



WEST BAY SANITARY DISTRICT SEWER RATE STUDY



MARCH 16, 2016 – FINAL REPORT



HF&H Consultants, LLC

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



SEWER RATE STUDY

FINAL REPORT

March 16, 2016

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



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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
Robert C. Hilton, CMC

March 16, 2016

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 final report from our study of the District's FY 2016-17 sewer 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, as well as, the comments received at the District's February 22, 2016 meeting.

Last year's rate study projected an 8% rate increase would be necessary for FY 2016-17; however, SVCW's capital cost projections have decreased since the last rate study, which lowers the recommended rate increase from 8% to 6% for FY 2016-17.

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

Richard J. Simonson, CMC
Vice President

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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.
STEP	Septic Tank Effluent Pumping systems

ACKNOWLEDGEMENTS

District Board

Edward Moritz, President
Fran Dehn, Secretary
David Walker, Treasurer
Roy Thiele-Sardina, Member
Rich Kinder, Member

District Staff

Phil Scott, District Manager
Liz Bahrami, Finance Manager
Bill Kitajima, Projects Manager
John Simonetti, Regulatory Compliance Coordinator
Sergio Ramirez, Maintenance Superintendent

HF&H Consultants, LLC

John Farnkopf, Sr. Vice President
Rick Simonson, Vice President



SEWER RATE STUDY

1. EXECUTIVE SUMMARY

The District’s rates for FY 2016-17 have been set to fund its expense projections for FY 2016-17. 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 SVCW’s capital costs, which are dependent on the pace with which SVCW makes progress with its capital improvement program.

In addition, during FY 2015-16, the District completed a three-year flow study to determine whether flow from multi family customers differ significantly from single family customers. Currently, single family customers and multi family customers are charged the same per dwelling unit rate. The study was undertaken due to concerns expressed by some of the District’s multi family customers that the cost to provide services to multi family customers is something less than the cost to provide services to single family customers.

1.1 FINDINGS AND RECOMMENDATIONS

1.1.1 Projected Revenue Increases

A 9% revenue increase for FY 2015-16 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
2016-17	6%
2017-18	5%
2018-19	5%
2019-20	4%
2020-21	3%

The forecasted increases are lower than last year’s projections due to a nearly \$18M reduction in the District’s share of SVCW’s projected operating and capital expenses for FY 2015-16 through FY 2019-20, with the most significant change due to reduced debt service expense projections for capital expenditures. 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 2015-16 rates and the projected FY 2016-17 rates, which reflect a 6% across-the-board increase.

Figure 1-2. Projected Rates

	Current FY 2015-16	Proposed FY 2016-17
Residential (charge per DU)		
Single Family, Multi Family	\$973	\$1,031
On-site Wastewater Disposal Zone	\$1,238	\$1,312
Non-Residential (charge per		
Retail/Commercial	\$8.97	\$9.51
Institution/Public	\$8.84	\$9.37
Restaurants	\$11.18	\$11.87
Supermarkets with Grinders	\$11.26	\$11.96
Hospitals	\$9.02	\$9.57
Hotels with Dining Facilities	\$10.40	\$11.05
Industrial	Measured	Measured

Of the 6% overall rate increase in FY 2016-17, approximately 5% is attributable to increases in SVCW's treatment costs and 1% is attributable to increases in the District's local operations and capital expenses.

Residential customers are charged per dwelling unit. Approximately 48 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 Flow and Loading Study Findings

The cost to treat wastewater is affected by two main factors: 1) the volume of wastewater to be treated (flow); and, 2) the strength of the flow. Strength is measured in terms of milligrams per liter of Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS). Wastewater charges should differ among customer classes if there is a significant difference in the average flow or strength of wastewater among the customer classes (i.e., residential, commercial, industrial).

The District's existing rate structure charges the same residential flat rate per dwelling unit for single family residences (SFR) and multi family residences (MFR), which is the most common residential rate structure. The District's non-residential commercial and industrial customers are based on their individual flow data and estimated BOD and TSS concentrations.

Some wastewater agencies are able to charge different flat rates for SFRs and MFRs based on measured differences in flow and strength. The District did not have this information, so from 2013-2015, sampled SFR and MFR flows and strengths to determine whether there were significant differences to warrant revising the residential rate structure. A copy of the District's Flow and Loading Rates Study report is included as Appendix B of this report.

The study found that flow rates from MFRs were slightly higher (on average) than those of SFRs and loadings for both BOD and TSS were higher in SFRs than those of MFRs.

The overall differences in flow and loading rates between SFRs and MFRs found in this study were relatively small. At this time, a change in rate structure is not warranted. However, if the drought were to continue in our area and we experience increased water restrictions, larger differences in flow and/or loading rates between SFRs and MFRs may become more apparent. This suggests the need for an ongoing periodic monitoring program (roughly every five years) may be warranted to ensure SFRs and MFRs flow and loadings remain relatively similar.

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 the SVCW Expenditure Projections by Member Entity - January 2016 (the latest available projections provided by SVCW). 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 2015-16 to FY 2020-21. 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.

The District owns and operates wastewater collection system facilities serving portions of Menlo Park, Atherton, and Portola Valley. Wastewater from these communities is treated at the Silicon Valley Clean Water (SVCW) treatment plant, the cost for which is billed to the District and included in the District's sewer service charges. Most recently, the District took over the wastewater collection system operations for the Towns of Los Altos Hills and Woodside under a new services contract. Wastewater from these communities is treated at the Palo Alto Regional Water Quality Control plant. Under the services contract, the District is fully compensated by the towns. The towns are responsible for setting rates for their customers, which will cover the District's cost as well as the cost of treatment.

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

	2011/12	2012/13	2013/14	2014/15	2015-16
Sewer Service Charge per EDU	\$690	\$752	\$820	\$894	\$973
Annual Increase in Charge		\$62	\$68	\$74	\$80
Annual Increase		9%	9%	9%	9%

The 41% cumulative increase during this period is primarily attributable to SVCW’s increasing debt service allocation to the District and, secondarily, to 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 2016-17 through FY 2020-21. The revenue requirements represent the costs that must be covered by revenue from rates and other sources. The District’s O&M budget for FY 2015-16 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

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Source
General Inflation	Per Budget	3.0%	3.0%	4.0%	4.0%	4.0%	WBSD Budget
Utilities	Per Budget	5.0%	5.0%	5.0%	5.0%	5.0%	Estimate
Salaries & Benefits	Per Budget	5.0%	3.0%	3.0%	3.0%	3.0%	Estimate
SVCW O&M Increase	Per Budget	5.0%	3.7%	3.7%	2.0%	4.4%	SVCW Budget
Interest on Earnings	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%	Estimate
Growth in Accounts & Demand	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 \$6.5 million to \$7.4 million over the planning period. Annual increases are generally no greater than the estimated rate of inflation or cost escalation for most recurring expenses.

3.2 DISTRICT CAPITAL EXPENSES

The District’s capital expenses are summarized by category in Figure 3-2. The District’s annual budgeted capital expenditures range from \$5.0 million to \$5.6 million during the modeling period; On average, the District expects to spend approximately \$5.27 million annually on these projects, the majority of which funds Master Plan projects. The remaining capital expenses comprise various ongoing administrative and other capital expenditures.

Figure 3-2. CIP Summary

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Administration	\$330,000	\$346,500	\$356,895	\$367,602	\$378,630	\$389,989
Collection Facilities	\$434,500	\$447,535	\$460,961	\$479,399	\$498,575	\$518,518
Subsurface Lines						
Proposed (Master Plan)	\$4,550,000	\$4,603,000	\$4,359,000	\$4,000,000	\$4,000,000	\$4,000,000
Other	\$0	\$0	\$0	\$0	\$0	\$0
Construction Proj. Environ Review	\$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
Allow. For Unanticipated Cap Ex	<u>\$75,000</u>	<u>\$75,000</u>	<u>\$75,000</u>	<u>\$75,000</u>	<u>\$75,000</u>	<u>\$75,000</u>
Total Capital Expenses	\$5,499,500	\$5,582,035	\$5,361,856	\$5,032,001	\$5,062,205	\$5,093,507

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 smooth annual contributions of rate revenue to the Capital Reserve equal to the average projected annual expenditures. Capital projects are funded in varying amounts each year from the Capital reserves. 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 (e.g. earthquake), the District cannot suddenly raise rates to generate additional funds due to state law requirements for such rate increases (i.e., Proposition 218). Moreover, the District bills annually on the tax rolls. Therefore, the District has set a target for the Emergency Reserve of \$5.0 million. 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 at times when the Capital Reserve is not 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. A target balance of \$3.5 million was used for determining an appropriate and reasonable target balance.

Maintaining the target balance for the Capital Reserve is recommended after meeting the minimum balances for the Operations and Emergency Reserves.

3.3.4 Vehicle and Equipment Replacement Fund

The vehicle and equipment replacement reserve provides funding to cover the replacement of vehicles and major equipment. Using the vehicle and equipment inventory developed by District staff, it was calculated that annual target funding of \$215,000 plus 3% inflation would provide adequate funding to replace vehicles and equipment as their useful lives expire. By funding the reserve on an annual basis, the District is also able to smooth out the year-over-year impact of vehicle and equipment replacement costs, which vary from year to year.

3.3.5 Rate Stabilization Reserve Fund

In late 2015, the Board established a rate stabilization fund with a target of \$3,000,000. The fund is currently fully funded. An adequate rate stabilization reserve will allow the District a margin of safety for the uncertainty of SVCW capital costs. The additional \$3,000,000 effectively increases the operating reserves another 6 weeks to 6.6 months, which is reasonable considering the lag in revenue due to billing on the tax roll.

3.4 SVCW EXPENSES

SVCW's treatment charge is 47% 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. 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.

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 in the District's own O&M expenses.
- The District's funding need for capital improvements will be higher initially but will remain fairly constant in the out years.
- 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.

