feet or greater in height and creates a maximum impounding capacity of 50 acre-feet or greater; or
- Twenty-five (25) feet or greater in height and creates a maximum impounding capacity of 15 acre-feet or greater, and
- Is not otherwise exempt from regulation by the Code of Virginia.

## State Regulated Impounding Structures = Dams Hazard Potential Classifications

- Hazard Potential Classification of Dams: *4VAC50-20-40*

Dams are classified with a hazard potential depending upon the downstream losses anticipated in event of failure. Hazard potential is unrelated to the structural integrity of a dam. Rather it is directly related to potential adverse downstream impacts should the given dam fail. Current hazard potential classifications are:

- HIGH - dams that upon failure would cause probable loss of life or serious economic damage.
- SIGNIFICANT - dams that upon failure might cause loss of life or appreciable economic damage.
- LOW - dams that upon failure would lead to no expected loss of life or significant economic damage.

## State Regulated Impounding Structures = Dams Hazard Potential Classifications

- Key Point on Hazard Potential Classification of Dams:

No allowances for evacuation or other emergency actions for the public (sirens, gates, road closures, etc.) can be considered in determining the hazard potential classification because emergency procedures are not a substitute for appropriate design, construction, and maintenance of impounding structures.

*Source: DCR guidance document DCR-VSWCB-039.*

# Virginia Dam Safety Regions Map

## Dam Safety Regions and Contacts

**REGION 1**  
 Zhengang "Michael" Wang, PE., Ph.D., C.F.M.  
*Regional Dam Safety Engineer*  
 98 Alexandria Pike, Suite 33  
 Warrenton, VA 20186-2849  
 540-351-1587  
 Zhengang.Wang@dcr.virginia.gov

**REGION 2**  
 Mark W. Killgore, PE., D.WRE, F.ASCE  
*Regional Dam Safety Engineer*  
 600 E. Main St., 24<sup>th</sup> Floor  
 Richmond, VA 23219  
 804-786-1359  
 Mark.Killgore@dcr.virginia.gov

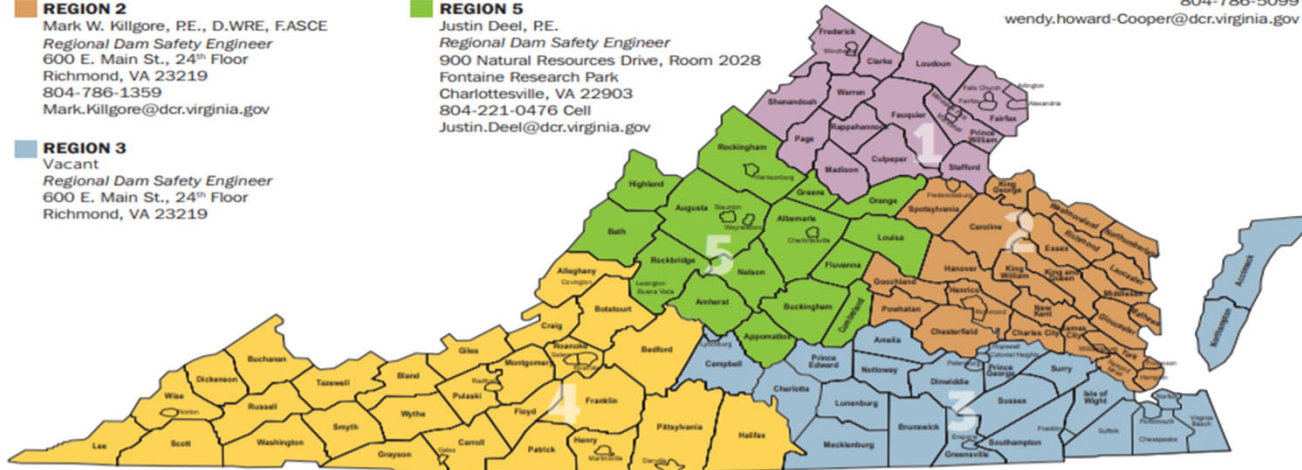
**REGION 3**  
 Vacant  
*Regional Dam Safety Engineer*  
 600 E. Main St., 24<sup>th</sup> Floor  
 Richmond, VA 23219

**REGION 4**  
 Steven Bricker, PE.  
*Regional Dam Safety Engineer*  
 8 Radford St., Suite 102A  
 Christiansburg, VA 24073  
 540-394-2550  
 Steven.Bricker@dcr.virginia.gov

**REGION 5**  
 Justin Deel, PE.  
*Regional Dam Safety Engineer*  
 900 Natural Resources Drive, Room 2028  
 Fontaine Research Park  
 Charlottesville, VA 22903  
 804-221-0476 Cell  
 Justin.Deel@dcr.virginia.gov

