West Bay Sanitary District
Sewer Rate Study

April 23, 2014

HF&H Consultants, LLC

WEST BAY SANITARY DISTRICT
500 Laurel Street
Menlo Park, CA 94025

SEWER RATE STUDY

FINAL REPORT

April 23, 2014

HF&H CONSULTANTS, LLC
201 North Civic Drive, Suite 230
Walnut Creek, CA 94596

HILTON FARNKOPF & HOBSON

HF&H CONSULTANTS, LLC
Managing Tomorrow's Resources Today

201 North Civic Drive, Suite 230
Walnut Creek, California 94596
Tel: (925) 977-6950
Fax: (925) 977-6955
hfh-consultants.com

Robert D. Hilton, CMC
John W. Farnkopf, PE
Laith B. Ezzet, CMC
Richard J. Simonson, CMC
Marva M. Sheehan, CPA

April 23, 2014

Mr. Phil Scott
District Manager
West Bay Sanitary District
500 Laurel Street
Menlo Park, CA 94025

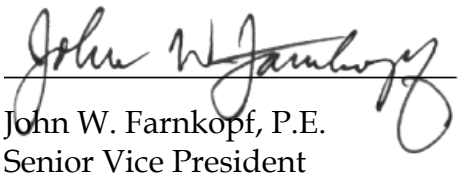
Subject: Sewer Rate Study – Final Report

Dear Mr. Scott:

HF&H is pleased to submit this sewer rate update of the District's FY 2014-15 rates. The report summarizes the analysis that was conducted to develop the recommended rates. The analysis updates last year's projections to reflect the District's and SVCW's current operating and capital costs. The results are consistent with last year, which indicates the need for a 9% revenue increase in FY 2014-15 rates. A copy of the rate model is included in the appendix.

Very truly yours,

HF&H CONSULTANTS, LLC



John W. Farnkopf, P.E.
Senior Vice President

TABLE OF CONTENTS

TABLE OF FIGURES

ACRONYMS

FY	Fiscal Year
CCF or HCF	Hundred cubic feet of metered water sold; 748 gallons; a cube of water 4.6 feet on edge
EDU	Equivalent dwelling unit
GPD	Gallons Per Day
O&M	Operations and Maintenance
PAYGo	Pay-As-You-Go, in reference to funding capital improvements from cash rather than from borrowed sources of revenue
SVCW	Silicon Valley Clean Water, a Joint Powers Authority that is responsible for regional conveyance and wastewater treatment for West Bay Sanitary District and the cities of Redwood City, San Carlos and Belmont. It is formally known as the South Bayside System Authority.
STEP	Septic Tank Effluent Pumping systems

ACKNOWLEDGEMENTS

District Board
Ron Shepherd, President
David Walker, Secretary
Fran Dehn, Member
Edward Moritz, Member, Treasurer
Roy Thiele-Sardina, Member

District Staff
Phil Scott, District Manager
Liz Bahrami, Finance Manager
Bill Kitajima, Projects Manager

HF&H Consultants, LLC
John Farnkopf, Sr. Vice President
Sima Mostafaei, Senior Associate

SEWER RATE STUDY

1. EXECUTIVE SUMMARY

The District's rates for FY 2014-15 have been set to fund its expense projections for FY 2014-15. Rates for subsequent years have been projected in this financial plan that are based on a number of assumptions and information that will require review prior to adopting any future rate increases. For present purposes, the rate increases in subsequent years provide a preview of the increases that may eventually be required. Prior to adopting rate increases in subsequent years, the District is advised to update the financial planning model in conjunction with an update to its capital improvement program and associated O&M. A critical area for consideration is Silicon Valley Clean Water's (formerly SBSA) capital costs, which are dependent on the pace with which SVCW makes progress with its capital improvement program.

1.1 FINDINGS AND RECOMMENDATIONS

1.1.1 Projected Revenue Increases

A 9% revenue increase for FY 2013-14 was approved and adopted in the District's rate-setting process last year. The increases indicated below reflect updated assumptions and currently available information. Multi-year revenue requirement projections indicate the need to increase rate revenue as follows:

Figure 1-1. Projected Revenue Increases

Fiscal Year	Revenue Increase
2014-15	9.0%
2015-16	9.0%
2016-17	9.0%
2017-18	9.0%
2018-19	3.0%
2019-20	2.0%
2020-21	2.0%
2021-22	2.0%

The increases for FY 2014-15 through FY 2021-22 are due to the need to fund the District's share of SVCW's debt service as well as to maintain the District's reserves. Because the SVCW debt service projection continues to change over time, prior to adopting future rate increases, it is recommended that the District update these assumptions to reflect the most current information available from SVCW.

1.1.2 Projected Rates

The following table shows the current FY 2013-14 rates and the projected FY 2014-15 rates, which reflect a 9% across-the-board increase.

Figure 1-2. Projected Rates

	Current FY 2013-14	Projected FY 2014-15
Residential (charge per DU)		
Single Family, Multi Family	$820	$893
On-site Wastewater Disposal Zone	$1,042	$1,136
Non-Residential (charge per CCF)		
Retail/Commercial	$7.55	$8.23
Institution/Public	$7.44	$8.11
Restaurants	$9.42	$10.27
Supermarkets with Grinders	$9.49	$10.35
Hospitals	$7.60	$8.28
Hotels with Dining Facilities	$8.76	$9.56
Industrial	Measured	Measured

Of the 9% overall rate increase in FY 2014-15, approximately 8.64% is attributable to increases in SVCW's costs and 0.36% is attributable to increases in the District's local operations and capital expenses.

Residential customers are charged per dwelling unit. Approximately 60 homes in the Portola Valley area (located within the On-Site Wastewater Disposal Zone) pay higher charges for the maintenance of the STEP or Grinder Sewer Collection Systems that they require.

Non-residential customers pay charges based on their metered water use from the prior calendar year (measured in CCF or hundred cubic feet). Each non-residential charge is the product of the customer's flow multiplied by the rate corresponding to the customer's class.

Industrial customers are billed based on each customer's prior annual flow and the strength of the customer's wastewater based on sampling data.

1.1.3 Cost of Service and Rate Structure Analysis

The District strives to charge equitable rates that are proportionate to cost of providing service. Toward that end, a cost of service analysis should be performed periodically to ensure that each customer class is paying its proportionate share of the cost of service. The District has conducted preliminary cost of service analysis based on partially

updated data. We recommended that the District conduct a comprehensive cost of service analysis after it compiles the necessary data.

Cost of service analysis relies on accurate data for flow, BOD, and TSS for all of its customers. Flow data for the District's residential customers is currently unavailable because of the difficulty collecting meter reading data from the multiple water agencies that supply the District's customers. BOD and TSS data for its industrial customers also needs to be updated. It is recommended that the District start collecting flow data so that it can calculate a multi-year average for purposes of allocating costs. An average of at least three years is recommended to smooth out any anomalies. It is also recommended that the District update its sampling data for its industrial customers.

The data that is needed for cost of service analysis can also be used for adjusting residential and non-residential rate structures to reflect the current cost of service. Again, the District has conducted preliminary flow studies that yielded inconsistent results. As the District collects flow data for cost of service analysis, it should be possible to resolve the inconsistencies and make any rate structure modifications that are appropriate.

2. BACKGROUND

This report presents a financial plan for the District that incorporates the capital improvements identified in the District's 2011 Master Plan, as well as updates to the December 9, 2013 SVCW Financial Plan Update. The District's financial plan comprises projected operating and capital expenses, including its share of SVCW costs, projected revenues from the District's sewer service charges, and projected District reserves for the period from FY 2014-15 to FY 2021-22. The results of the financial plan indicate the annual increases in sewer service charges that are projected to fund the District's expenses and maintain adequate reserves. Detailed spreadsheets comprising the rate model are included in Appendix A.

2.1 REGIONAL CONTEXT

The District provides wastewater collection and conveyance services to approximately 32,000 residential and non-residential EDUs through a system of pipelines and pump stations that transport their wastewater to the SVCW for treatment and discharge into San Francisco Bay. SVCW is a Joint Powers Authority (JPA) that provides wastewater treatment services to the Cities of Redwood City, San Carlos, and Belmont as well as the District.

SVCW's operating and capital costs that are common to all the member agencies are allocated based on their proportionate shares of the total EDUs. The SVCW JPA Commission approved a resolution that would increase the District's cost allocation for future capital improvement projects from 23.70% to 26.84%; this increase does not apply to Stage 2 Capacity Projects. This new cost allocation has been approved by each member agency, effective January 2012.

2.2 EXISTING SEWER RATES

The District charges sewer customers annually on the tax rolls, which is a common practice for billing for sewer service. Billing on the tax rolls is less expensive than it would be if the District issued its own bills while allowing the County to easily levy liens for nonpayment. Even though the District bills through the tax rolls, its sewer service charges are not a tax or assessment. Unlike taxes or assessments, which are based on land-related characteristics such as assessed value or parcel size, the District's sewer charges are a form of service fee or charge that is proportionate to the cost of providing sewer service.

The District's sewer service charges have recently increased primarily in response to increases in SVCW's treatment charges, as well as to maintain the level of service required to safely and reliably meet the sewer service needs of the District ratepayers. The District has also been faced with additional recent capital improvements to renew

and replace aging District infrastructure, in addition to significant increases in SVCW capital improvement needs.

2.3 RECENT RATE INCREASES

During the last five years, the District's rates have increased as shown in Figure 2-1.

Figure 2-1. Recent Rates and Rate Increases

	2009/10	2010/11	2011/12	2012/13	2013/14
Sewer Service Charge per EDU	$560	$650	$690	$752	$820
Annual Increase in Charge		$90	$40	$62	$68
Annual Increase		16%	6%	9%	9%

The 46% cumulative increase during this period is largely attributable to SVCW's increasing debt service allocation to the District and the increase in the District's reserves that was necessitated to bring them to the target levels.

3. REVENUE REQUIREMENT PROJECTIONS

A spreadsheet model was developed to derive revenue requirements for FY 2014-15 through FY 2021-22. The District's O&M budget for FY 2013-14 served as the starting point for projecting the District's expenses and revenues. The escalation factors summarized in Figure 3-1 were incorporated in the model for projecting expense and revenues.

Figure 3-1. Key Modeling Assumptions

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Source
General Inflation	Per Budget	3.0%	3.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	WBSD Budget
Utilities	Per Budget	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	Estimate
Salaries & Benefits	Per Budget	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	Estimate
SBSA O&M Increase	Per Budget	6.8%	4.6%	4.7%	4.7%	5.0%	5.0%	5.0%	5.0%	SBSA Budget
Interest on Earnings	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	WBSD Budget
Non-rate Revenues	Per Budget	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	Estimate
Growth in Accounts & Demand	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	Estimate

The application of these assumptions to the O&M and capital expenses is described below and summarized in Figure 3-3.

3.1 DISTRICT O&M EXPENSES

The District's O&M expenses are projected to increase by a few percent per year from approximately $5.9 million to $7.1 million over the nine year period. Annual increases are no greater than the estimated rate of inflation for most recurring expenses.

3.2 DISTRICT CAPITAL EXPENSES

The District's capital expenses are summarized by category in Figure 3-2. Annual costs range from $4.9 million to $5.8 million during the modeling period; the increase reflects estimated construction cost inflation. On average, the District expects to spend approximately $5.4 million annually on these projects, the majority of which (approximately $4.2 million per year) funds Master Plan projects. The remaining capital expenses comprise various ongoing administrative and other capital expenditures

Figure 3-2. CIP Summary

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Administration	$170,000	$170,000	$173,400	$176,868	$180,405	$184,013	$187,694	$191,448	$195,277
Collection Facilities	$657,500	$657,500	$677,225	$697,542	$725,443	$754,461	$784,640	$816,025	$848,666
Subsurface Lines									
Proposed (Master Plan)	$3,500,000	$3,500,600	$3,802,400	$3,800,000	$3,799,000	$4,000,000	$4,000,800	$4,213,000	$4,115,000
Other	$460,000	$460,000	$460,000	$460,000	$460,000	$460,000	$460,000	$460,000	$460,000
Construction Proj. Environ Review	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Manhole Raising	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
Allow. For Unanticipated Cap Ex	$75,000	$75,000	$75,000	$75,000	$75,000	$75,000	$75,000	$75,000	$75,000
Total Capital Expenses	$4,972,500	$4,973,100	$5,298,025	$5,319,410	$5,349,849	$5,583,475	$5,618,133	$5,865,473	$5,803,943

The District plans to fund these capital improvements on a pay-as-you-go (PAYGo) basis without issuing debt, which continues the District's historical practice. The District's rates do not directly fund each year's capital improvements. Instead, the funding for the District's capital expenses takes the form of contributions of rate revenue to the Capital Reserve from which capital projects are funded. In this way, rates can be modulated smoothly by using the Capital Reserve as a buffer. These contributions are in effect the capital expenses.