Figure 3-3. Projected Revenue Requirements (graph)

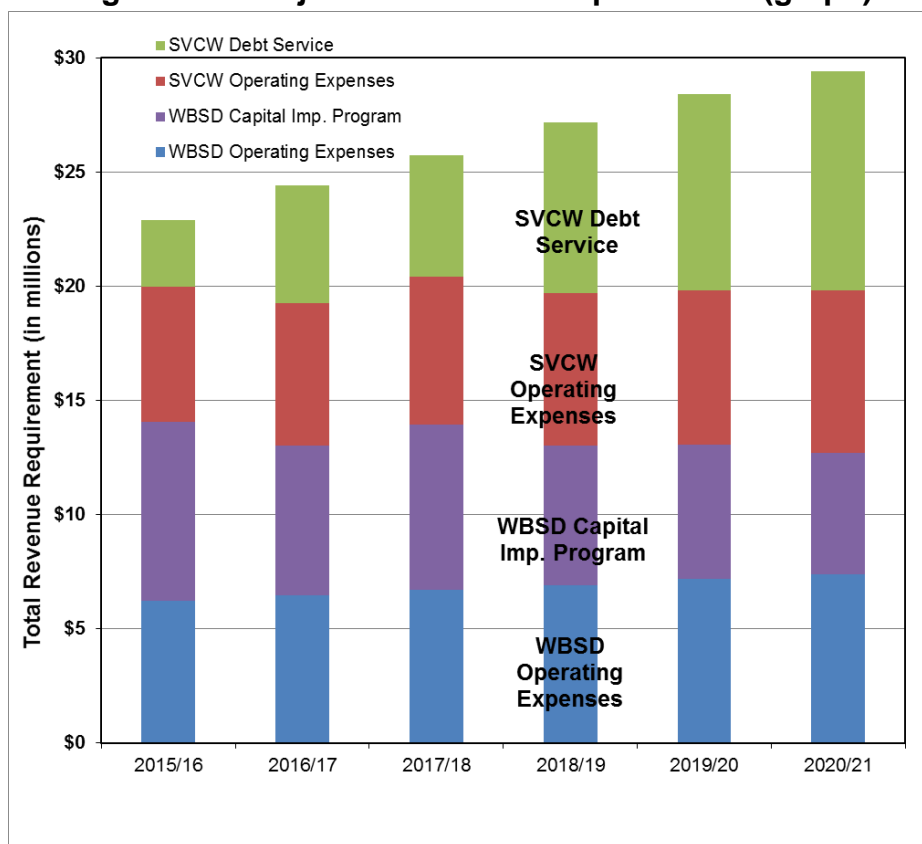


Figure 3-4. Projected Revenue Requirements (table)

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
SVCW Debt Service	\$2,928,830	\$5,160,478	\$5,346,869	\$7,484,674	\$8,583,354	\$9,584,261
SVCW Operating Expenses	\$5,903,475	\$6,223,157	\$6,443,354	\$6,671,677	\$6,766,873	\$7,119,630
WBSD Capital Imp. Program	\$7,867,001	\$6,562,297	\$7,254,646	\$6,114,217	\$5,863,556	\$5,294,921
WBSD Operating Expenses	\$6,200,401	\$6,449,126	\$6,698,017	\$6,894,611	\$7,179,262	\$7,392,249
Total Projected Revenue Req't.	\$22,899,707	\$24,395,058	\$25,742,885	\$27,165,179	\$28,393,046	\$29,391,061

SVCW’s share of the projected revenue requirement (expenses) is greatest in the years in which they plan on issuing bonds for its capital improvement program (FY2016-17 and FY2018-19). The District’s share of the revenue requirement increases most in FY 2017-18 when there is an increase in capital improvement program funding compared to the previous year.

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					
	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Sewer Service Charge per EDU	\$973	\$1,031	\$1,083	\$1,137	\$1,183	\$1,218
Annual Increase in Charge		\$58	\$52	\$54	\$45	\$35
Annual Increase		6.0%	5.0%	5.0%	4.0%	3.0%
Cumulative Increase		6.0%	11.3%	16.9%	21.5%	25.2%

4.2.1 STEP/Grinder Charges

The District has approximately 48 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 \$265 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, at which time 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 4-2 outlines the projected rate increases:

Figure 4-2. Projected STEP/Grinder Charges

	ADOPTED					
	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
STEP/Grinder Charge per EDU	\$265	\$281	\$295	\$310	\$322	\$332
Annual Increase in Charge		\$16	\$14	\$15	\$12	\$10
Annual Increase		6.0%	5.0%	5.0%	4.0%	3.0%

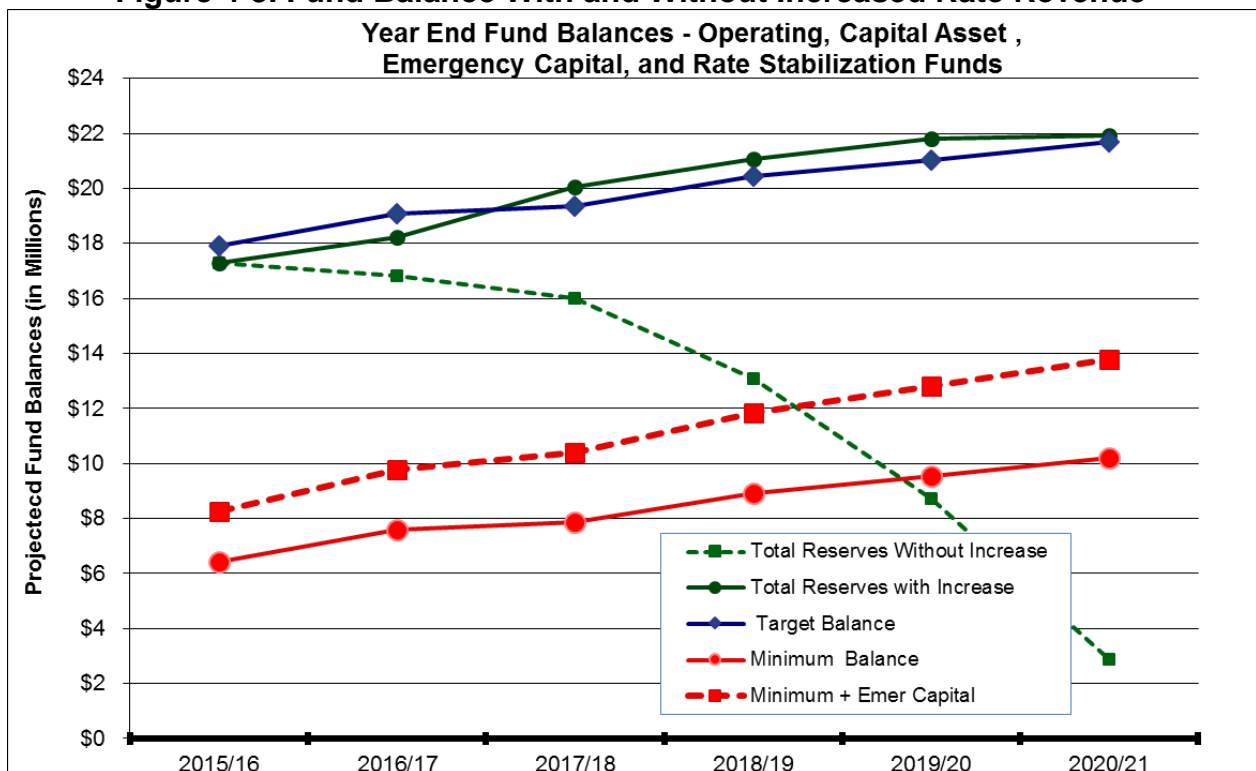
4.3 FUND BALANCE

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, 2021, the projected fund balance would be nearly \$7M below the minimum balance without future rate increases, assuming that the District did not to reduce expenditures.

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. Additional funding that can be accumulated above the target balance will provide the District with a contingency for emergencies or other unanticipated events.

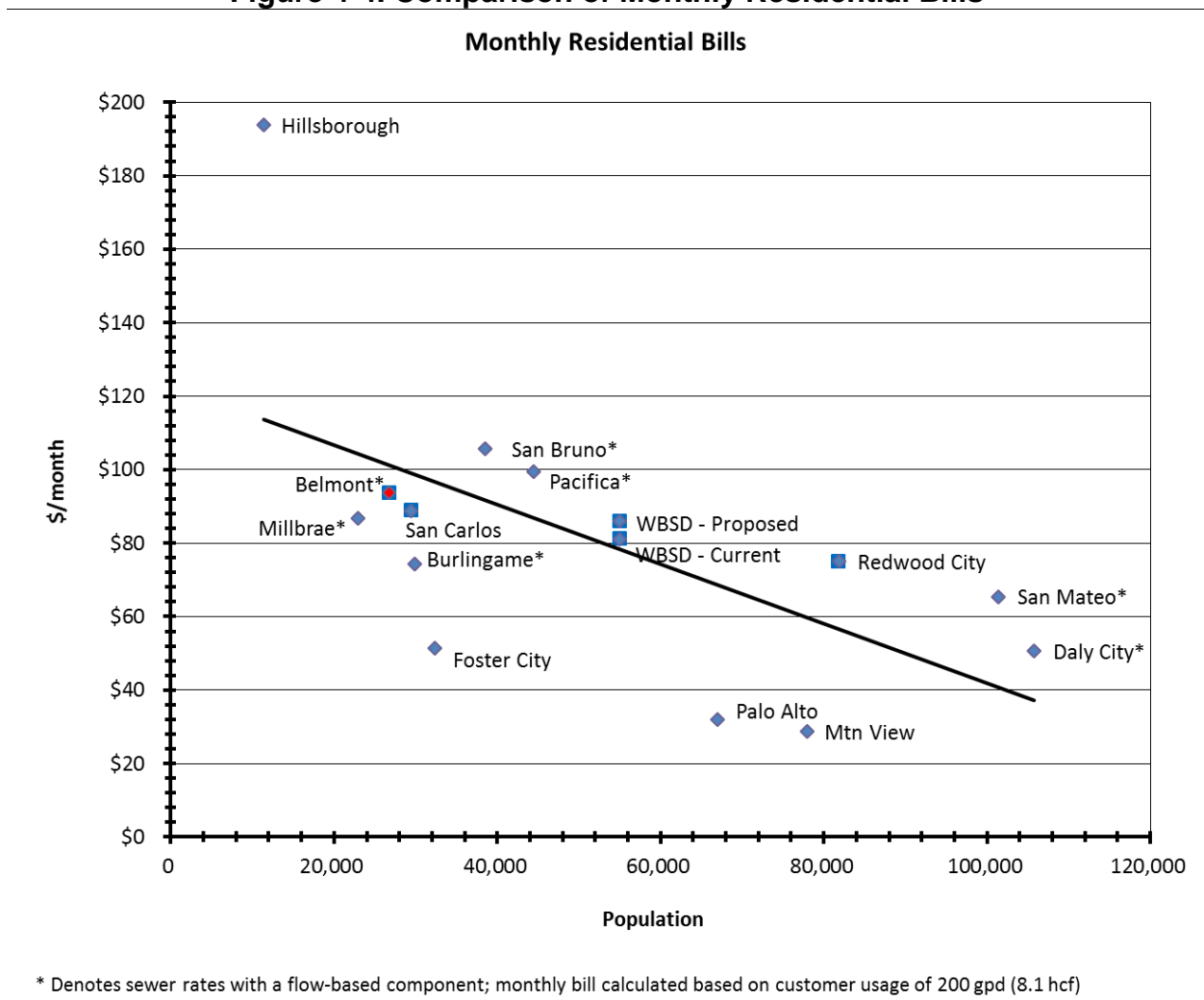
Figure 4-3. Fund Balance With and Without Increased Rate Revenue



4.4 COMPARISON OF RECENT AND PROPOSED SEWER COSTS

Based on available sources, Figure 4-4 shows the recent charges 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 trendline 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 relative position among its neighbors to change significantly.

