San José-Santa Clara
Regional Wastewater Facility

CIP

CAPITAL IMPROVEMENT PROGRAM

Quarterly Status Report:
April – June 2021

MISSION
Rebuild and revitalize the Regional Wastewater Facility and deliver the CIP on time and within budget.

CAPITAL IMPROVEMENT PROGRAM

HOW ARE WE DOING?

Key Performance Indicators (KPI) Year-to-Date:

SAFETY
0 Incidents

EXPENDITURES
On Target

ENVIRONMENTAL
0 Permit Violations

LEGEND

●	On Target
▲	Alert
◆	At Risk

The San José-Santa Clara Regional Wastewater Facility (RWF) is the largest advanced wastewater treatment facility in the western United States. The RWF has been treating the South Bay's wastewater and protecting public health and the environment without interruption since 1956. The discharge of clean wastewater into the South San Francisco Bay contributes to diverse and thriving fish and wildlife ecosystems.

Much of the RWF's infrastructure is functioning well beyond its intended use. As a result of a long and thoughtful Master Plan process, a $2.1 billion, 30-year Capital Improvement Program (CIP) is modernizing and refurbishing the RWF so that its critical work can continue into the future. Homes and businesses in Silicon Valley need a modern, reliable, state-of-the-art treatment plant to ensure a high quality of life and thriving economy. The CIP is rebuilding RWF infrastructure and updating treatment processes with innovative, efficient new technologies.

The first phase of the CIP is a 10-year plan that began in 2014, with a budget of $1.4 billion. This report summarizes the CIP's progress and highlights accomplishments from April to June 2021.

Verifying Equipment Effectiveness Prior to Ownership

By: Kerrie Romanow, ESD Director

As the City of San José (City) slowly returns to a more normal operating environment, safety remains a top priority. At the RWF, staff and contractors are continuing to undergo brief health screenings before entering buildings, as well as wearing masks while working indoors. Safety precautions like these have helped us continue, without major delays, the $2.1 billion refurbishments of the RWF through the CIP. This major investment of time, labor and funding will ensure that the RWF continues its important, non-stop work to protect public and environmental health for the next 30 years.

How can staff be certain that the large equipment the CIP is purchasing and installing will work effectively? Testing, startup, and commissioning (TSC) ensures that projects meet all plan and specifications requirements. "TSC verifies that what we've bought works before we take ownership of it," said Program Manager **Simon Alder**. The four-part process usually follows a prescribed order, described below. Each testing phase must be satisfactorily completed before the next one can begin.

Factory acceptance testing typically tests large equipment such as engine generators and electrical switchgear at the manufacturing site prior to shipping. Both CIP and Operations and Maintenance (O&M) staff are on hand to witness the equipment running in a controlled environment and ask the manufacturer questions directly. The contractor has the sole responsibility for accepting the equipment after the test.

The contractor completes **pre-operational testing** and inspection prior to starting systems that have been installed on site. All items need to be inspected and documented for acceptance by the City's project inspectors. During **functional testing, or startup**, the contractor tests installed equipment or systems in the presence of staff to demonstrate that the equipment meets all requirements. New equipment must also integrate well with complex, existing RWF systems and processes. In many cases, critical systems must be partially or fully shut down while installation takes place—all while the RWF continues to treat wastewater around the clock.

In **operational testing**, also known as acceptance testing or commissioning, O&M staff train on the new facility or system. The system must be operated continuously for a specified duration as a complete facility. If the operation fails due to malfunctioning equipment or other major problems, the testing is restarted. Successful TSC brings CIP and O&M staff, design engineers, contractors, and manufacturers together to witness and verify that critical equipment will work as required in the complex RWF environment, for years to come.

Advanced Facility Control and Meter Replacement – Phase 1 is one of the CIP projects where TSC is underway. Flow meters, sensors, valves and actuators are critical in controlling the RWF's treatment processes. Most of the facility's numerous controls are nearly 50 years old and in poor condition. In addition, the original manufacturers no longer provide support for the outdated equipment. This project is replacing or upgrading control equipment in the Secondary B Battery and Nitrification B Battery treatment areas. The TSC process ensures that the new equipment continues to meet rigorous RWF permit requirements. The project expected Beneficial Use date is October 2021.

New flow meter transmitters with weather protective enclosures at Secondary RAS Pump Station.

Secondary B Battery Tunnel new piping and flow meter installation.

The Secondary B Battery work is substantially complete, following successful **operational** testing of the final return activated sludge (RAS) flow meter in June 2021. The project team is working to issue the certificate of substantial completion and turn the equipment over to O&M. Construction in Nitrification B Battery is ongoing and includes final mechanical piping and pipe support installations and completion of **pre-operational** testing for electrical and instrumentation equipment. **Functional testing** will commence later this year.

"The instruments and sensors being installed under this project represent the operators' eyes and ears in monitoring the treatment process," said **Kyle O'Dea**, project manager. "The project provides for efficient, reliable operation of the wastewater treatment process, allowing the RWF to continue to provide world-class service that helps protect the South San Francisco Bay."

RWF Spotlight – Protecting the Western Burrowing Owls at the RWF

The Western Burrowing Owl is a charismatic, state species of special concern that's thriving on the RWF bufferlands. Pursuant to the RWF's Plant Master Plan, approximately 200 acres of land have been set aside as burrowing owl habitat. The City partners with the Santa Clara Valley Habitat Agency (SCVHA) to manage and improve the habitat, as well as track and monitor the owls, which live in abandoned ground squirrel burrows or in artificial burrows that have been installed as part of the Burrowing Owl Habitat Restoration project. The project is managed through a partnership with the Santa Clara Valley Audubon Society and the Talon Ecological Research Group.

Burrowing owl parents watch over their chicks at the RWF in May.
Photo credit: Phil Higgins

Habitat Agency biologists reported observing 12-13 owls in April 2021, and 17-18 in June 2021, including seven chicks. These owls either resided in the bufferlands over the winter, returned to the site from another site in the region, or from farther away, or were reintroduced to the bufferlands as part of SCVHA's Juvenile Burrowing Owl Overwintering Project.

