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SBSA Announces $339 Million, 10-Year Capital Improvement Program

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The South Bayside System Authority (SBSA) is launching a $339 million 10-year Capital Improvement Program (CIP) to improve the reliability and efficiency of its regional wastewater system and facilities.

Over the next few years these projects will help address the most critical needs of SBSA's aging wastewater system, improving the condition of sewer mains, repairing treatment facilities, and assuring compliance to stringent environmental standards.

SBSA is a regional wastewater treatment plant in Redwood Shores owned by the cities of Belmont, Redwood City, and San Carlos, and the West Bay Sanitary District, which services Menlo Park, Portola Valley, and portions of Atherton, Woodside, East Palo Alto, Redwood City, and San Mateo County. SBSA serves more than 200,000 residents and businesses by providing wastewater treatment in accordance with the highest technical, environmental, and safety standards.

Like similar plants across the nation, SBSA must replace or rehabilitate aging infrastructure and make sure the treatment facilities continue to comply with regulatory requirements and provide quality wastewater and recycled water services.

To meet these needs, the four-member SBSA Commission – comprised of one member from each of its agency owners – in May 2006, instructed their staff and professional engineering and financial consultants to develop a CIP with necessary components to modernize the facility that was constructed in 1980.

The CIP includes 131 projects totaling over $339 million. To fund the CIP, the SBSA will need to issue revenue bonds and seek loans from the State Revolving Fund loan program administered by the California State Water Resources Control Board. To repay these loans it will be necessary to substantially increase wastewater treatment fees. The exact amount of the increase will be determined by each of the SBSA member agencies as they identify the exact needs of the citizens of their community. It is expected that rates will increase over a period of time to meet the repayment schedule of the loans.

Heretofore, in order to keep rates low, the implementation of capital improvements at SBSA were accomplished on a yearly basis utilizing funds available only after operational and maintenance costs have been budgeted and paid. SBSA has not had a long term (five or more year) CIP in place since its inception. The SBSA facility is now over 25 years old and has reached the end of its designed life. Many structures and most mechanical equipment are beyond the point of reasonable repair and require replacement.

The single most expensive component of the CIP is $125 million to repair and upgrade the force main, which is a 40-year-old pipe located in Bay mud with joints every 12 feet. The force main starts at the Menlo Park pump station with a

33 inch line, proceeds down the frontage road to the Redwood City Pump station at Maple Street, where it turns into 48 inches, to the San Carlos Pump Station where it goes to 54 inches. Belmont's pump station ties into the force main and the pipe continues through Redwood Shores to the treatment plant.

The highest priority is to upgrade the pump stations because they are all 40-50 years old and the equipment has exceeded its expected useful life and frequent failures cause high repair costs and potential spills. They are no longer reliable to pump the wastewater flows. Without improvements to the pump stations, there is a real risk of spills and the inability to regulate pumping.

Another high priority is the protective coating of 16-20 process tanks. They have corroded over the years. They were constructed when technology in the 1980s used coal-tar epoxy, which has proven to be unable to protect concrete and metals from the highly corrosive environment of wastewater treatment. Modern technology utilizes polyurethane and has proven over the past 10 years to be very effective.

Still yet a high priority is to rebuild the four fixed film reactors. These are open tanks where water is distributed over a porous media. The media is worn out on all of them and the equipment is corroded and worn to the point of needing replacement. The walls are exposed to corrosion. Even the steel superstructure has eroded. These have to be refurbished during dry weather, so the plan is to do two in 2009 and two in 2010.

To meet this goal, engineering must start right away.

Another key element of the CIP will be facility-wide automation, which will allow SBSA to implement today's technology and reduce staffing from three shifts each day to one shift daily, reducing personnel, through attrition, by 10 to 15 percent over a period of time. Some examples of automation:

1. start and stop on-site pumps based on need;
2. better control of the disinfection processes;
3. start and stop pumps at the pumping stations without going to them;
4. monitor temperatures and vibration of equipment to prevent critical problems.

The CIP also will feature improvements and upgrades of the electrical system. The motor control centers were essentially outdated when they were installed in the 1980s and no longer are efficient. SBSA will double the cogeneration (utilization of methane gas produced from the breakdown of solids in the wastewater to produce electricity) from 450 kW to 900 kW. SBSA now generates 30% of its power and hopes to increase it to 50% or more.

Another CIP project will be the replacement of the administration and control offices, which were constructed over four processing tanks. Over the past 25 years, the building's steel studs have eroded due to sulfuric acid (formed when hydrogen sulfide produced in wastewater and moisture combines) to the point that the building is now held up by sheet rock and stucco. Evaluation of the location and needs of the replacement offices and control structures will be performed to establish the most cost effective solution.