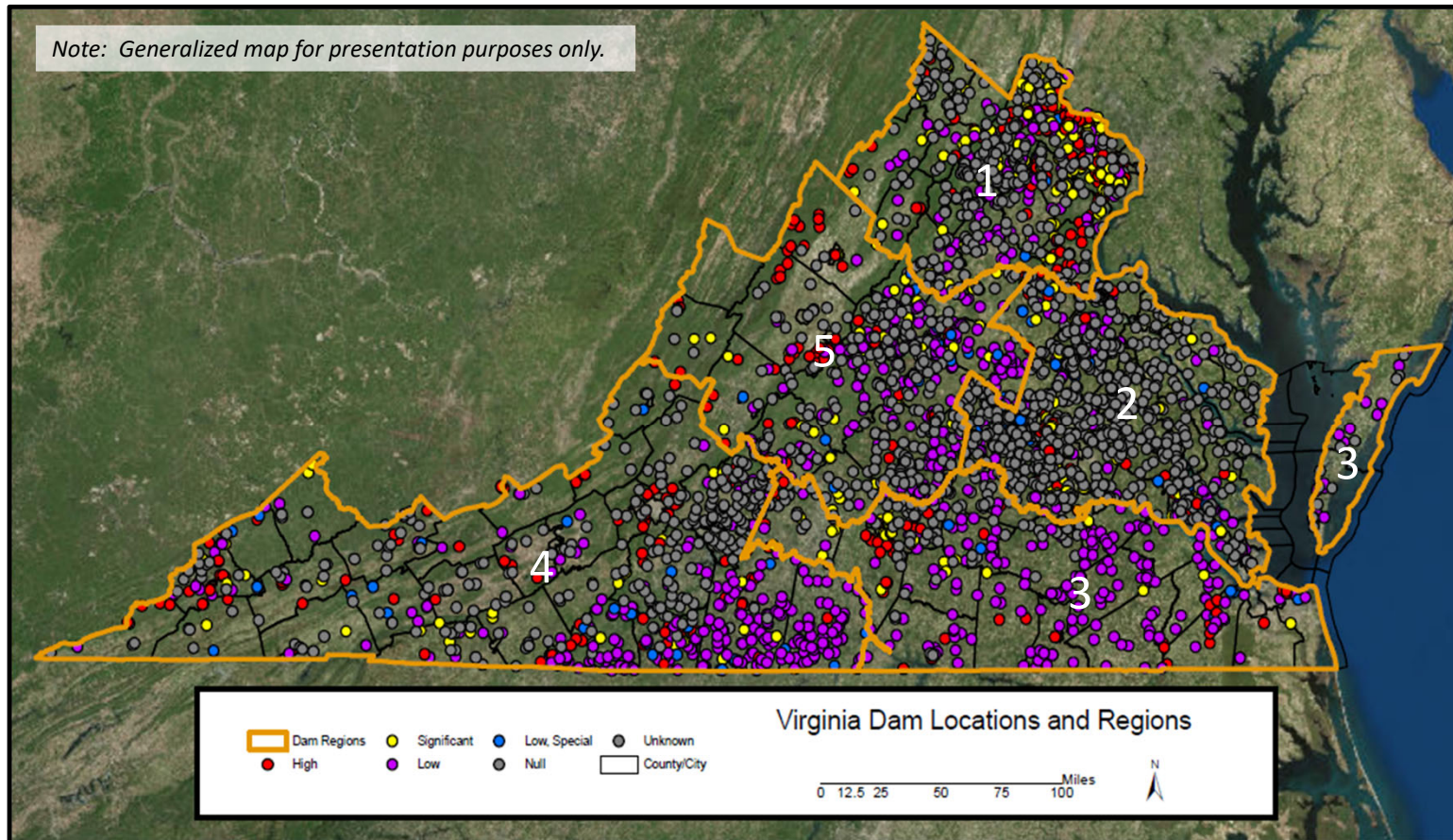
Russ Baxter – *Deputy Director*  
**Dam Safety and Floodplain Management**  
**and Soil and Water Conservation**  
 804-786-2291  
 Russ.Baxter@dcr.virginia.gov

Wendy Howard-Cooper – *Division Director*  
**Dam Safety and Floodplain Management**  
 804-786-5099  
 wendy.howard-Cooper@dcr.virginia.gov





## Virginia Impounding Structure Locations and Dam Safety Regions



## Dam Safety Program by the Numbers

	<u>2020</u>	<u>2021</u>	<u>Change</u>
<b>Total Number of Dams</b>	<b>3618</b>	<b>3653</b>	<b>35</b>
Total Number Regulated by DCR	2056	2621	<u>565</u>
Total Number Not Regulated by DCR	733	1000	267
Unknown	829	<u>32</u>	-797
	<u>2020</u>	<u>2021</u>	<u>Change</u>
<b>DCR Regulated Hazard Classification</b>	2056	2621	565
High	326	338	12
Significant	170	170	0
Low	261	268	7
Unknown	1302	1845	<u>543</u>

*Source: Virginia Dam Safety Inventory System (DSIS); April 19, 2021*

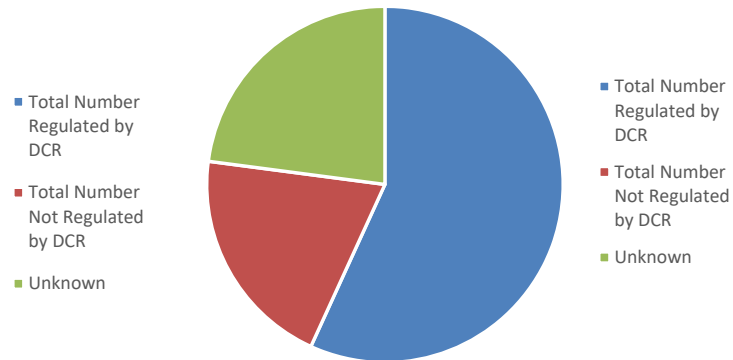
*Note: 565 increase in DCR regulated dams includes 512 from Unknown Category, previously known dams with new hazard classifications and dams newly regulated by DCR*