Burrowing owl eggs in an enclosure burrow, March 2021.
Photo credit: Phil Higgins

In June 2021, TPAC recommended approval and Council passed an amendment to the agreement with SCVHA to manage owl habitat that extended the term through June 30, 2026. Through the partnership with the Santa Clara Valley Audubon Society and the Talon Ecological Research Group, the SCVHA provides and manages habitat where the owls can successfully breed, which is critically important to the recovery of the species. The partners' coordinated efforts use science to reverse the trends of decline in the species locally. At the RWF, O&M staff protect habitat by maintaining fences, while ESD Environmental Compliance staff coordinate with biologists who are responsible for improving conditions for the owls.

"We can all protect Western Burrowing Owls and their chicks by respecting and avoiding burrowing owl habitat," said Environmental Services Specialist **Catherine Borrowman**. "This is especially important during spring and summer, when chicks develop survival skills quickly under the watchful eyes of their parents."

How the CIP Delivers Projects

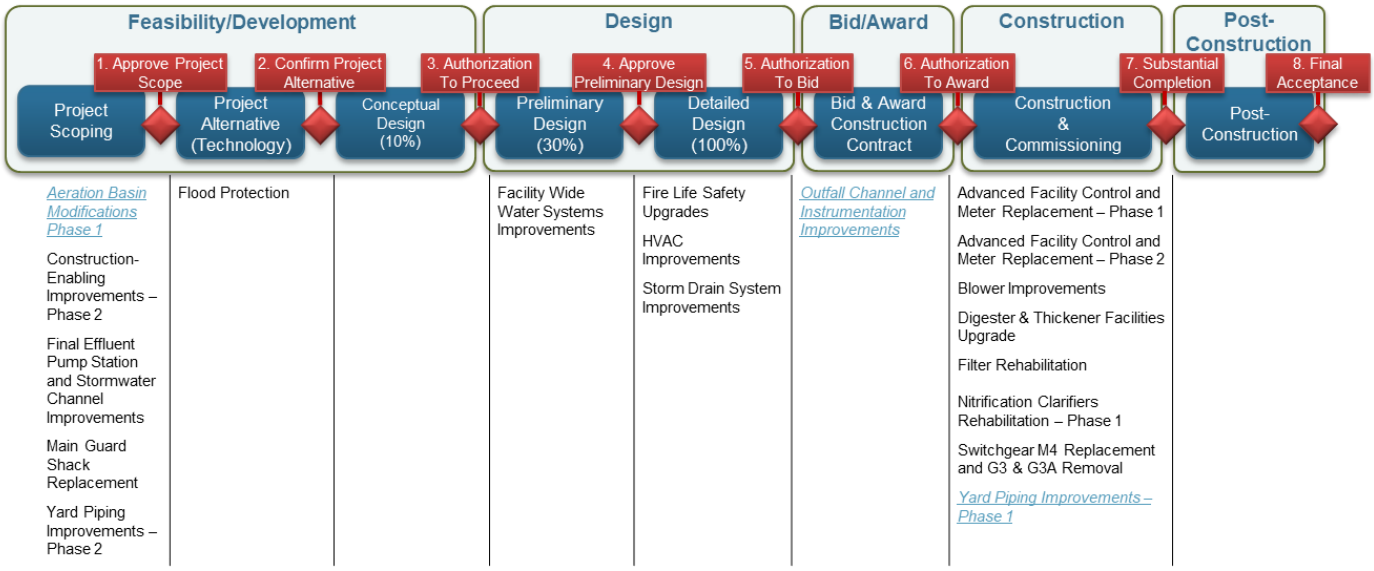
The CIP uses two project delivery methods:

- **Design-bid-build** is a commonly used delivery method in which an owner first procures a professional engineering firm to prepare detailed design plans and specifications for a project. The owner then procures a general contractor to construct the project, based on the design completed by the engineer.
- **Progressive design-build** is a two-phase delivery method contracted with a single design-build firm in which the project's design, cost estimating, construction schedule, and final guaranteed maximum price (GMP) are developed during the first phase. If the owner and design-builder agree on the schedule and the GMP during the first phase, the final design, construction, and commissioning are completed during the second phase.

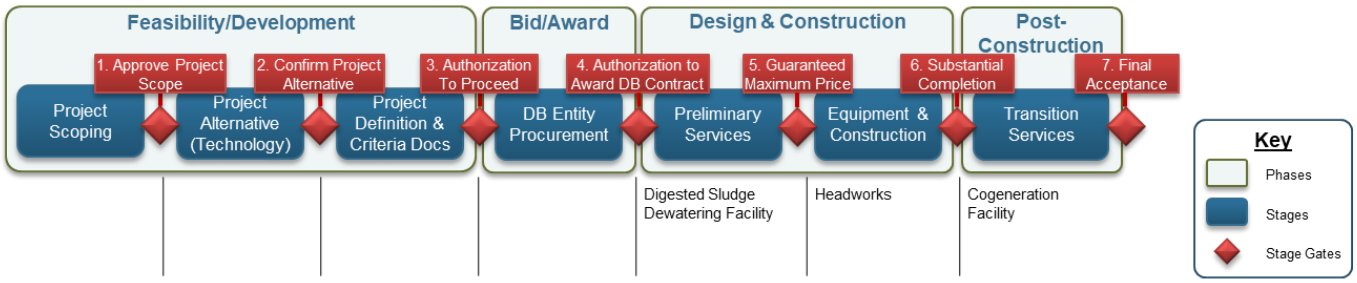
All CIP projects, regardless of project delivery method, follow a consistent process of consecutive delivery stages, each culminating in a stage gate, as presented in the project delivery models below. Stage gates are go/no-go points at which the project team must demonstrate that the project has met set evaluation criteria before advancing to the next delivery stage. The benefits of the stage gate process include consistency, quality, ensuring that the scope continues to address existing needs, budget/schedule control, and O&M team engagement.

Project Delivery Models

Design-Bid-Build Active Projects



Progressive Design-Build Active Projects



*Projects shown *underlined and in blue and italics* have either been initiated or advanced this reporting period.