Figure 4-4. Comparison of Monthly Residential Bills



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 past three years and the recommended 6% increase for this year. 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.

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 guidelines¹ 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 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.

Recently, some the District's multi family customers expressed concerns about the multi-family rates, which currently are the same charge per EDU as the single family rate. These customers pointed out that multi family customers can have lower flow per dwelling unit than single

¹ *Revenue Program Guidelines*. State Water Resources Control Board.

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. The District's existing rate structure 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 and estimated BOD and TSS concentrations.

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. 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.

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 monthly or bimonthly bills for both water and wastewater service, rather than bill annually on the tax rolls. 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 flow monitoring studies during 2013-2015 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.

In 2013, the District selected two neighborhoods that included either single or multi family dwelling units exclusively. The sample 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.

Based on the results produced from this study, the District determined further analysis of flow was required before any conclusions could be drawn on the difference in flow between single and multi family flows, and as such, another similar study was conducted in 2014.

In 2014, the District selected an additional two neighborhoods that included either single or multi family dwelling units exclusively. The SVCW performed the initial analysis from August 6, 2014 through September 5, 2014 and Accutest Laboratories performed the analysis from September 6, 2014 through September 30, 2014. This time, the study determined that the average daily flow from the single and multi family dwelling units was 73 GPD and 327 GPD, respectively, which results in multi family average daily flows that were 4.48 times higher per dwelling unit when compared to single family average daily flows. As a result of the significant variance from the 2013 sample data, the District re-sampled the dwelling units and found that the average daily flow from the single and multi family dwelling units was 90.74 GPD and 138.42 GPD, respectively. The multi family average daily flows were again higher, but not as significantly higher as the previous sampling. The BOD and TSS concentrations were nearly the same for single and multi family dwellings.

In 2015, the District selected an additional two neighborhoods that included either single or multi family dwelling units exclusively. The sample determined that the average daily flow from the single and multi family dwelling units was 171 GPD and 170 GPD, respectively.

The details of the District's 2013-2015 analysis can be found in Appendix B.

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.

APPENDIX A. SEWER RATE MODEL

	A	B	C	D	E	F	G	H	I
1	West Bay Sanitary District								
2	Sewer Rate Study								
3	Table 1A. Summary								
4									
5									
6	<i>Fiscal Year:</i>	Adopted 2014/15	Adopted 2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Notes
7	Revenue Increases	9%	9%	6.0%	5.0%	5.0%	4.0%	3.0%	To Tables 3, 4
8	<i>Cumulative Increase</i>			6.0%	11.3%	16.9%	21.5%	25.2%	From Table 3
9									
10	<i>Residential Bill (annual) Increase</i>	\$893	\$973	\$1,031	\$1,083	\$1,137	\$1,183	\$1,218	
11				\$58	\$52	\$54	\$45	\$35	
12									
13									
14				Projected Last Year Cumulative Increase	8.0%	8.0%	5.0%	1.0%	na
15									
16				<i>Residential Bill (annual) Increase</i>	\$1,051	\$1,135	\$1,192	\$1,204	
17					\$78	\$84	\$57	\$12	
18									
19									
20									
21									
22									
23									
24									
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**Year End Fund Balances - Operating, Capital Asset ,
Emergency Capital, and Rate Stabilization Funds**

Fiscal Year	Total Reserves Without Increase	Total Reserves with Increase	Target Balance	Minimum Balance	Minimum + Emer Capital
2015/16	17.5	17.5	18.0	6.5	8.5
2016/17	17.0	18.5	19.5	7.5	10.0
2017/18	16.0	20.0	19.5	7.8	10.5
2018/19	13.0	21.0	20.5	9.0	12.0
2019/20	8.5	21.5	21.0	9.5	13.0
2020/21	3.0	22.0	21.5	10.0	14.0

	A	B	C	D	E	F	G	H	I	J	K	
1	West Bay Sanitary District											
2	Sewer Rate Study											
3	Table 1B. General											
4												
5	List of Model Worksheets											
6	Table 1A. Summary											
7	Table 1B. General											
8	Table 2. Revenue Requirement											
9	Table 3. Revenue Increases											
10	Table 4. Reserves											
11	Table 5. Capital Projects											
12	Table 6. WBSD Debt Service Schedule											
13	###											
14												
15	Assumptions		2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Source		Notes	
16												
17	(1)	General Inflation	Per Budget	3.0%	3.0%	4.0%	4.0%	4.0%	Estimate		To Table 2	
18	(2)	Utilities	Per Budget	5.0%	5.0%	5.0%	5.0%	5.0%	Estimate		To Table 2	
19	(3)	Salaries & Benefits	Per Budget	5.0%	3.0%	3.0%	3.0%	3.0%	Estimate		To Table 2	
20	(5)	SVCW O&M Increase %	Per Budget	5.0%	3.7%	3.7%	2.0%	4.4%	SVCW Jan 2016 est. (except FY16/17 & FY29/20 District rvsd. est.)		To Table 2	
21	(7)	Interest on Earnings		0.5%	0.5%	0.5%	0.5%	0.5%	Estimate		To Table 4	
22	(8)	Non-rate Revenues	Per Budget	1.0%	1.0%	1.0%	1.0%	1.0%	Estimate		To Table 2	
23	(9)	% Growth in Accounts & Demand		0.5%	0.5%	0.5%	0.5%	0.5%	Estimate		To Tables 2,3	
24	(10)	Cost of Grinder Maintenance	Per Budget	6.0%	5.0%	5.0%	4.0%	3.0%	Based on Table 1A		To Table 2	
25	(11)	Construction Cost Inflation	Per Budget	0.0%	0.0%	0.0%	0.0%	0.0%			To Table 5	
26												
27	Target Fund Balances											
28	<u>Operating Fund</u>											
29		Purpose	For O&M cash flow during the year									
30		Minimum balance	Cannot go negative									
31		Target balance	Five months of operating expenses						to accommodate the biannual receipt of fees from the County tax roll - per WBSD Budget			
32												
33	<u>Capital Asset Fund</u>											
34		Purpose	To be used for replacement of Equipment/ Facilities									
35		Minimum balance	Cannot go negative									
36		Target balance	\$3,500,000						FY 2015-16 Budget Pg. 7			
37												
38	<u>Emergency Capital Fund</u>											
39		Purpose	To be used for sewer emergencies									
40		Minimum balance	Cannot go negative									
41		Target balance	\$5,000,000						FY 2015-16 Budget Pg. 7			
42												
43	<u>Rate Stabilization Fund</u>											
44		Purpose	Allow a margin of safety for the uncertainty of SVCW capital costs									
45		Minimum balance	Cannot go negative									
46		Target balance	\$3,000,000									

	A	B	C	D	E	F	G	H	I
1	West Bay Sanitary District								
2	Sewer Rate Study								
3	Table 2. Revenue Requirement								
4									
5		Tbl.	Budgeted	Projected					
6		1B	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Notes
7	SVCW Projected Expenses								
8	Operating Expense	(5)	\$5,701,938	\$5,910,849	\$6,127,465	\$6,352,074	\$5,987,852	\$6,251,066	SVCW Long Term Financial Plan - January 2016
9	Op Cost Projection Adj - per District rvsd. est.			\$76,185	\$78,977	\$81,872	\$574,773	\$600,039	
10	Debt Service: Existing Bonds		\$2,515,195	\$3,140,849	\$2,961,292	\$2,956,904	\$2,958,633	\$2,776,890	SVCW Long Term Financial Plan - January 2016
11	Debt Service: Existing SRF Loans		\$220,077	\$789,769	\$789,769	\$789,769	\$789,769	\$789,769	SVCW Long Term Financial Plan - January 2016
12	Debt Service: New Bonds		\$0	\$0	\$0	\$402,909	\$402,909	\$618,614	SVCW Long Term Financial Plan - January 2016
13	Debt Service: New SRF Loans		\$0	\$0	\$163,576	\$2,042,196	\$2,907,475	\$4,571,032	SVCW Long Term Financial Plan - January 2016
14	Revenue-Funded Capital		\$153,494	\$214,720	\$214,720	\$214,720	\$241,560	\$241,560	SVCW Long Term Financial Plan - January 2016
15	Operating Reserves		\$48,044	\$21,402	\$22,191	\$23,010	(\$37,313)	\$26,965	SVCW Long Term Financial Plan - January 2016
16	New Cash Reserves (SRF / CIP)		\$193,558	\$1,229,860	\$1,432,232	\$1,292,897	\$1,524,568	\$827,956	SVCW Long Term Financial Plan - January 2016
17		Subtotal, SVCW	\$8,832,305	\$11,383,635	\$11,790,223	\$14,156,351	\$15,350,227	\$16,703,891	
18		<i>Annual Change</i>		<i>28.9%</i>	<i>3.6%</i>	<i>20.1%</i>	<i>8.4%</i>	<i>8.8%</i>	
19									
20	Operating Expenses								
21	Salaries	(3)	\$3,092,348	\$3,246,965	\$3,344,374	\$3,444,706	\$3,548,047	\$3,654,488	
22	Employee Benefits	(3)	\$1,337,664	\$1,404,547	\$1,446,684	\$1,490,084	\$1,534,787	\$1,580,830	
23	Director's Fees	(1)	\$34,404	\$35,436	\$36,499	\$37,959	\$39,478	\$41,057	
24	Election Expense		\$40,000	\$0	\$40,000	\$0	\$40,000	\$0	
25	Gasoline, Oil and Fuel	(1)	\$70,000	\$72,100	\$74,263	\$77,234	\$80,323	\$83,536	
26	Insurance	(1)	\$92,000	\$94,760	\$97,603	\$101,507	\$105,567	\$109,790	
27	Memberships	(1)	\$30,000	\$30,900	\$31,827	\$33,100	\$34,424	\$35,801	
28	Office Expense	(1)	\$33,000	\$33,990	\$35,010	\$36,410	\$37,866	\$39,381	
29	Operating Supplies	(1)	\$332,195	\$342,161	\$352,426	\$366,523	\$381,184	\$396,431	
30	Contractual Services	(1)	\$388,000	\$399,640	\$411,629	\$428,094	\$445,218	\$463,027	
31	Professional Services	(1)	\$425,350	\$438,111	\$451,254	\$469,304	\$488,076	\$507,599	
32	Printing and Publications	(1)	\$62,500	\$64,375	\$66,306	\$68,959	\$71,717	\$74,586	
33	Rents and Leases	(1)	\$38,680	\$39,840	\$41,036	\$42,677	\$44,384	\$46,159	
34	Repairs and Maintenance	(1)	\$259,000	\$266,770	\$274,773	\$285,764	\$297,195	\$309,082	
35	Research and Monitoring	(1)	\$33,000	\$33,990	\$35,010	\$36,410	\$37,866	\$39,381	
36	Travel and Meetings	(1)	\$55,500	\$57,165	\$58,880	\$61,235	\$63,685	\$66,232	
37	Utilities	(2)	\$145,000	\$152,250	\$159,863	\$167,856	\$176,248	\$185,061	
38	Other Operating Expense	(1)	\$145,000	\$149,350	\$153,831	\$159,984	\$166,383	\$173,038	
39	Transf. to Solid Waste Fund		(\$65,000)	(\$65,000)	(\$65,000)	(\$65,000)	(\$65,000)	(\$65,000)	
40		Subtotal, Operating Expenses	\$6,548,641	\$6,797,350	\$7,046,266	\$7,242,805	\$7,527,448	\$7,740,480	
41		<i>Annual Change</i>		<i>3.8%</i>	<i>3.7%</i>	<i>2.8%</i>	<i>3.9%</i>	<i>2.8%</i>	

