



May 12, 2018

Franklin County Water District
P.O. Box 559
Mt. Vernon, TX 75457
Tel: 903-537-4536

Attention: Board of Directors

Subject: Recommendation of Temporary and Permanent Lowering of Lake Cypress Springs for Flood Protection Purposes

Board of Directors,

On December 27, 2015, the Lake Cypress Springs (LCS) watershed experienced a historic flooding event that caused lake waters to rise to record levels. The Water Surface Elevation (WSE) rose to a maximum of 383.92 feet above mean sea level (msl) or 5.92 feet above the conservation pool of the reservoir, set constant at 378.00 feet msl. Boats, houses, and boathouses experienced significant damage from the high-water event costing many property owners, including the District, thousands of dollars in damages.

This high-water event, classified as a 350-year storm, resulted in the public's concern over the conservation pool of the reservoir and a question about whether the citizens living around the lake might benefit from a temporary or permanent lowering of the conservation pool to mitigate the severity of a future high-water event or a future event that would engage the emergency spillway. As such, the District hired Carollo Engineers, Inc., (Carollo) to evaluate a variety of hydraulic scenarios to assist the District to understand the benefits and consequences of permanently or temporarily (seasonally) lowering the reservoir.

The results of these evaluations, as related to the lowering of the reservoir, are presented below, as well as my recommendation to the Board of Directors moving forward.

Permanent Lowering of the Reservoir:

In March of 2017, Carollo finalized the Preliminary Engineering Report (PER) that outlined a variety of flood relief mitigation options. As part of this exercise, they were tasked to evaluate an Operational Alternative #6 which included an evaluation of permanently lowering the reservoir.

Carollo completed Water Availability Modeling (WAM) modeling to determine the effects of lowering the reservoir to a new conservation pool. A series of five (5) scenarios were evaluated ranging from 0.5 feet lower than existing conservation pool to 4 feet lower. The results from the WAM analysis are shown below in Table 1.

Table 1: [Operational Alternatives Results](#)

Alternative	Conservation Pool	Difference in WSE	Firm Yield (ac-ft)	Difference (ac-ft)
Existing	378.0 ft msl	---	13,943	---
Alternative 6A	377.5 ft msl	-0.5 ft	13,597	346
Alternative 6B	377.0 ft msl	-1.0 ft	13,251	692
Alternative 6C	376.0 ft msl	-2.0 ft	12,560	1,383
Alternative 6D	375.0 ft msl	-3.0 ft	11,873	2,070
Alternative 6E	374.0 ft msl	-4.0 ft	11,188	2,755

The results show a clear impact on the firm yield of the reservoir if the conservation pool is lowered by any amount.

Carollo's Recommendation: *Given the firm yield impacts and implications to wholesale water contracts, Carollo cannot recommend lowering the conservation pool to provide flooding relief a feasible alternative.*

Given the firm yield impacts and implications to wholesale water contracts, Carollo did not recommend that lowering the conservation pool elevation to provide flooding relief as feasible alternative in the PER.

The General Manager made a recommendation and the Board adopted that recommendation based on the PER, to not permanently lower the conservation pool elevation of Lake Cypress Springs to provide flood relief.

[Seasonal Lowering of the Reservoir](#)

The District has received requests from the public requesting that Lake Cypress Springs be lowered on a seasonal basis. The proposal would be to lower the reservoir during the winter months when the threat of a high-water event is elevated and the risk of entering the summer months with a lowered pool is minimized.

Although Carollo was not tasked to evaluate a seasonal lowering of the reservoir through the WAM model, Carollo has indicated in their presentations that *any* lowering of the reservoir further adds to the risk that the District would enter into a drought-year while the reservoir is low. As such, the District can consider a temporary lowering of the reservoir to have a real, yet undetermined, impact on the firm yield of the reservoir.