CIP PROJECTS

The CIP includes projects in both design and construction. CIP accomplishments for this quarter are outlined in two sections: Projects in Design and Projects in Construction. The CIP's projects in construction and post-construction phases have cost and schedule baselines that are monitored using the City's Capital Project Management System.

COVID-19 update: In April through June, CIP projects continued to progress despite COVID-19 pandemic impacts. Projects in construction continued with all contractors and construction management (CM) staff following the latest guidance from the Santa Clara County Public Health Officer. The City continued to screen all City, consultant, and contractor staff at each RWF entrance, followed by screening questions at individual work sites. All other CIP staff continued to work remotely.

Projects in Design

- Aeration Basin Modification – Phase 1
  Initiated in June, this project will rehabilitate aeration basins and associated equipment, as well as make modifications to the existing aeration system to ensure that the secondary treatment process area continues to meet permit requirements.

- Digested Sludge Dewatering Facility Project
  Design-builder Walsh submitted the 60 percent design for review.

  In June, the City executed an amendment to the design-build contract for Early Work Package 1, which includes site improvement work and development of final design documents.

- Facility Wide Water Systems Improvements Project
  In May, consultant Kennedy Jenks (K/J) submitted the 30 percent design documents and Preliminary Design Report (PDR) to the City. The project team held a value engineering workshop to review the 30 percent design and PDR.

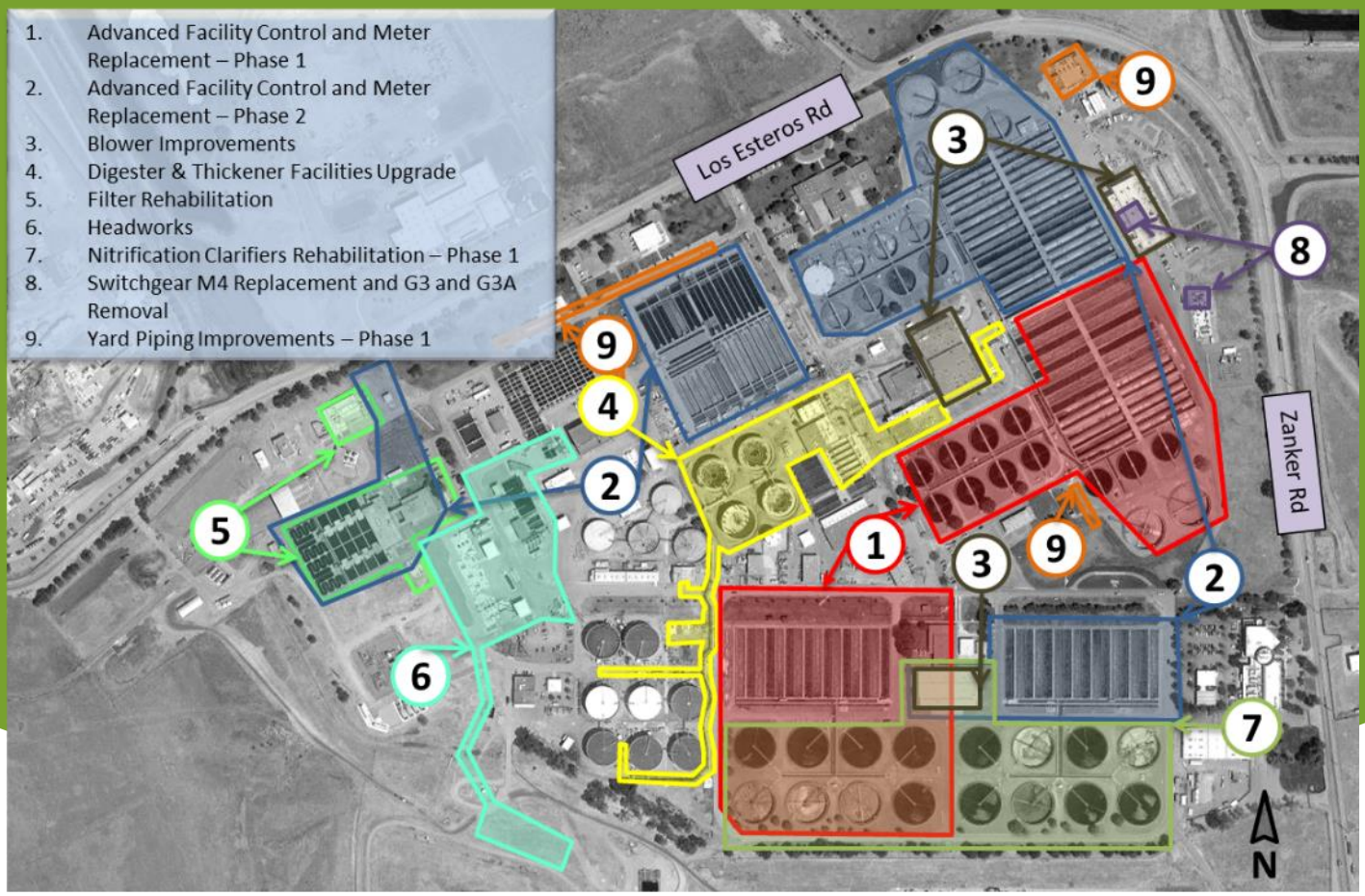
- Flood Protection Project
  The project team coordinated with consultant AECOM to review and finalize the alternative analysis report in June.

- Outfall Channel and Instrumentation Improvements Project
  The project was approved to bid in May and the construction contract was advertised on June 16. Bids will be opened in August.

- Storm Drain System Improvements Project
  Consultant AECOM submitted the 100 percent plans and specifications for final review and approval in June.

- Yard Piping Improvements – Phase 2
  Consultant Black & Veatch completed the condition assessment planning for the 48-inch, 84-inch, and 120-inch pipelines. Condition assessment of the 120-inch line is anticipated in July.

Projects in Construction



1 Advanced Facility Control & Meter Replacement - Phase 1 Project: Reliably controlling processes

Contractors pressure testing air supply lines.

This is the first of a two-phased project. The project will replace aging and outdated RWF control equipment such as flow meters, valves, actuators, and sensors. Original manufacturers no longer provide support for the existing equipment. New, reliable controls are vital to maintain effective process control and will ensure that the RWF continues to meet the requirements of the National Pollutant Discharge Elimination System (NPDES) permit.

