

PROJECT MEMORANDUM

Project Name: City of Franklin, Tennessee
Water Treatment Facility Expansion

Project Number: 12-41-013.0

Date: July 1, 2014

To: Mr. David Parker, P.E.

Cc: Mr. Mark Hilty, P.E.
Ms. Michelle Hatcher, P.E.

From: Smith Seckman Reid, Inc.
Joseph Griffey, P.E.

Re: Rate Impacts of WTF Capital Improvements

On June 20, 2014, SSR presented a memo in response to questions generated by the BOMA during its work session on May 27, 2014. As SSR was awaiting the analysis from our rate sub-consultant (Jackson Thornton), this memo did not include discussion on the rate impacts of the schedule capital improvements at the water treatment facility. We have received their analysis and summarized their findings below.

1. Rate Impacts:

Jackson Thornton, SSR's rate sub-consultant, completed an economic evaluation to review the impacts of the scheduled treatment facility improvements on the rates of the City's average residential inside customer. The city's average residential inside customer consumes roughly 7,000 gallons per month. Based upon information for fiscal year 2013, 203,000 bills were generated for average residential customers and were estimated to grow at 1% annually.

The total cost of water for the City's average residential customer will be impacted not only by the debt service associated with the capital improvements, but by the cost of producing/purchasing and distributing water. Operational costs vary between the evaluated alternatives and will impact the rates of residential customers to different degrees. These differences are primarily a function of the volume of water purchased from HVUD. The table below summarizes the impacts of capital improvements and operational costs on rates for the City's average residential customer.

Table 1 – Impact of Capital Improvements on Average Residential Rates

Year	2.6 MGD Facility			All HVUD		
	Capital Cost Per Customer (\$/1,000 gal)	Operation Cost Increase Per Customer (\$/1,000 gal)	Total Increase in Monthly Bill (\$)	Capital Cost Per Customer (\$/1,000 gal)	Operation Cost Increase Per Customer (\$/1,000 gal)	Total Increase in Monthly Bill (\$)
2017	\$0.25	\$0.11	\$2.55	\$0.11	\$1.22	\$9.31
2018	\$0.50	\$0.22	\$5.07	\$0.22	\$1.35	\$11.00
2019	\$0.50	\$0.33	\$5.82	\$0.22	\$1.49	\$11.93
2020	\$0.49	\$0.45	\$6.58	\$0.21	\$1.62	\$12.87
2021	\$0.49	\$0.56	\$7.35	\$0.21	\$1.76	\$13.82
2022	\$0.48	\$0.68	\$8.13	\$0.21	\$1.90	\$14.78
2023	\$0.48	\$0.79	\$8.92	\$0.21	\$2.04	\$15.75
2024	\$0.47	\$0.91	\$9.71	\$0.21	\$2.19	\$16.74
2025	\$0.47	\$1.03	\$10.52	\$0.20	\$2.33	\$17.74
2026	\$0.47	\$1.15	\$11.33	\$0.20	\$2.48	\$18.76
2027	\$0.46	\$1.28	\$12.16	\$0.20	\$2.63	\$19.78
2028	\$0.46	\$1.40	\$12.99	\$0.20	\$2.78	\$20.82
2029	\$0.45	\$1.53	\$13.84	\$0.20	\$2.93	\$21.88
2030	\$0.45	\$1.65	\$14.70	\$0.19	\$3.08	\$22.95
2031	\$0.44	\$1.78	\$15.56	\$0.19	\$3.24	\$24.03
2032	\$0.44	\$1.91	\$16.44	\$0.19	\$3.40	\$25.13
2033	\$0.43	\$2.04	\$17.33	\$0.19	\$3.56	\$26.25
2034	\$0.43	\$2.18	\$18.24	\$0.19	\$3.73	\$27.38
2035	\$0.43	\$2.31	\$19.15	\$0.18	\$3.89	\$28.53
2036	\$0.42	\$2.45	\$20.08	\$0.18	\$4.06	\$29.69
2037	\$0.21	\$2.59	\$19.57	\$0.09	\$4.23	\$30.24

We hope this meets your needs at this time. If you should need anything further, please do not hesitate to contact us.



