URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

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SUBJECT: UDFCD Position on the U.S. Army Corps of Engineers' Cherry Creek Dam Water Control Modification Study

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BACKGROUND:

The U.S. Army Corps of Engineers (USACE) has recently initiated a study to consider modifications to the existing Cherry Creek Dam Water Control Plan during periods of extreme rainfall in order to reduce the risk of the dam overtopping. The overtopping of an earthen dam like the Cherry Creek Dam will result in a catastrophic failure of the dam and massive downstream flooding. The study will examine the following:

1. Removing the existing 5,000 cubic feet per second (cfs) Denver maximum flow target to ensure that larger releases can be made from Cherry Creek Dam,
2. Increasing the maximum Cherry Creek Dam release from the current 5,000 cfs limit up to the current physical maximum of 13,300 cfs, and
3. Evaluating added impacts of Cherry Creek Dam releases to existing uncontrolled drainage flooding.

There are three USACE-constructed flood control dams that protect the Denver metropolitan area from upstream flooding sources, those being Cherry Creek Dam (completed in 1950), Chatfield Dam (completed in 1975), and Bear Creek Dam (completed in 1982). After the construction of Cherry Creek Dam, advances in extreme flood prediction technology resulted in a higher national design standard for USACE-constructed dams, so while Chatfield and Bear Creek Dams were built to withstand an extreme and very rare event we call the "Probable Maximum Flood" (PMF) event, Cherry Creek Dam is not. Under such an event in its current configuration, first the emergency spillway will be overwhelmed; sending floodwater through Aurora along Toll Gate Creek and Sand Creek, and then the dam embankment will overtop and disintegrate, abruptly releasing all of its stored floodwater through Aurora and Denver along Cherry Creek and the South Platte River. Adams County and its municipal communities would not be spared from this disaster, as the flood wave would wreak havoc well into northern Colorado. This failure would put 300,000 lives at risk and could result in an estimated $19 billion in property loss.

It is important to reiterate at this point that while the stakes are very high, the probability of this event occurring even once in the next century is very remote—some hydrologists compare it roughly to the 10,000-year flood. One scenario that would cause a flood of this magnitude is an average of 25 inches of rain falling over the entire watershed upstream of the dam over a three-day period, as shown in Figure 1.