	A	B	C	D	E	F	G	H	I
1	West Bay Sanitary District								
2	Sewer Rate Study								
3	Table 2. Revenue Requirement								
4									
5									
6		Tbl.	Budgeted	Projected					
62		1B	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Notes
42	Non-Operating Expenditures								
43	Other Non-Operating Expense	(1)	\$6,000	\$6,180	\$6,365	\$6,620	\$6,885	\$7,160	
44	Contrib. to LAFCo		\$15,000	\$15,900	\$16,695	\$17,530	\$18,231	\$18,778	
45	Subtotal, Non-Operating Expenditures		\$21,000	\$22,080	\$23,060	\$24,150	\$25,116	\$25,938	
46	<i>Annual Change</i>			5.1%	4.4%	4.7%	4.0%	3.3%	
47									
48	Total Expenses		\$15,401,946	\$18,203,066	\$18,859,549	\$21,423,305	\$22,902,790	\$24,470,308	
49	<i>Annual Change</i>								
50									
51	Non-Operating Revenues								
52	Flow Eq. Cost Sharing		(\$309,000)	(\$309,000)	(\$309,000)	(\$309,000)	(\$309,000)	(\$309,000)	
53	Permit & Inspection Fees	(8)	(\$50,000)	(\$50,500)	(\$51,005)	(\$51,515)	(\$52,030)	(\$52,551)	
54	Franchises		\$0	\$0	\$0	\$0	\$0	\$0	
55	Grinder Maintenance	(10)	(\$9,240)	(\$9,794)	(\$10,284)	(\$10,798)	(\$11,230)	(\$11,567)	Incr. by Rate % on Table 1A
56	Other Non-Operating Income	(8)	(\$1,000)	(\$1,010)	(\$1,020)	(\$1,030)	(\$1,041)	(\$1,051)	
57	Subtotal, Non-Operating Income		(\$369,240)	(\$370,304)	(\$371,309)	(\$372,344)	(\$373,301)	(\$374,169)	
58									
59	Other Transfers to/(from)								
60	Operating (General) Fund		\$7,332,001	\$6,340,847	\$7,026,552	\$5,879,281	\$5,621,572	\$5,045,677	From Table 4
61	Vehicle & Equipment Replacement Fund		\$215,000	\$221,450	\$228,094	\$234,936	\$241,984	\$249,244	To Table 4; 3% annual increase
62	Capital Projects Fund		\$320,000	\$0	\$0	\$0	\$0	\$0	From Table 4
63	Emergency Capital Reserves		\$0	\$0	\$0	\$0	\$0	\$0	From Table 4
64	Total Transfers		\$7,867,001	\$6,562,297	\$7,254,646	\$6,114,217	\$5,863,556	\$5,294,921	
65									
66	Total Revenue Requirement		\$22,899,707	\$24,395,058	\$25,742,885	\$27,165,179	\$28,393,046	\$29,391,061	To Table 3
67	<i>Annual Change</i>			6.5%	5.5%	5.5%	4.5%	3.5%	
68	<i>Cumulative Change</i>			6.5%	12.4%	18.6%	24.0%	28.3%	
69									
70	Source: West Bay Sanitary District FY 2015/16 Budget								

	A	B	C	D	E	F	G	H
1	West Bay Sanitary District							
2	Sewer Rate Study							
3	Table 3. Revenue Increases							
4								
5								
6		Estimated	Projected					
7		2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Notes
8	Current Rate Revenue							
9	Sewer Service Charges	\$22,899,707	\$23,014,206	\$23,129,277	\$23,244,923	\$23,361,148	\$23,477,953	Growth from Table 1b
10	Revenue Requirement	(\$22,899,707)	(\$24,395,058)	(\$25,742,885)	(\$27,165,179)	(\$28,393,046)	(\$29,391,061)	From Table 2
11	To/(From) operations before Rate Incr.	(\$0)	(\$1,380,853)	(\$2,613,609)	(\$3,920,256)	(\$5,031,898)	(\$5,913,107)	To Table 4
12								
13								
14	Increase in Rate Revenue		6%	5%	5%	4%	3%	From Table 1B
15	Cumulative Increase in Rate Revenue		6.00%	11.300%	16.87%	21.54%	25.19%	To Table 1A
16	Revenue from Rate Increases							
17	FY 2016-17 (eff. July 1, 2016)		\$1,380,852	\$1,387,757	\$1,394,695	\$1,401,669	\$1,408,677	
18	FY 2017-18 (eff. July 1, 2017)			\$1,225,852	\$1,231,981	\$1,238,141	\$1,244,332	
19	FY 2018-19 (eff. July 1, 2018)				\$1,293,580	\$1,300,048	\$1,306,548	
20	FY 2019-20 (eff. July 1, 2019)					\$1,092,040	\$1,097,500	
21	FY 2020-21 (eff. July 1, 2020)						\$856,050	
22	Total Revenue from Rate Increases	\$0	\$1,380,852	\$2,613,608	\$3,920,256	\$5,031,898	\$5,913,108	
23	Total Current Revenue	\$22,899,707	\$23,014,206	\$23,129,277	\$23,244,923	\$23,361,148	\$23,477,953	From above
24	Total Revenue	\$22,899,707	\$24,395,058	\$25,742,885	\$27,165,179	\$28,393,045	\$29,391,061	
25	Revenue Requirement	(\$22,899,707)	(\$24,395,058)	(\$25,742,885)	(\$27,165,179)	(\$28,393,046)	(\$29,391,061)	From above
26	To/(From) operations after Rate Incr.	(\$0)	(\$0)	(\$0)	\$0	(\$0)	\$0	To Table 4

	A	B	C	D	E	F	G	H	I	J
1	West Bay Sanitary District									
2	Sewer Rate Study									
3	Table 4. Reserves									
4										
5			Tbl.	Budgeted						
6			1B	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Notes
7										
8	OPERATING (GENERAL) FUND									
9	Revenue Increases									
10	Beginning Balance			9%	6%	5%	5%	4%	3%	From Table 1A
11	Surplus/Deficit									Ending 2014-15 projected by WBSD
12	Settlement Agreement									From Table 3
13	Transfers (To)/From									
14	Revenue Requirement									To Table 2
15	Capital Asset Fund									To Below; add'l funds allocated by board
16	Emergency Capital Reserves									\$0
17	Rate Stabilization Fund									From Below
18	Fund Subtotal									
19	Estimated Interest Earnings (7)									
20	Ending Balance									
21	<i>Minimum Balance (5 mo. operations)</i>									
22										
23	CAPITAL ASSET FUND (includes Capital Project Reserve)									
24	Beginning Balance									
25	Revenues									
26	Connection Charges (8)									WBSD Budget
27	Capital Projects									
28	Administration (3)									WBSD Budget
29	Collection Facilities (1)									WBSD Budget
30	Subsurface Lines									
31	Proposed (Master Plan)									
32	Other (11)									
33	Construction Proj. Environ Review (11)									WBSD Budget
34	Manhole Raising (11)									WBSD Budget
35	Allow. For Unanticipated Cap Ex									WBSD Budget
36	Subtotal Expenses									
37	Transfers (To)/From									
38	Revenue Requirements									WBSD Budget To Table 2
39	Operating Fund									From Above
40	Emergency Capital Reserve									WBSD Budget To Below
41	Subtotal Transfers									
42	Fund Subtotal									
43	Estimated Interest Earnings (7)									
44	Ending Balance									
45	<i>Target Balance</i>									From Table 1B

	A	B	C	D	E	F	G	H	I	J
1	West Bay Sanitary District									
2	Sewer Rate Study									
3	Table 4. Reserves									
4										
5			Tbl.	Budgeted						
6			1B	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Notes
46										
47	EMERGENCY CAPITAL RESERVES									
48	Beginning Balance		\$5,000,000	\$5,025,000	\$5,050,125	\$5,075,376	\$5,100,753	\$5,126,256		
49	Transfers (To)/From									
50	Revenue Requirements		\$0	\$0	\$0	\$0	\$0	\$0	\$0	To Table 2
51	Operating Fund		\$0	\$0	\$0	\$0	\$0	\$0	\$0	To Above
52	Capital Asset Fund		\$0	\$0	\$0	\$0	\$0	\$0	\$0	From Above
53	Subtotal Transfers		\$0	\$0	\$0	\$0	\$0	\$0	\$0	
54	Fund Subtotal		\$5,000,000	\$5,025,000	\$5,050,125	\$5,075,376	\$5,100,753	\$5,126,256		
55	Estimated Interest Earnings (7)		\$25,000	\$25,125	\$25,251	\$25,377	\$25,504	\$25,631		
56	Ending Balance		\$5,025,000	\$5,050,125	\$5,075,376	\$5,100,753	\$5,126,256	\$5,151,888		
57	Minimum Balance		\$1,850,000	\$2,200,000	\$2,550,000	\$2,900,000	\$3,250,000	\$3,600,000		
58	Target Balance (\$5M by 2015-16)		\$5,000,000	\$5,000,000	\$5,000,000	\$5,000,000	\$5,000,000	\$5,000,000		
59										
60	Vehicle & Equipment Replacement Fund									
61	Beginning Balance		\$0	\$0	\$132,107	\$266,527	\$383,370	\$408,387		
62	Vehicle & Equipment Replacement Cost		(\$215,000)	(\$90,000)	(\$95,000)	(\$120,000)	(\$219,000)	(\$219,000)		WBSD Budget
63	Transfers (To)/From									
64	Revenue Requirement		\$215,000	\$221,450	\$228,094	\$234,936	\$241,984	\$249,244		From Table 2
65	Fund Subtotal		\$0	\$131,450	\$265,201	\$381,463	\$406,355	\$438,630		
66	Estimated Interest Earnings (7)		\$0	\$657	\$1,326	\$1,907	\$2,032	\$2,193		
67	Ending Balance		\$0	\$132,107	\$266,527	\$383,370	\$408,387	\$440,824		
68										
69	RATE STABILIZATION FUND									
70	Beginning Balance		\$0	\$3,025,000	\$3,050,125	\$3,075,376	\$3,100,753	\$3,126,256		
71	Transfers (To)/From									
72	Revenue Requirements		\$0	\$0	\$0	\$0	\$0	\$0	\$0	To Table 2
73	Operating Fund		\$3,000,000	\$0	\$0	\$0	\$0	\$0	\$0	To Above
74	Subtotal Transfers		\$3,000,000	\$0	\$0	\$0	\$0	\$0	\$0	
75	Fund Subtotal		\$3,000,000	\$3,025,000	\$3,050,125	\$3,075,376	\$3,100,753	\$3,126,256		
76	Estimated Interest Earnings (7)		\$25,000	\$25,125	\$25,251	\$25,377	\$25,504	\$25,631		
77	Ending Balance		\$3,025,000	\$3,050,125	\$3,075,376	\$3,100,753	\$3,126,256	\$3,151,888		
78	Target Balance		\$3,000,000	\$3,000,000	\$3,000,000	\$3,000,000	\$3,000,000	\$3,000,000		