3.3 RESERVE EXPENSES

In addition to covering annual expenses, sewer service charges need to generate revenue to maintain adequate operations and capital reserves. To determine what constitutes adequate reserve amounts, the reserve balance was subdivided into Operations, Capital, and Emergency Reserves. In this way, it is possible to set recommended target balances for each purpose.

3.3.1 Operations Reserve Minimum Balance

The Operations Reserve provides working capital for monthly O&M expenses. Because of the nine-month lag between sewer service charge payments from the County tax assessor, the minimum Operations Reserve balance is set equal to five months of O&M expenses to provide adequate cash flow. If this minimum balance is maintained, the District should be able to fund its monthly operations cash flow over this extended period without relying on the Capital Reserve for a short-term loan.

Maintaining the minimum balance for the Operations Reserve is recommended as the highest priority for the District's three reserves.

3.3.2 Emergency Reserve Target Balance

The target balances for the Operations and Capital Reserves are sufficient to provide working capital on an ongoing basis, but do not provide for unforeseen contingencies such as emergencies. Should an emergency strike, the District cannot suddenly raise rates to generate additional funds due to state law requirements for such rate increases (e.g., Proposition 218). Therefore, an Emergency Reserve of $5.0 million is recommended. With such a reserve, the District would have funds on hand to take immediate remedial steps without waiting to procure a loan or issue bonds.

Maintaining the target balance for the Emergency Reserve is recommended as the second highest priority after meeting the minimum balance for the Operations Reserve. The Emergency Reserve can be used for funding capital projects until the Capital Reserve is fully funded.

3.3.3 Capital Reserve Target Balance

The Capital Reserve provides liquidity to fund construction for projects that are funded on a PAYGo basis (as opposed to those that are funded from debt). With adequate

capital reserves, the District is able to pay contractors without encroaching on the Operations or Emergency Reserves. The target balance for the Capital Reserve depends on the level of construction. A minimum balance equal to the average annual construction costs (approximately $3.8 million) was used for determining an appropriate and reasonable target balance.

Maintaining the target balance for the Capital Reserve is recommended to be a lower priority after meeting the minimum balances for the Operations and Emergency Reserves.

To provide additional protection until all reserves are fully funded, the cost of a line of credit is included in the revenue recommendations.

3.4 SVCW EXPENSES

SVCW's treatment charge currently is 48% of the District's total revenue requirement, and is the District's single largest expense. The District's charge is allocated in proportion to the number of its EDUs compared with the other SVCW member agencies.[1] SVCW's cost has recently increased significantly to fund the debt service on the series of bonds that have been issued to fund the rehabilitation of its interceptors, pump stations, and wastewater treatment plant. By the projected completion of the project, SVCW's debt service allocation to the District will equal $13.4 million, an increase of $11.7 million over the current debt service.

3.5 TOTAL REVENUE REQUIREMENTS

The foregoing modeling assumptions lead to the projected revenue requirements shown in Figure 3-3 and Figure 3-4. Figure 3-3 shows that:

- There will be very little increase projected in the District's own O&M expenses.
- The District's funding for capital improvements will gradually increase.
- The projected SVCW O&M expenses increase gradually; although current estimates may not reflect future O&M after SVCW completes its capital improvement program.
- SVCW's capital costs increase significantly as SVCW issues bonds to construct its capital improvement program.

Unlike the District's local costs, SVCW costs are largely beyond the District's control. Figure 3-4 contains the same data as Figure 3-3 in tabular form.

[1] As mentioned in Section 1.1, the resulting allocation increased recently. The combination of the District's increased share of costs and the overall increase in SVCW's costs is a primary reason for the need for the District's rate increases in the near term years.

Figure 3-3. Projected Revenue Requirements

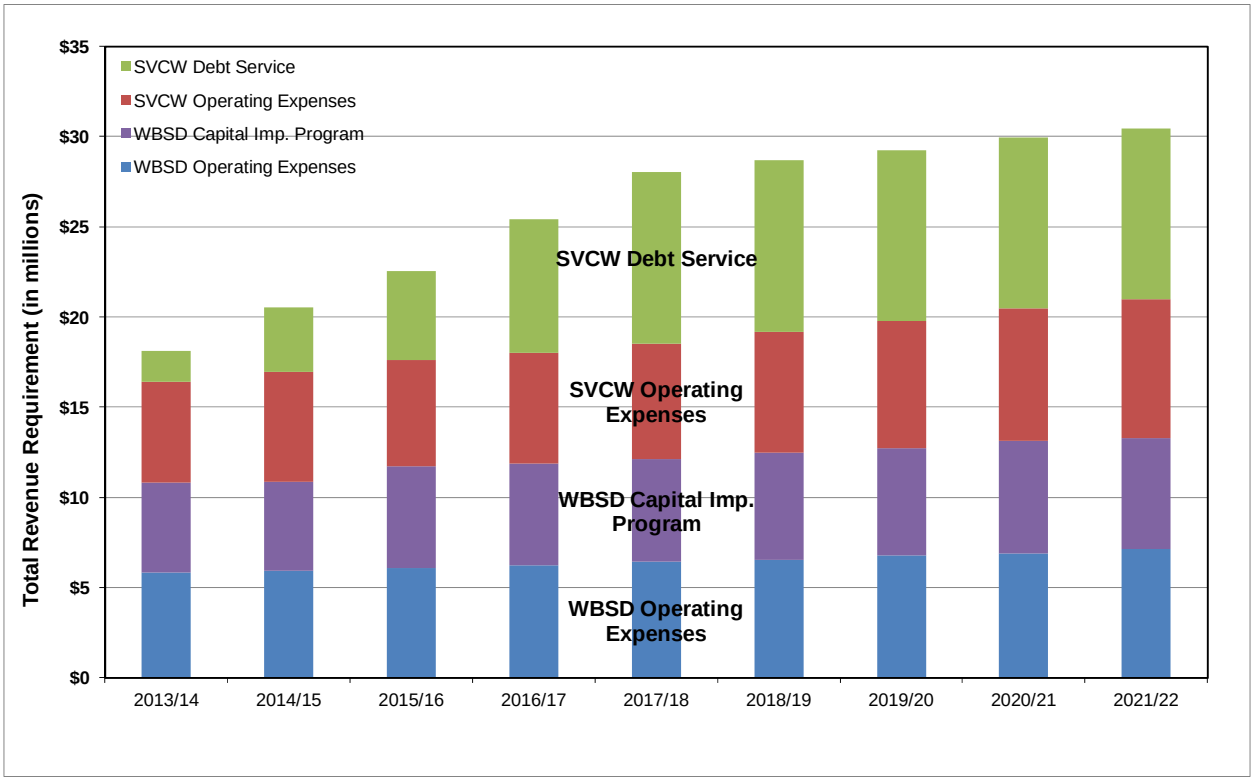


Figure 3-4. Projected Revenue Requirements

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
WBSD Operating Expenses	$5,815,118	$5,911,180	$6,090,354	$6,212,528	$6,419,305	$6,540,827	$6,757,201	$6,898,544	$7,124,979
SVCW Operating Expenses	$5,599,910	$6,048,000	$5,868,000	$6,129,000	$6,404,000	$6,710,800	$7,032,940	$7,371,187	$7,726,346
SVCW Debt Service	$1,708,216	$3,595,073	$4,932,832	$7,417,780	$9,516,875	$9,498,352	$9,477,086	$9,458,649	$9,441,388
WBSD Capital Imp. Program	$4,972,500	$4,973,100	$5,648,025	$5,669,410	$5,699,849	$5,933,475	$5,968,133	$6,215,473	$6,153,943
Total Projected Revenue Req't.	$18,095,744	$20,527,353	$22,539,211	$25,428,718	$28,040,028	$28,683,454	$29,235,361	$29,943,853	$30,446,656

Figure 3-5 shows the annual increases attributable to the District and SVCW. SVCW's share of the increases is greatest in the first five years because of the issuance of bonds for its capital improvement program. The District's share of the revenue requirement remains constant as O&M and capital expenditures grow at an inflationary pace. Figure 3-6 shows the cumulative increases in revenue requirements. Figure 3-6 indicates that increases in SVCW's costs are the primary factor driving the District's overall rate increases throughout the projection period.

Figure 3-5. Annual Increases in Revenue Requirements

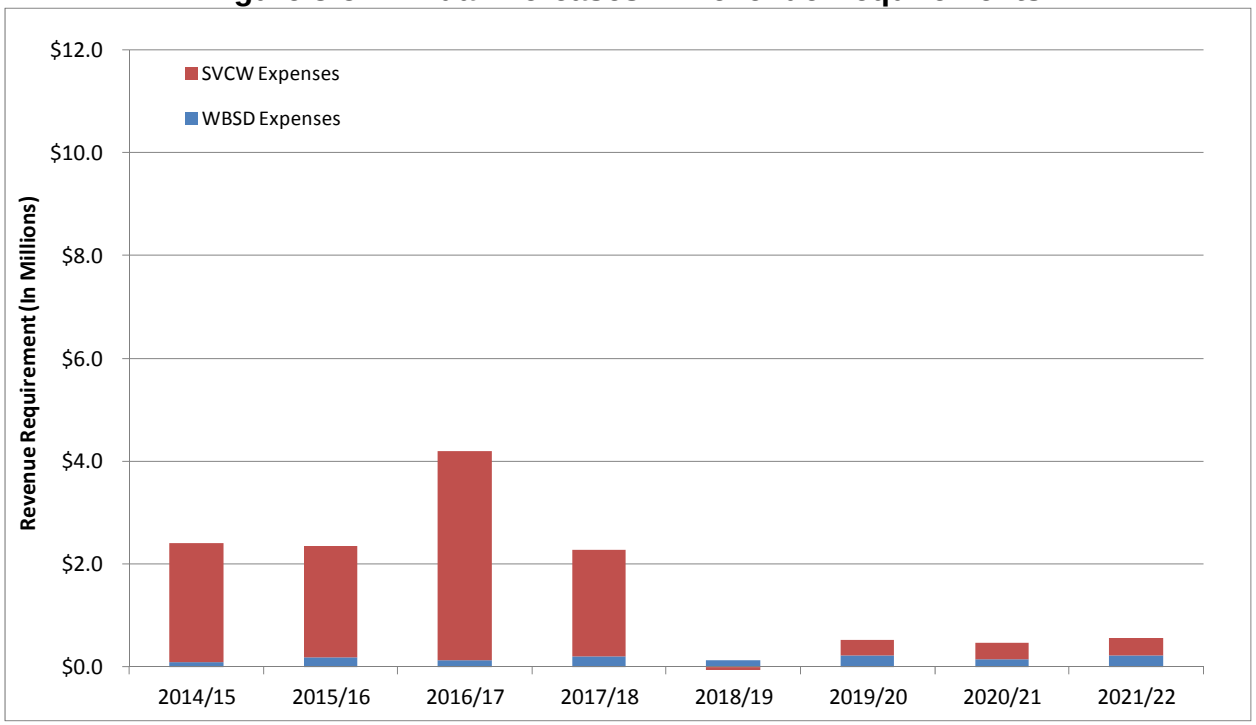
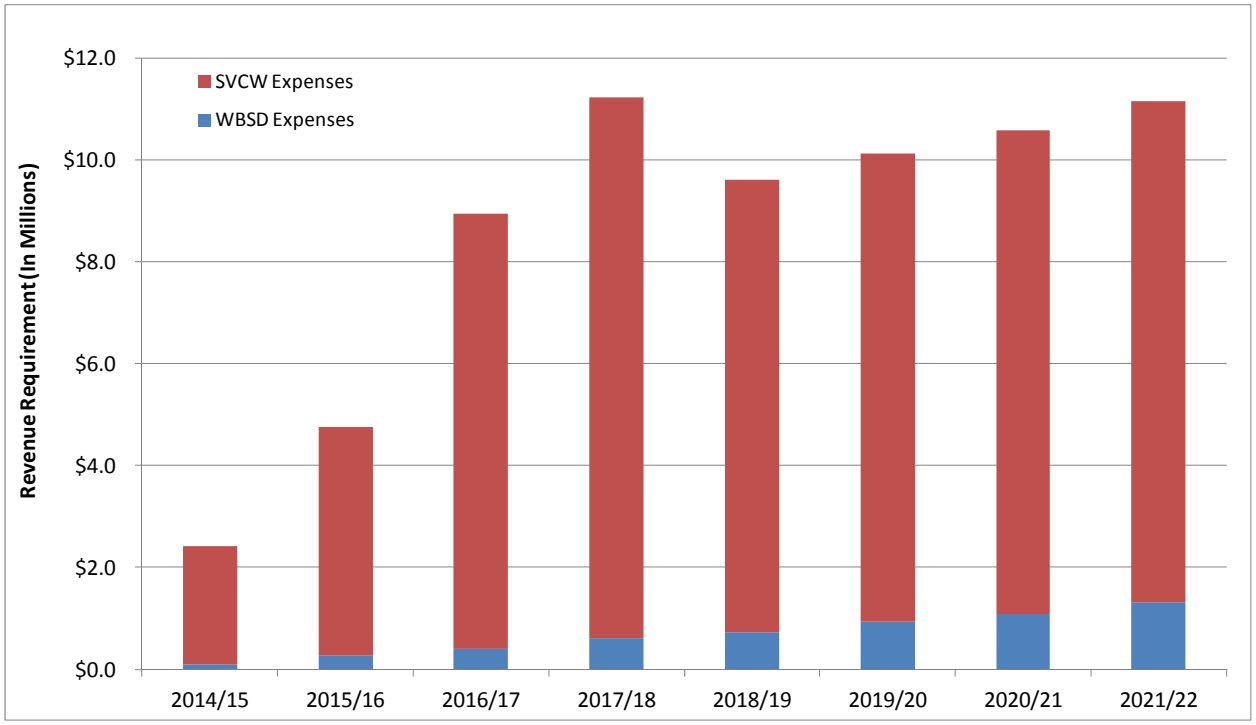


