RAFTELIS

MEMO

To: Chris Matkins, General Manager, South Fort Collins Sanitation District
From: John Wright, Project Manager
Rick Giardina, Project Director
Date: June 6, 2018
Re: Plant Investment Fee Technical Memorandum

I. Introduction

This memorandum discusses the process used by Raftelis to calculate the plant investment fees (PIFs) that were presented to the South Fort Collins Sanitation District (District) Board on May 9, 2018. In order for the Board to consider the appropriate relationship between single family and multi-family residential PIFs, this memorandum also provides additional information regarding average winter water consumption and associated wastewater discharges per residential dwelling unit.

II. PIFs Presented to the Board on May 9, 2018.

For all clients, Raftelis calculates the maximum allowable PIF that we believe can withstand legal challenges. We do not recommend that utility governing bodies implement PIFs that are higher than the maximum allowable. There are three industry accepted methods for calculating PIFs. These methods are discussed in greater detail later in this memorandum. The PIFs calculated by Raftelis, and presented to the Board at its meeting on May 9, 2018, are summarized in Table 1.

Table 1: Maximum Allowable PIFs Under Industry Standard Calculation Methods (3/4" Connection Size)

Fee	Capacity Equity Buy-In	Incremental Cost	Hybrid
Calculated PIF	$4,201	$6,217	$4,705
Current PIF	4,500	4,500	4,500
Difference	($299)	$1,717	$205

III. Background on PIFs

The primary funding sources used by water and wastewater utilities to pay for required capital improvement program (CIP) expenditures are operating revenues from rates, external debt financing, and PIF receipts. In rapidly growing communities, PIF receipts can provide a significant portion of required CIP funding and/or debt repayment. As a result, the calculation of PIFs and the projection of future PIF receipts is a critical part of the financial planning process. Depending on the utility, PIFs are also referred to as system development charges, capacity fees, connection fees, and a variety of other terms. As described in the Fourth Edition of the Water Environment Federation publication, *Manual of Practice No. 27, Financing and Charges for Wastewater*

Systems, these fees compensate utilities for the cost of acquiring, constructing and extending infrastructure to support new development:

> *"System development charge proceeds are typically used to pay for capital projects related to growth and/or reimburse existing customers for past system capacity investments. Application of these fees assists the utility in implementing a "growth pays for growth" policy and helps with future capital improvement planning."*

There are several legal standards that define the design and application of PIFs. For example, PIFs cannot be used to pay for operations and maintenance expenses, or the repair and replacement of existing infrastructure that does not increase the utility's capacity to serve customer demand growth. There must also be a rational nexus between the PIFs paid by new development and the costs these PIF receipts are used to pay for. This means that PIF receipts must be dedicated solely for infrastructure expansion required by new development or the debt service incurred to finance this infrastructure. In addition, PIFs must be proportional to a new development's share of growth-related infrastructure costs. For example, a new development that requires 100 single family residential connections should not be required to pay for more (or less) than the estimated cost of this amount of system capacity.

IV. Industry Accepted PIF Calculation Methods

The three primary industry accepted methods for calculating water and wastewater PIFs are the capacity equity buy-in, incremental cost, and hybrid methods. Depending on the unique circumstances of the utility in question, the use of one or more of these methods results in a legally defensible and fundamentally equitable approach for recovering the cost of system capacity additions required to serve new development.

A. Capacity Equity Buy-In Method

The capacity equity buy-in method focuses on the cost of existing system infrastructure and is typically used by utilities with existing available capacity to meet long-term demand growth. This method estimates the value of a unit of system capacity based upon the equity current customers have in existing capacity-related infrastructure. The resulting PIF reflects the proportional cost of a new customer's share of existing system capacity. Under the equity buy-in method, the cost of existing customer funded infrastructure is frequently based on the estimated cost, expressed in today's dollars, of replacing this infrastructure with assets of the same age and condition. This is often referred to as replacement cost new less depreciation, or "RCNLD". However, some utilities, depending on their circumstances, choose to value existing capacity-related infrastructure at original cost, net book value, or full replacement cost.

B. Incremental Cost Method

The incremental cost method focuses on the cost of the additional capacity-related infrastructure the utility must acquire to serve new customers. The incremental cost method is often most appropriate for utilities that do not have existing available capacity to serve growth and therefore must immediately make capacity additions. The resulting PIF reflects the proportional cost of each new customer's share of future system capacity.