	A	B	C	D	E	F	G	H	I	J	K
1	West Bay Sanitary District										
2	Sewer Rate Study										
3	Table 5. Capital Projects										
4	Source: "WBSD CIP Updated 11-02-15"										
5					Projected						
6		2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Notes			
7	R&R Priority										
8	Sausal Vista PS and Forcemain	\$ 750,000									
9	North Palo Alto Concrete	\$ -									
10	Fair Oaks									\$ 2,000,000	
11	Santa Cruz				\$ 1,004,000						
12	Roble			\$ 1,000,000	\$ 1,630,000						
13	Stevenson			\$ 1,155,000							
14	Elena					\$ 1,621,800					
15	Carlton-Madera Easements		\$ 1,150,000	\$ 1,354,000							
16	College Park North										
17	Oak Grove										
18	Encinal A										
19	Oak Knoll				\$ 845,000						
20	Encinal B										
21	Lucky/Campo Bello/Alameda&Atherton			\$ 400,000							
22	Menalto Easements					\$ 788,000					
23	Stowe Lane PS xcrossing SFPUC sag		\$ 150,000								
24	Berkeley										
25	Camino Al Lago		\$ 100,000								
26	MacBain			\$ 400,000							
27	Stowe Lane Pump Station		\$ 1,003,000								
28	Marsh Road/Burns Easement CIPP		\$ 2,000,000								
29	Belle Haven (frmly. Eastside Triangle)	\$ 3,750,000									
30	Pump Stations (miscellaneous)		\$ 150,000		\$ 75,000				\$ 200,000		
31	Point Repairs (miscellaneous)	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000		\$ 50,000		
32	Future R&R				\$ 396,000						
33	Subtotal - R&R	\$4,550,000	\$4,603,000	\$4,359,000	\$4,000,000	\$2,459,800	\$2,250,000				
34	Capacity Priority										
35	James Avenue Diversion										
36	Lower Ringwood					\$ 1,200,000					
37	Valparaiso										
38	Willow Gravity Main										
39	Upper Ringwood					\$ 125,000	\$ 1,375,000				
40	Santa Cruz Avy										
41	Cambridge Laurel										
42	Middlefield at Fair Oaks										
43	Future Capacity Projects					\$ 215,200	\$ 375,000				
44	Subtotal - Capacity	\$0	\$0	\$0	\$0	\$1,540,200	\$1,750,000				
45											
46	Total CIP	\$4,550,000	\$4,603,000	\$4,359,000	\$4,000,000	\$4,000,000	\$4,000,000				
47	Inflationary Index		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	From Table 1B		
48	Total Inflated CIP	\$4,550,000	\$4,603,000	\$4,359,000	\$4,000,000	\$4,000,000	\$4,000,000		To Table 4		
49											
50											
51	Source: West Bay Sanitary District CIP Updated 11-02-15										

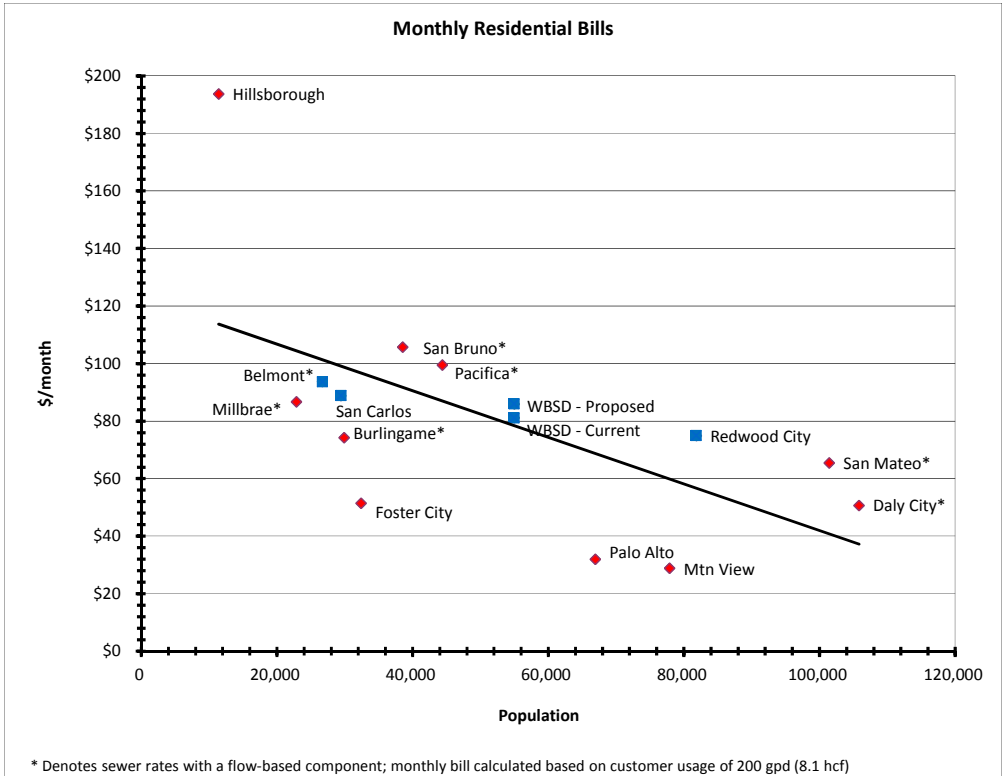
	A	B	C	D	E	F	G	H
1	West Bay Sanitary District							
2	Sewer Rate Study							
3	Table 6. WBSD Debt Service Schedule							
4								
5					Projected			
6		2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Notes
7								
8								
9	No debt has been issued by WBSD, SVCW debt only (see Table 2)							
10								

	A	B	C	D	E	F	G
1	West Bay Sanitary District						
2	Sewer Rate Study						
3	Table 7. Single-Family Rate Comparison						
4				Monthly Charge			
5				@ 4.05 hcf/mo	@ 8.1 hcf/mo	@ 16.2 hcf/mo	
6	City	Population	Basis	50% of avg.	avg.	2x avg.	Rates as of
7	Hillsborough	11,420	Fixed (incl. collection and treatment)	\$193.75	\$193.75	\$193.75	7/1/2015
8	San Bruno	44,409	Fixed + Flow (incl. collection and treatment)	\$62.09	\$99.47	\$174.24	7/1/2015
9	Millbrae	22,898	Fixed + Flow (incl. collection and treatment)	\$65.66	\$86.72	\$128.84	8/1/2015
10	Belmont	26,748	Fixed + Flow (collection) + SVCW Treatment	\$72.79	\$93.69	\$135.48	7/1/2015
11	West Bay SD (16-17)	55,000	Fixed (incl. collection and treatment)	\$85.92	\$85.92	\$85.92	7/1/2016
12	West Bay SD (15-16)	55,000	Fixed (incl. collection and treatment)	\$81.08	\$81.08	\$81.08	7/1/2015
13	Burlingame	29,890	Flow (incl. collection and treatment)	\$37.11	\$74.23	\$148.45	1/1/2015
14	Redwood City	81,838	Fixed (incl. collection and treatment)	\$74.95	\$74.95	\$74.95	7/1/2015
15	San Carlos	29,449	Fixed (incl. collection and treatment)	\$88.82	\$88.82	\$88.82	7/1/2015
16	San Mateo	101,429	Flow (incl. collection and treatment)	\$32.72	\$65.45	\$130.90	7/1/2015
17	Daly City	105,810	Flow (incl. collection and treatment)	\$25.35	\$50.71	\$101.41	7/1/2015
18	Palo Alto	66,932	Fixed (incl. collection and treatment)	\$31.95	\$31.95	\$31.95	9/1/2015
19	Mountain View	77,914	Fixed (incl. collection and treatment)	\$28.80	\$28.80	\$28.80	7/1/2015
20	Pacifica	38,551	Flow (incl. collection and treatment)	\$52.83	\$105.66	\$211.33	7/1/2016
21	Foster City	32,390	Fixed (incl. collection and treatment)	\$51.47	\$51.47	\$51.47	7/1/2015

Sources:

Population - California Department of Finance, Demographic Research Unit, E-5 City/County Population & Housing Estimates, 1/1/2014
except West Bay Sanitary District (population estimate from district).

Monthly Rates - online resources available on each respective agencies' website



blue squares = SVCW member red diamonds = other neighboring city

APPENDIX B. RESIDENTIAL FLOW AND LOADING ANALYSIS



FLOW AND LOADING RATES STUDY
(2013-2015):
Single vs. Multi-Family Residences

INTRODUCTION & BACKGROUND

The West Bay Sanitary District (WBSD) is a sewer collection system comprised of both residential and commercial buildings and facilities. The residential units are primarily represented by both single and multi-family residences (SFR and MFRs). The purpose of this study was to monitor, observe, and compare flow and loading rates (i.e. biochemical oxygen demand (BOD) and total suspended solids (TSS)) between SFR and MFR locations throughout the District. BOD is the amount of dissolved oxygen in a specific amount of water required by aerobic organisms to break down and metabolize organic material present in a given water sample at a certain temperature over a specific time period. The BOD values are most commonly expressed in milligrams of oxygen consumed per liter of sample during 5 days of incubation at 20 °C. TSS are the group of particles typically found in untreated wastewater discharge that cannot pass through a certain size filter.

Obtaining this data would allow the District to analyze similarities and differences of flow characteristics between SFRs and MFRs. Based on rates of payment from residences within WBSD, the assumed flow rate(s) for both SFRs and MFRs was and currently is approximately 220 gallons per day (gpd). The base loading rate(s) for both BOD and TSS had been assumed to be 150 mg/L.

However, it recently came into question if there is an actual difference in flow, TSS, and BOD loading rates between SFR and MFRs. It is also speculated that daily loadings for TSS and BOD (mg/L) are actually higher in MFRs than that of SFRs. In 2013, a study commenced to determine if there was an actual difference in flow, TSS, and BOD loading rates between various SFR and MFR customers located within WBSD. Staff members from both WBSD and Silicon Valley Clean Water (SVCW) met to determine optimal flow monitoring times. From here, a random sample of various SFR and MFRs located throughout WBSD were selected. The sanitary sewer effluent from these locations would be monitored, and true data regarding flow, TSS, and BOD loading rates could then be analyzed. This collection of data would allow the following to be determined:

- 1) The actual flow rates from various SFR and MFRs discharging into the WBSD's conveyance system.
- 2) If the actual daily loadings (TSS and BOD (mg/L)) discharging from MFRs are higher in concentration than that of SFRs.