# Regulated Dams By Owner Type

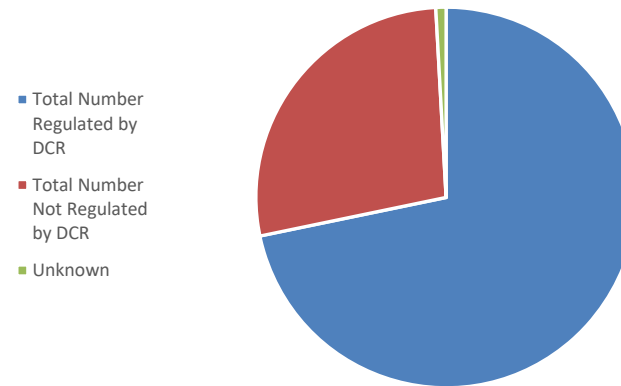
DCR Regulated Dams by Owner Type	<u>2020</u>	<u>2021</u>	<u>Change</u>
Private (incl. private utilities)	1072	1546	474
Local Government	190	197	7
State	76	77	1
S&W Conservation District	104	104	0
Public Utility	56	57	1
Unknown Owners	<u>558</u>	<u>640</u>	<u>82</u>
Total	2056	2621	565

# Dams Regulated by DCR

2020 Dams



2021 Dams







## § 15.2-2223. Comprehensive plan to be prepared and adopted; scope and purpose.

- In accordance with Title 15.2. Counties, Cities and Towns, Subtitle II. Powers of Local Government, Chapter 22. Planning, Subdivision of Land and Zoning, Article 3. The Comprehensive Plan
- A. The local planning commission shall prepare and recommend a comprehensive plan for the physical development of the territory within its jurisdiction and every governing body shall adopt a comprehensive plan for the territory under its jurisdiction. Code of Virginia

## § 15.2-2224. Surveys and studies to be made in preparation of plan; implementation of plan.

- In accordance with Title 15.2. Counties, Cities and Towns, Subtitle II. Powers of Local Government, Chapter 22. Planning, Subdivision of Land and Zoning, Article 3. The Comprehensive Plan
- Such comprehensive plans include amongst other items: existing public facilities, drainage, flood control and flood damage prevention measures, dam break inundation zones and potential impacts to downstream properties to the extent that information concerning such information exists and is available to the local planning authority

## § 15.2-2224. continued

2.B. The comprehensive plan shall recommend methods of implementation and shall include a current map of the area covered by the comprehensive plan. Unless otherwise required by this chapter, the methods of implementation may include but need not be limited to:

- 1. An official map;
- 2. A capital improvements program;
- 3. A subdivision ordinance;
- 4. A zoning ordinance and zoning district maps;
- 5. A mineral resource map;
- 6. A recreation and sports resource map; and
- 7. A map of dam break inundation zones.



## Localities can work with DCR to Inventory and better manages risks associated with dams

- Dambreaks are a key flood risk. By identifying flood risks associated with dambreaks and proactively working with DCR to regulate such dams, communities can reduce flood losses, and promote community resilience. Localities can also undertake similar efforts for dams below the DCR regulatory threshold in their communities.

## § 10.1-606.3. Requirement for development in dam break inundation zones.

A. For any development proposed within the boundaries of a dam break inundation zone that has been mapped in accordance with § [10.1-606.2](#), the locality shall, as part of a preliminary plan review pursuant to § [15.2-2260](#), or as part of a plan review pursuant to § [15.2-2259](#) if no preliminary review has been conducted, (i) review the dam break inundation zone map on file with the locality for the affected impounding structure, (ii) notify the dam owner, and (iii) within 10 days forward a request to the Department of Conservation and Recreation to make a determination of the potential impacts of the proposed development on the spillway design flood standards required of the dam.

## Importance of Having a DBIZ Study in Locality Planning Office

- Although most localities permit a developer to proceed if a dam does not have a DBIZ Study – It could put the public at unnecessary risk.
- We have seen at least one locality cracking down on development in a zone with a dam without a DBIZ and working with DCR and developer to facilitate such a study before issuing a permit.
- Reviews by locality planners is essential. Many dams were analyzed using incremental analysis and just because a dam is high hazard does not guarantee a home won't be sited in a dangerous dambreak zone. If in doubt consult with DCR Dam Safety!

## § 10.1-606.3. Requirement for development in dam break inundation zones continued.

- If the Department determines that the plan of development would change the spillway design flood standards of the impounding structure, the locality shall not permit development as defined in § 15.2-2201 or redevelopment in the dam break inundation zone unless the developer or subdivider agrees to alter the plan of development so that it does not alter the spillway design flood standard required of the impounding structure or he contributes payment to the necessary upgrades to the affected impounding structure pursuant to § 15.2-2243.1.

## How is Dam Safety Guarded in Localities When Hazard Ratings Change?

- § 15.2-2243.1. Payment by developer or subdivider.
- A. If DCR determines that a plan of development proposed by a developer or subdivider is wholly or partially within a dambreak inundation zone and would change the spillway design flood standards of an impounding structure, a locality shall require, prior to its final approval of a subdivision or development, that a developer or subdivider of land submit an engineering study. The study shall provide a contract-ready cost estimate for conducting the upgrades. DCR shall verify that the study conforms to the Board's standards.