Figure 3-6. Cumulative Increases in Revenue Requirements



4. PROJECTED RATE INCREASES

4.2 REVENUE AND RATE INCREASES

Current rates cannot support the projected revenue requirements shown in Figure 3-4. The revenue increases and corresponding sewer service charges that are recommended are summarized in Figure 4-1. The revenue increase represents how much more revenue is needed compared to existing rates.

Figure 4-1. Projected Revenue and Rate Increase

	ADOPTED 2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Sewer Service Charge per EDU	$820	$893	$974	$1,062	$1,157	$1,192	$1,216	$1,240	$1,265
Annual Increase in Charge	$0	$74	$80	$88	$96	$35	$24	$24	$25
Annual Increase	9.0%	9.0%	9.0%	9.0%	9.0%	3.0%	2.0%	2.0%	2.0%
Cumulative Increase		*19%*	*30%*	*41%*	*54%*	*58%*	*62%*	*65%*	*68%*

4.2.1 STEP/Grinder Charges

The District has approximately 60 single family residential customers located in the On-Site Wastewater Disposal Zone who require either Septic Tank Effluent Pumping systems (STEP) or Grinder Pumping systems. These customers are currently charged an additional $222 annually for the services the District provides these customers to service and replace their pumps and appurtenances; it has been the District's practice to charge the same amount for either a STEP or grinder pump.

Before FY 2013-14, the District had not updated the STEP/grinder charge for several years. During last year's update, cost analyses were prepared and verified by HF&H which indicated that the District's current cost to maintain STEP and grinder pumping systems is greater than the District's charge. Going forward, the Board elected to increase the STEP/Grinder charges by the same percentage as the sewer service charges in order to continue to recover the majority of the costs associated with providing this service. Figure 4-3 outlines the projected rate increases:

Figure 4-2. Projected STEP/Grinder Charges

	ADOPTED 2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
STEP/Grinder Charge per EDU	$222	$242	$264	$287	$313	$323	$329	$336	$343
Annual Increase in Charge	$0	$20	$22	$24	$26	$9	$6	$7	$7
Annual Increase	9.0%	9.0%	9.0%	9.0%	9.0%	3.0%	2.0%	2.0%	2.0%

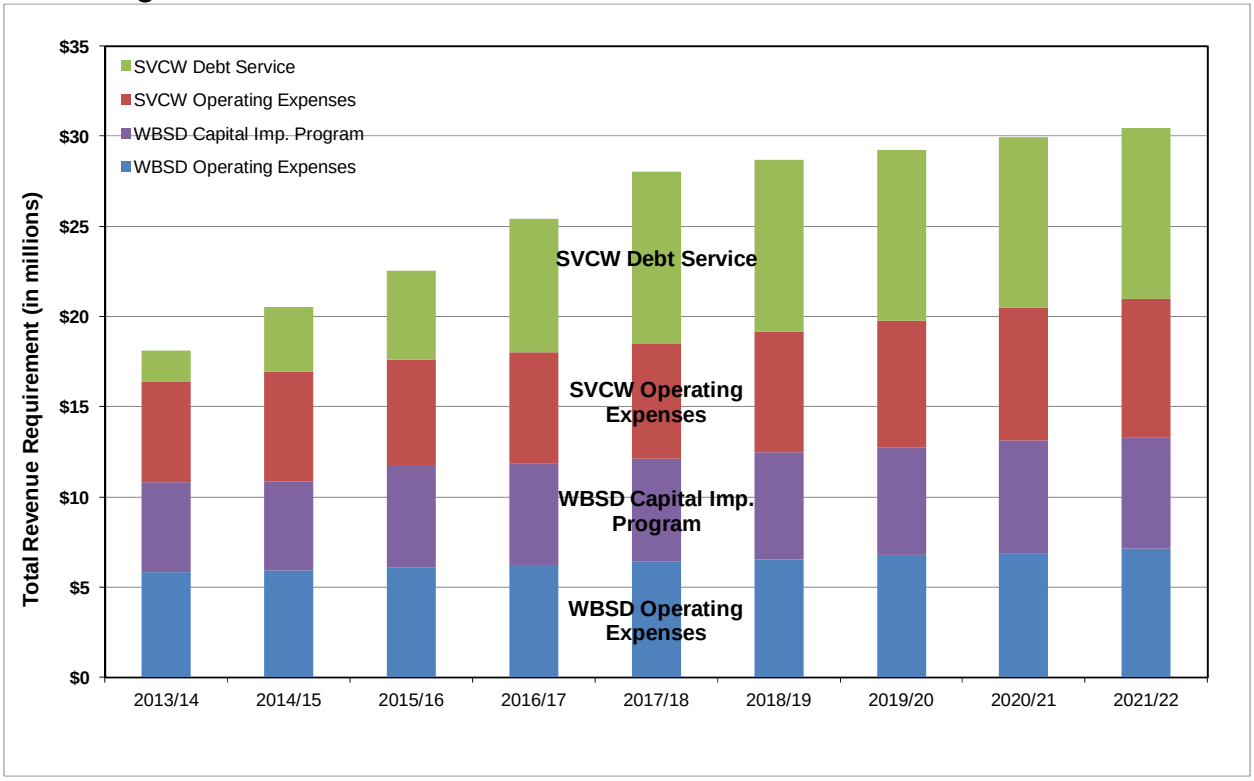
4.3 FUND BALANCE

Figure 4-3 shows the projected annual fund balances with the rate increases (solid green line) and without the rate increases (dashed green line). Although the projections show straight lines between years, the fund balance will fluctuate down substantially during each year. In other words, the reserves are actively drawn on at all times during the year but only periodically added to when payments are received from the County. The reserves are not simply accumulated without being used.

By June 30, 2017, the projected fund balance would be nearly zero without future rate increases, assuming that the District did not to reduce expenditures. Clearly, the District would not be able to continue expenditures that would result in a negative fund balance. The District would have to severely curtail expenditures if rates were not increased.

The recommended sewer service charges are increased so that the resulting fund balance meets the target balance (blue line). Once the target balance is met, the District will have sufficient liquidity to fund operating and capital needs, but should not be regarded as being amply endowed. Additional funding that can be accumulated above the target balance will provide the District with a contingency for emergencies or other unanticipated events.

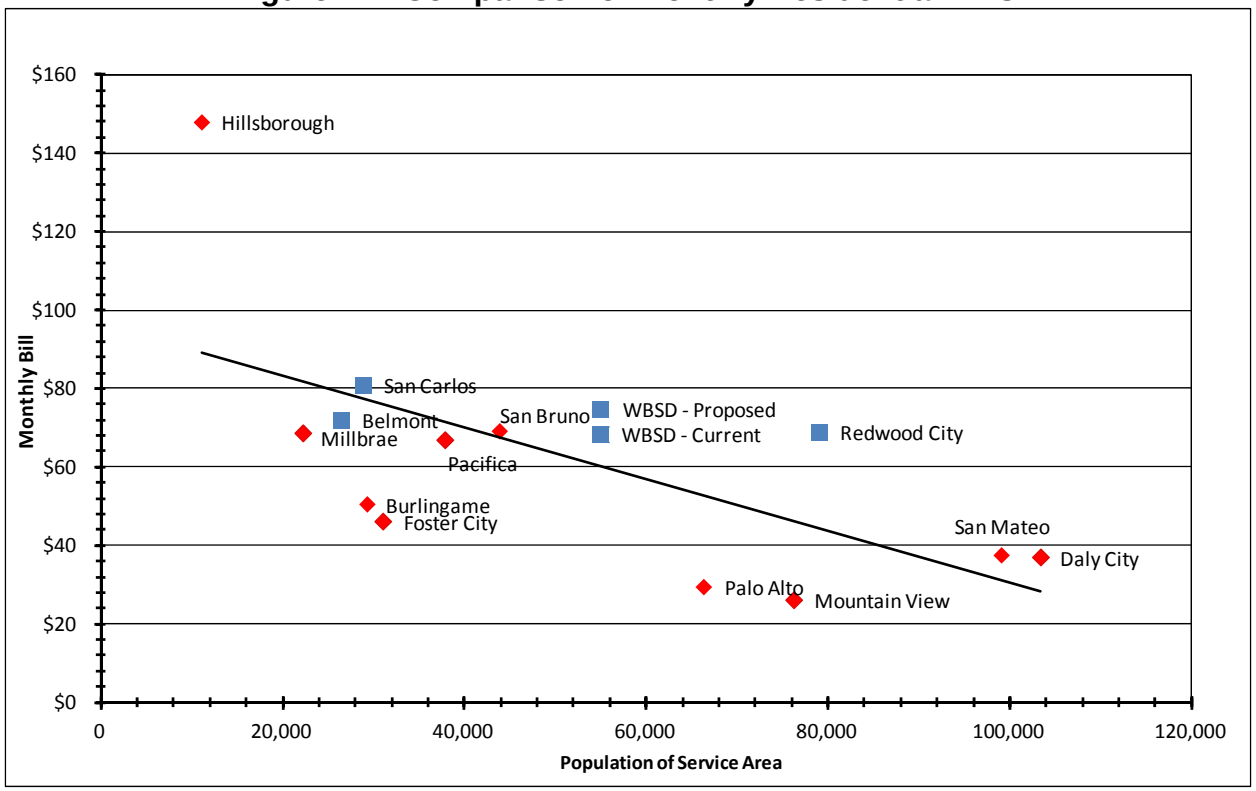
Figure 4-3. Fund Balance With and Without Increased Rate Revenue



4.4 COMPARISON OF RECENT AND PROPOSED SEWER COSTS

Based on available sources, Figure 4-4 shows the recent charges[2] for sewer service among various San Mateo and Santa Clara County agencies. Larger agencies tend to have lower rates because they can take advantage of economies of scale and have a larger base of customers over which to distribute fixed costs. Figure 4-4 indicates that the District's current sewer rates track the trend line along with the other SVCW member agencies (identified with blue squares in Figure 4-4). It should be noted that the other SVCW member agencies are also faced with similar additional costs as the District. It is expected that these agencies will be required to increase their rates substantially to cover their share of SVCW costs. Even with the projected rate increases, we would not expect the District's position among its neighbors to change significantly.