C. Hybrid Method

In addition to the capacity equity buy-in and incremental cost methods, it is also common for many water and wastewater utilities to use a combination of these two approaches. This combined "hybrid" method is often used when a utility has existing available capacity to accommodate growth over the medium-term future (for example, 5 years), but will be required to construct additional capacity to serve growth beyond this point. The resulting PIF calculated under the hybrid approach reflects the weighted average of the capacity equity buy-in and incremental cost methods.

V. Steps in the PIF Calculation Process

The calculation of PIFs requires a multi-step process that begins with the valuation of utility infrastructure. In the case of the capacity equity buy-in method, this valuation generally includes all of the utility financed assets used to provide service but excludes infrastructure paid for or contributed by developers. For the incremental method, the valuation includes only those projected future infrastructure additions required to serve demand growth.

The second step in the PIF calculation process is to determine the appropriate units of capacity to use in the calculation. In the case of the District, the fundamental unit of capacity is defined as the wastewater treatment capacity available to serve the average wastewater discharge volumes of a detached single family residential home served by a 3/4" water meter. This metric is referred to as single family residential equivalent (SFRE) demand and it serves as the proxy for all customers with 3/4" water meters, both residential and non-residential.

The third step in the PIF calculation process is to determine the unit cost of capacity. This is achieved by dividing capacity-related costs, as defined by the valuation of utility infrastructure in Step 1, by the appropriate units of capacity of as defined in Step 2.

The fourth and final step in the PIF calculation process is to develop an assessment schedule that reflects the demand relationships between various types of customers, as expressed by factors such as water meter sizes or land uses. Table 2 summarizes these steps for each industry accepted PIF calculation method.

Table 2: Steps in the PIF Calculation Process

Calculation Process	Capacity Equity Buy-In	Incremental Cost	Hybrid
Step 1: Infrastructure Valuation	Value existing infrastructure	Value growth-related infrastructure additions	Weighted Average of the values derived using the other 2 methodologies
Step 2: Units of Capacity	Units of capacity served by existing infrastructure	Units of capacity served by growth-related infrastructure additions	
Step 3: Unit Cost of Capacity	Unit cost of existing capacity	Unit cost of growth-related capacity additions	
Step 4: Assessment Schedule	Create the PIF assessment schedule for different meter sizes/land uses		

VI. Detail of the PIF Calculation for the District

A. Infrastructure Valuation (Step 1 in the PIF Calculation Process)

As of December 31, 2017, the estimated replacement cost less depreciation of the District's infrastructure was $50.3 million. This estimate was developed using the original cost and accumulated depreciation data for District's assets. These values were increased to current year values using construction cost inflation factors obtained from the Construction Cost Index (CCI) published by the Engineering New-Record (ENR). The ENR publishes monthly CCI data for 20 U.S. cities including Denver. The costs included in the ENR CCI reflect local prices for cement and lumber and national average prices for structural steel. Also included are local union wages and fringe benefits for carpenters, bricklayers and iron workers. Projected capital expenditures for growth-related infrastructure during the period 2018-2028 total $37.3 million. These expenditure estimates were provided by District staff from their current long-term CIP plan.

Table 3 summarizes the valuation of the District's infrastructure which also includes the District's current cash reserves. Although these reserves have not yet been expended for the construction of new assets, they represent an "equity" contribution made by the District's customers similar to the equity they have provided to finance the construction of existing assets through their rates.

Table 3: Valuation of Infrastructure for Each PIF Calculation Method

Infrastructure Function/Type	(1) Capacity Equity Buy-In	(2) Incremental Cost	(3) Hybrid (1) + (2) = (3)
Treatment	$37,316,696	$30,080,000	$67,396,696
Lift Stations	631,435	1,330,000	1,961,435
Conveyance/Collection	10,494,878	5,875,000	16,369,878
Biosolids Handling	433,543	0	433,543
Pretreatment	0	15,000	15,000
Administration	1,428,809	0	0
Total Infrastructure	50,305,361	37,300,000	1,428,809
Add: Cash Reserves at 12/31/17	25,308,047	0	25,308,047
Total Valuation	$75,613,407	$37,300,000	$112,913,407

B. Units of Capacity (Step 2 in the PIF Calculation Process)

Table 4 shows the calculation of the units of capacity used in the PIF calculation. The District's existing wastewater treatment facility has a maximum day hydraulic treatment capacity of 4.5 million gallons (MGD). An expansion of this facility that will add 1.5 MGD of additional maximum day hydraulic treatment capacity is currently under construction.