## **§ 15.2-2243.1. Payment by Developer or Subdivider**

- B. Following the completion of the engineering studies in accordance with subsection A, and prior to any development within the dam break inundation zone, a locality shall require that a developer or subdivider of land pay 50 percent of the contract-ready costs for necessary upgrades to an impounding structure attributable to the development or subdivision,





# How We Manage Emergency Situations

- Emergency Action Plans (EAPs) & Emergency Preparedness Plans (EPPs)
  - EAPs: “...recognizes potential impounding structure emergency conditions and specifies preplanned actions to be followed to minimize loss of life and property damage...”
    - Maps of what is impacted (Inundation Maps)
    - Contact Information
    - Local Emergency Managers





# EAP Required Sections

- I. Certification
- II. Notification Chart
- III. Statement of Purpose
- IV. Project Description
- V. Emergency Detection, Evaluation and Classification
- VI. **General Responsibilities**
- VII. **Preparedness**
- VIII. **Inundation Maps**
- IX. Appendices

# EAP – General Responsibilities Section

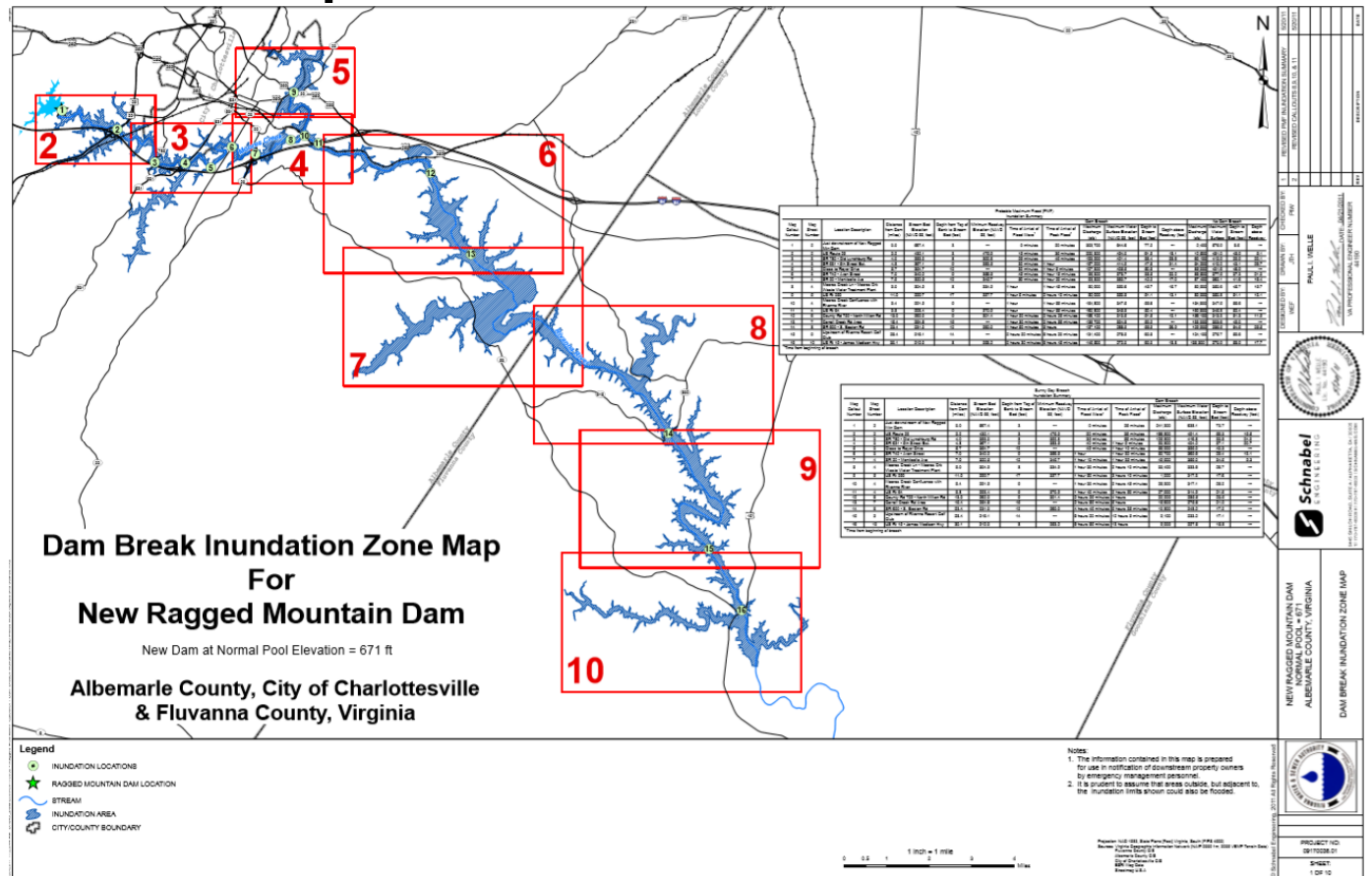
- Impounding Structure Owner Responsibility
- Responsibility for Notification
- Responsibility for Evacuation
- Responsibility for Termination and Follow-Up
- EAP Coordinator Responsibility