In addition to the risk lowering the reservoir has on the District's water supply (see above), Lake Cypress Springs is extremely limited in the physical ability to lower the reservoir. As Carollo has analyzed and documented, the low-flow outlet is used to deliver obligated water to the CoMP or other senior downstream water rights holders. The low-flow outlet is not able to convey a large amount of water and is typically only opened if the level of LCS is below the conservation pool

elevation. If the low-flow outlet is opened in these situations, it is only capable of lowering the LCS reservoir approximately 1-foot in 6-weeks.

Carollo's Recommendation: *"the low flow outlet is too small to be used to mitigate flooding on the reservoir. The low-flow outlet should continue to be used to deliver water to customers and meet our water right obligations downstream."*

Benefit vs. Risk

In addition to the evaluation of risk to the District's water supply from a permanent or seasonal lowering of the reservoir, the benefit to lakeside residents must be considered.

As an exercise in the 2017 PER, Carollo completed an elevation survey around the reservoir. Arroyo Environmental (Arroyo) was hired to provide Carollo with a single x,y,z point for each finished slab elevation around the entire lake. In Figure 2 below, each orange point represents a house and identifies the house's elevation.

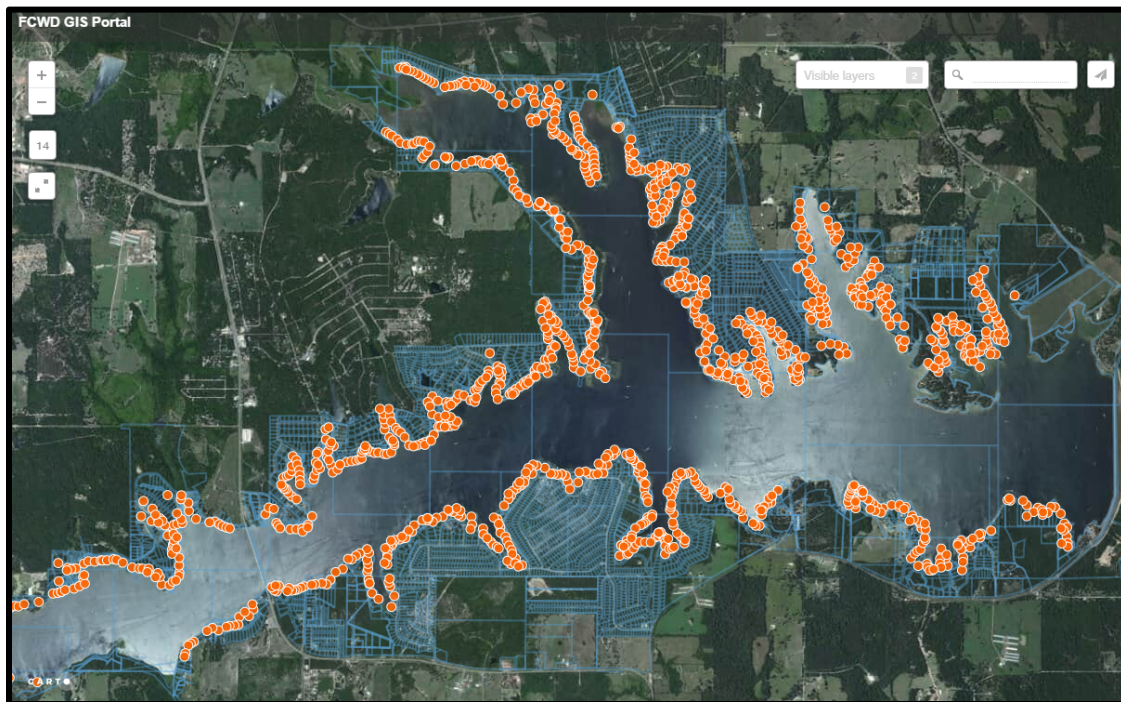
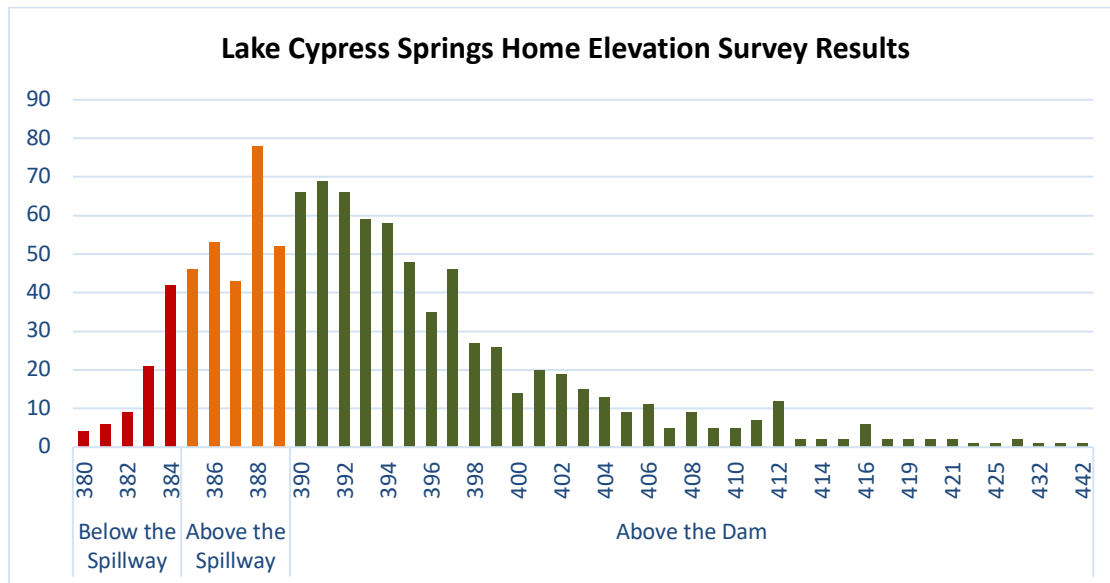