Project Budget: $12.4 million
Expected Beneficial Use: October 2021

Update:

- Contractor Overaa completed secondary RAS B4 flow meter replacement, pre-operational testing, and functional testing in April. Operational testing was completed in June.
- Overaa completed pre-operational testing of the air piping, influent and RAS flow control valves and flow meters on nitrification aeration tanks in June.

2 Advanced Facility Control & Meter Replacement - Phase 2 Project: Reliably controlling processes

Contractor functional testing a meter.

The second part of a two-phased project, this project will replace aging and outdated RWF control equipment such as flow meters, valves, actuators, and sensors. Original manufacturers no longer provide support for the existing equipment.

Project Budget: $15.0 million
Expected Beneficial Use: March 2023

Update:

- Contractor Kiewit completed installation, pre-operational testing, and functional testing of two analyzers in the filter building basement and several meters in the filter service wing sample room.
- Kiewit completed demolition of existing influent piping in the Nitrification Battery A tunnel in June.

3 Blower Improvements Project: Oxygenating wastewater with greater energy efficiency

Contractors dissembling a blower in the Tertiary Blower Building.

RWF's aeration blower systems supply the oxygen needed for breaking down organic material in wastewater. The existing blower systems are more than 30 years old and need rehabilitation. This project will replace blower engines, gearboxes, and associated control equipment, extending the system's useful life and enhancing its energy efficiency.

Project Budget: $51.5 million
Expected Beneficial Use: October 2022

Update:

- Contractor Monterey Mechanical began pre-operational testing of Building 40 Blower #3 in June. Completion of pre-operational testing and functional testing is anticipated in July.
- Monterey Mechanical began the simultaneous rehabilitation of Tertiary Building Blowers #4 and #5 in June.

4 Digester and Thickener Facilities Upgrade Project: Producing energy, improving treatment

Pre-operational testing at the Sludge Screening Building.

The RWF's 16 digesters use anaerobic digestion to break down sludge. This project will upgrade four of the digesters to improve gas production, reduce sludge volume and reduce the number of digesters required. A new sludge screening building will allow primary sludge to be thickened with secondary sludge before it reaches these upgraded digesters. Six thickening tanks will be renovated to improve efficiency, allowing the RWF to retire 10 older tanks.

Project Budget: $200.1 million
Expected Beneficial Use: January 2022

Update:

- The required 28-day operational testing was completed for the six upgraded dissolved air flotation thickening tanks and the new pressure flow pump in April.
- Contractor Walsh completed pre-operational testing at the sludge screening building and functional testing began in June.

5 Filter Rehabilitation Project: Protecting health and environment, increasing reliability and capacity

Aerial view of the current filtration area.

The filtration process is one of the final steps in wastewater treatment. The RWF's tertiary filtration unit process consists of 16 granular media filters and ancillary equipment. Built in the 1970s and 1980s, these components are near the end of their useful lives. The project will rehabilitate structural, mechanical, electrical and instrumentational elements of the system.
Project Budget: $58.3 million
Expected Beneficial Use: July 2024

Update:

- The project team began coordinating dedicated process shutdown requests with O&M staff in advance of upcoming demolition work by Contractor Walsh.
- The project team coordinated with O&M staff to develop a shutdown plan in May to replace the filter bypass valves.

6 Headworks Project: Pretreating wastewater with better performance and reliability

Progress on the raw sewage pump station

Headworks pretreatment of raw wastewater enhances and protects downstream treatment processes. This project will replace Headworks 1, the oldest facility in the RWF, with a new Headworks 3, and also modify Headworks 2. The new pretreatment system will be more reliable and will be able to treat projected wet-weather wastewater flows.
Project Budget: $172.6 million
Expected Beneficial Use: June 2023

Update:

- Design-builder CH2M began concrete deck work at the influent screen structure, grit facility, and electrical building in April. The concrete deck work was completed in June.
- CH2M completed the installation of the 108-inch pipe between new Headworks 3 and upstream raw sewage junction box in June. The design-builder continued installation of the 96-inch pipe to downstream processes and is expected to complete the work in December.

7 Nitrification Clarifiers Rehabilitation – Phase 1 Project: Improving secondary treatment infrastructure and efficiency

Contractor pouring a concrete pipe support.

Central to the RWF's biological nutrient removal (BNR) process, clarifiers separate sludge from effluent. The 16 existing clarifiers were constructed in the 1970s and 1980s and are near the end of their useful life. This project will make cost-effective improvements to enhance the clarifiers' efficiency and minimize unscheduled maintenance on them for the next 30 years.
Project Budget: $62.7 million
Expected Beneficial Use: January 2023

Update:

- Contractor Overaa completed mechanical installation work in eight influent valve boxes, installed the pressure relief valves and demolished the scum piping in eight clarifiers in May.
- Overaa completed the factory acceptance test of the motor control center enclosure in June.

8 Switchgear M4 Replacement and G3 & G3A Removal Project: Upgrading systems, enhancing safety

Arrival of the new Power Control

For the last 10 years, the RWF has been implementing a series of electrical reliability projects to strengthen the RWF electrical distribution system. This project will replace the aging M4 switchgear with a new switchgear with 3,000-amp breakers. The M4 switchgear replacement will have protective relays to lower arc flash levels, enhancing employee safety. Removal of the existing G3 and G3A switchgears is also in the project scope.
Project Budget: $9.6 million
Expected Beneficial Use: January 2023

Update:

- The factory acceptance test for the M4 Switchgear enclosure was completed in May.
- In June, the new M4 Switchgear enclosure and Power Control Room arrived on site. The M4 switchgear is anticipated to be installed in July.

9 Yard Piping Improvements – Phase 1: Repairing and replacing important pipelines at the RWF

Stop logs installed at the North Settled Sewage Vault.

The RWF has 67,000 linear feet of process pipes that carry gas, liquids, sludge, air, steam, and other process streams to and from the various treatment areas. These networks of pipeline are critical to RWF operations. Seventy percent of the pipes are more than 25 years old, and 10 percent are more than 50 years of age. This is the first of a multi-phased project to repair or replace pipe systems that have been identified as high priority or at high risk of failure.

