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**COMMONWEALTH of VIRGINIA**  
DEPARTMENT OF CONSERVATION AND RECREATION

October 31, 2016

The Honorable Terence R. McAuliffe  
Governor of the Commonwealth of Virginia  
1111 East Broad Street  
Richmond, VA 23219

The Honorable Emmett W. Hanger, Jr.  
Co-Chairman, Senate Finance Committee  
P.O. Box 2  
Mount Solon, VA 23843-0002

The Honorable Thomas K. Norment, Jr.  
Co-Chairman, Senate Finance Committee  
P.O. Box 6205  
Williamsburg, VA 23188

The Honorable S. Chris Jones  
Chairman, House Appropriations Committee  
P.O. Box 5059  
Suffolk, VA 23435-0059

**SUBJECT:** Department of Conservation and Recreation's 2016 Interim Report on the Rehabilitation of High Hazard Soil and Water Conservation District Impounding Structures (Dams)

Dear Governor McAuliffe, Senator Hanger, Senator Norment, and Delegate Jones:

The Department of Conservation and Recreation's (Department) District Dam Rehabilitation Committee (Committee) comprised of members of the Department, the Soil and Water Conservation Districts (District), and the Natural Resources Conservation Service, respectfully submits this interim report regarding the development of a Plan for Rehabilitation of District Owned Dams (Rehabilitation Report). This interim report is being submitted to satisfy the requirements of Item 364 L. of Chapter 780 of the 2016 Virginia Acts of Assembly:

L. The Department of Conservation and Recreation, in collaboration with Soil and Water Conservation Districts, shall develop a plan containing cost estimates, for the rehabilitation of high hazard Soil and Water Conservation District owned and managed impounding structures. An interim plan shall be provided to the Governor and the Chairmen of the House Appropriations and Senate Finance Committees by November 1, 2016, with a final plan due by November 1, 2017.

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*State Parks • Soil and Water Conservation • Outdoor Recreation Planning  
Natural Heritage • Dam Safety and Floodplain Management • Land Conservation*

The Honorable Terence R. McAuliffe  
The Honorable Emmett W. Hanger, Jr.  
The Honorable Thomas K. Norment, Jr.  
The Honorable S. Chris Jones  
October 31, 2016  
Page 2

Within this interim report, the Committee has defined the actions and resources needed to complete the Rehabilitation Report by November 1, 2017. Cost estimates and dam rehabilitation prioritization will be included in the final Rehabilitation Report based on preliminary engineering analyses.

### Overview

The Committee plans to research and develop a final Rehabilitation Report for submission by November 1, 2017 that addresses the rehabilitation of District High Hazard dams. This final report will identify which dams are High Hazard, determine which have a deficiency that requires rehabilitation, prioritize those dams, provide cost estimate information for the rehabilitation of those selected dams, identify staffing levels needed to complete the rehabilitation work, and outline the role and potential costs of contract engineering firms in the rehabilitation process.

It is important to note, that the final Rehabilitation Report will include a phased rehabilitation plan. Multiple projects may be in various phases (e.g. preliminary engineering, design, or construction) concurrently, and staffing levels must be commensurate with funding levels provided. The final report will include a staffing chart that shows what level of staffing and other engineering service support is needed based on the number of projects active at the various stages. It would be envisioned that any funding provided for dam rehabilitation would also include sufficient funding to support the necessary engineering support services which includes engineering staff, contract and construction management, and administrative support.

### Staffing to Complete the Final Rehabilitation Report

In order to complete the tasks required to create the final Rehabilitation Report, as detailed below, the Department must hire two Professional Engineers. The salaries for these restricted engineering positions (for a minimum of two years) are planned to be paid for out of a remaining portion of the bond funds that were awarded to the Department in 2008 (Item C-107 of Chapter 879 of the 2008 Virginia Acts of Assembly) to perform engineering and rehabilitation of Department and District owned or maintained dams and from funds available in the Dam Safety, Flood Prevention, and Protection Assistance Fund in accordance with § 10.1-603.19 D. of the *Code of Virginia*. The Department has received approval from the Secretary of Natural Resources to hire the bond funded position, and is currently working with our Design and Construction Section to complete the necessary documents for the Department of Planning and Budget (DPB) to authorize the use of the funds. A July 15, 2008 letter received from then DPB Director Richard D. Brown, with the concurrence of the Department of Treasury, found it an acceptable use of bond funds to support a project engineer position associated with the expenditure of those bond funds given the highly technical nature of dam repair projects.

Once the staff resources are in place, there are five distinct analyses needed to complete the final Rehabilitation Report.