SBSA is among numerous wastewater facilities across America faced with steep costs to upgrade facilities. A biannual survey by the American Society of Civil Engineers that was updated this year indicates a gap of $1.6 trillion over five years between what is needed to bring national infrastructure up to reasonable standards and what is now in progress. The study says California collectively has a $14.4 billion annual shortfall in wastewater infrastructure needs. Its report card for America's infrastructure gives wastewater a D-. You can read more yourself at www.asce.org/reportcard/2005/index.cfm

Just a sampling of other similar projects:

- The San Francisco Public Utilities Commission (SFPUC) launched a citywide $150 million five-year wastewater Capital Improvement Program in 2005 to improve the reliability and efficiency of San Francisco's combined wastewater and storm water system.
- Santa Rosa is in the midst of a $72 million project for water, wastewater, and drainage projects.
- Houston is spending $1.5 billion, yes billion, between now and 2016 to upgrade its wastewater system.
- San Jose has recently announced a wastewater CIP that exceeds $900 million over the next 10 years
- Fort Lauderdale has begun a CIP that entails the modernization of their water and wastewater infrastructure through the investment of $550 million in capital improvements to be completed over a period of 10 to

20 years, with the majority of the improvements to be completed by 2011.

Frequently Asked Questions

Why is SBSA (through its member agencies) raising rates?

The rate increase is necessary to fund needed capital improvement projects. SBSA does not receive tax revenue; all operations are funded by rates and fees charged for wastewater service. As a result, SBSA must borrow money to fund costly capital improvements needed to repair and replace the aging facilities and infrastructure.

How is the ownership among the member agencies calculated?

Ownership percentage was established based on flow capacity purchased when the plant was established. For the most part, the agencies contribute these percentages toward the operations and maintenance of SBSA:

1. Belmont-8.8%
2. San Carlos-13.8%
3. West Bay S.D.-23.7%
4. Redwood City-53.7%

What kind of capital improvement projects will the rates be funding?

The rates will be funding SBSA's 10-year Capital Improvement Program, which includes 131 projects ranging from upgrading equipment to replacing wastewater mains to improving pump stations.

How much will my bill increase?

Each member agency will determine the needed increases to the rates to meet the requirements of the SBSA Capital Improvement Program.

When will the rate increase go into effect?

Each member agency will also determine the timing of the needed rate increases; however, repayment of loans is anticipated to begin in early 2009 so rates will need to cover those payments. It is expected that rates will increase gradually over time to meet the repayment requirements of the loans.

What are the pump stations and the related costs to bring them up to modernization?

Pumping stations are facilities including pumps and equipment for pumping fluids from one place to another. They are used for a variety of infrastructure systems that many people take for granted, such as the supply of water to canals, the drainage of low-lying land, and in our case the removal of sewage to processing sites. Three of the four pump stations that service SBSA are over 40 years old and the equipment is corroding and no longer reliable to pump the sewage. Without improvements to the pump stations, the risk of spills of raw wastewater to the bay and an inability to regulate pumping is very high. It is necessary to start as soon as possible. The projected costs are:

1. $14,872,000 Belmont Pump Station east of 101 near Nikon.

2. $10,036,800 San Carlos Pump Station east of 101 between SC Airport and Hiller Museum.
3. $23,400,000 Redwood City Pump Station east of 101 on Maple near women's jail operated by the sheriff's department.
4. $5,454,000 for West Bay – refurbishment of their facilities because it is newer, about 25 years. Located near Marsh Road.
5. $9,666,500 million for the Booster pump which kicks in during wet-flow season.

To better understand the improvements necessary under the CIP, please review how SBSA treats wastewater?

By effectively treating wastewater at an advanced, two-stage biological treatment facility, the SBSA helps keep San Francisco Bay environmentally clean and safe. The treatment plant uses bacteria to remove organic material and toxins from the wastewater it treats. Sewage arrives at the plant through a series of pipelines and pump stations. The sewage then passes through physical and biological processes which result in high quality effluent being discharged to the deep water channel of the San Francisco Bay. The SBSA facility is designed to remove more than 97 percent of all solids, organic material and pathogens from the wastewater.

So what are the first things that happen when the wastewater reaches the SBSA plant?

The wastewater slowly flows through the primary sedimentation tanks where settling and skimming removes solids, floating grease and scum. The fixed film

reactors

are the first stage of the biological treatment. Wastewater is pumped to the top of the fixed film reactors where bacteria in the reactors consume much of the organic matter in the wastewater.

What does the second stage of treatment entail?