PROCEDURE

Sample populations/locations:

The study was performed from 2013-2015. Each year, a group of SFRs and MFRs were selected as respective sample populations. In 2015, new SFR and MFR sample populations were monitored, as well as the same sample populations that were observed in 2014. Below is a list of the yearly sample locations:

2013 -

- SFRs – Green Oaks (164-units)
- MFRs – Sharon Heights (120-units)

2014 -

- SFRs – Middle Ave. on San Mateo Dr. & Wallea Dr. (79-units)
- MFRs – Hoover St. between Oak Grove Ave. & Valparaiso Ave. (64-units)

2015 -

- SFRs – Felton Dr. (64-units)
(2014 re-sample site) Middle Ave. on San Mateo Dr. & Wallea Dr. (79-units)
- MFRs – Sharon Glen Condominiums on Sharon Road (57-units)
(2014 re-sample site) Hoover St. between Oak Grove Ave. & Valparaiso Ave. (64-units)

Flow Monitoring Process:

WBSD utilized a type of non-contact flow meter that uses radar technology. The flow meters were suspended above the flow in question (see picture below). Initially, the flow monitoring was performed to determine the peak flow cycles for each sample group, which is measured based on three different time intervals throughout the day (00:00 - 08:00 hours, 08:00 – 16:00 hours, and 16:00 hours – midnight). Once the flow cycles were determined, sampling protocols were developed and implemented.



Each year that flow data was analyzed, two flow meters were installed into two different manholes, one that would monitor flow from one group of SFRs and one that would monitor flow from one group of MFRs. Over a 24-hour day, flow quantities were measured, then divided by the number of SFRs or MFRs that were in the sample population. This number would then be the average discharge from an individual SFR or MFR.

Sampling Process:



24-hour composite sampling was performed over the course of two weeks. WBSD staff installed 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 (bottles 5-8) and
- 1600 hours to midnight, dinner, bathing (bottles 9-12).

In 2013, the first year of the Flow and Loading Program, the samples were collected based on the above timeframes, separately into three composite timeframes as noted above to determine loadings to sewer per time frame, and then the analytical results of the three samples were totaled and averaged for daily loadings to sewer per MFRs and SFRs.

In 2014 and 2015 samples were composited into one container for each sample site as opposed to 3-timeframes noted above.

RESULTS

Listed below are the results of the study. The tables are distinguished by year, as well as type of study (i.e. flow and loadings (TSS and BOD)).

