

# TODD LAKE DAM

Upper North River Watershed, Augusta County

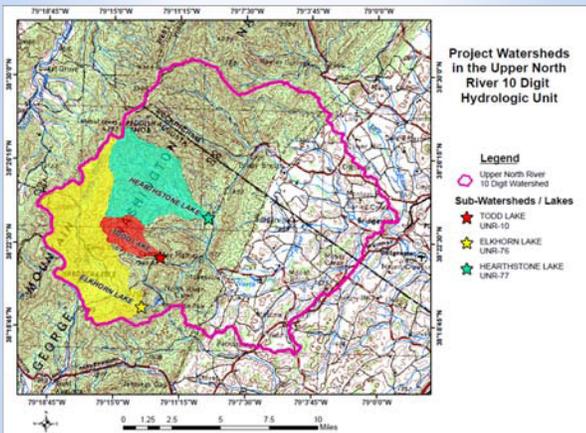


## THE WATERSHED SHORT STORY

The original Watershed Work Plan for the Upper North River Watershed was written by the Soil Conservation Service (SCS) in 1960 for the sponsor, the Shenandoah Valley Soil Conservation District. The plan called for the construction of three flood control dams in the headwaters of the North River. These three structures are known today as Todd Lake (built in 1963), Elkhorn Lake (built in 1965), and Hearthstone Lake (built in 1966).

The Headwaters SWCD took on the responsibility for the Operation and Maintenance (O&M) of Todd Lake and Hearthstone Lake in 1993. The City of Staunton owns and maintains Elkhorn Lake.

When Todd Lake was built, it was considered to be a significant hazard structure with the potential for loss of life. Due to downstream development and the increased threat of loss of life, the Todd Lake dam was reclassified as a high hazard structure in 2008. The dam needs to be rehabilitated to meet the more stringent criteria of a high hazard dam.



### Required characteristics of an auxiliary spillway:

**Capacity:** the combination or storage and auxiliary spillway size needed to safely handle the PMP.

**Stability:** the resistance of the soil to surface erosion.

**Integrity:** the strength of the underlying soil and rock material.

## EXISTING SITE INFORMATION:

- Drainage area of lake: 3.86 square miles
- Dam height: 64 feet
- Dam length: 1,029 feet
- Surface area at normal pool: 5.8 acres
- Surface area at flood pool: 32.5 acres
- Storage in normal pool: 688 acre-feet



Todd Lake, looking upstream at the pool and riser. The IFLOWS gage is in the foreground.

## DESCRIPTION OF PROBLEMS:

- The dam has been reclassified from a significant hazard structure to a high hazard structure.
- The auxiliary spillway does not have the capacity, stability, or integrity to pass the water volume associated with the Probable Maximum Precipitation (PMP).
- The principal spillway riser needs to be replaced.

## FUNDING:

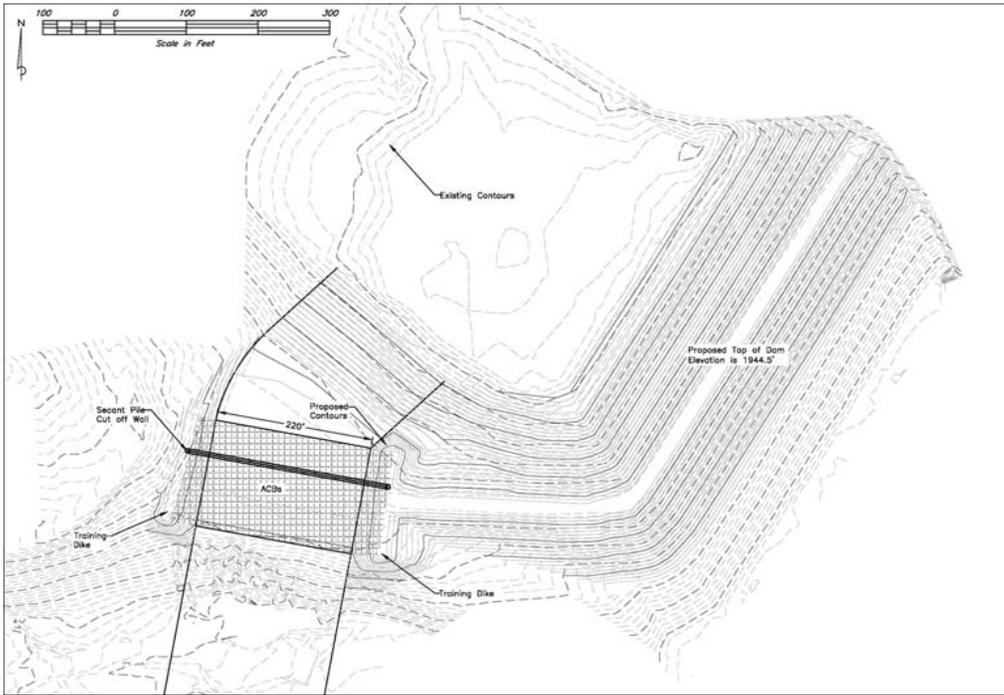
The USDA Natural Resources Conservation Service will pay 65% of the project costs, up to 100% of the cost of construction. The sponsors will be responsible for 35% of the project costs.

## SPONSORS:

Headwaters Soil and Water Conservation District  
Augusta County Board of Supervisors

## DAM REHABILITATION SCHEDULE:

The Todd Lake Plan was finished in September 2012. The plan must be authorized and funded in order for the process to continue into design and construction. Once design and construction are concluded, the dam's flood protection, recreation, and water quality benefits will continue for the next 50 years.



Plan view of proposed rehabilitation.



Secant pile cutoff wall installation.



ACB installation.

Flood control dams, such as Todd 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. This principal spillway pipe regulates the water level in the dam on a daily basis and controls 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 drawing above is a sketch of the proposed solution to the auxiliary spillway problem. The plan includes the following rehabilitation items:

- The top of the dam will be raised 5.5 feet with earthfill and reseeded. This will increase the capacity of the auxiliary spillway enough to safely pass the flows from the PMP storm event.
- The auxiliary spillway will be widened from 200 feet to 220 feet. All of the widening will be in the direction of the dam. The level section (control section) will be moved upstream and lengthened to 50 feet.
- A secant pile cutoff wall will be installed at the end of the level section to prevent a dam breach. A secant pile cutoff wall is built by placing concrete columns in a row across the width of the auxiliary spillway. These columns are reinforced to prevent erosion and anchored to prevent tipping.
- To prevent surface erosion in the auxiliary spillway, the level section and the constructed outlet section will be covered with articulated concrete blocks (ACBs) that are cabled together. The blocks will be completely covered with soil and vegetated with grass. It will look a lot like the existing spillway. Although the photo above shows the blocks as they will be installed, they will not be visible once the project is completed.
- The training dikes will be extended to the valley floor to direct the water away from the back of the dam.
- The concrete principal spillway riser and gate will be replaced with new materials.

Flood control dams also serve to trap sediment and keep it from moving downstream. In the 49 years since this dam was built, it has trapped about 9 acre-feet of sediment. As of 2012, there is enough room in the reservoir to retain sediment for the next 253 years. Therefore, sediment removal will not be included as part of the rehabilitation of the dam.