The second stage of the biological treatment process is activated sludge. The microorganisms and the biodegradable matter they consume are collectively called “activated sludge.” Air is continuously mixed into the wastewater and activated sludge to provide oxygen for the microorganisms to grow and consume the remaining biodegradable matter. This occurs in the aeration basin. The activated sludge flows to the secondary clarifiers for final settling to separate the activated sludge from the wastewater. The activated sludge is sent back and reused at the aeration basins. At this point in the treatment process about 90% to 95% of the solids and biodegradable matter has been removed from the wastewater.

Is there a final filtration?

Yes. The filters have anthracite coal media through which the secondary effluent flows to remove most of the remaining suspended particles. Chlorine bleach (sodium hypochlorite) is applied to the filter effluent. The chlorine kills and disinfects nearly all remaining bacteria. During the dry season SBSA further

treats some of the plant flow with coagulation and additional disinfection for use as recycled water for landscape irrigation in the SBSA service area.

What happens to the solids at that point?

Most of the solids collected by the primary tanks and some of the solids collected by the secondary clarifiers are sent to the sludge thickeners. This process thickens the solids, reducing volume in order that the next process, anaerobic digestion, can operate more efficiently.

What is anaerobic digestion?

Anaerobic (absence of oxygen) digestion is a two-stage biological process first converting large organic compounds to organic acids, and then converting these to carbon dioxide and methane. The process reduces solids volume, stabilizes the solids - reducing the chance of odor, and reduces pathogens. The finished product is called biosolids. The methane gas is used to produce some of the electricity needed to run the plant's equipment, and for process and building heating. Much of the water in the biosolids is removed by either centrifuge or drying beds. For centrifuge operations, a polymer solution is added to aid the separation of solids from water. The water is passed through the centrifuge, leaving the dewatered biosolids. Another option used for dewatering is drying beds. Nature does the work of dewatering the biosolids, using sun and wind. This reduces the cost of operation. The biosolids have high nitrogen content and

can be used as an agricultural soil conditioner, a feed stock for composting, or disposal in a landfill.

How much of the CIP is devoted to improving the facilities and equipment for these processes?

A considerable amount, including these highlights:

- $22 million to rebuild the four fixed film reactors. All need to be refurbished at $5.5 million each. These are open tanks with rotating distribution arms that distribute water over a porous media – the media has worn out on all of them. The walls are exposed to corrosion. Even the steel superstructure has eroded. These have to be refurbished during dry weather, so the plan is to complete the work on two of them in 2009 and complete the other two in 2010.
- $15 million on automation, which will allow us to implement today's technology and reduce our staffing from 3 shifts per day to one shift daily, reducing personnel by 10 to 15 over a period of time. Some examples of automation: a) start and stop on-site pumps based on need; b) better control of the disinfection process; c) start and stop pumps at the pumping stations without going to them; d) monitor temperatures and vibration of equipment to prevent critical problems; e) the ability to monitor the processes and facilities remotely and respond to alarms when received. This wastewater automation has been evolving over the past decade. It

will take approximately three years, starting September 2008, and will include one year to design and approximately 24 months to implement.

- $15 million in improvements and upgrades of the electrical system. The motor control centers were essentially outdated when they were installed in the 1980s and no longer are efficient. All of the conduits in the concrete floors are filled with water, which has caused corrosion and deterioration of the plant's electrical system resulting in inoperable equipment. SBSA will also double cogeneration capacity, from 450 kW to 900 kW, in which we use methane gas to produce electricity. We now generate 30% of our power and hope to increase it to more than 50 %.
- $5 million for protective coating of 16-20 process tanks. They have corroded over the years. They were constructed when technology in the 1980s used coal tar epoxy, which has proven to be highly susceptible to corrosion. Modern technology now uses polyurethane which SBSA has demonstrated on one of its tanks to last 10 years with no difficulties. The corrosion essentially eats the concrete. This project will be done over several years because SBSA cannot take all of the processes out at the same time. Repairing the tanks is necessary to prevent the potential collapse of tanks and other support structures.

Why weren't these improvements done earlier, over time?

SBSA management, over the life of SBSA, has taken many positive and productive steps to keep the service charge for wastewater treatment at very low

and reasonable rates. As equipment has worn or replacement has become necessary it has been possible to address small needs through the annual budgeting of Operations and Maintenance (O&M) charges which included a small portion for Capital Repair and Replacement funding. The needs and expenditures have, historically, been low as the facilities were relatively new. The needs have climbed in recent years and even with added funding, approved by the Commission, SBSA was not available to meet the requirements of the facilities. This has resulted in deferred maintenance that must now be done. In the effort to keep rates and fees low, the cost of replacing the depreciating structures and equipment was not accounted for in the monthly or annual fees charged to system users. As of June 30, 2007 the accumulated depreciation of SBSA facilities is $50,142,489 in original cost (1980) dollars. As noted above, SBSA has not included the cost of depreciation in service fees and has not saved to address the need of replacing the depreciated assets.

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