Figure 4-4. Comparison of Monthly Residential Bills



[2] In most cases, the proposed increases in sewer service charges are already adopted. In some cases, the final charge is pending adoption at the respective agency's public hearing.

5. CUSTOMER LOADING AND FLOW ANALYSIS

5.1 COST OF SERVICE ANALYSIS

In recent years, the District's rate-setting process focused on ensuring that revenue from rates is sufficient to cover its revenue requirements. As a result of the magnitude of the increases in the District's share of SVCW's debt service, the District's rates have increased 9% per year over the last two years. These percentage increases have been applied across the board to the rates charged to all the District's customers.

By applying the same percentage increase to all rates, the District has maintained the current proportionality among its residential and non-residential customers. In other words, each class has continued to pay the same proportionate share of the overall costs. The amount that each class pays as a proportion of the total represents its share of the cost of service. The cost of service is determined by allocating costs in proportion to the services that each class requires to treat its share of the flow and the amount of BOD and TSS that it contributes.

Cost of service analysis should be conducted periodically to ascertain each class' share of the total loading. The interval between cost of service analyses is typically five years. During that time, it is unlikely that there is a significant difference in the relative distribution of loadings among customer classes. Longer periods may be appropriate in stable service areas. It has been at least five years since the last cost of service analysis was performed.

It is appropriate for the District to undertake a new cost of service analysis in the near future. Cost of service analysis requires the best available data on customer class flows and on BOD and TSS strength concentrations. Customer class flows are typically derived from billing data from the local water supplier. Strength concentrations are based on State guidelines[3] for most customer classes and from sampling data for industrial customers.

The acquisition of metered water billing data can complicate conducting a cost of service analysis. In the District's case, its customers are served potable water by six different water suppliers. Each of these water suppliers collects its own meter readings using its own customer billing systems. This data is currently compiled for the District's non-residential customers, which are billed based on flow. Because the number of residential accounts is much greater, the process of collecting this data for individual single and multi family accounts would be significantly more complicated. The District does not currently collect residential meter reading data because its

[3] *Revenue Program Guidelines.* State Water Resources Control Board.

residential customers are not billed based on their individual flow; they are billed per EDU.

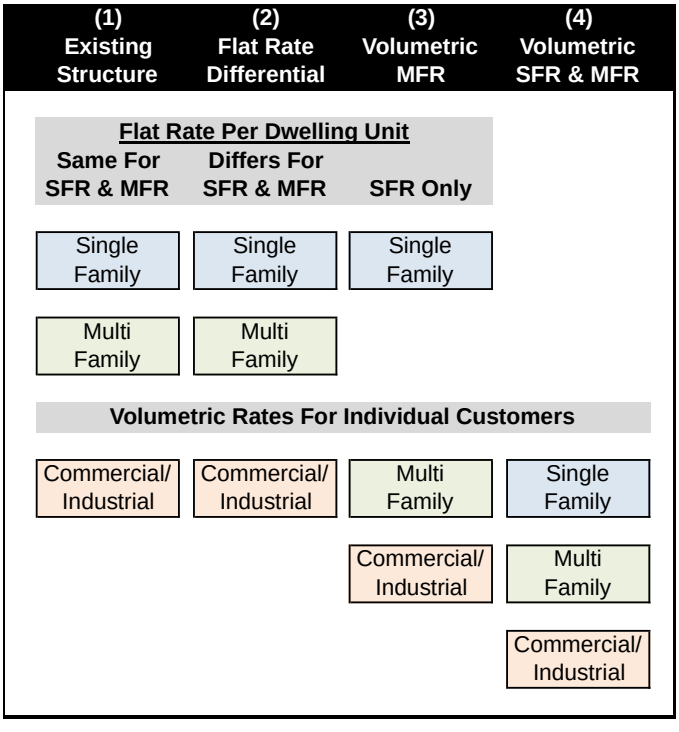
5.2 RATE DESIGN

Cost of service analysis is also a precursor for evaluating rate structures. In the District's case, its residential flat charges per EDU and its volumetric non-residential rates should be set so that they generate each class' share of the cost of service. The District should evaluate its rate structure at the same time it updates its cost of service analysis.

Last year, three of the District's multi-family customers expressed concerns about the multi-family rates, which currently are the same per EDU charge as the single family rate. These customers pointed out that multi family customers can have lower flow per dwelling unit than single family customers because multi family dwellings may have fewer bedrooms and, hence, fewer occupants; lower occupancy can also occur among single family customers.

To account for lower flows per dwelling unit in setting rates, other rate structures are used in the industry for multi-family customers as shown in Figure 5-1. The alternatives are arranged from left to right according to the extent to which flow data is used for setting residential rates.

Figure 5-1. Alternative Rate Structures



The District's existing rate structure (column 1 in Figure 5-1) charges the same flat rate per dwelling unit for single and multi family customers, which is the most common residential rate structure. The District's non-residential commercial and industrial customers are based on their individual flow data.

Some wastewater agencies are able to charge different flat rates for single and multi family dwelling units based on differences in flow when flow data is available (column 2). In this case, flow data for the single family and multi family classes is used to establish different flat rates for single and multi family customers.

Typically, flow is evaluated periodically and used to establish the differential between single and multi family customers that will apply for several years; annual flow analysis is not warranted because the differential does not vary greatly.

A third alternative is to charge multi family accounts based on flow rather than per dwelling unit while leaving single family customers with flat rates per dwelling unit (column 3). This is the same way the District currently charges its commercial accounts. Multi family accounts are usually commercial in nature because the landlord is the customer, not the tenants.

A fourth alternative is to charge all customers, including single family customers, based on their individual flow (column 4). This is difficult for most wastewater agencies that do not have ready access to metered water billing data, such as the District.
Rate design also depends on data for flow and for BOD and TSS concentrations. For a comprehensive rate design, the District would need to aggregate the flow from its several water suppliers by customer class. It is also advisable for the District to compile multiple years of metered water use data so that it does not determine the cost of service and design rates based on a single year's metered water use data. With multiple years, the District could calculate averages that could be fixed during the term of the cost of service analysis or on a running average of, say, three years.

Averages can smooth out the fluctuations from year to year caused by changes in occupancy and climate. Occupancy can be a factor for residential customers when winter water use, the time of year when irrigation is the lowest, is used to estimate sewered flows. Occupancy during this two-month to four-month period may not be representative of year-round occupancy because of visiting guests or winter vacations. The use of multi-year averages can account for unusual occupancy. Using winter water use minimizes the amount of outside water use but may still be affected by irrigation in drier winters. Again, the use of averages can smooth out the climatic differences from year to year.

Designing accurate rates and calculating fair customer bills depends on the best available flow data. Because of the difficulty the District has in compiling flow data from disparate sources, it is difficult for the District to design sophisticated residential rates. Its current residential rates are flat, unvarying amounts for both its single and multi family customers, which can be calculated without knowing each customer's water use data.

The District's flat residential rates are the most common structure in California. Approximately two-thirds of wastewater agencies charge flat residential rates. The one-third that charge volumetric residential rates do so to improve rate payer equity. By using flow, these agencies are reflecting proportionate differences among each customer's flow. The majority of agencies that charge volumetric residential rates are

also the local water supplier, which gives them ready access to the metered water use data. These agencies also issue their own bills for both water and wastewater service. The District has neither of these advantages. The District does not provide water service and bills its customers on the tax rolls.

5.3 RECENT FLOW STUDIES

Based on the concerns expressed by the District's multi family customers, District staff conducted a flow monitoring study during September 10, 2013 through October 14, 2013 to determine the gallon per day flow rate for multi-family and single family customers discharging into the District's conveyance system, and to determine if the daily loadings are higher in concentration for single family versus multi family. The District selected two neighborhoods that included either single or multi family dwelling units exclusively.

The study determined that the average daily flow from the single and multi family dwelling units was 203 GPD and 201 GPD, respectively. It was also found that the single family BOD and TSS concentrations were 50% higher than the multi family concentrations. The details of the District's analysis can be found in Appendix B.

Another flow study was conducted using single and multi family residential meter readings from January 2011 to April 2011 for a portion of the City of Menlo Park, which represented a subset of the District's total service area. The single family average daily flow was 322 gpd, based on the January 2011 to April 2011 water data, annualized. The 322 gpd included unsewered water use such as irrigation. This 322 gpd compared with the 203 gpd from the District's focused monitoring study suggests that 63% of the water use returned to the sewer.

Using the metered water use data from January 2011 to April 2011, annualized, for the City of Menlo Park multi family customers yielded a daily flow of 115 gpd, which is well below the 201 gpd from the District's focused monitoring study. This inconsistency indicates that the 201 gpd value is not representative of the part of Menlo Park for which 115 gpd is the water use. This illustrates the difficulty the District is faced with in determining the difference in flow between single and multi family customers for purposes of designing rates. Further analysis of flow is required before the District can draw any conclusions on the difference in flow between single and multi family flows.

5.4 FURTHER ANALYSIS

Because the District has not conducted a recent cost of service analysis, we recommend that it do so based on the best available data. Recent flow studies presented discrepancies that underscore the difficulty the District is faced with in analyzing flow data from a number of water suppliers.

We recommend that the District collect metered water use data from its water suppliers for as many of its customers as feasible for a period of at least three years. This data can be used for calculation flows by customer class, which can be used for the cost of service analysis as well as for evaluating the rate structure.

We further recommend that the District compile loading data for BOD and TSS for its flow to the SVCW treatment plant as well as for its industrial customers for the next three years. This loading data can also be used for determining each customer class' share of the cost of service but also for designing rates.

With three years of data, the District should calculate the variance from year to year for each class. If the variances are significant (e.g., greater than ±5% per year from the three-year average), we recommend collecting two more years of flow and loading data, for a total of five years.

The District should be able to determine with either three or five years of flow data whether there is sufficient difference in flow between single and multi family customers to adjust its flats rates. Alternatively, the District could elect to convert its multi family accounts to commercial accounts, which would be billed on flow rather than per dwelling unit.

With multiple years of industrial sampling data, coupled with multiple years of flow data, the District should also be able to adjust its non-residential rates so that they reflect the current cost of service.