The Honorable Terence R. McAuliffe  
The Honorable Emmett W. Hanger, Jr.  
The Honorable Thomas K. Norment, Jr.  
The Honorable S. Chris Jones  
October 31, 2016  
Page 3

### Task 1 - Fully Evaluate the 2016 Probable Maximum Precipitation (PMP) Values

The Department's Division of Dam Safety and Floodplain Management recently completed a major precipitation study to develop more accurate and current PMP values for the entire State of Virginia. These new values became effective March 2016. For a very large percentage of the State, the refined PMP values are lower than the ones previously used which may mean that some dams may no longer require rehabilitation and for others, rehabilitation costs may be reduced.

A preliminary analysis to determine if the PMP depth (rainfall, in inches) has increased or decreased has already been performed for the District dams by the Department. Where the preliminary analysis has shown a decline in PMP values, this reduction could result in High Hazard dams currently on the list being removed, following additional analysis, due to a finding of adequate spillway capacity for the revised rainfall amounts. The reason for this is because the flow to the dam (rainfall runoff) should be reduced, therefore reducing the amount of flow the spillway is required to pass. However, further detailed analysis is needed to confirm any changes in spillway design. Accordingly, additional analysis would entail using a computer program to model the rainfall and determine the revised runoff, or Probable Maximum Flood (PMF) in cubic feet per second, from the watershed to the dam. This runoff is routed, or modeled, through the dam and outlet structures to determine the adequacy of the spillway and the appropriate spillway design flow.

While ultimately, this analysis will need to be performed for each of the dams included in the Rehabilitation Report to determine required rehabilitation actions (i.e. how much wider the spillway needs to be, how much the dam needs to be raised, etc.), this will not need to be done for each dam for the purposes of creating the Final Rehabilitation Report and prioritization. Dams will be selected for this analysis based on engineering judgement. Selection of dams for this task will be based on how much the PMP values have decreased compared to how much more flow previous Dam Break Inundation Zone Studies identified.

### Task 2 - Perform ACER-11 Analysis

ACER-11 is a Hazard Classification process document developed by the Bureau of Reclamation. This process considers the incremental effects of the dam break while performing the Hazard Classification analysis. This was not used for the Dam Break Inundation Zone Studies previously completed for the District dams; however, further Hazard Classification analysis utilizing this method may benefit selected dams as there may be the potential for lowering their Hazard Classification and subsequent Spillway Design Flood (SDF). As with dams that are selected for a full PMF model analysis, dams will be selected for this analysis based on engineering judgement.

### Task 3 - Perform Incremental Damage Analysis (IDA) for Spillway Reduction

IDA is an analysis, permitted by the Impounding Structure Regulations that may be used to lower the required SDF. While the process is very similar to ACER-11, ACER-11 is a Hazard Classification process and an IDA is strictly intended to lower the SDF per Table 1 of the Regulations.

The Honorable Terence R. McAuliffe  
The Honorable Emmett W. Hanger, Jr.  
The Honorable Thomas K. Norment, Jr.  
The Honorable S. Chris Jones  
October 31, 2016  
Page 4

Since the modeling process is similar, IDA may be performed concurrently with ACER-11 and will likely apply to the same subset of dams.

#### Task 4 - Dam Prioritization

Following the process set forth in the *Priority Ranking System for Rehabilitation of Aging Watershed Dams*, developed by the USDA-Natural Resources Conservation Service, we will create for the Rehabilitation Report a prioritization of the High Hazard Dams remaining on the list. Such prioritization does consider the risk to people and structures downstream as well as other important factors.

#### Task 5 - Preliminary Engineering

As a final step, the Department will perform preliminary engineering on a selected number of the top priority dams identified in Task 4. This will require the use of Geotechnical and/or Survey contracts with private firms. Cost estimates will then be developed using the preliminary design and associated data from the preliminary engineering reports. This will allow the Committee to develop more accurate cost estimates for the long-term rehabilitation of District owned dams.

The District Dam Rehabilitation Committee is pleased to share with you this interim report regarding the development of a Plan for Rehabilitation of District Owned Dams and we look forward to submitting the final Rehabilitation Report for your consideration.

Respectfully submitted,



Clyde E. Cristman, Director

cc: David C. Dowling, Deputy Director, Department of Conservation and Recreation  
Toni Walker, Associate Director, Department of Planning and Budget  
Anne E. Oman, Legislative Fiscal Analyst, House Appropriations Committee  
Jason Powell, Legislative Analyst, Senate Finance Committee