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Re: Demand Projections, Payback, and Rate Impacts

On May 27, 2014, SSR and the City staff presented an update on the expansion slated for the City's water treatment facility. During the presentation, several questions were raised centering on demand projections, payback periods, and the resulting impacts on rates were raised by individual Board members. Based upon our understanding of each comment, SSR has worked to address each item. Responses are summarized below.

1. Demand Projections:

As noted during the BOMA presentation, SSR utilized the demand projections included in the 2012 Integrated Water Resource Plan, Table 3-1 of Appendix A (Modeling and Modeling Inputs). Questions from the Board included whether the demand projections included in the IWRP represented the total projected demand for the entire City or just the water service area.

Subsequent to the BOMA presentation, SSR contacted CDM Smith (the IWRP consultant) to confirm the characteristics of the demand projections referenced above. CDM Smith indicated that the values listed in Table 3-1 represented the demand projections for the entire urban growth boundary and not just the water service area. CDM Smith referenced Table 4-1 from Section 4, Phase II (System Analysis) of the IWRP that outlined the percent of the City's total projected demand that is within the City's service area.

Because the demands used initially for the economic analysis included in SSR's Preliminary Engineering Report (PER) included areas outside the City's service area, SSR adjusted its model and evaluated the reduced demands associated

with only the City's service area. The revised model is based upon the following projected demands:

Table 1 – Demand Projections (Service Area Only)

Year	Average Annual Demand, MGD
2015	6.21
2020	6.70
2025	7.13
2030	7.70
2035	8.52
2040	9.54

These demand projects represent a modest annual growth of 1.7% within the service area. Also, based upon the last eight years of operation, these demands are consistent with current demands in the water service area. The table below summarizes the annual average use within the water service area between 2006 and 2013.

Table 2 – Historical Annual Average Demand (Service Area Only)

Year	Average Annual Demand, MGD
2006	5.66
2007	5.56
2008	5.68
2009	5.22
2010	6.21
2011	5.44
2012	5.41
2013	5.58

2. HVUD Rates

As referenced during the BOMA presentation, SSR assumed a conservative rate increase from HVUD at 3% annually. The actual rates and annual increases over the last six years are presented in the table below.

Table 3 – Historical HVUD Rates

Year	Rate (\$/1,000 gallons)	% Increase
2008	\$1.81	---
2010	\$1.91	5.5%
2011	\$2.00	4.7%
2012	\$2.18	9.0%
2013	\$2.36	8.3%
2014	\$2.55	8.1%

Based upon the actual rates charged by HVUD shown above, an average annual increase of 7.11% has been incurred by the City. Given the number of water infrastructure improvements currently on-going at HVUD, we would expect annual rate increases to be consistent with these historical rates in the foreseeable future.

Because the rate increase initially utilized in the economic evaluations is lower than the City has actually experienced, SSR performed a sensitivity analysis to demonstrate the impacts of a higher rate increase on payback and consumer rates. Therefore, additional calculations were completed assuming a rate increase equal to what the City has actually experienced (i.e. 7.11% annually).

3. Harpeth River Flows

Raw water for treatment and distribution to the water service area originates from the City's raw water reservoir. Water from the Harpeth River is pumped to maintain or replenish levels in the reservoir. Consequently, the production of drinking water is more directly impacted by reservoir levels than daily river flows. For this reason, the City can still produce water from the treatment facility on days it cannot pump water from the river.

Still, sufficient water must be available over the course of a month to maintain reservoir levels. With prolonged dry periods and low flows in the Harpeth River, the stored volume of raw water in the reservoir could diminish to the point where plant production is limited. Therefore, historical river flows were analyzed to determine the influence of river flows on reservoir levels, and by extension, the effects on plant production.