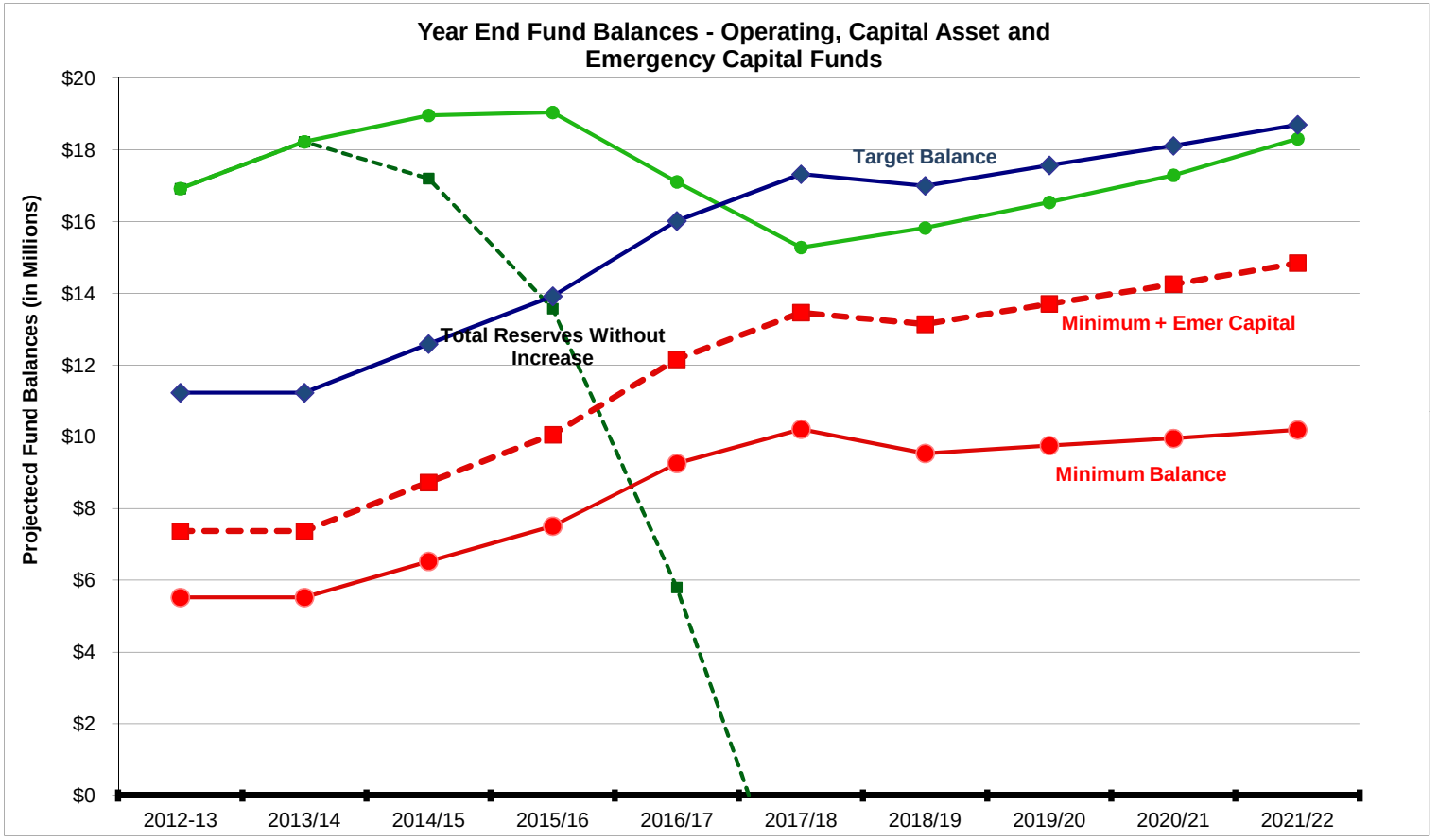
In adjusting either multi family or non-residential rates, we recommend a gradual transition from the current rate structure to a new rate structure. The transition will avoid "rate shock" in which sudden hardships are experienced.

APPENDIX A. SEWER RATE MODEL

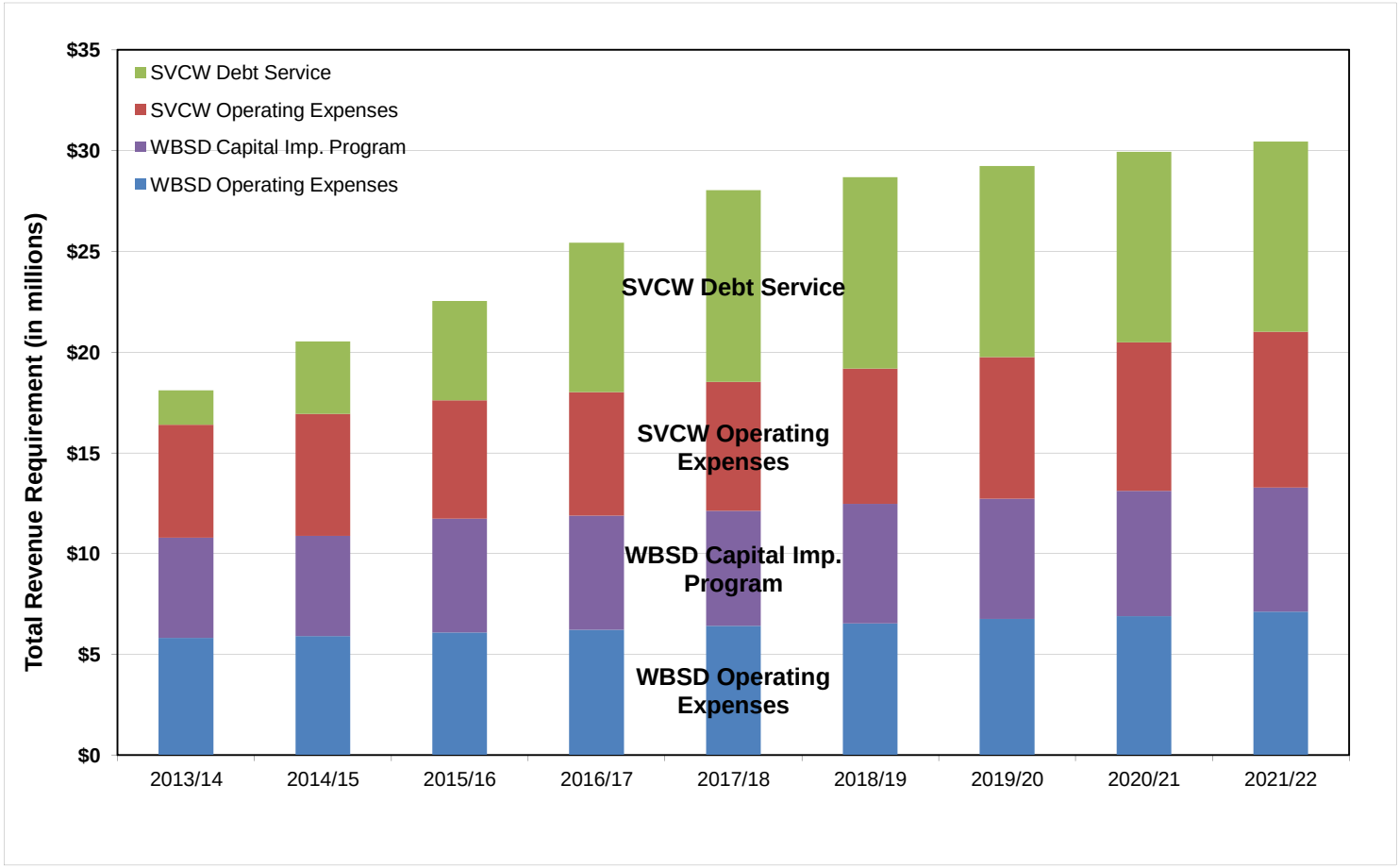
West Bay Sanitary District
Sewer Rate Study
Table 1A. Summary

Scenario #3

	Adopted 2012/13	Adopted 2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Notes
Fiscal Year:											
Revenue Increases	**9%**	**9%**	9.0%	9.0%	9.0%	9.0%	3.0%	2.0%	2.0%	2.0%	To Tables 3, 4
Cumulative Increase			*18.8%*	*29.5%*	*41.2%*	*53.9%*	*58.5%*	*61.6%*	*64.9%*	*68.2%*	From Table 3
Average Residential Bill	*$752*	*$820*	*$893*	*$974*	*$1,062*	*$1,157*	*$1,192*	*$1,216*	*$1,240*	*$1,265*	
Average Residential Bill Increase			*$74*	*$80*	*$88*	*$96*	*$35*	*$24*	*$24*	*$25*	



	A	B	C	D	E	F	G	H	I	J	K	L
1	**West Bay Sanitary District**											
2	**Sewer Rate Study**											
3	**Table 1A. Summary**		Scenario #3	9%	9%	9%	9%	6%	2%	2%	2%	



West Bay Sanitary District
Sewer Rate Study
Table 1B. General

List of Model Worksheets

Table 1A. Summary
Table 1B. General
Table 2. Revenue Requirement
Table 3. Revenue Increases
Table 4. Reserves
Table 5. Capital Projects
Table 6. Debt Service Schedule

Assumptions	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Source	Notes
(1) General Inflation	Per Budget	3.0%	3.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	WBSD Budget	To Table 2
(2) Utilities	Per Budget	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	Estimate	To Table 2
(3) Salaries & Benefits	Per Budget	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	Estimate	To Table 2
(5) SVCW O&M Increase %	Per Budget	6.8%	4.6%	4.7%	4.7%	5.0%	5.0%	5.0%	5.0%	SVCW Fin. Plan 12/9/2013	To Table 2
(7) Interest on Earnings	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	WBSD Budget	To Table 4
(8) Non-rate Revenues	Per Budget	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	Estimate	To Table 2
(9) % Growth in Accounts & Demand	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	Estimate	To Tables 2,3
(10) Cost of Grinder Maintenance	Per Budget	9.0%	9.0%	9.0%	9.0%	3.0%	2.0%	2.0%	2.0%	Based on Table 1A	To Table 2
(11) Construction Cost Inflation	Per Budget	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	ENR SF BCI; 2013 to 2012 YR Avg	To Table 5

Target Fund Balances

Operating Fund

Purpose	For O&M cash flow during the year
Minimum balance	Cannot go negative
Target balance	Five months of operating expenses

Capital Asset Fund

Purpose	To be used for replacement of Equipment/ Facilities
Minimum balance	Cannot go negative
Target balance	$3,500,000

Emergency Capital Fund

Purpose	To be used for sewer emergencies
Minimum balance	Cannot go negative
Target balance	$5,000,000

