

Dam Embankment Armoring Project

- Frequently Asked Questions-

Please read all the questions and answers below. This project is multi-layered, and some questions/answers overlap each other.

- **Question – Who owns Lake Barcroft Dam?**
 - *Answer – The Lake Barcroft Association (LBA) owns the Lake Barcroft Dam.*

- **Question - Who is responsible for managing the operation of the Lake Barcroft Dam and for insuring its regulatory compliance?**
 - *Answer – In 1973, following Hurricane Agnes and after the establishment of the Lake Barcroft Watershed Improvement District (LBWID), the LBA (formerly known as Barcroft Beaches Incorporated (BBI)) assigned “LBWID the sole rights to make all determinations relative to the operation, maintenance, repair, inspection, and testing of the Dam”.*

- **Question - What is the primary objective of this major dam project?**
 - *Answer – To bring the Lake Barcroft Dam into all regulatory compliances with Virginia Dam Safety Regulations.*

- **Question – Which government authority is requiring this work to be done?**
 - *Answer – The Virginia Division of Dam Safety (a division of the Virginia Department of Conservation and Recreation) is the regulating authority on all privately owned dams, county-owned dams, and State-owned dams. Virginia’s dam safety regulations are embodied in the Virginia Code and are enforceable by law.*
 - [Virginia Division of Dam Safety \(virginia.gov\)](http://www.virginia.gov)
 - [Virginia Dam Safety Regulations](#)
 - [Code of Virginia - Article 2. Dam Safety Act](#)

- **Question – Are existing dams “Grandfathered” (exempt) from regulatory changes?**
 - *Answer – When considering the mitigation of risk to lives and properties downstream of a dam, an existing dam is not exempt from regularity changes.*

- **Question – Is the Lake Barcroft Dam being singled out by the Virginia Division of Dam Safety?**
 - *Answer – The answer is NO, over recent years there have been numerous dams across the State that have had to make upgrades to comply with Virginia’s dam safety regulations. Furthermore, states across the Country have strengthened their regulations in recent years and upgrades have been required on many of dams that they regulate as well.*

- **Question – What has changed with the Dam that now requires these upgrades to be implemented?**
 - *Answer - There have been no changes to the Lake Barcroft Dam over the last 50 years that have caused the new requirement for this project. The changes have been regulatory requirements, not the dam. Dam failures globally and the higher frequency of major climate disasters have prioritized downstream impacts as the major consideration in regulating dam safety requirements.*

- **Question – How has LBWID validated the need and justification for these dam improvements?**
 - *Answer - LBWID has employed the services of two of the very best engineering firms in our region to thoroughly review the DCR Dam Safety Regulations and the existing structure and capabilities of the Dam. This analysis involved the review of the civil engineering, structural engineering, and hydraulic/hydrologic engineering details for the Dam. There have also been several meetings and discussions with DCR Dam Safety officials to better understand their assessment of the Dam and their application of the regulations. This process was not rushed and took almost 18 months to complete.*

- **Question – What is the primary objective of Virginia’s Dam Safety Regulations?**
 - *Answer - To protect the lives and properties of those that are downstream of the Dam.*

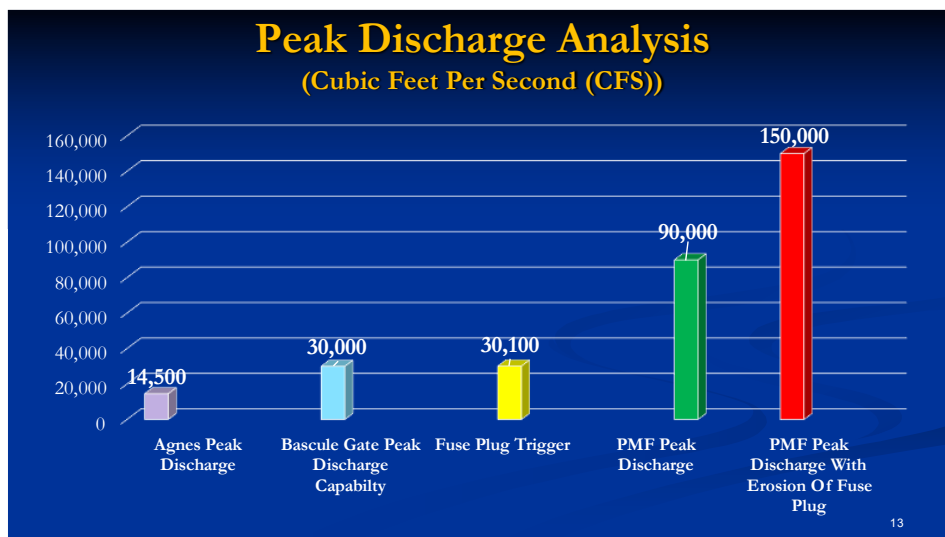
- **Question - What is the greatest risk that a dam poses to lives and properties that are downstream of it?**
 - *Answer – The greatest risk to lives and properties downstream of a dam is the amount of water that the dam impounds on a normal basis. If this water were to be suddenly released, it has the potential to result in man-made catastrophic flooding. Furthermore, if this water were to be released during an extreme rainfall event, it could substantially increase the level of flooding that would have naturally resulted from the rain event itself.*