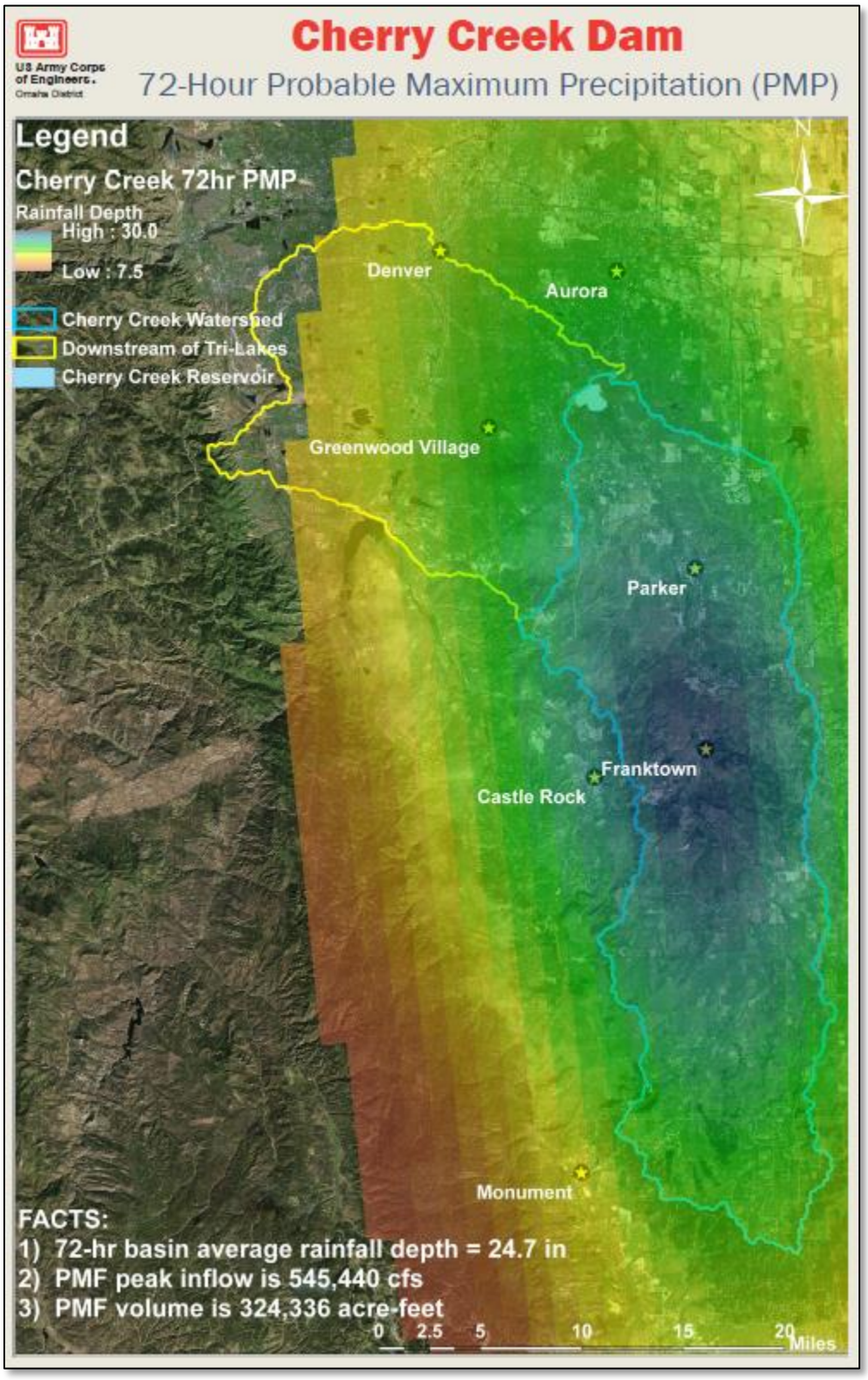

Figure 1: One possible scenario of a rainfall event triggering the Probable Maximum Flood (courtesy USACE)

HOW USACE IS ADDRESSING THE RISK:

USACE is implementing interim risk reduction measures such as:

- Increasing warning time by improving forecasting models and improving gages that monitor inflows of water into the dam during extreme rain events,
- Developing better downstream flood mapping to aid emergency response agencies in flood evacuation efforts,
- Installing additional relief wells at the downstream toe of the dam to relieve seepage pressure within the dam's foundation due to high water levels in the reservoir.

These interim measures reduce risk to the public while potential long-term remedial measures are pursued. A parallel "Dam Safety Modification Study" is currently underway to further define the risk associated with Cherry Creek Dam and assess options for further reducing these risks associated with the dam. The primary outlet for water to leave Cherry Creek Lake into Cherry Creek through Denver is through three pipes located at the base of the dam along I-225, while the emergency spillway directs flows in excess of the dam's capacity into Toll Gate Creek in Aurora, as shown in Figures 2 and 3.

Figure 2: Cherry Creek Dam principal outlet (courtesy USACE)