2013 Flow Data

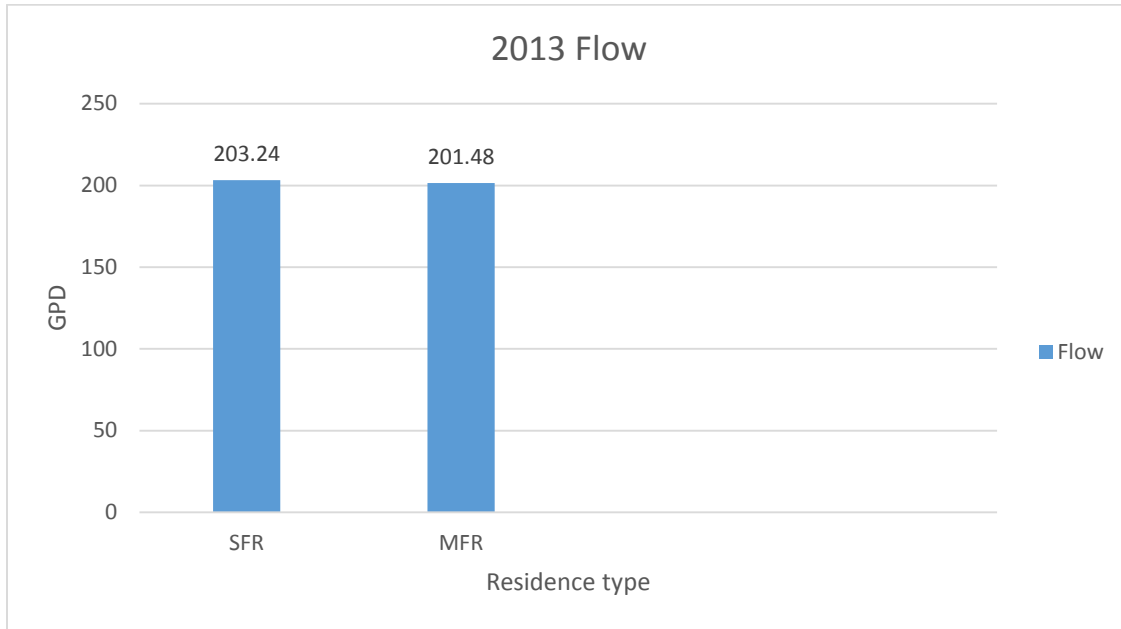


Table 1

2013 Loadings Data

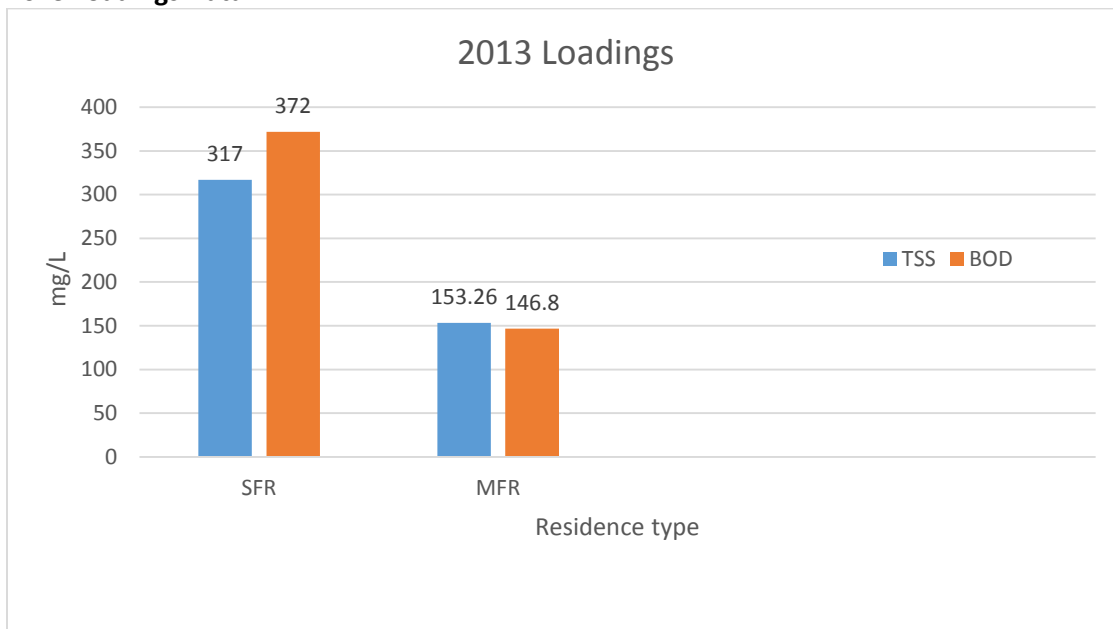


Table 2

2014 Flow Data

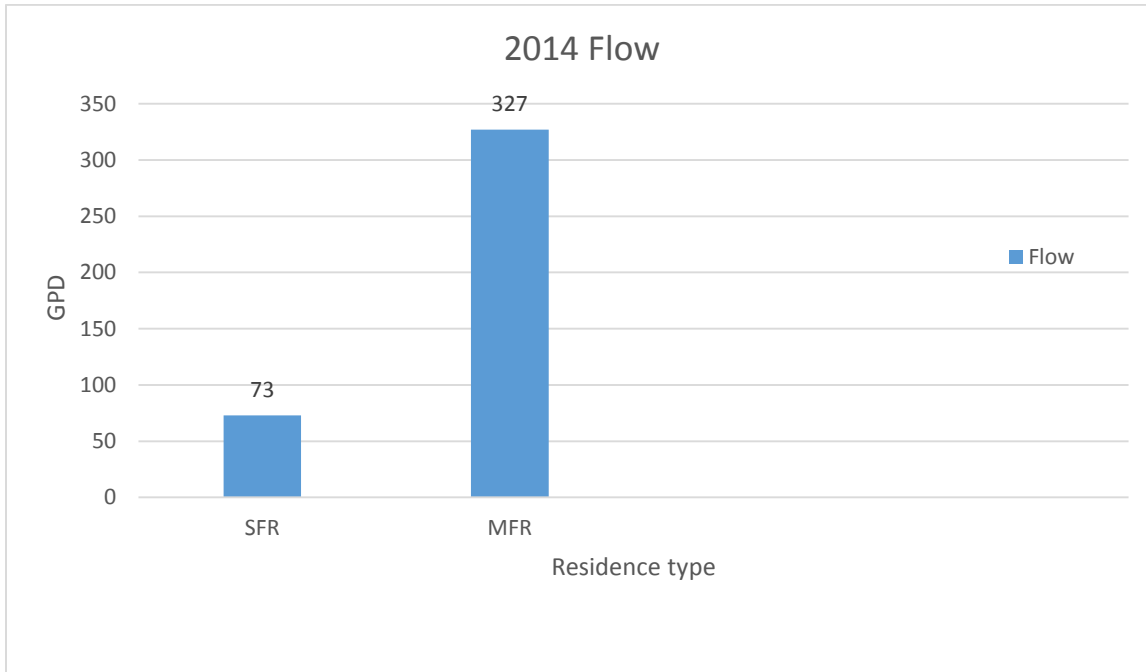


Table 3

2014 Loadings Data

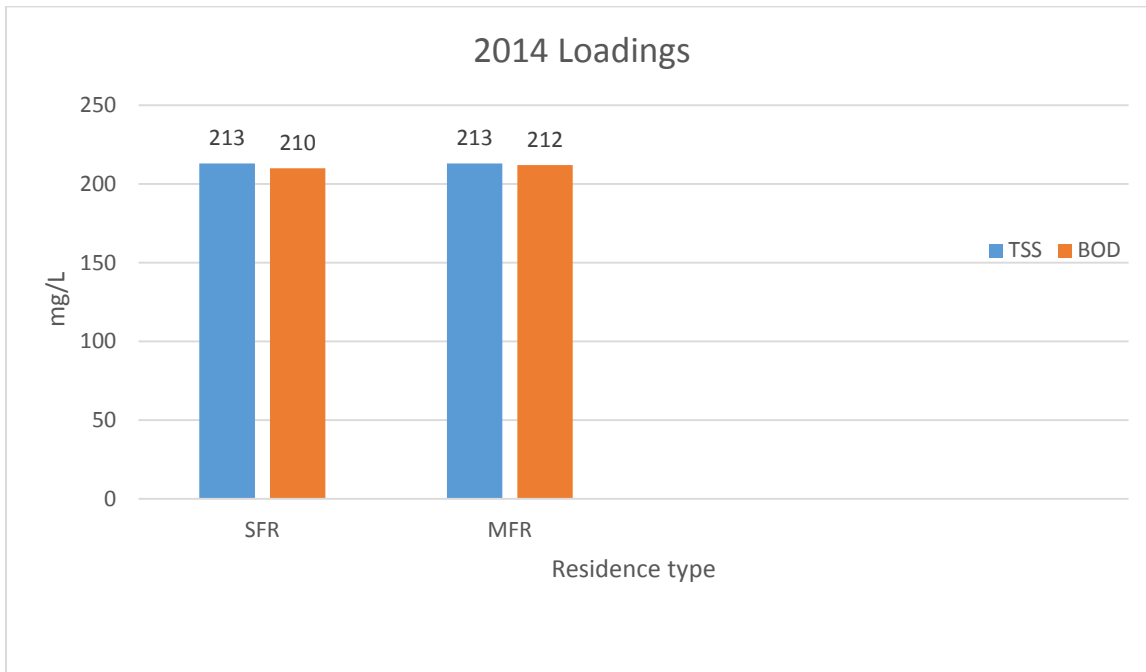


Table 4

2015 Flow Data

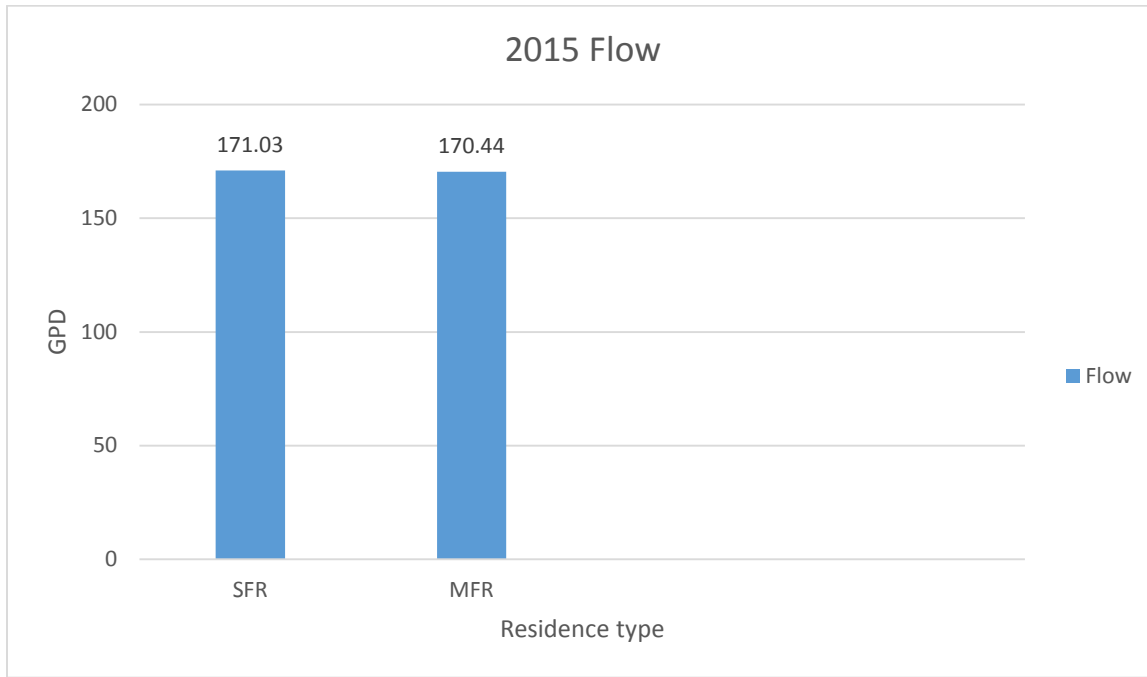


Table 5

2015 Loadings Data

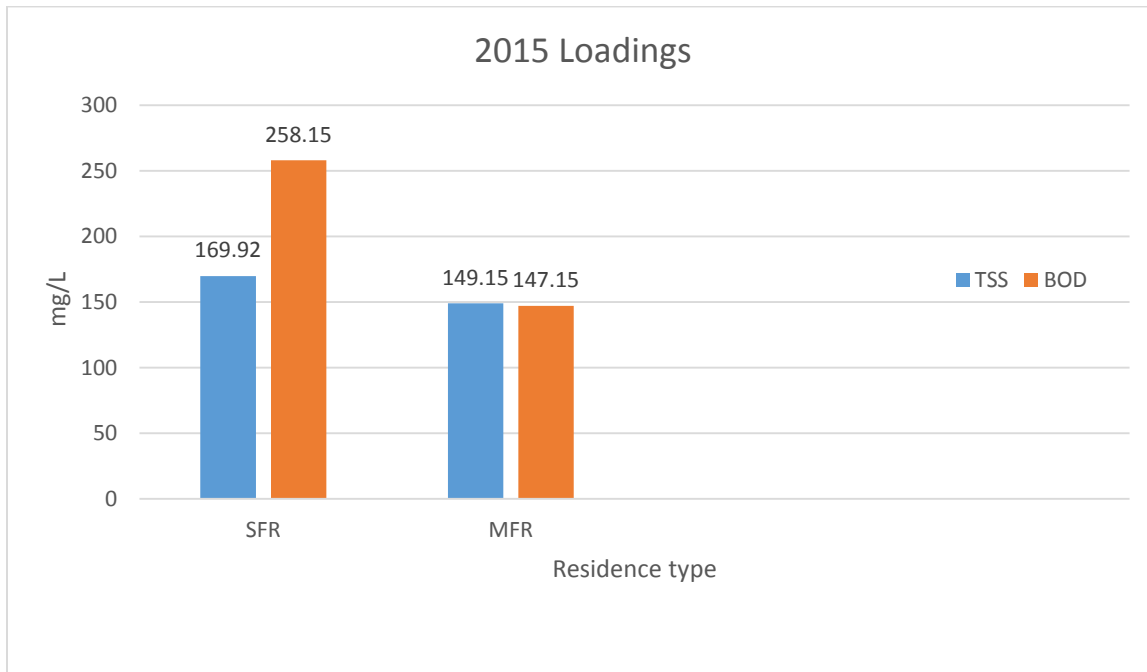


Table 6

2015 Flow Data (re-sample locations from 2014)

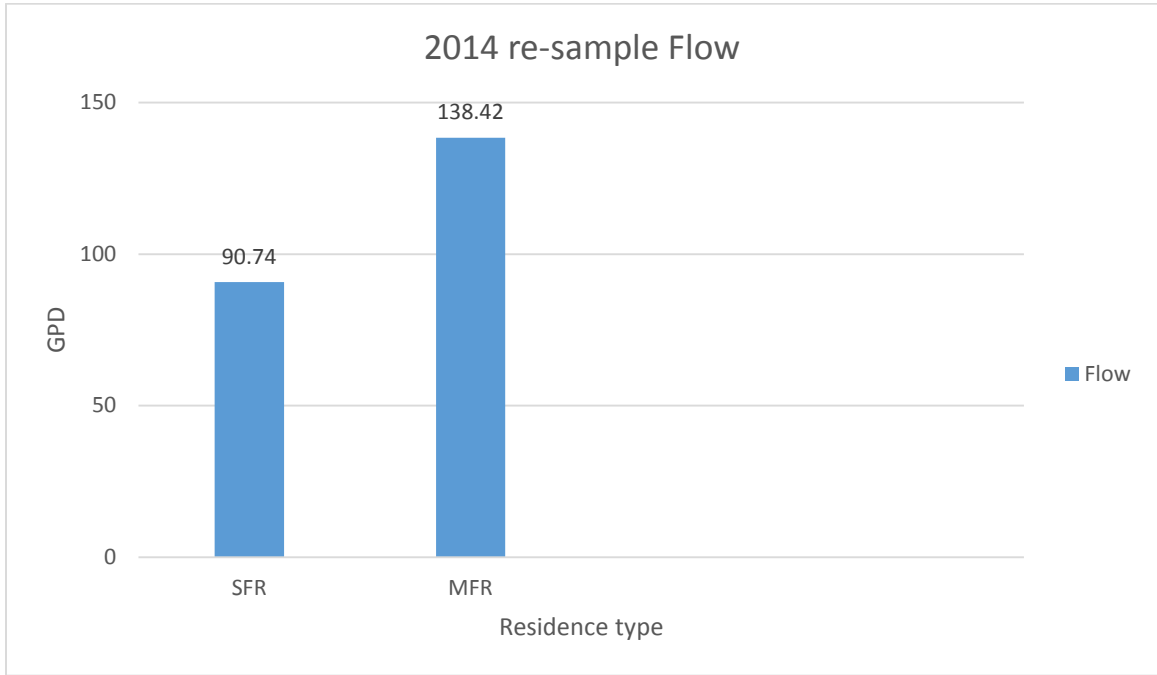


Table 7

2015 Loadings Data (re-sample locations from 2014)

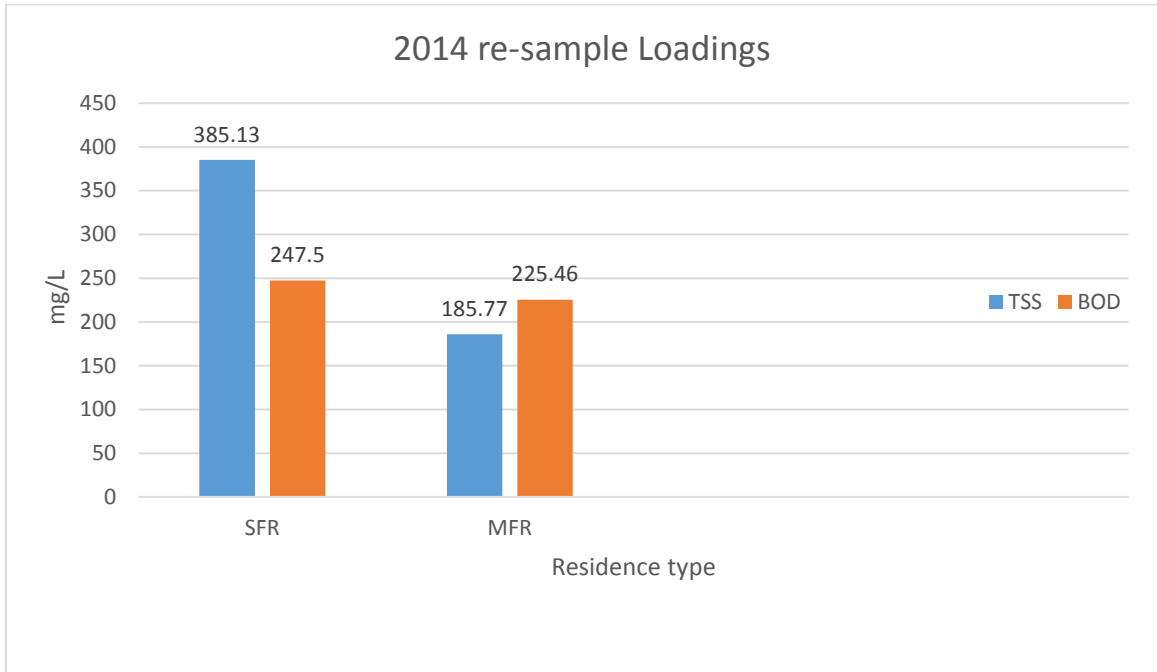


Table 8

ANALYSIS

The tables listed below show the comparisons of flow characteristics (i.e. flow amount and loadings (BOD and TSS)) on a year to year basis between SFRs and MFRs.