The estimated values shown in Table 4 for single family residential annual wastewater discharge volume of 47,000 gallons was derived from District provided customer billing data. This volume is based on the actual annualized 2016 winter average billed water consumption for single family customers during the months of December, January and February. The assumption of maximum day discharge volumes of 250 gallons per day was obtained from the District's 2016 Master Plan

Update prepared by Liv Engineers, Inc. This volume includes both the sanitary discharges from customers and the estimated infiltration and inflow that occurs on the District's system during maximum wet weather events.

Based on the data shown in Table 4, the District's existing wastewater treatment facility has the capacity to serve 18,000 single family residential equivalent customers. The expansion currently underway will provide the capacity to treat the estimated maximum day wastewater discharges of an additional 6,000 single family residential equivalent customers. The District currently serves approximately 14,300 total customer accounts, of which, approximately 13,400 are single family residential.

Table 4: Units of Capacity for Each PIF Calculation Method

Line	Metric	(1) Capacity Equity Buy-In	(2) Incremental Cost	(3) Hybrid (1) + (2) = (3)
1	Treatment Capacity (MGD)	4.5	1.5	6.0
2	Treatment Capacity (Gallons per Day)	4,500,000	1,500,000	6,000,000
3	3/4" SFRE Discharges			
4	Annual Discharges (Gallons)	47,000	47,000	47,000
5	Daily Discharges (Gallons per Day)	128.77	128.77	128.77
6	Maximum Day Peaking Factor	1.94	1.94	1.94
7	Annual Daily Demand Including I/I	250.00	250.00	250.00
8				
9	3/4" SFRE Connections that can be served (Line 2 divided by Line 8)	18,000	6,000	24,000

C. Unit Cost of Capacity (Step 3 in the PIF Calculation Process)

The maximum allowable unit cost of capacity (i.e., the maximum allowable PIF) is calculated by dividing the value of infrastructure by the number of connections that can be served. Table 5 shows this calculation for the District under each calculation method.

Table 5: Maximum Allowable Unit Cost of Capacity for Each Calculation Method

Line	Metric	(1) Capacity Equity Buy-In	(2) Incremental Cost	(3) Hybrid (1) + (2) = (3)
1	Value of Infrastructure (from Table 3)	$75,613,407	$37,300,000	$112,913,407
2	3/4" SFRE Connections that can be served (from Table 4)	18,000	6,000	24,000
3	**Maximum Allowable Unit Cost of Capacity for a 3/4" SFRE (Line 1 divided by Line 2)**	**$4,201**	**$6,217**	**$4,705**
4	Current PIF for a 3/4" SFRE	$4,500	$4,500	$4,500
5	Difference (Line 3 less Line 4)	($299)	$1,717	$205

D. Assessment Schedule (Step 4 in the PIF Calculation Process)

Table 6 shows an abbreviated version of the District's existing PIF assessment schedule and how this schedule would be revised for the maximum allowable PIFs as shown on Line 3 of Table 5. Note that the multi-family residential PIFs shown in Table 5 maintain the current relationship between single family and multi-family residential customers. Specifically, the per dwelling unit PIFs for each type of residential customer remains the same