Our evaluations utilized the last thirty-eight (38) years of river monitoring by USGS at a location along the Harpeth River adjacent to the treatment facility. Monitoring of this site began in 1975, and the data set analyzed for the purpose of the PER accounted for all years since this origination date. As presented to the BOMA, the PER used the five (5) driest years on record, with two (2) of these years being 2007 and 2012. This note is important to remember as "pumping days" are discussed in subsequent sections. Average daily river flows for the years utilized in the evaluations presented to the Board are shown in the table below.

Table 4 – Harpeth River Flows for Five Driest Years, (Average Day, cfs)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.
1981	14.7	214.8	235.5	209.1	25.2	63.2	15.1	18.4	22.5	15.9	44.6	250.7	94.1
1985	237.0	538.0	159.3	157.1	49.4	25.0	5.62	13.9	6.63	4.52	59.0	50.1	108.8
2007	461.3	122.7	253.6	102.9	34.5	5.02	4.2	2.99	10.3	32.7	75.8	219.7	110.5
2012	526.2	228.4	303.6	67.0	49.7	5.6	9.36	4.63	36.4	57.1	13.2	339.4	136.7
1987	304.1	510.6	288.1	137.1	27.6	24.2	18.5	13.4	4.57	3.15	30.7	446.9	150.7

Because the river flow period initially utilized in the economic evaluations could be viewed as overly conservative, SSR performed a sensitivity analysis to demonstrate the impacts of using the twenty (20) driest years. The results of the sensitivity analysis are presented in subsequent sections.

4. Withdrawal Rates

Because the treatment facility utilizes water from the raw water reservoir, days in which water cannot be withdrawn from the Harpeth River do not immediately impact the plant's ability to produce water. Based upon the current (2007) Aquatic Resource Alteration Permit (ARAP), pump operations along the Harpeth River must stop when river flows fall below 10 cubic feet per second (cfs).

Based on this regulation, SSR completed a review of historical river flows to determine how frequently different volumes of water can be pumped from the Harpeth River. The frequency was calculated as number of days per year and is based upon average river flow and the 2007 ARAP. The last seven (7) years were analyzed. Here again it is important to recall that 2007 and 2012 are two of the 5 driest years on record (i.e. since 1975).