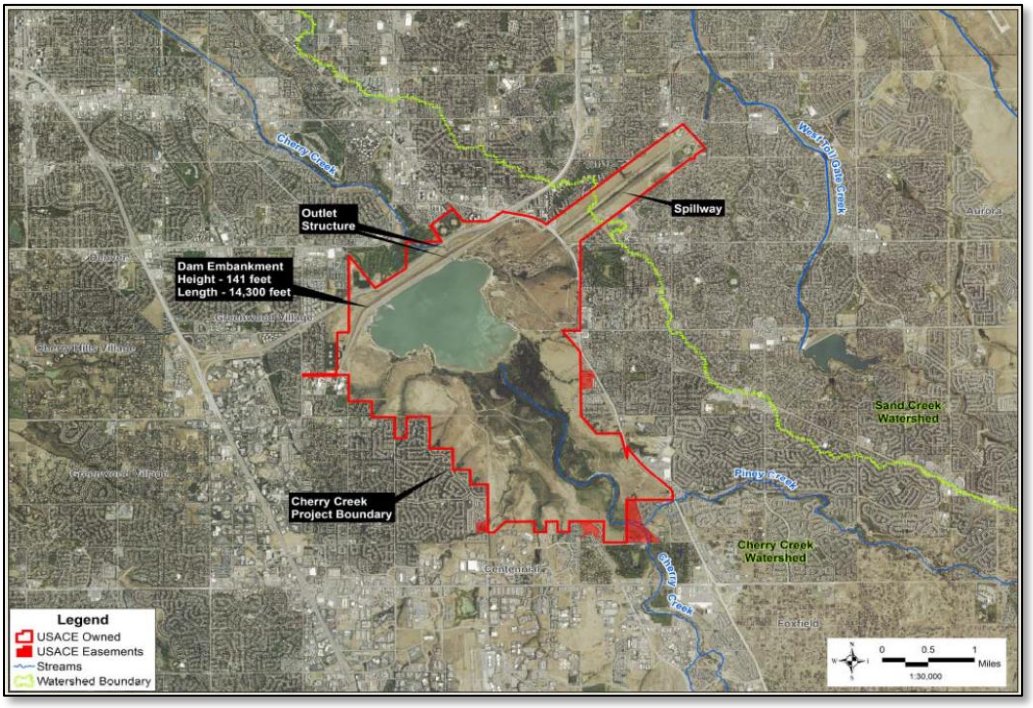

Figure 3: Aerial view showing emergency spillway into Aurora (courtesy USACE)

While these three pipes together are physically capable of passing 13,300 cfs, the current Cherry Creek Dam Water Control Plan limits the release to 5,000 cfs. This Water Control Plan was approved by the U.S. Congress and cannot be changed without a public process release, which is where we are today.

THE UDFCD POSITION:

The 5,000 cfs mandated in the existing Water Control Plan has been used since 1955 as the metric for watershed planning, construction of infrastructure, and floodplain administration. In addition to this flow, there are many other urban flood sources downstream of the dam and all of this has gone into the land development strategy that now results in fewer properties within the District's 100-year floodplains than in 1969 when the District was created, in spite of the population doubling during that same time. The existing bridges and channel armoring below the dam were designed for 5,000 cfs from the dam, so without extensive improvements, a release of 13,300 cfs into Cherry Creek would be damaging; likely washing out bridges and causing the creek to rise out of its banks and into adjacent properties. Evacuations would be necessary. Property and transportation infrastructure would be damaged and the extensive public recreational amenities along the creek would be destroyed.

But, keeping in mind that we are talking about an event much larger than the 100-year flood that is the national minimum standard for flood protection, the alternative is even worse. Without an increase in height to the dam itself and other substantial improvements to armor the dam and enlarge the spillway, the risk of overtopping and sudden failure of the dam with the lake behind completely full is real. The loss of life and property damage would be staggering and the damage to the economy felt for a generation.

So we consider the emergency release of up to 13,300 cfs from the principal outlet a tolerable consequence compared with the alternative. With that in mind, we do have specific concerns that we want to see addressed in this study, those being:

1. A robust early warning system must be in place (including at a minimum sirens and reverse 911), with regular testing. This must be coordinated with the National Weather Service.
2. A regional evacuation plan must be coordinated among the USACE, the State, every affected community, and UDFCD.
3. A public education/outreach program must be developed such that all the affected citizens are fully aware of the risk and know what to do should this release occur.
4. To the extent possible, the flood gates should be opened in a graduated manner to prevent a flood surge through the system. The plan to incrementally open the flood gates as the water rises behind the dam should be agreed upon as best scenario by the State, every affected community, and UDFCD.

Additionally, this solution should not preclude other more sustainable solutions. The current emergency spillway into Toll Gate Creek must be improved and the proposal to increase the dam height revisited, and this work should begin immediately. If the combination of those two strategies can reduce the proposed 13,300 cfs to a flow less damaging, that should be the top priority.