## EAP – Preparedness Section

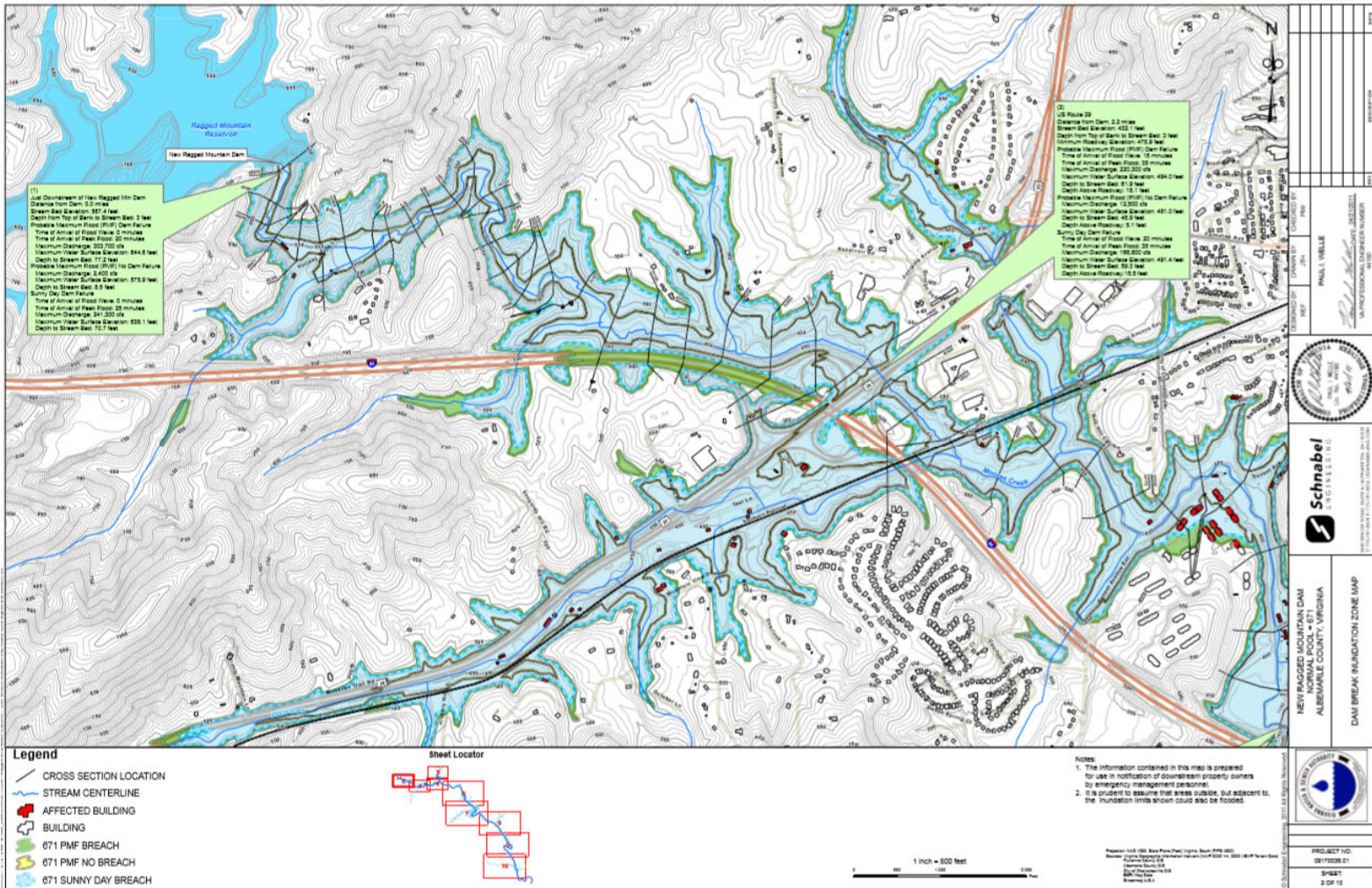
- A description of preparedness actions should be listed with associated possible failure situations.
  - Potential failure mechanisms and the associated signs and necessary actions  
i.e. Piping, overtopping, valve failure.

# EAP – Inundation Maps

Developed from Dam Break Inundation Zone (DBIZ) Studies







## EAPs

- EAP must be developed in coordination with state and local emergency management groups.
- It is the owner's responsibility to develop, maintain and, exercise, and implement the EAP.
- The EAP shall be submitted every 6 years or as is it is updated due to site specific changes.
  - Hazard Class reclassification
  - Ownership change
  - Personnel change
  - Downstream changes, including residents, development, roads, etc.

## EAPs (cont)

- Emergency actions plans are a critical component of community resilience
- DBIZ studies, dam inventories, flood studies and flood management plans are critical resources for mitigation, recovery and response



# Emergency Preparedness Plan (EPP)

- Developed for low hazard dams that provides maps and procedures for notifying downstream property owners that may be affected by an emergency situation

## Dam Safety Inventory System (DSIS)

- The DSIS application enables users to access information about all dams in Virginia that DCR tracks. Depending on the level of access granted, users may use DSIS to view, edit, download, upload and enter information related to the dams. Any member of the public may also apply for read-only access to information about individual dams and sets of dams.
- We encourage all local emergency management and planning officials are particularly encourage to subscribe to DSIS for localities in their particular area of interest.
- All regulatory submissions now required to be submitted through DSIS

Home > Dams > 003053

Dam Name: Ragged Mountain Dam  
 Dam Inventory Number: 003053  
 Legacy Number: 00053

Dam Region: 5  
 Hazard Classification: High  
 County: Albemarle

Owner Name: Rivanna Water and Sewer Authority  
 Regional Engineer: Justin Deel  
 Inundation Study Date:

