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Executive Summary
Water Treatment Plant and FCLWD Service Alternative Analysis

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Project No. 11-051.20

The Spring Canyon Water and Sanitation District (SCWSD or District) currently withdraws water from the Horsetooth Reservoir Inlet canal and treats it in the water treatment plant. The water treatment plant consists of a newer DAF pretreatment system and an older filter and chemical feed system located in a separate building. The plant has high service pumps that deliver water through the distribution system and to the existing storage tanks. The raw water system and the water treatment contain many mechanical and electrical components that must be maintained and upgraded in the future to assure that water can be delivered safely and reliably to the District's customers.

As part of this alternative study the raw water system and treatment plant was evaluated to determine what future improvements are needed. An alternate to the District supplying and treating water would be to have the Fort Collins Loveland Water District (FCLWD) supply water to the District, thereby eliminating the need for the District to supply water through its water treatment plant. This memo evaluates from a conceptual level the comparison of the cost to the District to supply water through its own system, or to obtain a source of supply from FCLWD.

A. Summary of the Existing Water Treatment Plant

1. Description

The water plant consists of three main components; the Raw Water Intake, the DAF system, and the Filter Building. The Raw Water Pumps and the Filter Building were originally constructed pre-1970's. The Raw Water Pumps transport water from the Charles Hanson Feeder Canal to the DAF System. Modifications have been made to the Plant throughout the years. The capacity of the Filter Building is the bottleneck in the system. The DAF system was constructed in 2002 and has a capacity of 500,000 gallons per day.

Studies in 2007 and 2008 concluded that the Raw Water Intake, DAF, and Filter Building need significant improvements to provide the level of service needed for the future. The following description and evaluation was obtained from that study, as well as information that is relatively current.

a) Raw Water Pump System Improvements

The following major items have been considered for rehabilitation or replacement within the Raw Water Intake facilities:

- Installation of a new pump station (six foot diameter manhole), located next to and identical to the existing pump station.
- Installation of a new duplex pumping system (two new pumps) with pump lifting provisions and control panel; one new pump in each pump station with a single pump capacity of 300 gpm.
- Replacement of pump station piping, including pipe headers and valves that would connect the two pumps to form a duplex system.
- Rewiring of the electrical feed to the pump station to facilitate operation of a duplex pump system.
- Replacement of approximately 140 feet of 4-inch yard pipe with 6-inch diameter pipe.
- Construction of a new gabion weir structure, including rock excavation under the structure and backfill where needed.
- Installation of a filter fabric beneath the gabion weir structure.
- All necessary channel diversions and/or coffer dams and dewatering to facilitate installation of new pump station and new gabion weir structure.
- Construction of new 3 foot wide, 200 foot long footpath for accessibility to pump station.
- Construction of platform and hoist to facilitate the placement of boards and the entrance into the inlet tunnel.
- Coordination during design with NCWCD and other agencies as required.

b) DAF and Filter Building Improvements

- Procure new pH meters, turbidimeters, chlorimeters, and benchtop testing equipment.
- Replace aging chemical feed pumps, tanks, piping, valves, and controls.
- Install new SCADA equipment for DAF system.
- New 400 gpm membrane filtration system to replace aging gravity filters.
- New CMU block building to house new filtration equipment.
- New chemical feed system, electrical and controls to operate the new system.

Conceptual level cost estimates were developed for the proposed improvements to the water treatment plant. The total project costs for the Raw Water Pump Station and the Water Treatment Plant are $2,000,000.

c) Operations and Maintenance

The costs related to the current operation and maintenance of the water plant area consist of normal expenses that have occurred for many years. The total annual costs for the water treatment portion of the operating budget are $135,776. This includes components for wages and benefits that are allocated to the WTP operations.

In 2011 the WTP produced 39,189,998 gallons of treated water. This included plant production losses from backwash, sludge blowdown, and miscellaneous sample and process lines. ***The resulting cost of treated water is $3.46/1000 gallons***.