Table 5 – Withdrawal Rate Frequency, days/year

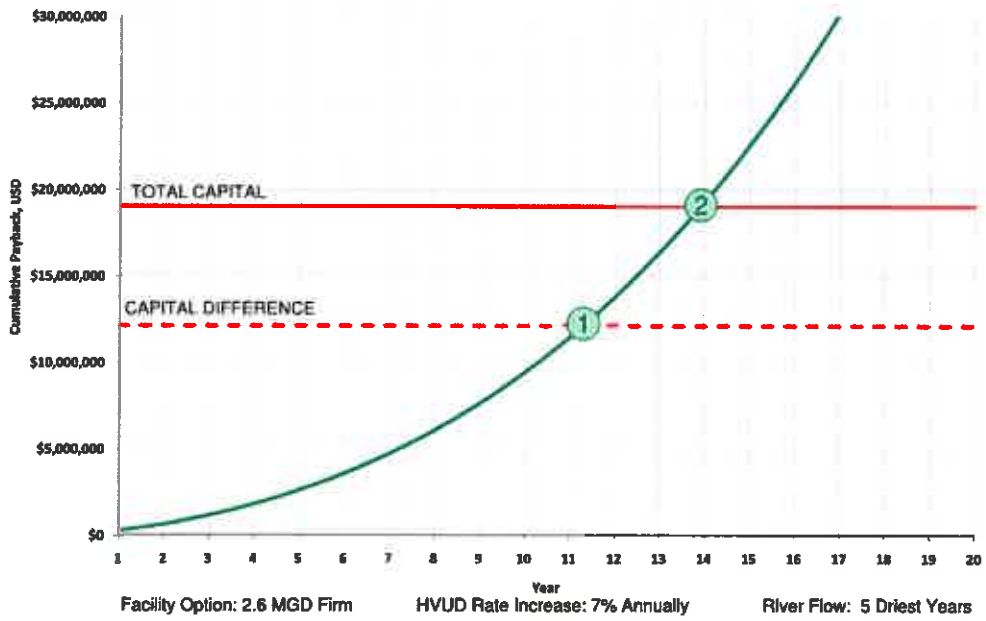
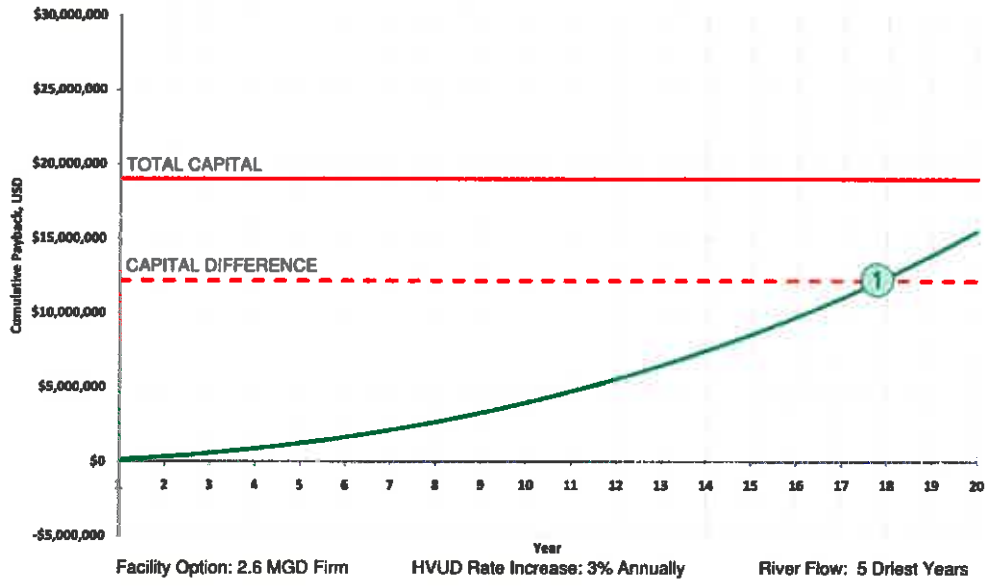
Year	0.0 MGD, d/yr	Between 0.0 and 2.6 MGD, d/yr	Between 2.6 and 4.0 MGD, d/yr	More than 4 MGD, d/yr
2007	138	35	19	173
2008	78	73	20	195
2009	10	65	15	275
2010	105	53	16	191
2011	52	76	20	217
2012	94	96	21	155
2013	10	95	30	230
Average	70	70	20	205