- **Question - How many lives and properties reside downstream of the Dam?**
 - *Answer - Within the inundation zone of the Dam, there are multiple thousands of lives and properties. There are residential communities, schools, businesses, government facilities, major highways, mass transit, medical facilities, and more.*

- **Question – How will the planned improvements to the Dam mitigate risk to lives and property downstream?**
 - *Answer - Currently the Dam requires the use of what is called an “Emergency Earthen Fuse Plug” to be able to pass the flow that would be generated by the most scientifically conceivable extreme rainfall events. The Dam’s bascule gate alone cannot discharge that much flow. The issue at hand is that the use of the Emergency Earthen Fuse Plug will substantially increase the amount of flow being discharged during that extreme rain event. The substantial increase in flow is caused by the Emergency Earthen Fuse Plug eroding (as it was designed to do) and the water that would normally be in the Lake being discharged at the same time as the flow being generated by the rain event is being discharged. By armoring the Dam and abandoning the use*

of the Emergency Earthen Fuse Plug, the Dam will be capable of passing the flow generated by the extreme rain event and would no longer increase the flooding levels downstream during those extreme rain events.

- **Question – How much additional flooding would be caused by the current configuration of the dam?**
 - *Answer - Currently the Dam must be able to safely discharge a volume of 90,000 cubic feet of water per second. This is the amount of flow that can be conceivably generated in our watershed during the most extreme rain event. The Dam’s bascule gate is not capable of discharging that amount. To discharge that amount of water, we currently rely on the Dam’s emergency earthen fuse plug. By using the emergency earthen fuse plug, we will also start draining the entire lake and the peak discharge would increase to approximately 150,000 cubic feet per second. The Dam’s current configuration would increase the outflow during that most conceivable rain event by approximately 66%.*



- **Question – Please help me understand these extreme rain and flooding events that have been referenced?**
 - *Answer- As for the extreme rain events, when developing dam safety regulations, the Federal Government and the States rely on the studies that NOAA (the National Oceanic and Atmospheric Administration) has done to determine what is scientifically possible when it comes to the most extreme rainfall that our atmosphere can produce. NOAA has developed regional charts for the maximum amount of rain that is scientifically possible. NOAA refers to these as Probable Maximum Precipitation charts. Dam owners across the Country are required to use these charts when developing hydraulic modeling that is specific to their dam.*
 - *As for the extreme flood or flow events that have been referenced. Dam owners are required to develop very sophisticated and detailed modeling of their contributing watershed to determine what is the most extreme peak flow that is possible for their dam to experience. That model is then used to simulate the Probable Maximum Precipitation so that the Probable Maximum Flood/Flow (PMF) can be determined. Please note that the way that the models are developed is also highly regulated as well. Once the maximum flood/flow is determined, the dam must be*

able to safely pass that amount of water without the risk of dam failure or contributing to additional flow.

- **Question - Would downstream flooding still occur during extreme rain events after the improvements to the Dam were completed?**

- *Answer – The answer is YES, flooding downstream of the Dam would still likely occur during extreme rain events after the completion of the Dam improvements. However, the level of flooding that would occur would only be caused by the rain event itself. It would not be increased by releasing the water that is normally in the Lake. The flooding that would occur would only be a result of Mother Nature. The Dam would simply be passing the amount of water that it is receiving (which is required by law to maintain).*

- **Question - In simple terms, what improvements will be made to the Dam?**

- *Answer – The earthen embankments on the eastern and western ends of the dam will be armored so that during the most scientifically conceivable extreme rainfall events, water can flow over the entire width of the dam, not just through the bascule gate that generally regulates normal flow. This will prevent the major erosion of the western earthen embankment (now what is considered the “Emergency Earthen Fuse Plug”), that happened during Hurricane Agnes.*

- **Question – How soon does this project have to be completed?**

- *Answer – This project will take several years to complete. Over the course of the next 18 to 24 months, we will be working on the following phases: design concept, detailed design/contact development, and permitting approval. Following that, we will then move into the advertising and bidding phase. It should also be noted that the actual construction may be completed in multiple phases. It is not inconceivable to think that it may take 4 to 6 years to complete this project.*

- **Question – When will we know how much the improvements to the Dam will cost?**