Figure 2: [Structural Elevation Survey Points](#)

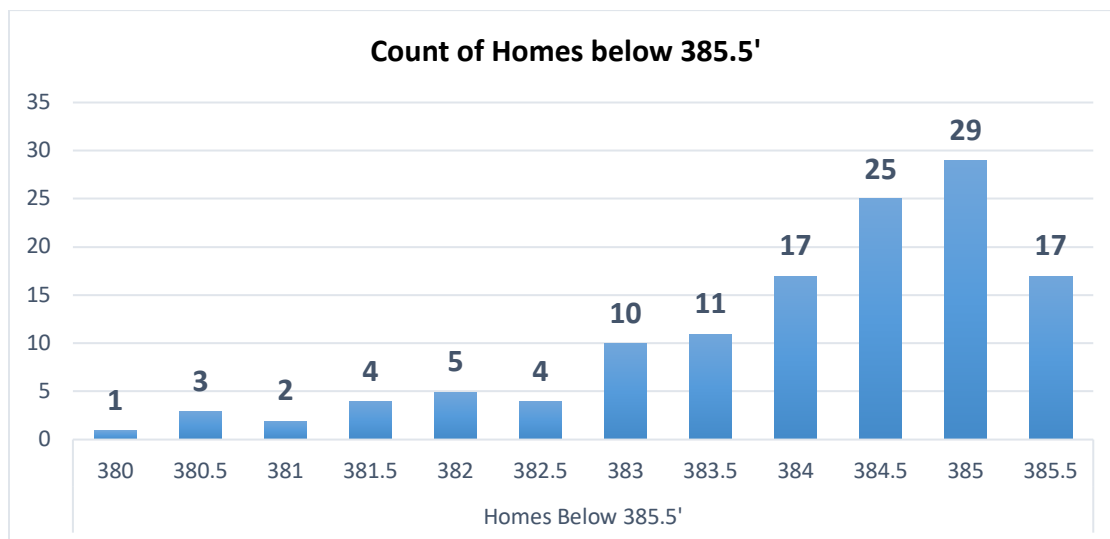
The results of this elevation survey show that a majority of the houses around the lake are above the emergency spillway's elevation of 385.0 feet msl (see Graph 3 below). Of the 1,025 houses surveyed, 82 (approximately 8 percent) are below the emergency spillway's elevation of 385.0 feet msl. Additionally, 272 (approximately 26 percent) are above the emergency spillway but below the dam's designed elevation of 395.0 feet msl, and 689 houses (approximately