West Bay Sanitary District
Sewer Rate Study
Table 2. Revenue Requirement

	Tbl. 1B	Budgeted 2013/14	Projected 2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Notes
SVCW Projected Expenses											
Contrib. to Operations	(5)	$5,010,794	$5,352,000	$5,600,000	$5,861,000	$6,136,000	$6,442,800	$6,764,940	$7,103,187	$7,458,346	WBSD Cash Flow FCST 12/18/201
Contrib. to Capital Reserve (fmrly ERF)		$589,116	$268,000	$268,000	$268,000	$268,000	$268,000	$268,000	$268,000	$268,000	WBSD Cash Flow FCST 12/18/201
Contrib. to SRF Reserve		$0	$401,000	$979,000	$2,296,000	$2,034,000	$0	$0	$0	$0	WBSD Cash Flow FCST 12/18/201
Line of Credit Expense		$20,000	$27,000	$34,000	$40,000	$0	$0	$0	$0	$0	WBSD Cash Flow FCST 12/18/201
2008 SVCW Bond ($10 million)		$200,278	$201,378	$202,278	$198,578	$198,934	$198,940	$198,577	$198,577	$198,577	From Table 6
2009 SVCW Bond ($55 million)		$1,301,018	$1,298,882	$1,294,981	$1,284,356	$1,281,924	$1,272,780	$1,262,048	$1,253,626	$1,247,598	From Table 6
2014 SVCW Bond ($60 million)		$0	$989,284	$1,145,508	$1,144,323	$1,144,173	$1,144,768	$1,144,886	$1,145,479	$1,145,183	From Table 6; Bartle Wells Repor
Future SVCW Bonds		$0	$500,000	$708,000	$915,000	$992,000	$992,000	$992,000	$992,000	$992,000	SVCW Fin Plan 12/9/13 and Staff
2011 SRF Loan ($7 million)		$206,921	$204,530	$202,065	$199,524	$196,904	$194,202	$191,417	$188,546	$185,585	From Table 6 - Estimated
2012 SRF Loan - WWTP Projects		$0	$0	$611,000	$611,000	$603,940	$596,662	$589,158	$581,421	$573,445	SVCW Fin Plan 12/9/2013; From
Future SVCW SRF Loan		$0	$401,000	$769,000	$3,065,000	$5,099,000	$5,099,000	$5,099,000	$5,099,000	$5,099,000	SVCW Fin Plan 12/9/2013; 2020/
Subtotal, SVCW		$7,328,126	$9,643,073	$11,813,832	$15,882,780	$17,954,875	$16,209,152	$16,510,026	$16,829,836	$17,167,734	
Annual Change			*31.6%*	*22.5%*	*34.4%*	*13.0%*	*-9.7%*	*1.9%*	*1.9%*	*2.0%*	
Operating Expenses											
Salaries	(3)	$2,759,540	$2,814,731	$2,871,025	$2,928,446	$2,987,015	$3,046,755	$3,107,690	$3,169,844	$3,233,241	
Employee Benefits	(3)	$1,153,542	$1,176,613	$1,200,145	$1,224,148	$1,248,631	$1,273,604	$1,299,076	$1,325,057	$1,351,558	
Director's Fees	(1)	$28,365	$29,216	$30,092	$31,296	$32,548	$33,850	$35,204	$36,612	$38,077	
Election Expense		$40,000	$0	$40,000	$0	$40,000	$0	$40,000	$0	$40,000	Per Board's Direction
Gasoline, Oil and Fuel	(1)	$75,000	$77,250	$79,568	$82,750	$86,060	$89,503	$93,083	$96,806	$100,678	
Insurance	(1)	$92,000	$94,760	$97,603	$101,507	$105,567	$109,790	$114,181	$118,749	$123,499	
Memberships	(1)	$21,800	$22,454	$23,128	$24,053	$25,015	$26,015	$27,056	$28,138	$29,264	
Office Expense	(1)	$33,000	$33,990	$35,010	$36,410	$37,866	$39,381	$40,956	$42,595	$44,298	
Operating Supplies	(1)	$343,395	$353,697	$364,308	$378,880	$394,035	$409,797	$426,189	$443,236	$460,966	
Contractual Services	(1)	$283,000	$291,490	$300,235	$312,244	$324,734	$337,723	$351,232	$365,281	$379,893	
Professional Services	(1)	$425,350	$438,111	$451,254	$469,304	$488,076	$507,599	$527,903	$549,019	$570,980	
Printing and Publications	(1)	$62,500	$64,375	$66,306	$68,959	$71,717	$74,586	$77,569	$80,672	$83,899	
Rents and Leases	(1)	$28,000	$28,840	$29,705	$30,893	$32,129	$33,414	$34,751	$36,141	$37,587	
Repairs and Maintenance	(1)	$258,825	$266,590	$274,587	$285,571	$296,994	$308,874	$321,228	$334,078	$347,441	
Research and Monitoring	(1)	$8,000	$8,240	$8,487	$8,827	$9,180	$9,547	$9,929	$10,326	$10,739	
Travel and Meetings	(1)	$51,500	$53,045	$54,636	$56,822	$59,095	$61,458	$63,917	$66,473	$69,132	
Utilities	(2)	$140,500	$147,525	$154,901	$162,646	$170,779	$179,318	$188,283	$197,698	$207,582	
Other Operating Expense	(1)	$153,000	$157,590	$162,318	$168,810	$175,563	$182,585	$189,889	$197,484	$205,384	
Transf. to Solid Waste Fund		($65,000)	($65,000)	($65,000)	($65,000)	($65,000)	($65,000)	($65,000)	($65,000)	($65,000)	
WBSD Emer. Reserve LOC fee		$15,000	$15,000	$15,000	$15,000	$15,000	$5,000	$5,000	$5,000	$5,000	WBSD Cash Flow FCST 12/9/2013
Subtotal, Operating Expenses		$5,907,317	$6,008,516	$6,193,308	$6,321,566	$6,535,003	$6,663,798	$6,888,136	$7,038,209	$7,274,217	
Annual Change			*1.7%*	*3.1%*	*2.1%*	*3.4%*	*2.0%*	*3.4%*	*2.2%*	*3.4%*	
Non-Operating Expenditures											
Other Non-Operating Expense	(1)	$6,000	$6,180	$6,365	$6,620	$6,885	$7,160	$7,447	$7,744	$8,054	
Contrib. to LAFCo		$7,500	$8,175	$8,911	$9,713	$10,587	$10,904	$11,123	$11,345	$11,572	Incr. by Rate % on Table 1A
Subtotal, Non-Operating Expenditures		$13,500	$14,355	$15,276	$16,333	$17,472	$18,065	$18,569	$19,089	$19,626	
Annual Change			*6.3%*	*6.4%*	*6.9%*	*7.0%*	*3.4%*	*2.8%*	*2.8%*	*2.8%*	
Total Expenses		**$13,248,943**	**$15,665,944**	**$18,022,416**	**$22,220,679**	**$24,507,350**	**$22,891,015**	**$23,416,732**	**$23,887,135**	**$24,461,577**	
Annual Change											
		55%									
Non-Operating Revenues											
Flow Eq. Cost Sharing		($47,916)	($52,708)	($57,978)	($63,776)	($70,154)	($77,169)	($84,886)	($93,375)	($102,712)	Increases 10% per annum
Permit & Inspection Fees	(8)	($50,000)	($50,500)	($51,005)	($51,515)	($52,030)	($52,551)	($53,076)	($53,607)	($54,143)	
Franchises		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Grinder Maintenance	(10)	($7,783)	($8,483)	($9,247)	($10,079)	($10,986)	($11,316)	($11,542)	($11,773)	($12,009)	

	A	B	C	D	E	F	G	H	I	J	K	L
1	**West Bay Sanitary District**											
2	**Sewer Rate Study**											
3	**Table 2. Revenue Requirement**											
4												
5		**Tbl.**	**Budgeted**	**Projected**								
6		**1B**	**2013/14**	**2014/15**	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**Notes**
58	Other Non-Operating Income	(8)	$0	$0	$0	$0	$0	$0	$0	$0	$0	
59	**Subtotal, Non-Operating Income**		($105,699)	($111,691)	($118,230)	($125,370)	($133,170)	($141,036)	($149,504)	($158,755)	($168,864)	
60												
61	**Other Transfers to/(from)**											
62	Operating (General) Fund		$5,400,000	$5,000,000	$4,500,000	$2,400,000	$2,200,000	$5,600,000	$5,800,000	$6,100,000	$6,700,000	From Table 4
63	Capital Projects Fund		$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$0	From Table 4
64	Emergency Capital Reserves		$0	$0	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	From Table 4
65	**Total Transfers**		$5,750,000	$5,350,000	$5,200,000	$3,100,000	$2,900,000	$6,300,000	$6,500,000	$6,800,000	$7,050,000	
66												
67	**Total Revenue Requirement**		**$18,893,244**	**$20,904,253**	**$23,104,186**	**$25,195,309**	**$27,274,179**	**$29,049,980**	**$29,767,227**	**$30,528,380**	**$31,342,714**	To Table 3
68	*Annual Change*			*10.6%*	*10.5%*	*9.1%*	*8.3%*	*6.5%*	*2.5%*	*2.6%*	*2.7%*	
69	*Cumulative Change*			*10.6%*	*22.3%*	*33.4%*	*44.4%*	*53.8%*	*57.6%*	*61.6%*	*65.9%*	
70												
71	*Source: West Bay Sanitary District FY 2013/14 Budget*											

	A	B	C	D	E	F	G	H	I	J	K
1	**West Bay Sanitary District**										
2	**Sewer Rate Study**										
3	**Table 3. Revenue Increases**										
4											
5											
6		**Estimated**	**Projected**								
7		**2013/14**	**2014/15**	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**Notes**
8	**Current Rate Revenue**										
9	Sewer Service Charges	$17,687,653	$17,776,091	$17,864,972	$17,954,297	$18,044,068	$18,134,288	$18,224,960	$18,316,085	$18,407,665	2013-14 from COS Analysis Da
10	Revenue Requirement	($18,893,244)	($20,904,253)	($23,104,186)	($25,195,309)	($27,274,179)	($29,049,980)	($29,767,227)	($30,528,380)	($31,342,714)	From Table 2
11	**To/(From) operations before Rate Incr.**	($1,205,591)	($3,128,162)	($5,239,214)	($7,241,012)	($9,230,111)	($10,915,691)	($11,542,267)	($12,212,296)	($12,935,048)	To Table 4
12											
13											
14	**Increase in Rate Revenue**	**9%**	**9%**	**9%**	**9%**	**9%**	**3%**	**2%**	**2%**	**2%**	From Table 1B
15	Cumulative Increase in Rate Revenue	9%	18.81%	29.50%	41.16%	53.86%	58.48%	61.65%	64.88%	68.18%	To Table 1A
16	**Revenue from Rate Increases**										
17	FY 2013-14 (eff. July 1, 2013)	$1,591,889	$1,599,848	$1,607,847	$1,615,887	$1,623,966	$1,632,086	$1,640,246	$1,648,448	$1,656,690	
18	FY 2014-15 (eff. July 1, 2014)		$1,743,835	$1,752,554	$1,761,316	$1,770,123	$1,778,974	$1,787,869	$1,796,808	$1,805,792	
19	FY 2015-16 (eff. July 1, 2015)			$1,910,284	$1,919,835	$1,929,434	$1,939,081	$1,948,777	$1,958,521	$1,968,313	
20	FY 2016-17 (eff. July 1, 2016)				$2,092,620	$2,103,083	$2,113,599	$2,124,167	$2,134,787	$2,145,461	
21	FY 2017-18 (eff. July 1, 2017)					$2,292,361	$2,303,823	$2,315,342	$2,326,918	$2,338,553	
22	FY 2018-19 (eff. July 1, 2018)						$837,056	$841,241	$845,447	$849,674	
23	FY 2019-20 (eff. July 1, 2019)							$577,652	$580,540	$583,443	
24	FY 2020-21 (eff. July 1, 2020)								$592,151	$595,112	
25	FY 2021-22 (eff. July 1, 2021)									$607,014	
26	**Total Revenue from Rate Increases**	$1,591,889	$3,343,683	$5,270,685	$7,389,658	$9,718,967	$10,604,618	$11,235,293	$11,883,620	$12,550,052	
27	**Total Current Revenue**	$17,687,653	$17,776,091	$17,864,972	$17,954,297	$18,044,068	$18,134,288	$18,224,960	$18,316,085	$18,407,665	From above
28	**Total Revenue**	$19,279,542	$21,119,774	$23,135,656	$25,343,955	$27,763,035	$28,738,906	$29,460,253	$30,199,705	$30,957,718	
29	**Revenue Requirement**	($18,893,244)	($20,904,253)	($23,104,186)	($25,195,309)	($27,274,179)	($29,049,980)	($29,767,227)	($30,528,380)	($31,342,714)	From above
30	**To/(From) operations after Rate Incr.**	**$386,298**	**$215,521**	**$31,471**	**$148,646**	**$488,856**	**($311,074)**	**($306,975)**	**($328,675)**	**($384,996)**	To Table 4