Certificate Type: Regular Operation and Maintenance Certificate  
 Certificate Expiration Date: 09/30/2026  
 EP Expiration Date: 11/04/2025

Events

General

Regulated

Technical Basics

Technical Hydrology

Contacts

Map

Inundation / PMP Studies

Emergency Plans

Emergency Map

Inspections

Certificates

Permits

Grants

Attachments

This dam is located in a special flood hazard area. This may require a local floodplain permit. Contact your local floodplain administrator for more information. Click here for directory: [Floodplain Directory](#)

Add Event

Event Log

Event Type:  Start Date:  End Date:  Apply Filter Clear Filter

Note: Right click to view actions

Event Type	Event Date	Contact	Number of People	Description
RE Site Visit	05-19-2021		0	RE conducted site visit in review of Regular O&M Certificate Application. RE was joined by Victoria Fort, PE, of RWSA. Dam appeared well maintained and consistent with recent PE inspections. Site visit photos uploaded to certificate application attachments.

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Upcoming Expirations

Expiration Date	Type	Sub Type
09-2026	Certificate	Regular Operation and Maintenance Certificate
11-2025	Emergency Plan	EAP
07-2013	Permit	Construction Permit

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# Whole Community Level Planning

- Pursuant to the Code of Virginia §44-146.20, Virginia Communities County combined their efforts in planning and responding to emergencies and disasters through adoption of a combined Emergency Operations Plan.
- The plan is an accurate and appropriate reflection of how the locality will address natural and man-made disasters and events as they develop. The revised plan is based on current resources available at the local level.
- The plan has been formatted to conform to the recommendations of the Virginia Department of Emergency Management, the National Response Framework (NRF), the National Incident Management System (NIMS), and the Incident Command System (ICS).
- The EOP consists of a Basic Plan followed by the Emergency Support Functions (ESFs), and Support Annexes. Key annexes include dambreaks, hurricanes and other flooding

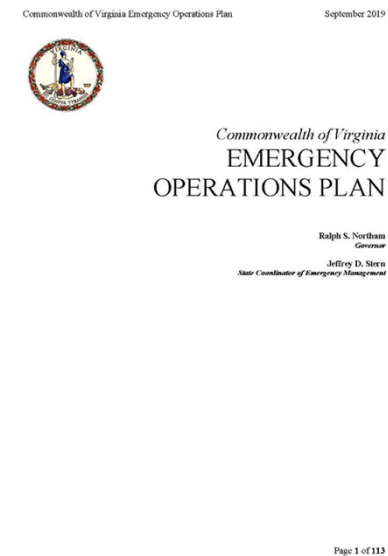
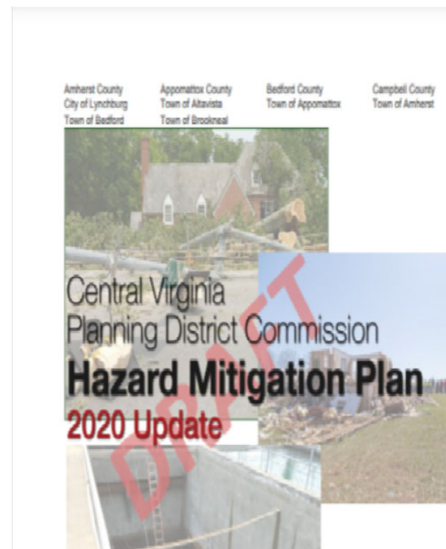
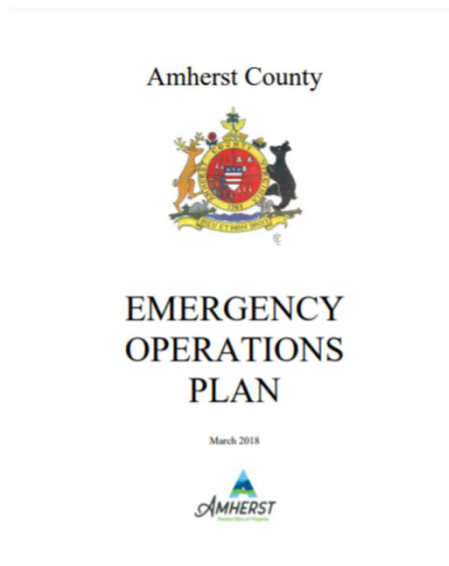


# Whole Community Level Planning Continued

Plans specific to floodplain management and flooding should include

- Potential measures, practices, and policies to reduce loss of life, injuries, damage to property and facilities, public expenditures, and other adverse impacts of flooding in the area protected by the project;
- Plans for flood fighting and evacuation; and
- Public education risk communication targeting communities in dam break inundation areas.

# Plans Should Tier up From Locality to Regional Planning District to State Level







# Emergency Alteration Permits

- 4VAC50-20-60. Required permits.
  - B. “...If an owner or the owner’s engineer has determined that circumstances are impacting the integrity of the impounding structure that could result in the imminent failure of the impounding structure, temporary repairs may be initiated prior to approval from the board...”