B. FCLWD Connection Alternative

1. FCLWD Supply

To obtain service from FCLWD it is necessary to connect to their water system at a location as close as possible to the SCWSD system. That location is by a storage tank located on Trilby Road west of Taft Hill Road. The tank is located generally south of the Larimer County Landfill. The possible location of the pump station and the pipeline routes to SCWSD are shown on Exhibit ES-1. The pump station would be located adjacent to the FCLWD District tank and would draw water from the pipeline that feeds the tank. The pump station could be located in the northeast corner of the FCLWD site. Table 1 shows the peak daily demands in 2006 through 2011. The pump station would need to be sized to meet the current conditions with consideration of future increased demands. Assuming the initial capacity to be 25% higher than current peak flow, the pump station should be sized for 215 gpm with provisions for increasing to an ultimate capacity of 300 gpm. The pump station would contain a 3 pump system with Variable Frequency Drives (VFD's) that can adjust the pump flows to meet demands in the system. It will be necessary to have backup power in the form of an emergency generator. SCADA control will be necessary to allow the District staff to remotely monitor the pump station operations for alarm conditions and for recording flow data.

Table 1 – Peak Day Demands

Date	Peak Day (gal/day)	Peak Day (gpm)
2006	229,000	159
2007	248,000	172
2008	221,000	154
2009	184,420	128
2010	207,211	144
2011	196,285	136
	Average	**148**

The estimated costs for the pipeline and pump station are $1,400,000 for the Stout "Canyon" route. The costs do not include any easement acquisition costs. All acquisitions are unique and can be accomplished by cash payment, credits for consideration of future service, or other methods.

2. Deer Trail Court Pump Station and Tank Improvements

Improvements to the District's water system are necessary to accommodate the FCLWD connection. This includes constructing a new tank and pump station in the area of Deer Trail Court and County Road 38E. This tank would be at an elevation established based on the hydraulics of the proposed FCLWD pipeline and pump station. The location of a proposed tank and pump station is shown on Exhibit ES-2. The tank and pump station location is in a valley south of County Road 38 E that is private property. The siting will require property negotiations, and approval through the Larimer County Planning Department. Tank size is typically based on fire storage and emergency storage for the south area. However, fire flows will be provided from the Arrowhead tank and through a Pressure Reducing Valve (PRV) located on the north side of the CR 38E. This PRV will open only under low pressure conditions such as a fire or other high demand condition. The tank would then be sized to provide emergency storage for the south end. For the basis

of designs a 50,000 gallon tank would provide 24 hours of peak day usage. In addition, the tank would provide a fixed water surface level for the FCLWD pump system which would stabilize pressure in the south area and simplify pumping operations. The tank would also function as a forebay for the Deer Trail pump station.

In addition to the tank, a pump station will be required to pump to the west side of the District. The pump station will be similar to the FCLWD pumps station in size and configuration, although the pumping head requirements will be less.

The estimated cost for the Deer Trail improvements is $660,000. This does not include any costs for property acquisition for the tank and pump station.

3. Additional Considerations

The District operation will change with the FCLWD supply option due to the modification described above. In the south area of the District, pressures will increase and may impact water mains and service lines, and require individual PRV's in some cases. In other areas of the system, water will be flowing in different directions, and some water quality issues may be noticed at start up. Because the point of supply comes from a remote location, there is some concern for water quality problem on the extreme west and north ends of the District. It may be necessary to provide additional chlorination in the system. This should be carefully balanced against the formation of disinfection by-products which are regulated and monitored in the system.

4. Operations and Maintenance

The FCLWD connection alternative will allow the District to terminate operation of the water treatment plant to produce water for supply. This option significantly reduces the costs that the District has associated with plant operations. The costs are estimated to be reduced from $135,000 to $102,000 annually. Staffing and other costs will remain the same.