Project Budget: $5.4 million
Expected Beneficial Use: October 2021

Update:

- In June, contractor Michels Pipeline Construction completed installation of double isolation stop logs at the North Settled Sewage Vault.
- Michels began installation of the new 96-inch gate guides in June, with completion anticipated in July.

Contractor completing electrical work for the Digester and Thickener Facilities Upgrade Project.

What's Ahead?

In July - September 2021:

- Open construction bids for the Outfall Channel and Instrumentation Improvements Project and issue the Notice of Intent to Award (NOITA);
- Advertise the construction contract for the Storm Drain System Improvements Project; and
- Obtain Council approval to award five new general engineering master consultant agreements for engineering support on various CIP projects.

Program Performance Summary

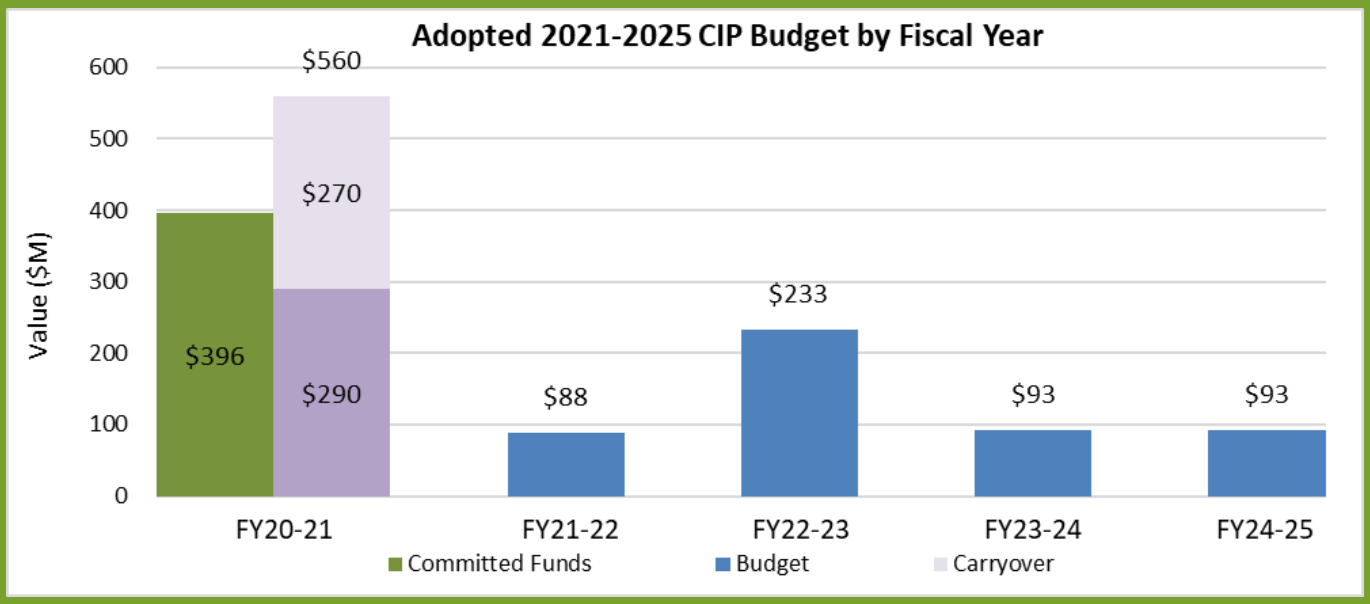
KPI	Target	Fiscal Year to Date			Fiscal Year End		
		Actual	Status	Trend	Forecast	Status	Trend
Stage Gates	90%	91% 10/11 [2]			91% 10/11 [3]		
Measurement: Percentage of initiated projects and studies that successfully pass each stage gate on their first attempt. Target: Green: >= 90%; Amber: 75% to 90%; Red: < 75%							
Schedule	90%	50% 1/2			50% 1/2		
Measurement: Percentage of CIP projects delivered within 2 months of approved baseline Beneficial Use Milestone.[1] Target: Green: >= 90%; Amber: 75% to 90%; Red: < 75%							
Budget	90%	100% 1/1 [4]			100% 1/1 [5]		
Measurement: Percentage of CIP projects that are accepted by the City within the approved baseline budget.[1] Target: Green: >= 90%; Amber: 75% to 90%; Red: < 75%							
Expenditure	$393M	$396M			$396M [6]		
Measurement: CIP FY20-21 committed costs. Target: Committed costs meets or exceeds 70% of planned budget. 70% of $560M = $392M. Therefore Fiscal Year End Green: >=$392M; Red: < $392M							
Safety	0	0			0		
Measurement: Number of OSHA reportable incidents associated with CIP delivery for the fiscal year. Criteria: Green: zero incidents; Amber: 1 to 2; Red: > 2							
Environmental	0	0			0		
Measurement: Number of permit violations caused by CIP delivery for the fiscal year. Target: Green: zero incidents; Amber: 1 to 2; Red: > 2							
Vacancy Rate[7]	10%	13% 11/88			13% 11/88 [8]		
Measurement: Ratio of the number of vacant approved positions to approved positions. Target: Green: <= 10%; Amber: 10% to 20%; Red: > 20%							

Program KPI – Fiscal Year 2020-2021 information

Program Budget Performance

This section summarizes the cumulative monthly budget performance for FY20-21 based on the Adopted 2021-2025 CIP Budget.