## 2021 Legislative Changes

- VIRGINIA ACTS OF ASSEMBLY -2021  
An Act to amend and reenact § [55.1-703](#) of the Code of Virginia, and is amended by adding a section numbered § 55.1-708.2 to the Code of Virginia relating to Real Estate Board Flood Risk Disclosure and Use of VFRIS

## Recent Legislation – Buyer Beware!

- 6. The owner makes no representations with respect to whether the property is within a dam break inundation zone. Such disclosure statement shall advise purchasers to exercise whatever due diligence they deem necessary with respect to whether the property resides within a dam break inundation zone, including a review of any map adopted by the locality depicting dam break inundation zones;

## Recent Legislation – Buyer Beware!

- 9. The owner makes no representations with respect to whether the property is located in one or more special flood hazard areas, and purchasers are advised to exercise whatever due diligence they deem necessary, including (i) obtaining a flood certification or mortgage lender determination of whether the property is located in one or more special flood hazard areas, (ii) reviewing any map depicting special flood hazard areas, (iii) contacting the Federal Emergency Management Agency (FEMA) or visiting the website for FEMA's National Flood Insurance Program or for the Virginia Flood Risk Information website operated by the Virginia Department of Conservation and Recreation.



## Recent Legislation – Buyer Beware!

- (iv) determining whether flood insurance is required, in accordance with terms and conditions as may be contained in the real estate purchase contract, but in any event prior to settlement pursuant to such contract. *A flood risk information form, pursuant to the provisions of subsection D, that provides additional information on flood risk and flood insurance is available for download by the Real Estate Board on its website the Virginia Flood Risk Information website operated on its website;*

## Legislation – Repetitive Loss

- **§ 55.1-708.2. Required disclosures pertaining to repetitive loss.**
- *The owner of residential real property located in the Commonwealth who has actual knowledge that the dwelling unit is a repetitive risk loss structure shall disclose such fact to the purchaser. For purposes of this section, "repetitive risk loss" means that two or more claims of more than \$1,000 were paid by the National Flood Insurance Program within any rolling 10-year period, since 1978. Such disclosure shall be provided to the purchaser on a form provided by the Real Estate Board on its website.*
- **2. That the provisions of this act shall become effective on January 1, 2022.**

## § 10.1-613.6. Negotiated Settlement Agreements

- With the consent of any owner of an impounding structure who has allegedly violated or failed, neglected, or refused to obey any regulation or order of the Board, any condition of a permit, or any provision of this chapter, the Board may enter into a negotiated settlement agreement with such owner, so long as the impounding structure or dam is not subject to the provisions of § 10.1-609 (unsafe dams – non imminent danger), to correct deficiencies at the structure according to the schedule of implementation appended to the negotiated settlement agreement and for the payment of civil charges for past alleged violations in specific sums not to exceed the limit specified in § 10.1-613.2.

## § 10.1-613.6. Negotiated settlement agreements. (cont.)

- Such civil charges shall be suspended upon compliance with the terms and conditions of the negotiated settlement agreement as determined by the Director. Such civil charges shall be instead of any appropriate civil penalty that could be imposed under § 10.1-613.2 and shall be paid into the Dam Safety, Flood Prevention and Protection Assistance Fund established by Article 1.2 (§ 10.1-603.16 et seq.).





## High Hazard Potential Dams (HHPD)

- The objectives of the program are to: 1. Reduce or eliminate risk of dams of highest consequence. 2. Increased understanding and management of risks posed by eligible dams.
- **Priorities** For FY2021, the HHPD priorities are: the technical, planning, design, pre-construction activities related to the repair, removal, or rehabilitation of eligible high hazard dams.
- The HHPD supports FEMA Strategic Goal 1: Build a Culture of Preparedness and Presidential Policy Directive 8: Build and Sustain National Preparedness. Specifically, the HHPD supports Objective 1.1 of Strategic Goal 1 to incentivize investments that reduce risk, including pre-disaster mitigation, and reduce disaster costs at all levels.



## HHPD Continued

- **Subrecipient Eligibility Criteria** Eligible subrecipients under FY2021 HHPD are non-federal governmental organizations (other than the designated Recipient) and nonprofit organizations. Under FY 2021 HHPD, eligible subrecipients apply for and receive subawards directly from the State.
- Local governments with inventories that include high hazard dams in poor or unsatisfactory condition could use this grant to bring all deficient high hazard dams into compliance by working with DCR and the dam owners.

## HHPD Continued

- **Subrecipient Eligibility Criteria** . Have in place (by the application deadline and at the time of obligation of grant funds) a FEMA-approved state hazard mitigation plan that includes all dam risks and complies with the Disaster Mitigation Act of 2000 (Public Law 106–390; 114 Stat. 1552).
- Have in place at the time of obligation of grant funds a FEMA-approved (local) hazard mitigation plan that includes all dam risks and complies with the Disaster Mitigation Act of 2000 (Public Law 106–390; 114 Stat. 1552).



## Dam Safety and Floodplain Management Grants

- Dam Safety, Flood Prevention and Protection Assistance Fund state grants help dam owners and Virginia localities enhance public safety and reduce the risk of dam failures and property damage from flooding. The fund was established to provide grants to public and private dam owners whose dams are under state regulation. Grants are available also to help local governments improve methods for flood prevention and protection. All grants are reimbursements and require a 50 percent match.

# The Virginia Community Flood Preparedness Fund

- The Virginia Community Flood Preparedness Fund (CFPF) was established in the Code of Virginia pursuant to Chapter 13, Title 10.1, Article 4, Section 10.1-603.24 and Section 10.1-603-25 and the provisions of § 10.1-1330. Clean Energy and Community Flood Preparedness Fund, which was passed during the 2020 session of the General Assembly. Money in the fund comes from the auction of carbon allowances through the Regional Greenhouse Gas Initiative (RGGI).