2013 - 2015 Flow Analysis

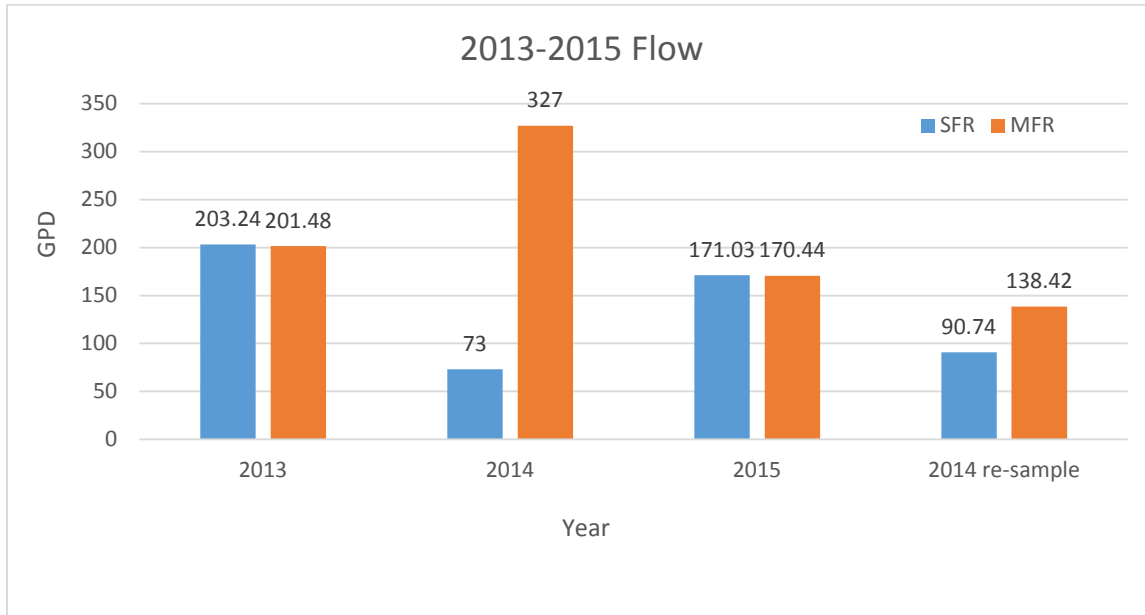


Table 9

2013 - 2015 Loadings (TSS) Analysis

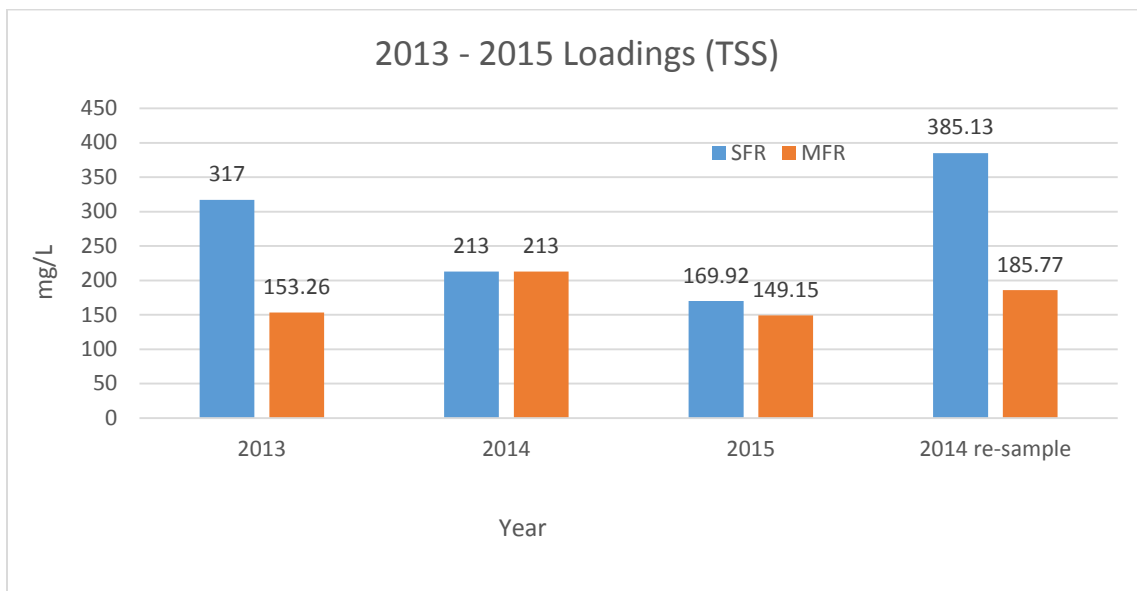


Table 10

2013 - 2015 Loadings (BOD) Analysis

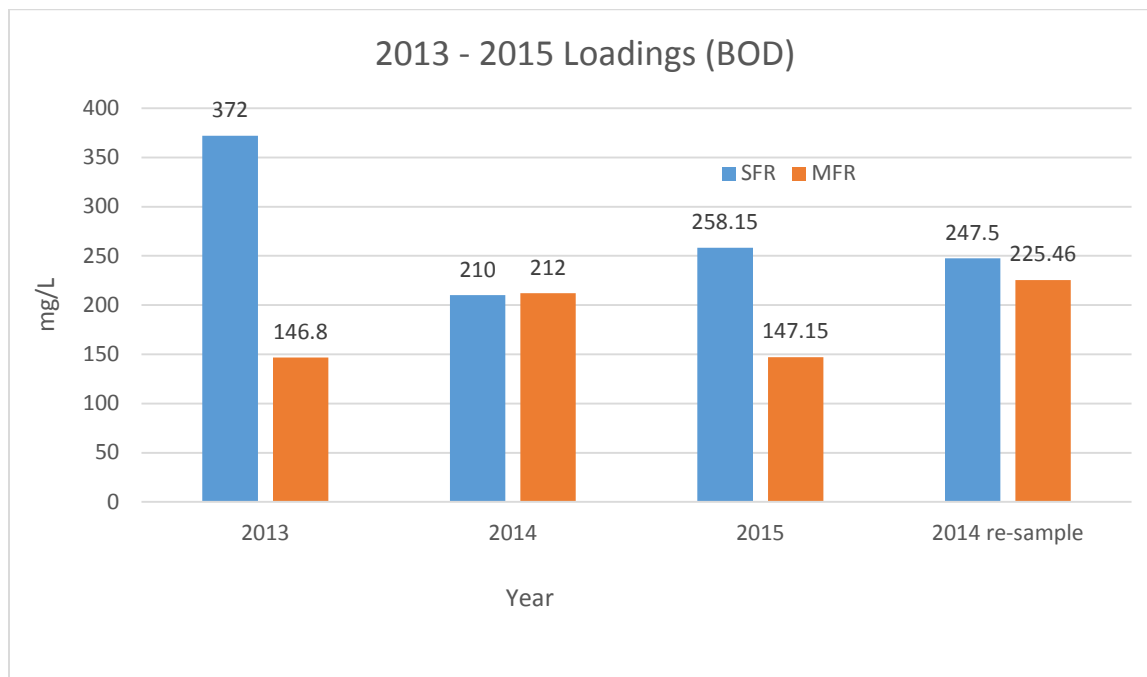


Table 11

CONCLUSION

Flow rates:

Over the course of the three-year study, the flow rates from MFRs were slightly higher (on average) than those of SFRs. In general, defined areas within sanitary districts (i.e. specific SFRs or MFRs) that have higher flow rates in their sewer discharge can attribute these above average flow rates to factors such as the following:

- Leaking flapper valves in toilet tanks have the potential to double the amount of sewer discharge from an individual residence or household.
- On-site sewer pipes that discharge/connect into the sanitary district main lines can have cracks in them caused by roots or upheaval. This can allow for pipe infiltration caused by lawn irrigation, more specifically, from “over” irrigation.
- Less significant water saving incentives.

When facility problems arise within MFRs, the repairs, or more importantly, the timing of the repairs, are usually dictated by the respective landlord(s) and or property managers. This delay can cause

extended periods of leaking fixtures and or on-site piping infiltration (via lawn irrigation), which can potentially lead to an increase in sewer flow rates. Perhaps residents of MFRs do not have the incentive to make those types of repairs, as opposed to residents of SFRs which often times own the property in which they live in. Also, water usage fees/bills are often times included in the monthly rent payment of residents of MFRs. Again, this can cause a lack of incentive, which can then lead to an increase water usage and, ultimately, sewer discharge.

In 2015, a mandatory 25% reduction in water usage was handed down by Governor Brown. In relation to this study, it was interesting to note the approximately 18% decrease in flow rates from the MFR that was observed in 2014 and then re-sampled in 2015. Also, with the mandatory water usage reduction, both SFRs and MFRs fell within WBSD's estimated 220 GPD discharge rate.

Loading rates:

In general, the loading rates for both TSS and BOD were higher in SFRs than those of MFRs. This could be attributed to the coinciding lower flow rates observed in the SFRs compared to the MFRs. Loading rates or concentrations have an inverse relationship with the volume represented in flow rates. Lower volumes of water usage will most likely always contribute to higher concentrations of loadings (i.e. TSS and or BOD) found in sewer discharge. Ultimately, and again, the lower flow rates could possibly be due to the increased incentives that residents of SFRs (often individual home owners) have as opposed to residents of MFRs. Because the residents of SFRs typically own their place of dwelling, they could possibly be more inclined to repair the leaking toilet, fix the cracked on-site sewer line, not over water their lawns, and decrease overall water usage to minimize their monthly water bill(s).

The overall differences in flow and loading rates between SFRs and MFRs found in this study were relatively small. At this time, a change in rate structure does not seem to be warranted. However, if the drought were to continue in our area and we experience increased water restrictions, larger differences in flow and/or loading rates between SFRs and MFRs may become more apparent. This suggests the need for an ongoing periodic monitoring program (roughly every five years) may be warranted to ensure SFRs and MFRs flow and loadings remain relatively similar and inside of WBSD's current estimated flow and loading rates (220 GPD and 150 mg/L respectively).

