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COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

October 25, 2017

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: 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 (NRCS), respectfully submits this interim progress report regarding the development of a Plan for Rehabilitation of District-owned High Hazard Dams (Rehabilitation Report). This progress report is being offered to satisfy the requirements of Item 364 L. of Chapter 836 of the 2017 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

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

Appropriations and Senate Finance Committees by November 1, 2016, with a final plan due by November 1, 2017.

In order for the Committee to provide a viable final report, extensive work is still needed to build upon the significant efforts that have been put forth on this project. As a result of this determination, the Department has requested a budget amendment to reflect a final report date requirement of November 1, 2018.

This additional interim report provides an overview of the progress made since the November 1, 2016 interim report and addresses the actions and resources necessary to produce a final report by November 1, 2018. The final report will include prioritization, cost estimates, and a plan of action to complete rehabilitation of District-owned High Hazard dams.

Overview

Staff initially reviewed all 66 High Hazard dams owned by the Districts. Dams with adequate spillway capacity, or dams that have been or are in the process of being rehabilitated by NCRS, were eliminated from any further consideration. This review resulted in a final list of 43 dams for additional study. Please see Appendix A for a complete list of the 43 dams.

Once the list of 43 dams was developed, staff initiated analyses to complete Tasks 1 through 4 as described in the November 2016 Interim Report. Details on the progress of these tasks are provided below.

Staffing

The Department hired a Professional Engineer (PE) in August 2017 to oversee the analysis of the conditions of the District-owned dams. A Rehab Engineering Technician was also hired in October 2017 to assist the PE in completing the report and to specifically perform hydrologic and hydraulic modeling and analyses. Please note that further staffing may be required to adequately manage rehabilitation projects in the future once analyses are complete and potential funding is secured to begin rehabilitation.

Progress on Tasks

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

A preliminary analysis of the new PMP values was completed for each of the 43 High Hazard dams to determine if the new PMP values would benefit any of the dams on the rehabilitation list. This analysis involved checking the new PMP depths to see if the values increased or decreased since inundation studies were originally completed using the PMP depths derived from HMR51/52 (a National Weather Service publication).

The new PMP values may reflect a lower PMP depth resulting in less runoff to the dam, potentially effecting the spillway capacity (i.e. a spillway deemed inadequate may have the capacity to pass the

required storm event with the reduction in PMP). Additionally, these dams may benefit from a narrower inundation zone (i.e. less runoff to the dam equates to less water downstream of the lake in event of a breach under storm loading conditions), which could result in less impacts downstream. Accordingly, this analysis could potentially change the hazard classification of the dam from High Hazard to a lower hazard classification such as Significant Hazard, thereby reducing the spillway capacity requirement. The preliminary analysis identified the following nine dams for further study (Table 1):

Table 1: PMP Analyses that Require Additional Review

Dam ID #	County	Dam Name	SWCD
067002	Franklin	Upper Blackwater #4	Blue Ridge
045003	Craig	Johns Creek #3	Mountain Castle
089007	Henry	Leatherwood Creek #6	Blue Ridge
029002	Buckingham	Willis River #1A	Peter Francisco
089009	Henry	Horse Pasture Creek #2	Blue Ridge
165011	Rockingham	Shoemaker River #3B	Shenandoah
165010	Rockingham	Shoemaker River #4C	Shenandoah
089012	Henry	Horse Pasture Creek #1C	Blue Ridge
037013	Charlotte	Roanoke Creek #54	Southside

Tasks 2 and 3: Perform ACER-11 Analysis and Incremental Damage Analysis (IDA) for Spillway Reduction

Eleven dams are identified as having the potential to benefit from further incremental damage analysis to hazard classification using ACER-11 or IDA for a reduction in required spillway capacity. As described in the November 2016 Interim Report, these two analyses are similar and therefore are performed concurrently. This analysis is currently in progress. The 11 dams are listed in the following table:

Table 2: Dams that May Benefit from ACER-11 Analysis and Incremental Damage Analysis (IDA) for Spillway Reduction