West Bay Sanitary District
Sewer Rate Study
Table 4. Reserves

	Tbl. 1B	Actual 2012-13	Budgeted 2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Notes
OPERATING (GENERAL) FUND												
Revenue Increases			9%	9%	9%	9%	9%	3%	2%	2%	2%	From Table 1A
Beginning Balance			$6,144,471	$7,970,422	$9,231,873	$9,812,161	$8,402,611	$6,121,924	$5,437,905	$4,955,585	$3,745,544	Ending 2009-10 projected by WBSD
Surplus/Deficit			$386,298	$215,521	$31,471	$148,646	$488,856	($311,074)	($306,975)	($328,675)	($384,996)	From Table 3
Settlement Agreement			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
Transfers (To)/From												
Revenue Requirement			$5,400,000	$5,000,000	$4,500,000	$2,400,000	$2,200,000	$5,600,000	$5,800,000	$6,100,000	$6,700,000	To Table 2
Emergency Capital Reserves			$0	$0	$0	$0	$0	$0	$0	$0	$0	From Below
Capital Asset Fund			($4,000,000)	($4,000,000)	($4,000,000)	($4,000,000)	($5,000,000)	($6,000,000)	($6,000,000)	($7,000,000)	($7,500,000)	To Below
Fund Subtotal			$7,930,769	$9,185,943	$9,763,344	$8,360,807	$6,091,467	$5,410,851	$4,930,930	$3,726,910	$2,560,548	
Estimated Interest Earnings	(7)		$39,654	$45,930	$48,817	$41,804	$30,457	$27,054	$24,655	$18,635	$12,803	
Ending Balance		$6,144,471	**$7,970,422**	**$9,231,873**	**$9,812,161**	**$8,402,611**	**$6,121,924**	**$5,437,905**	**$4,955,585**	**$3,745,544**	**$2,573,351**	
Minimum Balance (5 mo. operations)			*$5,520,393*	*$6,527,477*	*$7,509,340*	*$9,258,616*	*$10,211,396*	*$9,537,923*	*$9,756,971*	*$9,952,973*	*$10,192,324*	
CAPITAL PROJECTS FUND (includes Capital Project Reserve)												
Beginning Balance			$8,575,330	$8,042,844	$7,507,093	$6,643,621	$5,755,892	$5,840,266	$6,697,486	$7,526,466	$9,118,414	
Revenues												
Connection Charges	(8)		$50,000	$50,000	$51,500	$53,045	$55,167	$57,373	$59,668	$62,055	$64,537	
Capital Projects												
Administration	(3)		($170,000)	($170,000)	($173,400)	($176,868)	($180,405)	($184,013)	($187,694)	($191,448)	($195,277)	
Collection Facilities	(1)		($657,500)	($657,500)	($677,225)	($697,542)	($725,443)	($754,461)	($784,640)	($816,025)	($848,666)	
Subsurface Lines												
Proposed (Master Plan)			($3,500,000)	($3,500,600)	($3,802,400)	($3,800,000)	($3,799,000)	($4,000,000)	($4,000,800)	($4,213,000)	($4,115,000)	From Table 5
Other	(11)		($460,000)	($460,000)	($460,000)	($460,000)	($460,000)	($460,000)	($460,000)	($460,000)	($460,000)	
Construction Proj. Environ Review	(11)		($10,000)	($10,000)	($10,000)	($10,000)	($10,000)	($10,000)	($10,000)	($10,000)	($10,000)	
Manhole Raising	(11)		($100,000)	($100,000)	($100,000)	($100,000)	($100,000)	($100,000)	($100,000)	($100,000)	($100,000)	
Allow. For Unanticipated Cap Ex			($75,000)	($75,000)	($75,000)	($75,000)	($75,000)	($75,000)	($75,000)	($75,000)	($75,000)	
Subtotal Expenses			($4,972,500)	($4,973,100)	($5,298,025)	($5,319,410)	($5,349,849)	($5,583,475)	($5,618,133)	($5,865,473)	($5,803,943)	
Transfers (To)/From												
Revenue Requirements			$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$0	To Table 2
Operating Fund			$4,000,000	$4,000,000	$4,000,000	$4,000,000	$5,000,000	$6,000,000	$6,000,000	$7,000,000	$7,500,000	From Above
Emergency Capital Reserve			$0	$0	$0	$0	$0	$0	$0	$0	$0	To Below
Subtotal Transfers			$4,350,000	$4,350,000	$4,350,000	$4,350,000	$5,350,000	$6,350,000	$6,350,000	$7,350,000	$7,500,000	
Fund Subtotal			$8,002,830	$7,469,744	$6,610,568	$5,727,256	$5,811,210	$6,664,165	$7,489,021	$9,073,049	$10,879,008	
Estimated Interest Earnings	(7)		$40,014	$37,349	$33,053	$28,636	$29,056	$33,321	$37,445	$45,365	$54,395	
Ending Balance		$8,575,330	**$8,042,844**	**$7,507,093**	**$6,643,621**	**$5,755,892**	**$5,840,266**	**$6,697,486**	**$7,526,466**	**$9,118,414**	**$10,933,403**	
Target Balance (Avg Annual CIP)			*$3,858,978*	*$3,858,978*	*$3,858,978*	*$3,858,978*	*$3,858,978*	*$3,858,978*	*$3,858,978*	*$3,858,978*	*$3,858,978*	
EMERGENCY CAPITAL RESERVES												
Beginning Balance			$2,200,000	$2,211,000	$2,222,055	$2,584,915	$2,949,590	$3,316,088	$3,684,418	$4,054,590	$4,426,613	
Transfers (To)/From												
Revenue Requirements			$0	$0	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	To Table 2
Operating Fund			$0	$0	$0	$0	$0	$0	$0	$0	$0	To Above
Capital Asset Fund			$0	$0	$0	$0	$0	$0	$0	$0	$0	From Above
Subtotal Transfers			$0	$0	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	
Fund Subtotal			$2,200,000	$2,211,000	$2,572,055	$2,934,915	$3,299,590	$3,666,088	$4,034,418	$4,404,590	$4,776,613	
Estimated Interest Earnings	(7)		$11,000	$11,055	$12,860	$14,675	$16,498	$18,330	$20,172	$22,023	$23,883	
Ending Balance		$2,200,000	**$2,211,000**	**$2,222,055**	**$2,584,915**	**$2,949,590**	**$3,316,088**	**$3,684,418**	**$4,054,590**	**$4,426,613**	**$4,800,496**	
Minimum Balance			$1,850,000	$2,200,000	$2,550,000	$2,900,000	$3,250,000	$3,600,000	$3,950,000	$4,300,000	$4,650,000	
Target Balance ($5M by 2015-16)			*$5,000,000*	*$5,000,000*	*$5,000,000*	*$5,000,000*	*$5,000,000*	*$5,000,000*	*$5,000,000*	*$5,000,000*	*$5,000,000*	
OPERATING FUND (without rate increases)												
Beginning Balance			$6,144,471	$7,970,422	$7,471,320	$4,345,615	($2,903,508)	($13,341,731)	($23,065,533)	($33,215,912)	($44,736,319)	Ending 2009-10 projected by WBSD
Surplus/Deficit			$386,298	($1,536,273)	($3,647,325)	($5,649,123)	($7,638,223)	($9,323,803)	($9,950,379)	($10,620,407)	($11,343,160)	From Table 3
Settlement Agreement			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
Transfers (To)/From												
Revenue Requirement			$5,400,000	$5,000,000	$4,500,000	$2,400,000	$2,200,000	$5,600,000	$5,800,000	$6,100,000	$6,700,000	From Above
Emergency Capital Reserves			$0	$0	$0	$0	$0	$0	$0	$0	$0	From Above
Capital Asset Fund			($4,000,000)	($4,000,000)	($4,000,000)	($4,000,000)	($5,000,000)	($6,000,000)	($6,000,000)	($7,000,000)	($7,500,000)	From Above
Fund Subtotal			$7,930,769	$7,434,149	$4,323,995	($2,903,508)	($13,341,731)	($23,065,533)	($33,215,912)	($44,736,319)	($56,879,479)	
Estimated Interest Earnings	(7)		$39,654	$37,171	$21,620	$0	$0	$0	$0	$0	$0	
Ending Balance		$6,144,471	**$7,970,422**	**$7,471,320**	**$4,345,615**	**($2,903,508)**	**($13,341,731)**	**($23,065,533)**	**($33,215,912)**	**($44,736,319)**	**($56,879,479)**	
Minimum Balance (5 mo. operations)			*$5,520,393*	*$6,527,477*	*$7,509,340*	*$9,258,616*	*$10,211,396*	*$9,537,923*	*$9,756,971*	*$9,952,973*	*$10,192,324*	

West Bay Sanitary District
Sewer Rate Study
Table 5. Capital Projects

	2013/14	2014/15	2015/16	2016/17	2017/18	Projected 2018/19	2019/20	2020/21	2021/22	FUTURE	Notes
R&R Priority											
Sausal Vista PS and Forcemain	$ 300,000	$ 1,000,000									
North Palo Alto Concrete	$ 1,665,000										
Fair Oaks								$ 2,000,000			
Santa Cruz							$ 1,004,000				
Roble						$ 2,630,000					
Stevenson					$ 1,155,000						
Elena							$ 1,621,800				
Carlton-Madera Easements				$ 1,150,000	$ 1,354,000						
College Park North									$ 2,213,000		
Oak Grove										$ 1,261,000	
Encinal A										$ 2,289,000	
Oak Knoll						$ 845,000					
Encinal B										$ 2,170,000	
Bayfront Expressway											
Menalto Easements								$ 788,000			
Willow											
Berkeley										$ 1,213,000	
Frederick											
Haven						$ 400,000					
Suburban Park											
Willow Road Pump Station											
Hamilton Henderson Pump Station	$ 155,000										
Stowe Lane Pump Station		$ 200,600	$ 802,400								
Village Square (generator)	$ 80,000										
Marsh Road/Burns Easement CIPP	$ 1,000,000		$ 1,000,000	$ 800,000	$ 200,000						
Eastside Triangle	$ 250,000	$ 2,250,000	$ 1,800,000	$ 1,650,000	$ 1,040,000						
Laurel Easement Relief Project									$ 500,000		
Pump Stations (miscellaneous)			$ 150,000	$ 150,000		$ 75,000			$ 200,000		
Point Repairs (miscellaneous)	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 100,000	
Future R&R											
Subtotal - R&R	**$3,500,000**	**$3,500,600**	**$3,802,400**	**$3,800,000**	**$3,799,000**	**$4,000,000**	**$2,675,800**	**$2,838,000**	**$2,963,000**	**$7,033,000**	
Capacity Priority											
James Avenue Diversion											
Lower Ringwood							$ 1,200,000				
Valparaiso									$ 450,000		
Willow Gravity Main									$ 200,000		
Upper Ringwood							$ 125,000	$ 1,375,000			
Santa Cruz Avy										$ 1,100,000	
Cambridge Laurel										$ 3,300,000	
Middlefield at Fair Oaks									$ 502,000		
Future Capacity Projects											
Subtotal - Capacity	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$1,325,000**	**$1,375,000**	**$1,152,000**	**$4,400,000**	
Total CIP	$3,500,000	$3,500,600	$3,802,400	$3,800,000	$3,799,000	$4,000,000	$4,000,800	$4,213,000	$4,115,000		
Inflationary Index		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		From Table 1B
Total Inflated CIP	$3,500,000	$3,500,600	$3,802,400	$3,800,000	$3,799,000	$4,000,000	$4,000,800	$4,213,000	$4,115,000		To Table 4

10-yr uninflated annual average = $3,858,978

Source: West Yost updated capital improvement plan - last revised 2/13/13

West Bay Sanitary District
Sewer Rate Study
Table 6. Debt Service Schedule

			Projected								
		2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Notes
SVCW 2009 Wastewater Revenue Bonds ($55M)											
	Principal	$275,000	$285,000	$295,000	$300,000	$315,000	$325,000	$335,000	$350,000	$370,000	From Schedule
	Interest	$1,026,018	$1,013,882	$999,981	$984,356	$966,924	$947,780	$927,048	$903,626	$877,598	From Schedule
		$1,301,018	$1,298,882	$1,294,981	$1,284,356	$1,281,924	$1,272,780	$1,262,048	$1,253,626	$1,247,598	To Table 2
SVCW 2008 Wastewater Revenue Bonds ($10M) - Maturity Date 8/1/2029											
	Principal	$110,000	$110,000	$115,000	$120,000	$125,000	$125,000	$125,000	$125,000	$125,000	From Schedule
	Interest	$90,278	$91,378	$87,278	$78,578	$73,934	$73,940	$73,577	$73,577	$73,577	From Schedule
		$200,278	$201,378	$202,278	$198,578	$198,934	$198,940	$198,577	$198,577	$198,577	To Table 2
SVCW 2014 Wastewater Revenue Bonds ($60M) - Matures 2044											
	Principal	$0	$243,057	$289,000	$299,375	$314,195	$330,498	$343,836	$361,621	$379,405	From Schedule
	Interest	$0	$746,227	$856,508	$844,948	$829,978	$814,270	$801,050	$783,858	$765,778	From Schedule
		$0	$989,284	$1,145,508	$1,144,323	$1,144,173	$1,144,768	$1,144,886	$1,145,479	$1,145,183	To Table 2
SVCW SRF Loan ($7M)		$ 7,800,000	Par Amount								
		3.10%	Interest								
		20	Years								
		1	2	3	4	5	6	7	8	9	
	Principal	$529,142	$529,142	$529,142	$529,142	$529,142	$529,142	$529,142	$529,142	$529,142	
	Interest	$241,800	$232,892	$223,709	$214,240	$204,478	$194,414	$184,037	$173,339	$162,309	
		$770,942	$762,034	$752,850	$743,382	$733,620	$723,555	$713,179	$702,481	$691,451	To Table 2
WBSD's Share		$206,921	$204,530	$202,065	$199,524	$196,904	$194,202	$191,417	$188,546	$185,585	To Table 2; From SVCW Fin Plan 12/9/13
SVCW SRF Loan ($23M)					$ 23,032,005	Par Amount					
					3.10%	Interest					
					20	Years					
					1	2	3	4	5	6	
	Principal	$0	$0	$0	$1,562,461	$1,562,461	$1,562,461	$1,562,461	$1,562,461	$1,562,461	
	Interest	$0	$0	$0	$713,992	$687,690	$660,572	$632,613	$603,788	$574,069	
		$0	$0	$0	$2,276,453	$2,250,151	$2,223,033	$2,195,074	$2,166,249	$2,136,530	
WBSD's Share		$0	$0	$611,000	$611,000	$603,940	$596,662	$589,158	$581,421	$573,445	To Table 2; From SVCW Fin Plan 12/9/13

APPENDIX B. RESIDENTIAL FLOW AND LOADING ANALYSIS

WEST BAY
SANITARY DISTRICT

Serving Our Community Since 1902

500 Laurel Street, Menlo Park, California 94025-3486 (650) 321-0384 (650)321-4265 FAX

PHIL SCOTT
District Manager

In reply, please refer to our
File No.