- *Answer - Currently our engineers are working on developing alteration/upgrade concepts and evaluating them for compliance, difficulty, operational impacts, and cost. Upon completion of this phase, the LBWID will receive a recommendations report from the engineers. The LBWID will then evaluate the report and work with the engineers and the Dam Safety officials to determine the most appropriate concept, or combination of concepts, with which to move forward. As of right now, the LBWID is expecting to receive the Phase 2 recommendations report by the end of this year (2023). At that time, we should have a better estimate of what the total cost of the project may be. It is likely to be a very significant cost, in the millions of dollars.*

- **Question – How will this project be paid for and will LBWID have to increase its tax rate?**

- *Answer - LBWID will look for a combination of using existing reserves, accessing Federal and State grants and loans, and use of its bonding ability as a government entity to cover the cost. While any bonds and/or loans would be paid back through the WID taxing authority, this cost would be amortized over many years (20 to 30), as was done to reestablish and upgrade the*

Dam following Hurricane Agnes. This will likely result in a modest increase in the current LBWID tax rate but will avoid any short-term assessments in the thousands of dollars to any resident of the community. LBWID's goal is to make any direct burden to the community as equitable as possible for current and future residents.

- **Question – What steps are the LBWID undertaking to identify options?**
 - *Answer - Fortunately, the community is in a better situation than it found itself following Hurricane Agnes—the LBWID is established and it has status that opens more funding avenues that were not available back then. By being a governmental entity (a Political Subdivision of the Commonwealth), the LBWID has access to State and Federal grants. Furthermore, in recent years there have been Federal and State grants established to address the funding of dam-related projects such as ours. We are evaluating the potential of each of those grant opportunities.*
 - *We are also reaching out to our elected political leaders to brief them on the project. We will be seeking their support for government grant/funding mechanisms.*
 - *Lastly, we are evaluating the possibility of issuing long-term bonds, or low interest loans, to supplement any shortage of grant revenue that will be required to fully fund the project.*

 - **Question – Why don't those downstream of the Dam pay for the upgrades if they are the ones at risk?**
 - *Answer – The way that Virginia's dam safety regulations are structured, the dam owner is the party that is responsible for mitigating the risk to downstream lives and property. Because the risk that is being regulated is the amount of water that is being impounded, the party that is impounding it is responsible. If impoundment didn't exist, neither would the risk.*

 - **Question – How do we know that our design approach will be accepted by the Virginia Division of Dam Safety?**
 - *Answer - Because the Virginia Division of Dam Safety performs the regulatory oversight for dam construction and repairs/upgrades, we will be working very closely with them throughout the design process so that we can have confidence that any selected plan will fulfill our regulatory obligation.*
-

Additional Questions that have been submitted to the LBWID.

- **Question - Would the amount of downstream flooding in a catastrophic storm change if the Dam was not there?**
 - *Answer - If the Dam does not breach or fail during a catastrophic storm, the flooding that would occur downstream would be the same as if there was no Dam. If the fuse plug erodes during a*

catastrophic storm event, the level of flooding downstream of the Dam would significantly increase.

- **Question - Would it help if we were able to lower the water level behind the Dam in anticipation of a storm?**
 - *Answer - Lowering the Lake in advance of a PMP level storm would not provide enough storage capacity to absorb the peak inflow, the Dam would still eventually overtop, and the fuse plug would erode.*

- **Question - Would downstream flooding be worse if there was a Dam breach?**
 - *Answer - If the Dam were to breach or fail during an extreme storm event, the flooding downstream would be significantly worse compared to if it did not fail or breach. If the fuse plug erodes during an extreme storm event, the level of flooding downstream of the Dam would also be significantly worse.*

- **Question - It was said at the last informational session that the LBWID has to plan in light of existing County development regulations, assuming full development. What if the County changes its regulations to allow more development that would add to the watershed drainage into the Lake? Does that mean we might have to pay for even more dam improvements?"**
 - *Answer - Dam owners are responsible for ensuring that their dam is capable of safely passing the peak flow that could be generated from the contributing watershed. If development within the watershed theoretically increases the peak flow, the dam owner is required to increase the discharge capacity of the dam to safely pass the increased peak flow. However, because the required modeling techniques already account for the watershed being developed to the fullest extent that County ordinances will permit, there would have to be a significant number of changes to zoning ordinance to impact the peak flow. In addition, when modeling almost 25 inches of rain in 6 hours, the entire watershed becomes impervious rather quickly. The absorption rate of the soil in the watershed is very limited during extreme rain events.*

- **Question - How much of the flow volume and intensity is due to hard scape developments upstream of lake Barcroft? If this amount is significant, what actions are under consideration to assure that a fair share of the cost is borne by the developers of the hard scape areas or the Fairfax County because permits were issued for developments with inadequate stormwater retention or attenuation?**
 - *Answer - By dam safety regulations, the maximum flow requirement is not calculated by actual watershed development data. Rather, it is by the maximum extent the watershed is permitted to be developed by existing county zoning ordinances. This ensures that a dam is capable of safely passing the maximum flow that can be expected if the contributing watershed becomes fully developed.*