Dam ID #	County	Dam Name	SWCD
029002*	Buckingham	Willis River #1B	Peter Francisco
113002	Madison	Beautiful Run #2A	Culpeper
029004	Buckingham	Willis River #4	Peter Francisco
147041	Prince Edward	Bush River #4B	Piedmont
089006	Henry	Leatherwood Creek #4	Blue Ridge
029001	Buckingham	Willis River #1A	Peter Francisco
089012*	Henry	Horse Pasture Creek #1C	Blue Ridge
037013*	Charlotte	Roanoke Creek #54	Southside
037009	Charlotte	Roanoke Creek #67	Southside
029003	Buckingham	Willis River #3	Peter Francisco
029019	Buckingham	Willis River #2	Peter Francisco
147036	Prince Edward	Bush River #7	Piedmont

* Dams duplicated from Table 1 should the PMP analysis not justify removal from list.

Three dams are in the process of undergoing new inundation studies based on new PMP values and updated modeling criteria. The new studies are expected by July of 2018 and will be included in our classification studies, spillway analysis, and ranking of the other dams. Please see Table 3 below for a list of these dams.

Table 3: Dams Requiring New Inundation Studies

Dam ID #	County	Dam Name	SWCD
015014	Augusta	South River #19	Headwaters
015022	Augusta	South River #7	Headwaters
015009	Augusta	South River #6	Headwaters

As previously noted, 43 dams on the list of District-owned High Hazard dams were identified as needing rehabilitation. Of these, 21 dams qualified for analysis to determine if the dam may benefit from the new PMP values (Table 1) or ACER-11 or IDA analyses (Table 2) and therefore, potentially be removed from the rehabilitation list. Table 4 below is a list of the remaining 22 dams.

Table 4: Remaining Dams for Continuing Analysis

Dam ID #	County	Dam Name	SWCD
165007	Rockingham	Lower North River #82	Shenandoah
165001	Rockingham	Lower North River #80	Shenandoah
165003	Rockingham	Lower North River #83	Shenandoah
165002	Rockingham	Lower North River #78	Shenandoah
089002	Henry	Leatherwood Creek #5	Blue Ridge
089004	Henry	Leatherwood Creek #3	Blue Ridge
089005	Henry	Leatherwood Creek #2A	Blue Ridge
045001	Craig	Johns Creek #2	Mountain Castle
045004	Craig	Johns Creek #4	Mountain Castle
067001	Franklin	Upper Blackwater #6	Blue Ridge
147003	Prince Edward	Buffalo Creek #4	Piedmont
037010	Charlotte	Roanoke Creek #4A	Southside
029035	Buckingham	Slate River #8	Peter Francisco
029008	Buckingham	Willis River #6A	Peter Francisco
037005	Charlotte	Roanoke Creek #5B	Southside
029005	Buckingham	Willis River #5E	Peter Francisco
037006	Charlotte	Roanoke Creek #6A	Southside
029007	Buckingham	Willis River #6	Peter Francisco
029012	Buckingham	Muddy Creek #2	Peter Francisco
029006	Buckingham	Willis River #5F	Peter Francisco
029011	Buckingham	Muddy Creek #1	Peter Francisco
029010	Buckingham	Willis River #9	Peter Francisco

Task 4: Dam Prioritization

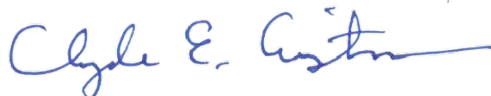
Staff are currently populating the fields required to complete the *Priority Ranking System for Rehabilitation of Aging Watershed Dams*, developed by the USDA-Natural Resources Conservation Service. Staff will be able to complete this analysis for each of the dams remaining on the list once Tasks 2 and 3 are completed.

Task 5: Preliminary Engineering

As a final step, the Department will perform preliminary engineering on a select number of top priority dams identified in Task 4. This requires the use of Geotechnical and/or Survey contracts with private firms. Cost estimates will be developed using the preliminary design and associated data from the preliminary engineering reports. This will allow the Committee to develop accurate cost estimates for the long-term rehabilitation of District-owned dams. No action has been taken on this task to date, as the above tasks need to be completed prior to creating an accurate prioritization list.

The District Dam Rehabilitation Committee is pleased to share this interim report regarding the progress made towards the development of a Plan for Rehabilitation of District-Owned Dams. We look forward to submitting the final report next year for your consideration.