Adopted 2021-2025 CIP Expenditures and Encumbrances

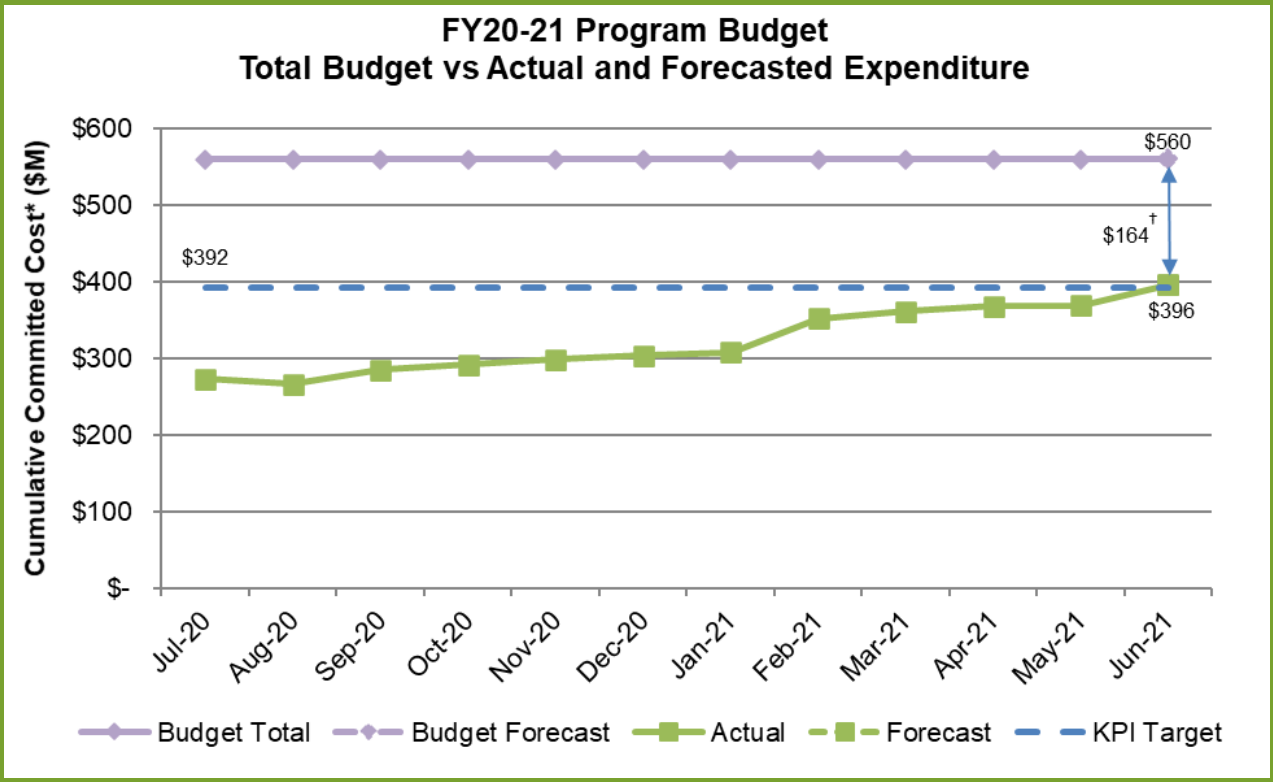


Budget performance information

Fiscal Year 2020-2021 Program Budget Performance

The FY20-21 CIP budget is comprised of approximately $289.9 million in new and re-budgeted funds, plus encumbered carryover of $269.7 million, for a total of $559.7 million.

