

# 2008 Lake Barcroft Inundation Study

# Lake Barcroft



# Facts and figures

- Lake Barcroft is a man-made recreational lake created by a concrete and earthen dam located within Fairfax County, just past the City boundaries. It was originally built in the early 20th century for water supply, and was substantially reconstructed following a failure during Hurricane Agnes in 1972.
- Lake Barcroft is a 135 acre lake which holds over 675,000,000 gallons of water.



# Dam Operations

- The lake and dam operation itself are governed through a separate legal entity known as a Watershed Improvement District (WID), and governed by a board of trustees as appointed by the Governor.
- The dam operates as a "water pass through structure" and therefore it does not detain run-off into the lake during various rainfall events. Water is released from the lake through a concrete dam and flume structure into the upper reaches of Holmes Run.



# Flooding

- In 2006, City Council received a presentation and report on flooding within the upper and lower reaches of Holmes Run, Backlick Run, Cameron Run as well as unnamed tributaries within these watershed areas
- Although the flooding was not attributed to the operation of the dam, the City has tightened communication ties to the WID via real time website notification of dam opening levels, partnership with Fairfax County and the WID on the purchase of a back up generator to ensure appropriate dam operation and monitoring in the event of a power failure and periodic meetings between the County, the WID and the City.

# State Regulations

- The lake and dam are regulated by the Virginia Department of Conservation and Recreation (DCR) Rules under Title IV of the Virginia Administrative Code, and require an operation and maintenance permit as an impounding structure.
- As a part of the new required permit preparation process instituted this past year, an inundation analysis was prepared by the WID's consulting engineering firm.

# Inundation Study

- The WID has provided a copy of the inundation analysis for City review
- This analysis includes a map which depicts water reaching many low lying properties along Holmes and Cameron Runs, as well as some of their tributaries, in the most extreme scenarios.
- Significant in-structure flooding would occur in both City and within Fairfax County.



# Inundation Study Criteria

- **Sunny Day Events**  
Lake Barcroft is at its normal level (208.3), there is no rainfall or runoff, and the dam fails due to piping failure.
- **Probable Maximum Flood (PMF)**  
The Lake Barcroft watershed receives 27.5 inches of precipitation over a 6 hour period, and the dam passes this flow undamaged. The PMF is defined as “the flood that might be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region.” For reference, a 100-year, 6-hour rainfall is 5.24 inches, a 1,000-year, 6-hour rainfall is 7.86 inches. The PMF is a standard engineering tool used in dam safety, but cannot reasonably be assigned a recurrence interval. This scenario defines the outer limit of the breach hazard area.
- **½ Probable Maximum Flood (PMF)**  
The PMF precipitation is adjusted to create a flood flow one half of the PMF. This scenario may prove a useful as defining the lower limits of the breach hazard area.
- **Dam Breach**  
Lake Barcroft receives a PMF and is breached by the event

# City Actions

- We have reviewed this study, and found that while it is technically correct, it is not useful for emergency management or response.
- We have written to both the WID and DCR requesting more detailed information, including inundation depth mapping, velocity zone mapping, time to peak analysis, analysis supporting notification levels and listings of affected property addresses

# City Actions continued

- Currently, the city awaits a response to its letter
- The WID, Fairfax County and DCR have all acknowledged receipt of the letter.
- The City is reaching out to the DCR for interpretation of the regulation.
- The City is receiving cost estimates to complete this analytical work by outside consultant forces this week.
- The City has created a telephone emergency notification group to notify down stream properties, utilizing the mapping developed by the WID's consulting engineer to use until additional analytical work is complete.

# City Actions continued

- The City has requested that the DCR's attorney review our letter and determine if the intent of the regulations are being met.
- The City has contracted with Baker and associates to complete the necessary engineering study.
- The City has met jointly with Lake Barcroft WID and Fairfax County and we have begun to develop mutual acceptable plans.