Table 6: Existing PIF Assessment Schedule for Each Calculation Method

Customer	Design GPM	Dwelling Units	Ratio	Existing PIF	Calculated Maximum Allowable PIF (From Line 3 of Table 5)		
					(1) Capacity Equity Buy-In	(2) Incremental Cost	(3) Hybrid
3/4" SF	10	1	1	$4,500	$4,201	$6,217	$4,705
3/4" MF (2 DU)	10	2	1	9,000	8,401	12,433	9,409
3/4" Commercial	10	n/a	1	4,500	4,201	6,217	4,705
1" MF (2 DU)	25	2	2.5	9,000	8,401	12,433	9,409
1" MF (3 DU)	25	3	2.5	13,500	12,602	18,650	14,114
1" Commercial	25	n/a	2.5	11,250	10,502	15,542	11,762
1" MF (4 DU)	50	4	5	18,000	16,803	24,867	18,819
1" MF (5 DU)	50	5	5	22,500	21,004	31,083	23,524
1" MF (6 DU)	50	6	5	27,000	25,204	37,300	28,228
1" MF (7 DU)	50	7	5	31,500	29,405	43,517	32,933
1" MF (8 DU)	50	8	5	36,000	33,606	49,733	37,638
1" MF (9 DU)	50	9	5	40,500	37,807	55,950	42,343
1" MF (10 DU)	50	10	5	45,000	42,007	62,167	47,047
1 1/2" Commercial	50	n/a	5	22,500	21,004	31,083	23,524
1" MF (11 DU)	80	11	8	49,500	46,208	68,383	51,752
1" MF (12 DU)	80	12	8	54,000	50,409	74,600	56,457
1" MF (13 DU)	80	13	8	58,500	54,610	80,817	61,161
1" MF (14 DU)	80	14	8	63,000	58,810	87,033	65,866
1" MF (15 DU)	80	15	8	67,500	63,011	93,250	70,571
1" MF (16 DU)	80	16	8	72,000	67,212	99,467	75,276
1" MF (17 DU)	80	17	8	76,500	71,413	105,683	79,980
1" MF (18 DU)	80	18	8	81,000	75,613	111,900	84,685
1" MF (19 DU)	80	19	8	85,500	79,814	118,117	89,390
1" MF (20 DU)	80	20	8	90,000	84,015	124,333	94,095
1" MF (21 DU)	80	21	8	94,500	88,216	130,550	98,799
1" MF (22 DU)	80	22	8	99,000	92,416	136,767	103,504
1" MF (23 DU)	80	23	8	103,500	96,617	142,983	108,209
1" MF (24 DU)	80	24	8	108,000	100,818	149,200	112,913
1" MF (25 DU)	80	25	8	112,500	105,019	155,417	117,618
1" MF (26 DU)	80	26	8	117,000	109,219	161,633	122,323
1" MF (27 DU)	80	27	8	121,500	113,420	167,850	127,028
1" MF (28 DU)	80	28	8	126,000	117,621	174,067	131,732
1" MF (29 DU)	80	29	8	130,500	121,822	180,283	136,437
1" MF (30 DU)	80	30	8	135,000	126,022	186,500	141,142

VII. Raftelis Recommendation Regarding the PIF Calculation Method

The incremental cost method results in a PIF of $6,217 for 3/4" connections (Table 5, Line 3). This value reflects the most accurate and up-to-date estimate of the cost of capacity on the District's system because it is based on the 1.5 MGD capacity expansion currently under construction at the District's wastewater treatment facility. For this reason, $6,217 is the maximum allowable PIF that Raftelis recommends be assessed on new connections to the District's system.

VIII. Single Family Residential vs. Multi-Family Residential

A. Average Winter Water Consumption

As noted previously, on a per dwelling unit basis, the District currently charges both single family and multifamily residential customers the same PIF of $4,500. Raftelis has raised the question of whether this is appropriate given the differentials in winter average water consumption and associated wastewater discharges between these two types of residential customers. Table 7 shows these differences based on actual data obtained from Fort Collins-Loveland Water District customer water billing records and the District's own customer account information. As indicated in Table 7, on a per dwelling unit basis, the winter average water consumption of multi-family residential customers is approximately 75% of single family residential customers.

Table 7: Comparison of Single Family and Multi-Family
Winter Average Water Consumption Based on Actual District Billing Data