67 percent) are above the dam's elevation. This means that 961 (approximately 94 percent) houses are above the emergency spillway's elevation.



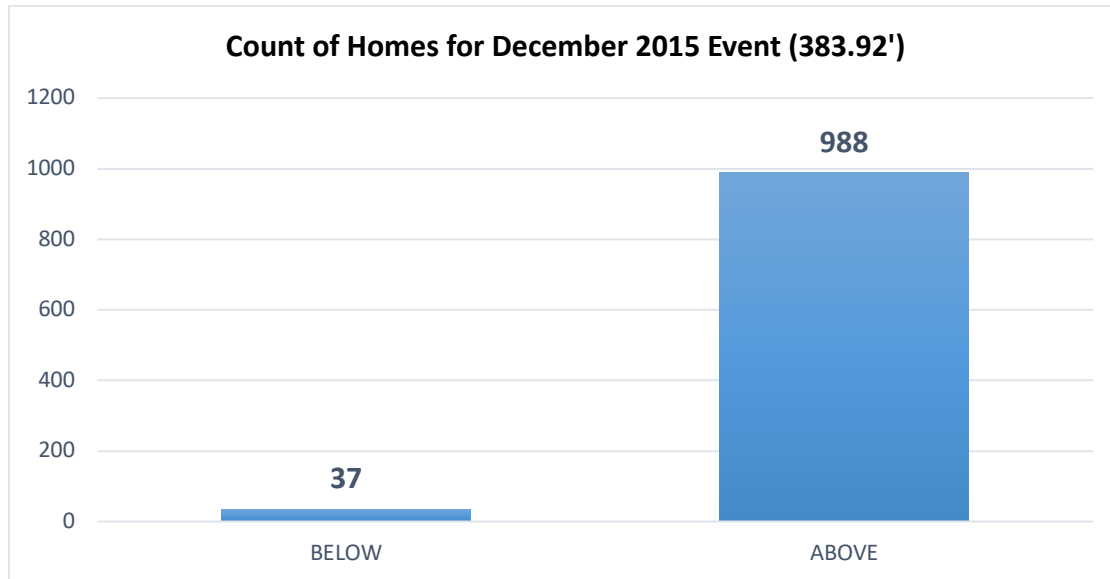
Graph 3: [Elevation Survey Results](#)

Graph 4 below shows the 82 houses below the spillway's 385.0 feet msl elevation. It also includes houses between 385.0 and 385.5 (17 houses). As shown, there is a right skew toward the higher elevations, with a majority of houses above 383.0.



Graph 4: [Focused Chart on Homes Below the Emergency Spillway](#)

Graph 5 focuses on the December 2015 record high water event showing the number of houses that theoretically flooded based on the survey. Of the 1,025 houses surveyed, only 37 (approximately 4 percent) were below the flood elevation of 383.92 feet msl or 5.92 feet above the conservation pool of the reservoir set at 378.0 feet msl. The vast majority of houses, approximately 96 percent, remained above the record high December 2015 event.



Graph 5: [December 2015 Flooded Homes](#)

Opinion

As outlined in the above three (3) sections, there exist multiple risks with limited benefits in the District permanently or seasonally lowering the reservoir to mitigate for the possibility of a future high-water or flood event.

It is my opinion that the District should take no action in permanently or seasonally lowering Lake Cypress Springs.

David I. Weidman
General Manager