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Franklin County Water District
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Attention: Board of Directors

Subject: Preliminary Engineering Report Recommendation

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. Homes, boats, and boathouses experienced significant damage from the event costing many property owners, including the District, thousands of dollars in damages. As a result, the Franklin County Water District (District), tasked Carollo Engineers, Inc., (Carollo) with preparing and submitting a Preliminary Engineering Report (PER) to determine feasible solutions to curtail flood events similar to the December 2015 event. The authorization to prepare the report was executed on April 19, 2016 on a time and materials basis not to exceed \$137,500.

The report was completed and delivered to the board on March 6, 2017. The overall purpose of the PER was to explore the District's options for flood control prevention on LCS by studying high-level baseline structural and operational alternatives to curtail flooding around the lake. The purpose of the report was to also study the hydraulic feasibility of the alternatives proposed, determine the requirements from various regulatory agencies, and outline the costs associated with each alternative evaluated. Additionally, the PER evaluated the benefit (dollar saved in damages) each alternative would have to the surrounding community in a large storm event.

In my opinion, the report does as it was intended to do by fully identifying, broadly describing, and generally evaluating all feasible flood control projects and improvements, as well as ancillary alternatives that could significantly reduce current and future flooding of residential structures around the lake. The overall decision to implement a specific proposed alternative and the process to determine how to fund a large-scale flood relief project is solely left up to the District, as Carollo was not authorized to recommend a specific alternative for selection. This letter serves as my recommendation to the board based on the results presented in the PER.

BOARD OF DIRECTORS:

Rodney Newsom, President – Gary Cunningham, Vice-President – Dwayne Bolin, Secretary – Billy M. Jordan, Director – Gary Swan, Director

From various stakeholder meetings, five baseline structural alternatives and a single (1) operational alternative (6 in total) were presented during a public forum on July 27, 2016. Subsequently, the list of baseline alternatives was filtered from the original six (6) down to three (3) structural alternatives and a single (1) operational alternatives (4 in total) to be evaluated in greater detail with hydrologic modeling, agency review, and cost analysis. The PER presented the results of this entire process, starting with preliminary hydraulic analysis, then stakeholder engagement, and finally the detailed evaluation of each alternative.

The summary results of the PER are presented in the table below in matrix form with a legend at the bottom of the table.

Alternative	Task Hurdle				
	Hydraulic Feasibility	Federal / State Agency Approval is Feasible	Local Agency Approval (Downstream Stakeholders) is Feasible	Cost Feasibility	Minimal Impact to Water Supply
1A	x	x	✓	x	✓
1B	x	x	✓	x	✓
1C	x	x	✓	x	✓
2A	x	✓	✓	x	✓
2B	x	✓	✓	x	✓
2C	x	✓	✓	x	✓
3A	✓	✓	✓	✓*	✓
3B	✓	✓	✓	✓*	✓
3C	✓	✓	✓	✓*	✓
6A	---	✓	✓	✓	x
6B	---	✓	✓	✓	x
6C	---	✓	✓	✓	x
6D	---	✓	✓	✓	x
6E	---	✓	✓	✓	x
Legend					
✓	Carollo predicts FCWD's ability to hurdle the task is feasible for specific alternative.				
✓*	Carollo predicts FCWD's ability to hurdle the task is feasible, however, cost feasibility and funding options will be determined by the FCWD available funds and policy decisions.				
x	Carollo predicts FCWD would not be able hurdle the requirements for a specific alternative. Feasibility of accomplishment is deemed low.				

As shown in the matrix above and described in greater detail in the PER itself, Carollo shows that Alternatives 3A, 3B, and 3C appear to be the only viable alternatives for the District when evaluating the hydraulics, agency approval requirements, concurrence from downstream stakeholders, and impact to water supply.

Although Carollo predicts the District's ability to hurdle each accomplishment in Alternative 3A, 3B, and 3C is feasible, the roadmap for each hurdle is costly, time consuming, and each has some risk potential to pivot into infeasibility. Additionally, as shown in the cost-benefit table below, the capital cost for Alternative 3A, 3B, and 3C is \$23.8M, \$31.1M, and \$39.0M respectively. Corresponding benefits seen by the community around the lake in a 350-yr event (equivalent to our December event) are 14%, 11%, and 9% respectively. *In summary, this means that it will take over 7+ 500-yr events (or 8.5+ December 2015 Events) to break even on the capital investment of the 1-gate project (Alternative 3A).*

			ALTERNATIVE 3		
Rain Event	Probability	Revised Model Conditions	3A	3B	3C
			100-YR 1 gates	350-YR 2 gates	500-YR 3 gates
CAPITAL COSTS →			\$23.8 M	\$31.1 M	\$39.0 M
100-year	0.01000	\$347,890	\$38,402	\$19,706	\$16,104
350-Year	0.00285	\$2,910,117	\$120,175	\$32,749	\$19,706
500-Year	0.00200	\$3,495,949	\$174,235	\$36,353	\$21,790
100-YR BC RATIO			1.30%	1.06%	0.85%
350-YR BC-RATIO			11.73%	9.26%	7.41%
500-YR BC-RATIO			13.96%	11.14%	8.91%

The PER results indicate that a solution to resolve LCS of flooding issues is *possible yet costly*. With that said, the benefit to the surrounding community when compared to the cost of Alternative 3 (BC-Ratio) is low.

Moreover, the ancillary alternatives proposed in the PER will eventually curtail flooding damages to the lakeside community. These include modifications to the FCWD Rules and Regulations, implementation of a Lake Closure Policy, and FEMA Coordination efforts that have already been started. As you know, these ancillary alternatives will take time to curtail flooding damages, as non-compliant structures will be grandfathered but phased out over time. The District has already implemented a number of these recommendations by mandating minimum building elevations, requiring building materials to withstand temporary inundation, and other rules that will, in the future, curtail flooding damages to the community in a large storm event. Additionally, fees associated with these ancillary recommendations have already been incurred by the District.

In my opinion, the capital costs required to implement Structural Alternative 3 coupled with a low BC-Ratio warrants no action from the District.

In addition to flood protection relief alternatives, Carollo presented the results of a field-survey comparison on the Emergency Spillway to the actually intended design. The results of this analysis show that the existing Emergency Spillway does exhibit, in most areas, an excess of fill above the designed ground elevation. In the event that the District decides to remove fill from the emergency spillway

corridor, it is possible that only the south tributary entrance into the spillway would need to be excavated. If this is possible, it would be also likely that excavated spoils could be deposited onto the western second half. See the figure below. This restoration potential could significantly reduce restoration costs.

It is recommended by Carollo in the PER that the District, at a minimum, return the spillway to its original design by removing excess fill in areas where accumulation has occurred. Before this can occur, it is recommended that the District proceed with an investigation to analyze the possibility of only the south tributary entrance into the spillway needing excavation. This possibility could significantly reduce restoration costs.

In my opinion, the District should authorize Carollo Engineers, Inc. to perform the necessary hydraulic analysis per the attached scope of work to determine the alternatives available to the District by looking at the hydraulic feasibility, the permitting requirements, the risks, and the costs associated with returning the design functionality to the Emergency Spillway.