2015 Thousands of Gallons					
Class	**Jan-15**	**Feb-15**	**Dec-15**	**Average Winter**	**Annualized**
Multi-Family					
Class Billed Water Consumption	6,437.8	5,655.6	6,888.4	6,327.2	75,927.0
Multi-Family Dwelling Units	2,108	2,108	2,108	2,108	2,108
Average per Dwelling Unit	3.1	2.7	3.3	3.0	36.0
Single Family					
Billed Water Consumption	51,313.9	45,741.7	57,333.9	51,463.2	617,558.3
Single Family Dwelling Units	12,597	12597	12597	12597	12597
Average per Dwelling Unit	4.1	3.6	4.6	4.1	49.0
Ratio of Multi-Family to Single Family	**75.0%**	**73.9%**	**71.8%**	**73.5%**	**73.5%**
2016 Thousands of Gallons					
Class	**Jan-16**	**Feb-16**	**Dec-16**	**Average Winter**	**Annualized**
Multi-Family					
Class Billed Water Consumption	6,397.4	5,884.4	6,492.8	6,258.2	75,098.3
Multi-Family Dwelling Units	2,122	2,122	2,122	2,122	2,122
Average per Dwelling Unit	3.0	2.8	3.1	2.9	35.4
Single Family					
Billed Water Consumption	48,974.0	47,477.4	55,746.3	50,732.6	608,790.7
Single Family Dwelling Units	12,953	12,953	12,953	12,953	12,953
Average per Dwelling Unit	3.8	3.7	4.3	3.9	47.0
Ratio of Multi-Family to Single Family	**79.7%**	**75.7%**	**71.1%**	**75.3%**	**75.3%**

B. Profile of Household Units in Fort Collins

One question that often arises during the consideration of multi-family versus single family residential water consumption relates to household density. Specifically, the argument is sometimes made that multi-family housing units are occupied by large family groups with water demands and associated wastewater discharges that are equivalent to a single family residential dwelling unit. This theory is somewhat undermined by U.S. Census Bureau data for the City of Fort Collins as obtained from the 2012-2016 American Community Service (data set S2501: Occupancy). Table 8 shows household size of occupied housing units in the City of Fort Collins. As shown in this table, approximately 87% of renter occupied housing units are composed of 3 or less persons.

Table 8: City of Fort Collins Occupied Housing Units

Metric	Owner-Occupied	Renter Occupied	Total Occupied
Occupied Housing Units	32,565	27,567	60,132
Household Size			
1-person	20.4%	30.4%	24.9%
2-person	38.2%	36.8%	37.6%
3-person	16.5%	20.0%	18.1%
4-or-more-person	24.9%	12.8%	19.4%
Total	100.0%	100.0%	100.0%
% of 2 Person or Less Households	58.6%	67.2%	62.5%
% of 3 Person or Less Households	75.1%	87.2%	80.6%

C. How Do Other Sanitation Utilities Deal with Multi-Family PIFs?

There are many local sewer utilities that recognize the differences between multi-family residential and single family residential customers in their PIF assessment schedules. Table 9 presents the results of a survey completed by Raftelis on this issue.

Table 9: Survey of Multi-Family vs. Single Family PIFs (per dwelling unit)

Location	Single Family Residential	Multi-Family Residential, per dwelling unit	Ratio of Multi-Family to Single Family
Greeley	$5,700	$2,850	50%
Fort Collins	3,500	2,520	72%
Loveland	2,740	2,420	88%
Boxelder	12,000	12,000	100%
Boulder (1)	12,188	6,966	57%
Arvada	1,579	1,105	70%
Thornton	1,603	1,254	78%
Broomfield	12,609	12,609	100%
Denver	4,630	4,630	100%
Littleton	5,000	5,000	100%

(1) Assumes a 2-bedroom apartment

C. Raftelis Recommendation Regarding Multi-Family PIFs

Strong evidence indicates that, on a per dwelling unit basis, the wastewater discharge demands placed on the District's system by multi-family residential customers are lower than those imposed by single family residential customers. For this reason Raftelis recommends the Board consider the implementation of a per dwelling unit PIF for multi-family residential customers that is 75% of the PIF assessed on a single-family residential customer. Table 10 shows the multi-family PIFs that would result from this change.

Table 10: Multi-Family PIFs based on Water Consumption

Metric	(1) Capacity Equity Buy-In	(2) Incremental Cost	(3) Hybrid
Maximum Allowable Unit Cost of Capacity for a 3/4" SFRE (From Line 3 of Table 5)	$4,201	$6,217	$4,705
Reduction for Multi-Family Demand Differences	(1,050)	(1,554)	(1,176)
New Per Dwelling Unit Multi-Family PIF	3,151	4,663	3,529
Current Per Dwelling Unit Multi-Family PIF	$4,500	4,500	4,500
Difference	($1,349)	$163	($971)