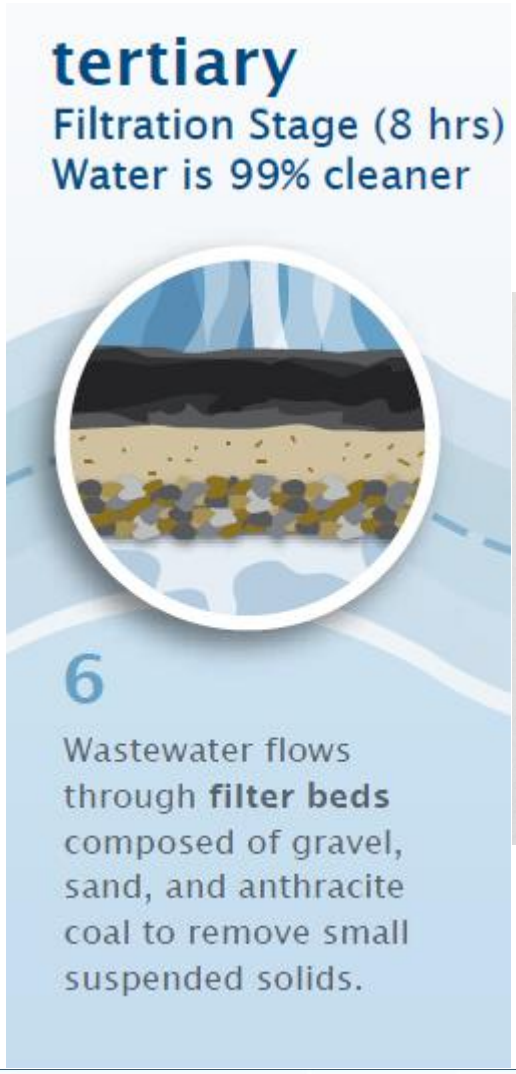
FY20-21 Program Budget

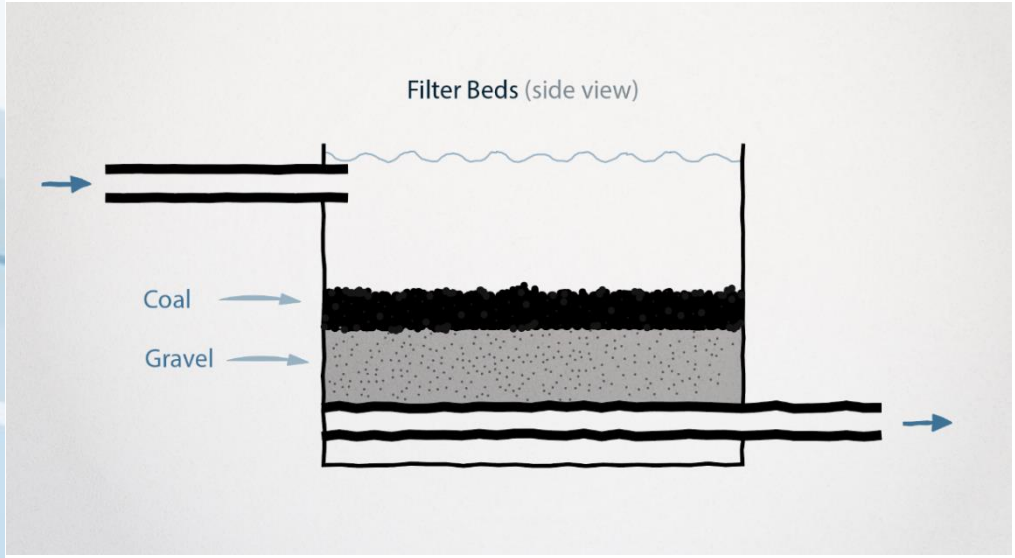


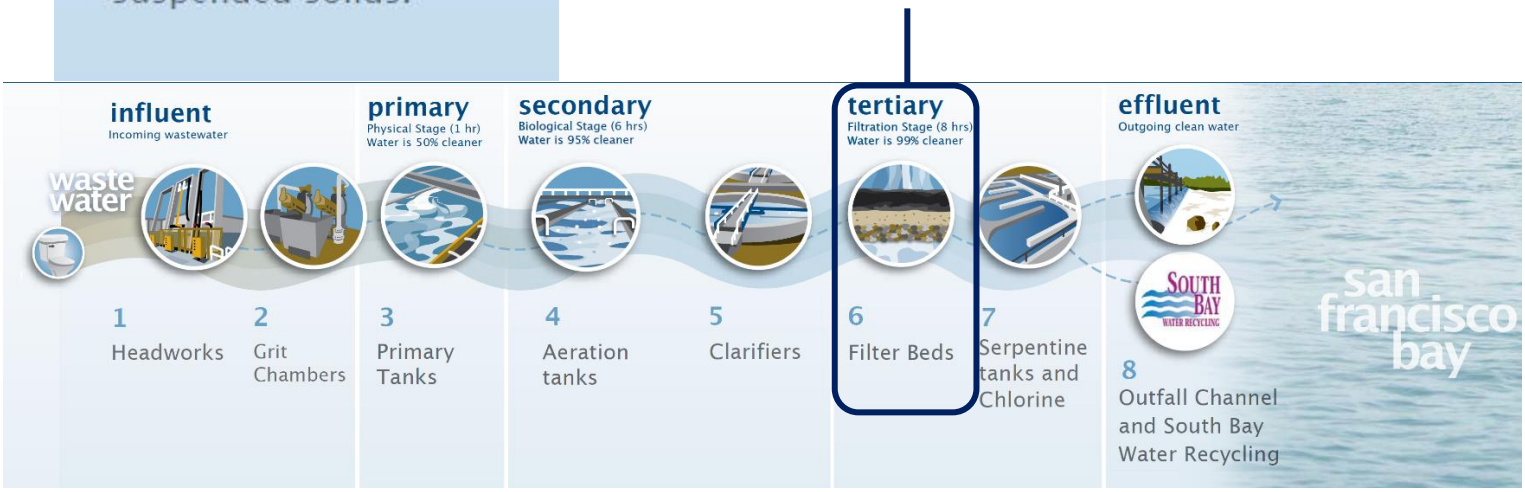
CIP program budget information

How does the wastewater facility clean wastewater?