October 29, 2013

West Bay Sanitary District Loadings Analysis & Report

By John Simonetti, Regulatory Compliance Coordinator

Introduction

The purpose of this study is; 1) To determine the gallon per day flow rate for Multi-Family and Single Family Residences discharging into the District's conveyance system and 2) Determine if the daily loadings discharged are higher in concentration for MFR's vs. Single Family Residences.

WBSD Staff member John Simonetti and SBSA staff members Dr. Bob Wandro and Norman Domingo met on several occasions to identify how this project could be developed and implemented. It was decided that flow monitoring must be performed first to identify when the peak and off peak flows occurred. The results of the flow monitoring would identify the timeframes for the sampling process.

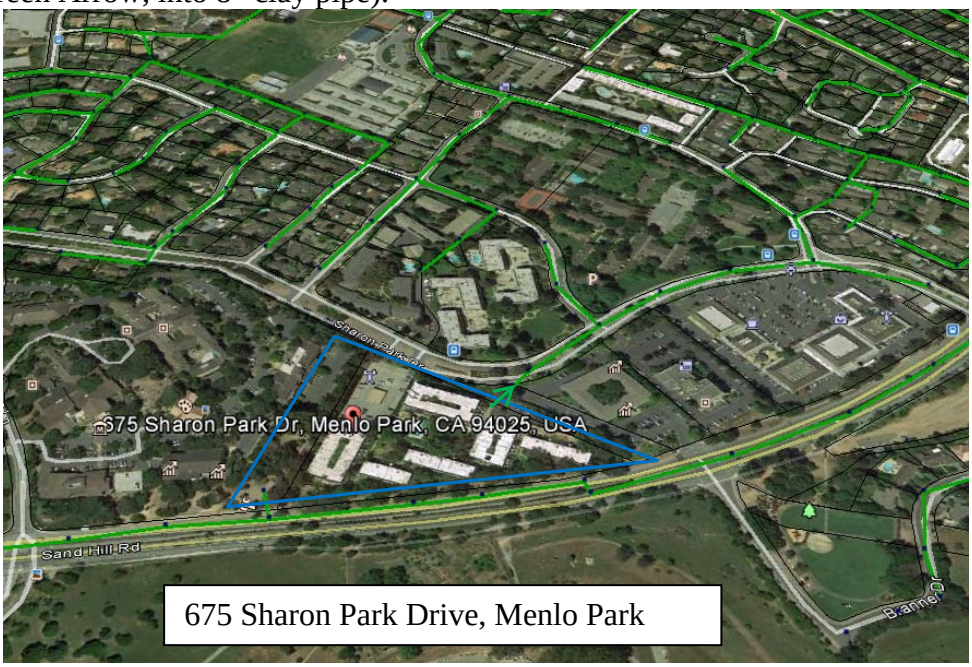
Assumptions: The current assumed flow rates for Single Family (SFR) and Multi-Family Residences (MFR) is estimated at approximately 220 gallons per day. The Total Suspended Solids (TSS) and Biochemical Oxygen Demand (BOD) loadings from the MFR's are currently thought to be higher in concentration and flow when compared to SFR's. The base loading rate is 150 mg/L for BOD and TSS.

Sample Sites

Multi-Family Residences (MFR's) vs. Single Family Residences (SFR's)

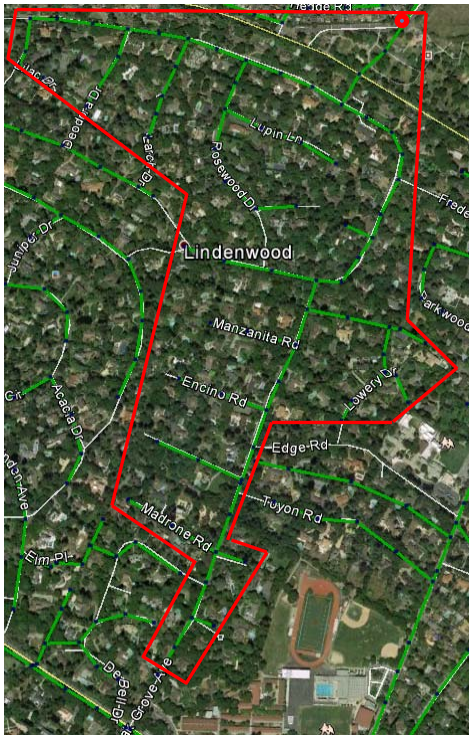
Two areas within the District were identified to perform the above loading and flow analysis; these sites were selected based on ease of accessibility and equipment installation.

The Multi Family Residence location is at 675 Sharon Park Drive in Menlo Park, which has 120 MFR's, (this is Site WBSD 1, located in the picture below within the blue lines. All sanitary sewer flows from this site exit at the Green Arrow, into 8" clay pipe).



675 Sharon Park Drive, Menlo Park

The Single Family Residential Units are located within Atherton which is within the “Red Lines” of the picture below.



The sample location is located at the top right of the picture “Red Bull’s-eye”, 10” clay pipe. There are 157 Single Family residences and 1-Elementary School, upon further review of the number of connections within the sample group Laurel school was confirmed connected within the sample site. The school entitlement is 3205 GPD with an actual usage of 1500 GPD, equivalent to 7-SFR’s. The adjusted number of SFR’s =164.

Flow Monitoring (Installation of equipment by WBSD staff)

The District utilized Non-Contact Flow Meters, manufactured by Marsh McBirney which uses Radar technology (referred to as Flo-Dar) the flow meter is suspended above the flow (Picture at left). Flow Monitoring was performed first to determine the Peak Flow cycles for each sample group. Once the flow cycles were determined, sampling protocols were developed and implemented. The standard used for the peak flow timeframes were 00:00 hours to 0800 hours, 0800 hours to 1600 hours, and 1600 hours to Midnight, Three 8-hour increments for one 24-hour day. Equipment provided by Oratech Controls, Anton Loof.

The flow monitoring period of the project was from September 10, 2013 through October 14, 2013.

Sampling Process

24 hour composite sampling was performed over the course of two weeks. WBSD staff members Jed Beyer and Mark Praturlon deployed two 3700 series ISCO samplers, each with 12-1,000ml bottles. Each bottle received 4-180ml per sample aliquots every 30 minutes.
Three sampling timeframes were used to identify specific house hold activities;

- Midnight to 0800 hours, sleeping, bathing and breakfast off to work and school (Bottles 1-4),
- 0800 hours to 1600 hours, laundry, lunch and
- 1600 hours to midnight, dinner, bathing.

The collected sample timeframes were blended separately into three composite timeframes as noted above to determine loadings to sewer per time frame, then the analytical results of the three samples were totaled and averaged for daily loadings to sewer per Multi Family Residence(s) and Single Family Residence(s).

Sample Analysis & Reports

SBSA performed the sample analysis and reporting to WBSD. The wastewater generated from each sample site was tested for Total Suspended Solids (TSS) and Biochemical Oxygen Demand (BOD).

Biochemical oxygen demand or **B.O.D** is the amount of dissolved oxygen needed by aerobic biological organisms in a body of water to break down organic material present in a given water sample at certain temperature over a specific time period. The BOD value is most commonly expressed in milligrams of oxygen consumed per liter of sample during 5 days of incubation at 20 °C.
Total Suspended Solids of T.S.S. includes all particles suspended in water which will not pass through a filter.

Flow Monitoring and Sample Results

MFDs WBSD-1 Sharon Park Drive, 120-MFD's

Sample Date	Day of the Week	Measured Flow in GPD	Daily AVG BOD mg/L	BOD Loadings in lbs./day to SS	Daily AVG TSS mg/L	TSS Loadings in lbs./day to SS
10-6-2013	Sunday	25,228.89	180	37.87	87.33	18.38
10-14-2013	Monday	20,662.51				
9-24-2013	Tuesday	24,911.30	115	23.89	96	19.94
10-2-2013	Wednesday	24,003.63	154	30.83	119	23.82
9-26-2013	Thursday	25,811.22	122	26.26	223	48.0
10-4-2013	Friday	24,021.55				
9-28-2013	Saturday	24,602.87	163	33.45	241	49.45
	AVERAGES	**24,177.42**	**146.8**	**38.08**	**153.26**	**39.90**
MFR-AVG	**GPD**	**201.48**	**183.5**	**0.25**	**153.26**	**0.26**

Average Velocity was 2.5 Ft/Sec

The formula for loadings to sewer is "Flow in MGD x Concentration in mg/L x 8.34 pounds per gallon = pounds"

SFR's WBSD-2 Flood Park, 164 SFR's

Sample Date	Day of the Week	Measured Flow in GPD	Daily AVG BOD mg/L	BOD Loadings in lbs./day to SS	Daily AVG TSS mg/L	TSS Loadings in lbs./day to SS
10-6-2013	Sunday	24,025.87	300	60.11	255.66	51.23
10-14-2013	Monday	32,669.97				
9-24-2013	Tuesday	36,680.34	213	65.16	171	52.31
10-2-2013	Wednesday	46,306.00	236	91.14	208	80.33
9-26-2013	Thursday	29,041.05	283	68.54	513	124.25
10-4-2013	Friday	33,701.51				
9-28-2013	Saturday	30,889.89	236	60.80	341	87.85
	AVERAGES	**33,330.66**	**317**	**86.44**	**372.16**	**98.99**
SFR-AVG		**203.24**	**317**	**0.53**	**341**	**0.63**

Average Velocity 0.5 Ft/Sec

B.O.D. Ranges over each 24-hour sampling periods for the MFR's were from 47 mg/L to 290 mg/L. The ranges for the SFR's were 130 mg/L to 800 mg/L.
T.S.S. Ranges over each 24-hour sampling periods for the MFR's were from 48 mg/L to 290 mg/L. The range for the SFR's was 29 mg/L to 1060 mg/L.

Conclusion

The average daily flow from the SFR's was 203.2 GPD and MFR's was 201.4 GPD well within the estimated 220 gallons per day limit.
The average daily loadings to sanitary sewer were 50% higher for the Single Family Residential group when compared to the Multi Family Residences.
Potential causes for the higher loadings at the SFR sampling site:

- Significantly Lower velocity (5 x)
- Significantly Longer detention time in pipe
- Maintenance schedule, the cleaning schedule for this section of pipe is every 3 years. Last cleaned in August of 2011

Though flow data confirms that the MFR average daily flow is comparable with SFR average daily flow, further analysis using neighborhoods with similar pipe variations would be required in order to draw any valid conclusions regarding MFR vs. SFR loadings.

Since flow comparisons of MFR and SFR show flows are essentially the same there is no basis for staff to recommend any change in Multi-Family Residential sewer service charges.