C. Comparison of Alternatives

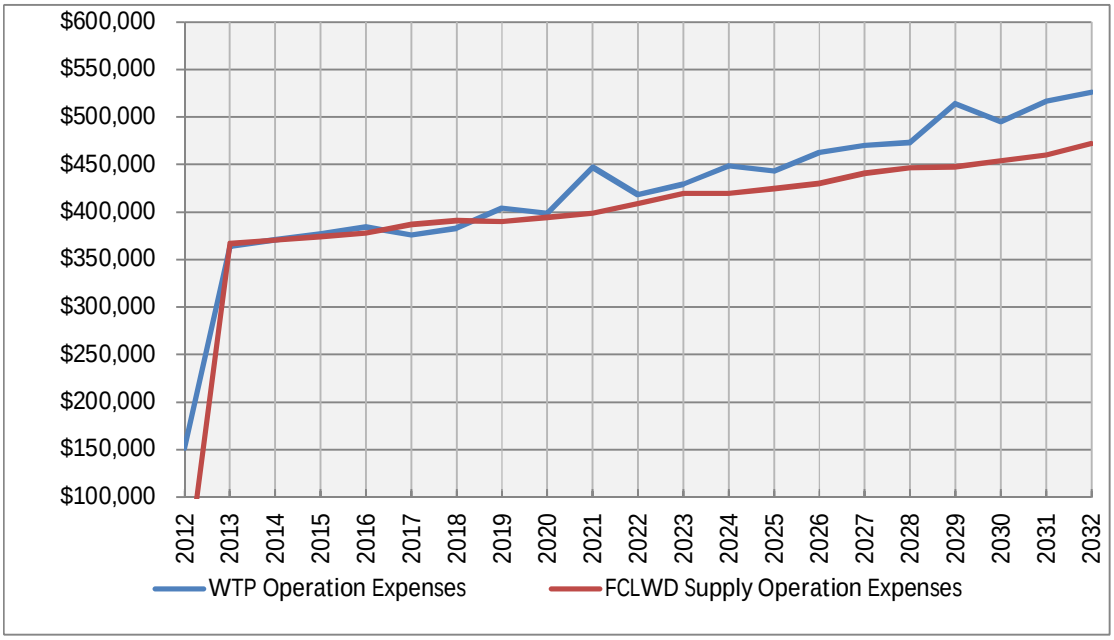
An analysis was conducted to compare Capital and Operation and Maintenance (O&M) cost for two alternatives. 20-year expense projections were developed for each alternative.

The analysis starts in year 2012 and assumes that construction of either the WTP improvements or the FCLWD connection improvements will be completed in 2013. The data show that the capital costs of the facility are equal for both alternatives. The variability in the comparison comes from the O & M costs and the capital replacement costs that are different for each of the alternatives. The data show that the operational expenses are slightly higher with the FCLWD alternative until 2017, primarily due to the cost associated with purchasing water which is estimated to be **$3.00/1000 gallons**. After 2017, the cost of the WTP options are higher due to: 1.) increased operational expenses for the plant and 2.) increased ongoing staffing costs incurred by adding a new operator that will be needed for the new plant.

It is anticipated that the new plant improvements will be as automated as possible, but there will be some increased operator involvement needed, particularly for a membrane plant. Additional operator time is anticipated as regulations change, and more monitoring and reporting may be required.

In addition to the operation expense difference, the WTP alternative will have on-going Capital Replacement costs that are estimated to be $16,000 for capital replacement items in 2012 through 2016 for existing equipment, and another $140,500 that is spread out from 2019 to 2032 for a total capital replacement cost of $220,000. As a comparison, the Capital Replacement costs for the FCLWD option are $35,000. In addition, the timing of the capital expenses is variable and will depend on various factors, including how well preventive maintenance is being performed. Figure 1 shows the annual costs for each alternative over the planning period.

Figure 1 – Comparative Annual Costs



The average difference between the two alternates over the planning period is $27,000 with the highest difference of $66,000 when membrane replacements are projected. Not only are the WTP alternate expenses higher, they are also more variable due the timing of capital replacement costs, which are difficult to predict.