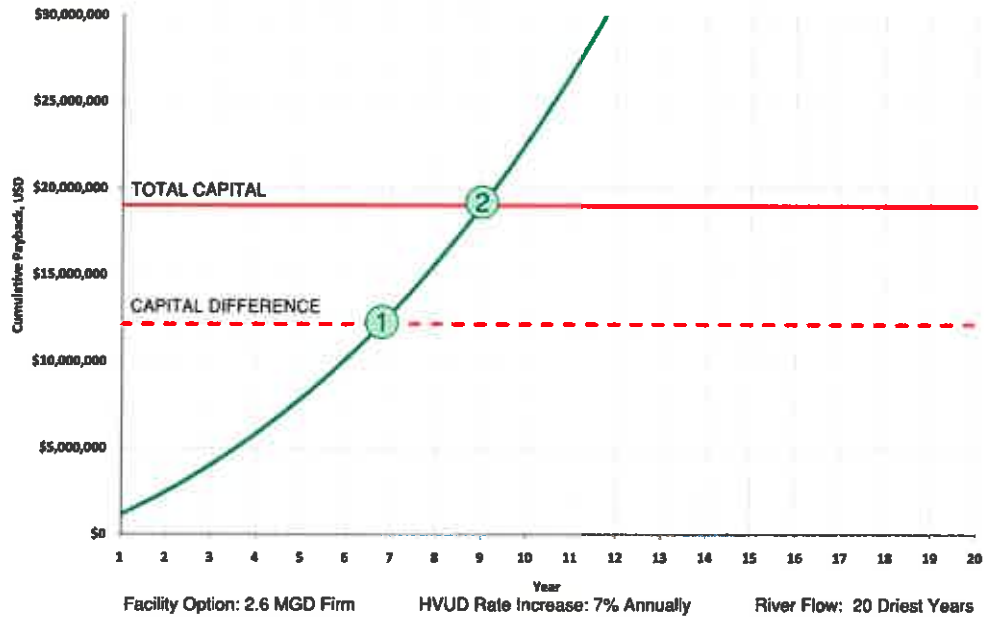
5. Sensitivity Analysis on Return on Investment

As outlined above, sensitivity analysis were run on the financial model built to analyze the impacts of HVUD rates and Harpeth River flows on the return on investment (ROI) for both the 2.6 and 4.0 facilities. For each size facility, three figures are shown. The rate and river flow parameters used are noted on each figure. Two payback periods are shown on each figure that corresponds to the following:

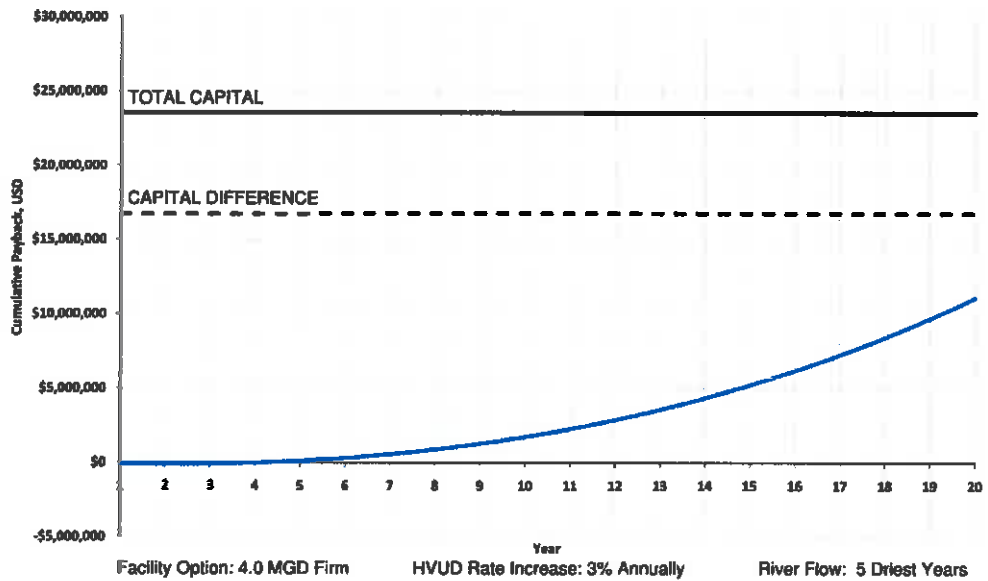
- ROI on capital difference between plant upgrade option and all HVUD option (Point 1 on Figure)
- ROI on total capital expense for plant upgrade (Point 2 on Figure)