Respectfully submitted,



Clyde E. Cristman

cc: Darryl Glover, Acting Deputy Director, Department of Conservation and Recreation
Toni Walker, Associate Director, Department of Planning and Budget
Samantha Martin, Budget and Policy Analyst, Department of Planning and Budget
Anne E. Oman, Legislative Fiscal Analyst, House Appropriations Committee
Jason Powell, Legislative Analyst, Senate Finance Committee

Appendix A

DAM ID #	County	Dam Name	District	Year Built	Roads Overtopped	# of Dwellings Impacted
015009	Augusta	South River #6	Headwaters	1959	New inundation study under development	
015014	Augusta	South River #19	Headwaters	1975	New inundation study under development	
015022	Augusta	South River #7	Headwaters	1957	New inundation study under development	
029001	Buckingham	Willis River #1A	Peter Francisco	1975	8	1
029002	Buckingham	Willis River #1B	Peter Francisco	1975	6	1
029003	Buckingham	Willis River #3	Peter Francisco	1974	3	1
029004	Buckingham	Willis River #4	Peter Francisco	1973	2	1
029005	Buckingham	Willis River #5E	Peter Francisco	1973	4	2
029006	Buckingham	Willis River #5F	Peter Francisco	1973	2	2
029007	Buckingham	Willis River #6	Peter Francisco	1972	4	2
029008	Buckingham	Willis River #6A	Peter Francisco	1973	5	3
029010	Buckingham	Willis River #9	Peter Francisco	1969	1	0
029011	Buckingham	Muddy Creek #1	Peter Francisco	1961	3	0
029012	Buckingham	Muddy Creek #2	Peter Francisco	1961	5	0
029019	Buckingham	Willis River #2	Peter Francisco	1975	4	1
029035	Buckingham	Slate River #8	Peter Francisco	1984	4	1
037005	Charlotte	Roanoke Creek #5B	Southside	1962	7	1
037006	Charlotte	Roanoke Creek #6A	Southside	1962	7	0
037009	Charlotte	Roanoke Creek #67	Southside	1960	3	0
037010	Charlotte	Roanoke Creek #4A	Southside	1962	7	1
037013	Charlotte	Roanoke Creek #54	Southside	1968	4	0

DAM ID #	County	Dam Name	District	Year Built	Roads Overtopped	# of Dwellings Impacted
045001	Craig	John's Creek #2	Mountain Castle	1968	5	31
045003	Craig	John's Creek #3	Mountain Castle	1967	4	25
045004	Craig	John's Creek #4	Mountain Castle	1966	5	32
067002	Franklin	Upper Blackwater River #4	Blue Ridge	1974	8	5
067001	Franklin	Upper Blackwater River #6	Blue Ridge	1972	9	14
089002	Henry	Leatherwood Creek #5	Blue Ridge	1963	12	100+
089004	Henry	Leatherwood Creek #3	Blue Ridge	1964	11	28
089005	Henry	Leatherwood Creek #2A	Blue Ridge	1964	10	28
089006	Henry	Leatherwood Creek #4	Blue Ridge	1964	5	1
089007	Henry	Leatherwood Creek #6	Blue Ridge	1964	5	3
089009	Henry	Horse Pasture Creek #2	Blue Ridge	1972	5	1
089012	Henry	Horse Pasture Creek #1C	Blue Ridge	1973	4	1
113002	Madison	Beautiful Run #2A	Culpeper	1964	4	2
147003	Prince Edward	Buffalo Creek #4	Piedmont	1967	8	28
147036	Prince Edward	Bush River #7	Piedmont	1990	8	0
147041	Prince Edward	Bush River #4B	Piedmont	2001	7	5
165001	Rockingham	Lower North River #80	Shenandoah	1967	12	200+
165002	Rockingham	Lower North River #78	Shenandoah	1980	7	100+
165003	Rockingham	Lower North River #83	Shenandoah	1986	9	200+
165007	Rockingham	Lower North River #82	Shenandoah	1980	16	1000+
165010	Rockingham	Shoemaker River #4C	Shenandoah	1984	8	85
165011	Rockingham	Shoemaker River #3B	Shenandoah	1986	7	67