

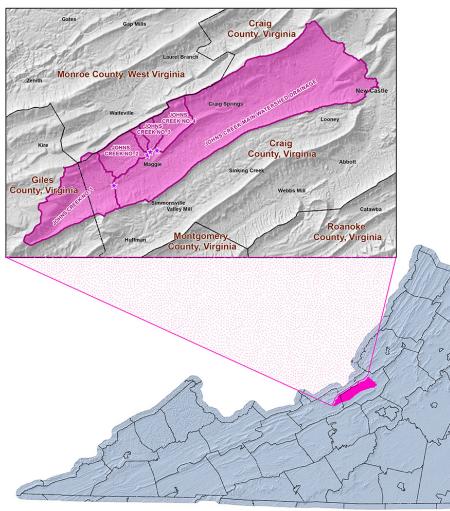
The Watershed Short Story:

The Soil Conservation Service (SCS), now the Natural Resources Conservation Service (NRCS), wrote the original Johns Creek Watershed Work Plan with Craig County and the Natural Bridge Soil and Water Conservation District in 1962. These entities are collectively known as project sponsors.

The four dams built in the watershed control about 30 percent of the drainage area above the town of New Castle. The first two were completed in 1966 and remaining two in 1967. All of the dams were built for the single purpose of flood control. Now known as the Mountain Castles SWCD, the district is responsible for the Operation and Maintenance (O&M) of the four dams.

When Johns Creek Dam 1 was built, McDaniel's Lake was considered to be a significant hazard structure with the potential for infrastructure damage downstream. Due to construction in the downstream watershed, the State Division of Dam Safety changed it to high hazard.

The dam's auxiliary spillway only has 38 percent of the needed capacity for a high hazard dam and needs to be rehabilitated to increase its size.



March 2019

Dam Rehabilitation Fact Sheet

Johns Creek 1, McDaniel's Lake, Craig County, Virginia



McDaniel's Lake, looking across the dam at the pool and riser. The lake can store about 210 acre-feet of sediment and 2,571 acre-feet of floodwater.

Description of Problem: NRCS identified three problems with the dam: the vegetated earth auxiliary spillway does not have the capacity, integrity or stability to pass the water volume required by Virginia dam safety regulations; the footer of the riser does not meet current seismic criteria; and the toe drains are corroded.

Sponsors: Craig County Board of Supervisors and the Mountain Castles Soil and Water Conservation District

Funding: USDA NRCS will pay 100 percent of planning and design costs, 65 percent of the total project costs, and up to 100 percent of the construction costs. The sponsors will be responsible for 35 percent of the total project costs estimated to be \$9,904,000. This figure includes an estimated \$9.1 million for construction.

Dam Rehabilitation Schedule: The McDaniel's Lake Dam Rehabilitation Plan will be finished in August 2019. The NRCS Chief must authorize the plan for the process to continue into design and construction. Once design and construction are concluded, the dam's flood protection benefits will continue for the next 50 years.

Site information:

- Drainage Area of lake: 12,209 acres
- Dam Height: 58.9 feet
- Dam Length: 1,478 feet
- Surface Area at Normal Pool: 29.9 acres / Surface Area at Flood Pool: 131 acres



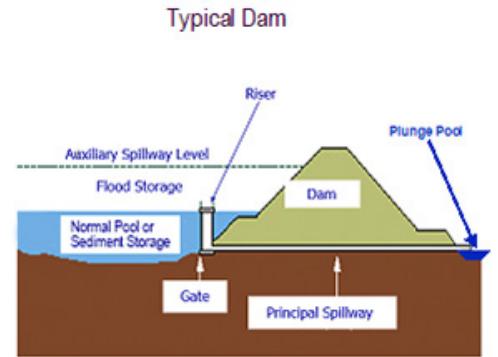
Proposed rehabilitation alternative (above) and cross-section of a typical dam (top right).

Flood control dams, such as McDaniel's Lake, are designed to store flood water during storm events and gradually release it into the stream over several days through the principal spillway pipe. The principal spillway riser and pipe regulate the water level in the dam on a daily basis and control the rate at which the detained storm water is released from behind the dam. Excess water that cannot be stored in the reservoir exits through the grassy area at the end of the dam known as the auxiliary spillway.

The plan includes the following rehabilitation items with no change to the level of flood protection downstream:

- Install a 270-foot-wide roller-compacted concrete chute auxiliary spillway over the dam. The dam will be raised by four feet, but the auxiliary spillway crest and normal pool elevation will stay the same. The existing vegetated earth auxiliary spillway will be closed with an earth embankment.
- Replace the principal spillway riser with a new riser to meet seismic criteria. The lake will be drained during construction.
- Flatten the downstream slope of the embankment from 2.5 horizontal: 1 vertical to 3:1 to accommodate installation of a chimney drain for improved seepage control.
- Install a new toe drain.
- Move the existing plunge pool downstream about 30 feet.
- Floodproof nearby house and hunting cabin.
- Mitigate impacts on approximately 0.3 acres of wetland.

Flood control dams serve to trap sediment and keep it from moving downstream. The McDaniel's Lake dam has trapped about 38 acre-feet of sediment in the 50 years since it was built. Sediment removal will not be included in the dam rehabilitation because 2019 calculations indicate the reservoir can retain submerged sediment for the next 273 years.



Principal spillway riser at McDaniel's Lake



Existing plunge pool (outlet)



Vegetated earth auxiliary spillway