Table 2 is a comparison of the Risks and Benefits for each of the alternatives.

Table 2 - Alternative Comparison

WTP Operation Option	FCLWD Operation Option
Benefits	**Benefits**
• Utilizes current water resources • Facilities are in place and pretreatment system is not that old • Autonomy of controlling costs • Valuable water rights being utilized	• Water Quality compliance, monitoring, reporting and record management provided by others • Reliable and high quality water supply • Reduced O&M costs • No need for plant operator expenses • No WTP operations and equipment maintenance SOP's to maintain • No chemical ordering, handling or disposal • No WTP backwash and sludge to pump through Lift Stations 1& 4~1,000,000gal/year • More accuracy in determining project costs as planning and design continue • More efficient for future District management to run distribution-only system than a system with water treatment plant • Future options of contract operations of District
Risks	**Risks**
• Single source of water supply from Inlet canal • Possibility of critical failure of the current raw water and filtration system if significant improvements are not made • Liability to produce water that meets regulations and is safe for the customers use • Increasing monitoring, reporting and lab expenses • Increasing record keeping and record keeping and record retention/management for WTP operators and water quality monitoring • Management and employee time conflicts between WTP operations and Distribution/Collection operations/emergencies • Increased equipment and control maintenance and technology advances • Future capital costs more variable, making it difficult to develop future budgets • Regulations may change requiring additional plant modifications • Difficult to find and retain operators in the future that work in treatment and distribution and the District's wastewater facilities • New filtration system will be more difficult to operate than the current system • Current DAF is a single train process (no redundancy) • More variability in final cost of project as further planning and design occurs	• Single source of supply with long pipeline to feed system • Subject to contractual changes that can affect costs and level of service • May not be able to successfully negotiate a contract • Change in pressures and flow patterns in system may create water quality and pressure related problems • May have disinfection by-products compliance issues

D. Summary

The analysis completed in the Technical Memorandum dated May 18, 2012, determined that the District should consider the option of connecting to the FCLWD system as a replacement to the current supply and WTP operation. The existing facilities have exceeded their design life and are in need of significant modifications. The critical components of the treatment plant are the filters, raw water system, and miscellaneous chemical and control system. The estimated cost for the improvements is approximately $2.1 million. Cost estimates at this level are considered to be a feasibility level and have a range of -20% to plus 50% on the estimates presented. Typically, at this stage treatment plant work is more difficult to estimate than a pipeline type project due to the level of detail that is unknown until more detailed planning and design is completed. The comparative capital cost estimate for the FCLWD connection alternative is also about $2.1million; but these costs are generally more detailed at the level of study.

The analysis showed a cost difference between the two alternates when the O&M and equipment replacement costs were analyzed for a 20-year planning period. The WTP option showed that the costs for the WTP will be higher than those for the FCLWD alternative by an average of approximately $27,000.

In addition to the cost analysis, the benefit/risk comparison determined more benefits and less risk with the FCLWD alternative. Therefore, the result of this feasibility level analysis is that the FCLWD alternative is the recommended approach for a long term supply, operation, and management of the District. The following items should be considered for further steps in the planning process:

1. The District should consider how they would fund the needed capital improvement. The method of funding can come from a variety of sources including cash reserves, State Revolving Fund Loans, Grants and Loans through Department of Local Affairs, or Revenue Bonds.

2. Continue discussion with FCLWD about a possible service contract. The contract negotiations should address cost, term, and service provided by FCLWD. It is anticipated the other issues will be addressed that include: water rights and capital contributions (tap fees).

3. Begin looking into possible sites for the pipeline, tanks, and pumps stations that are required for the connection. Property acquisition issues may affect the costs and timing of when the project can be completed.

4. Consider alternative management structures to see what best serves the District in the future.

5. Evaluate the rate structure to address future operational, capital replacement, and water costs from FCLWD.