# The Virginia Community Flood Preparedness Fund

- The fund was established to provide support for regions and localities across Virginia to reduce the impacts of flooding, including flooding driven by climate change. The fund will prioritize projects that are in concert with local, state and federal floodplain management standards, local resilience plans and the Virginia Coastal Resilience Master Plan. The fund will empower communities to complete vulnerability assessments, and develop and implement action-oriented approaches to bolster flood preparedness and resilience.



## How We Train Localities & Dam Owners

- In 2019, DCR conducted statewide training to orient stakeholders to the *Dam Safety and Floodplain Management Grants Program and the Dam Safety Inventory System*.
- COVID 19 led DCR to move to a virtual approach to training and technical assistance.
- Almost every year DCR DSFM presents at VLWA Conference in March.
- DCR has developed guidance documents on a variety of topics and are present on our website <https://www.dcr.virginia.gov/dam-safety-and-floodplains/>

# How is DCR Promoting Dam Safety on the Web?

- DCR launched an education page and “Message to Dam Owners” segment on the webpage.
- Know Your Risk (Citizen’s guide to risk at dams)
- Know Your Role and the Role of Dam Owners
- Recreating Near Dams
- Dams 101 - This video focuses on the types of dams and how they work.

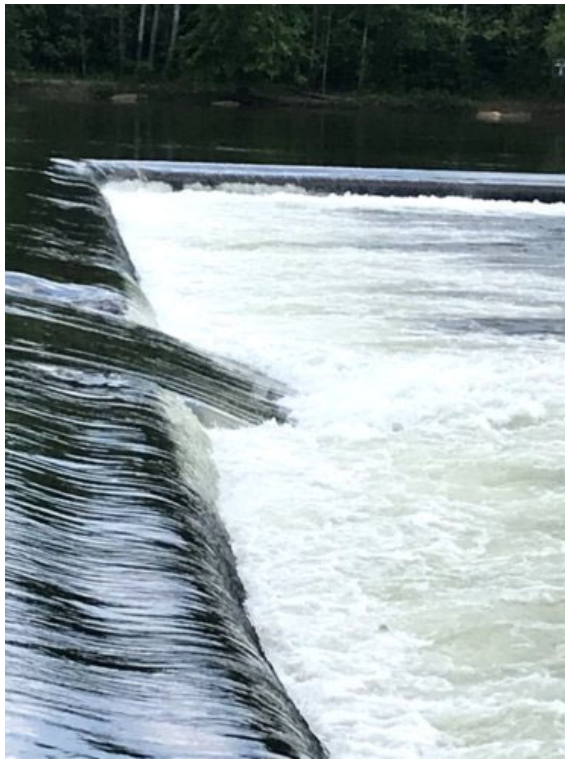
## How is DCR Promoting Dam Safety?

- National Dam Safety Awareness Day is observed on May 31 each year and was created to encourage individual and community responsibility for dam safety, as well as to provide information on what steps can be taken to prevent catastrophic dam failures. A secondary goal is to promote the benefits dams offer to communities.
- The day commemorates the failure of the South Fork Dam in Johnstown, Pennsylvania in 1889, which killed more than 2,200 people. It is the worst dam-related disaster to date in the United States.
- Governor Ralph Northam working with DCR routinely proclaims May 31<sup>st</sup> as Dam Safety Awareness Day in Virginia, encouraging individuals and communities to realize the flood risk associated with dam failures and to take actions that increase safety.
- Communities are encourage to participate in this effort



- Flooding is the most common and costly natural disaster, but only 3% of Virginians have flood insurance. It is estimated that 1 inch of water in a home can cause upwards of \$25,000 in damages.
- Virginia Flood Awareness Week encourages Virginians to learn about their flood risk and protect the life they've built with flood insurance.

# Building Consciousness about Low Head Dams



- Many more fatalities
- Drowning machines
- Often encountered by boaters and swimmers
- Promote awareness entering recreation season



# How is DCR Positioning Itself for Future Success?

- Currently adding staff (Lead Engineer, DSIS Support and Lead Dam Safety Data Management & Mapping Technician).
- Planning for future staff as the number of Certificates rise in order to maintain 200 or few dams per Regional Engineer.
- Planning Assistance to the States from the Corps (50% match) to add DBIZ and EAPs in specific localities.
- Participating in FEMA's Rehabilitation Of High Hazard Potential Dam (HHPD) Grant Program (35% match by dam owner).
- Seeking additional funding opportunities to repair and rehabilitate dams, especially high hazard

# How is DCR Positioning Itself for Future Success?

- Identifying where the dam safety act and regulations could be clarified.
- Updating the Strategic Plan for Dam Safety and Floodplain Management.
- Recently passed regulations to require all dam safety submittals be provided in DSIS and the ability of the Department to enter into negotiated settlement agreements.
- Continue to educate planning officials about hazard creep and cost sharing to enhance spillway design floods as dams change hazard ratings.
- Ongoing upgrades to Virginia Dam Safety Inventory System (DSIS)



## For Further Information

- Justin Deel, PE, Regional Engineer, [Justin.Deel@DCR.Virginia.Gov](mailto:Justin.Deel@DCR.Virginia.Gov)
- Mark Killgore, PE, Regional Engineer, [Mark.Killgore@DCR.Virginia.Gov](mailto:Mark.Killgore@DCR.Virginia.Gov)
- General Information, 804-371-6095, [dam@dcr.virginia.gov](mailto:dam@dcr.virginia.gov)