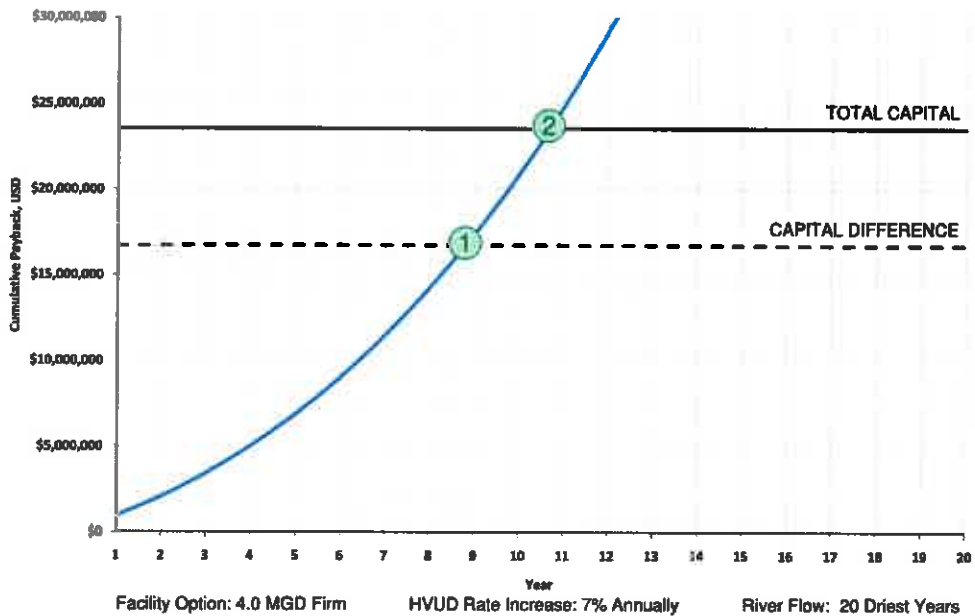
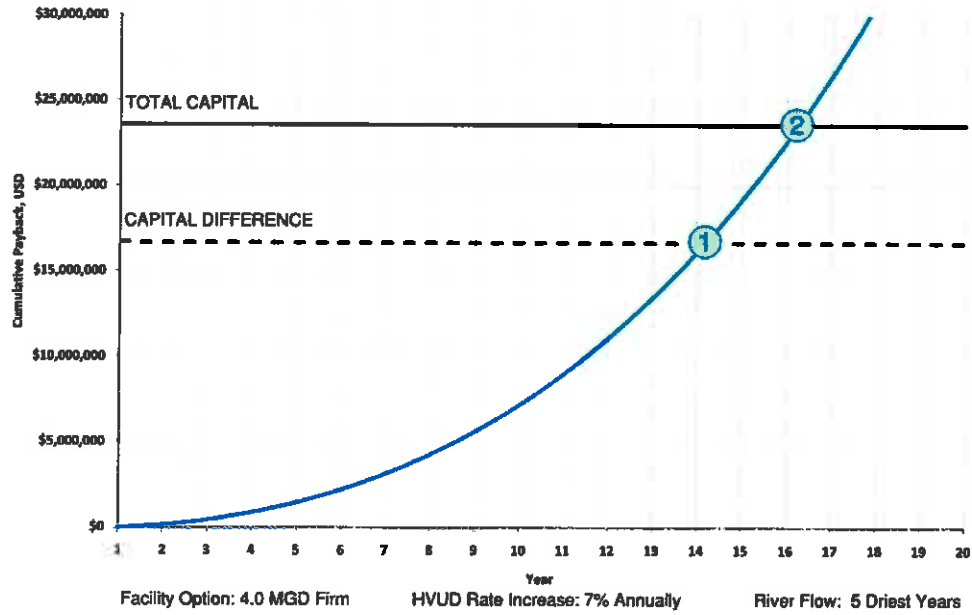
2.6 MGD Firm Facility Analysis





4.0 MGD Firm Facility Analysis





6. Impact on Residential Rates

Our sub-consultant, Jackson Thornton, is finalizing the rate impacts on residential customers and is not included in the memo. Rate impacts will be sent under a separate cover by the next BOMA work session.

We hope this meets your needs at this time. If you should need anything further, please do not hesitate to contact us.