Sixth Step: Filter Beds





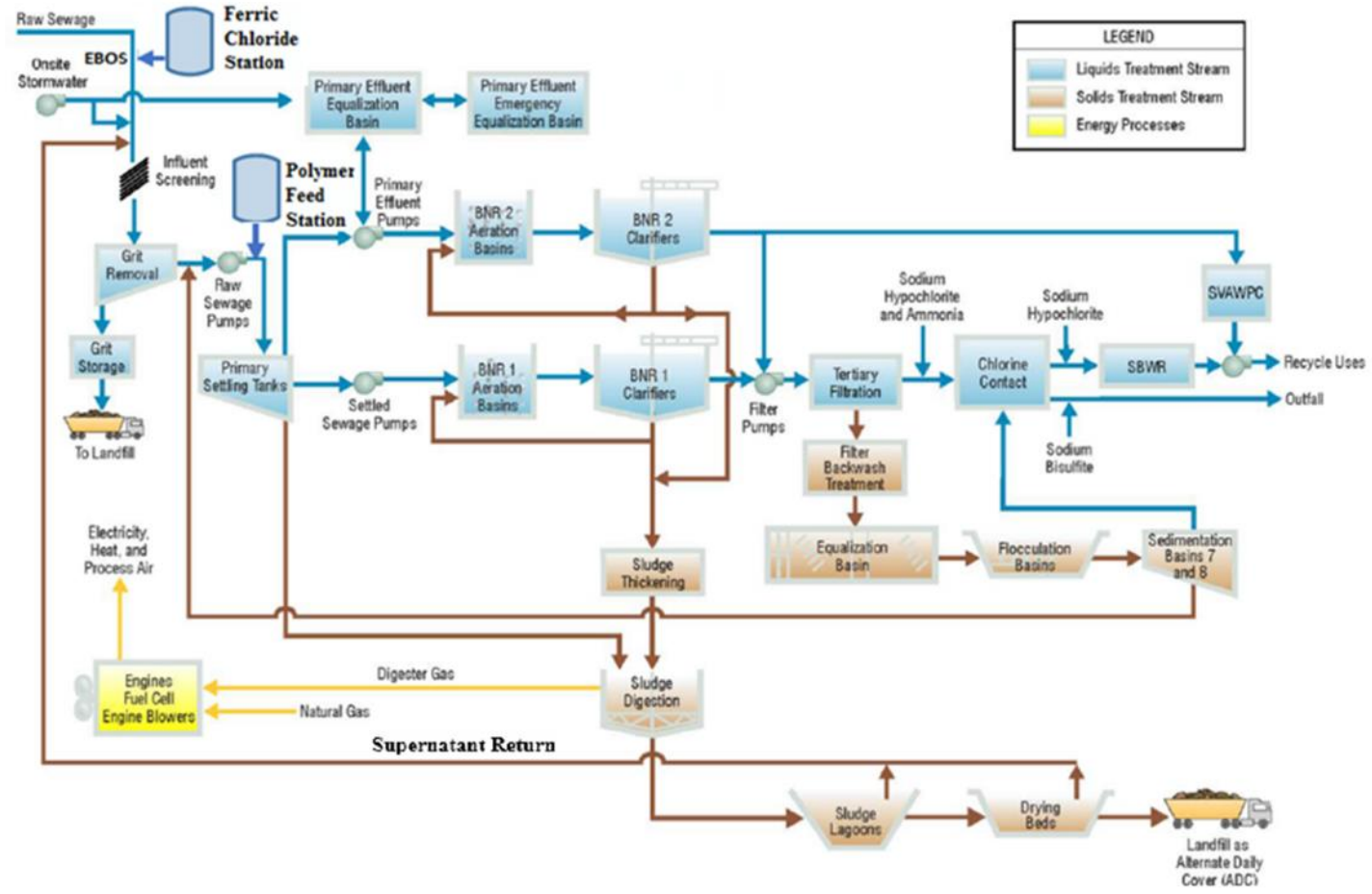


Want to learn more?

@sjenvironment @sjenvironment @sjenvironment

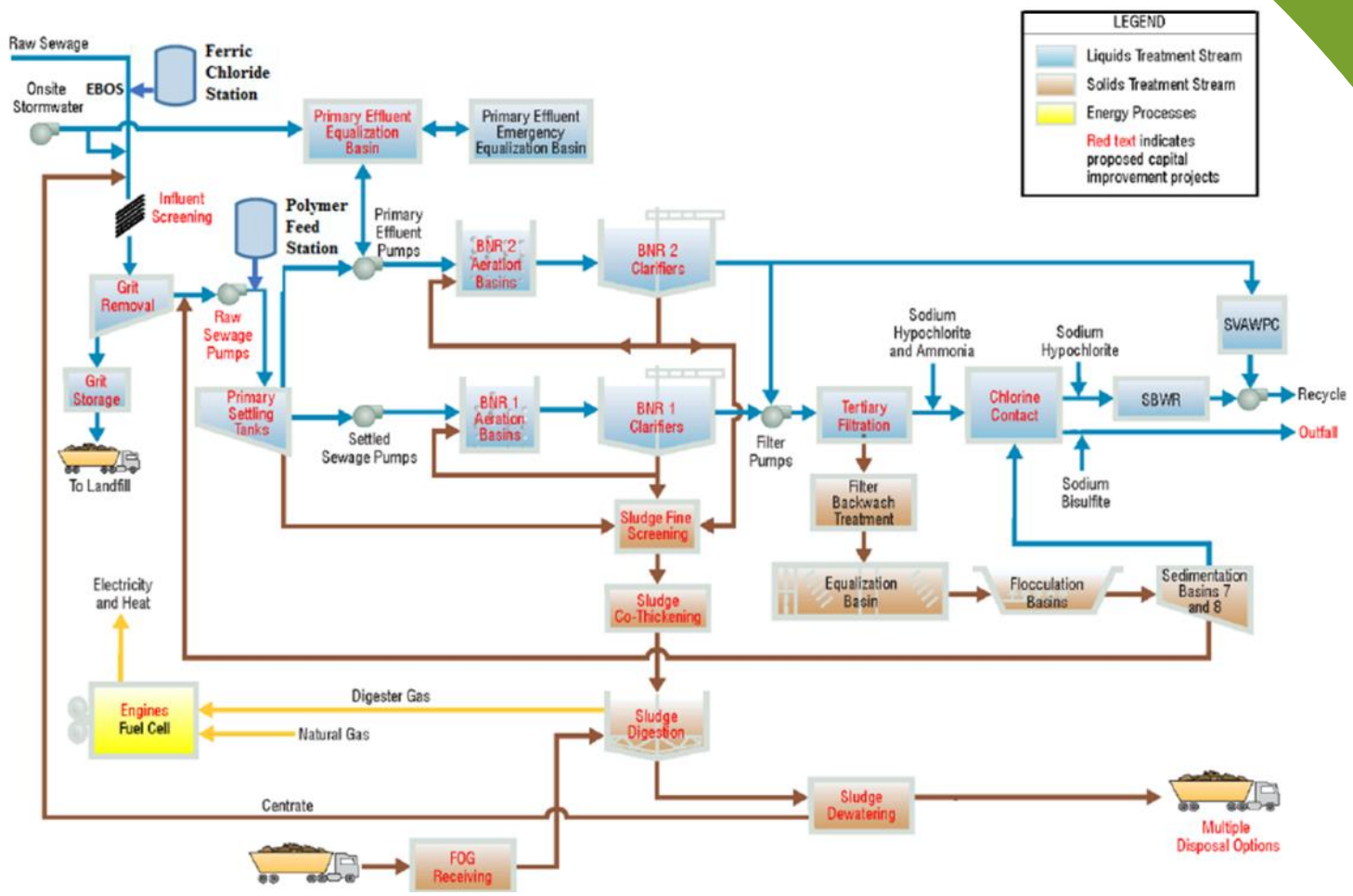
Regional Wastewater Facility Treatment

Current Treatment Process Flow Diagram



Regional Wastewater Facility Treatment

Proposed Treatment Process Flow Diagram



Glossary

Beneficial Use	When a CIP project is complete in accordance with contract documents and can be used or occupied by the City, it has achieved Beneficial Use.
Biogas	A renewable energy source produced by the breakdown of sewage waste in the absence of oxygen. Biogas is comprised of methane, carbon dioxide and small amounts of hydrogen sulfide.
Biosolids	Treated sewage sludge.
Bufferlands	Open acreage used by wastewater treatment plants as a buffer between plant operations and nearby communities. Bufferlands minimize odor and operational impacts on plant neighbors, and often serve as wildlife habitat.
Commissioning	The process of assuring that all systems and components of a facility, building or plant are designed, installed, tested, operated and maintained according to the owner's requirements.
DAFT	Dissolved air flotation thickener tanks. Dissolved air flotation, or DAF, is a treatment process that clarifies wastewater by removing suspended matter.
DCS	A distributed control system (DCS) is a computerized system that allows treatment plant staff to remotely monitor and control treatment processes.
EIR	An Environmental Impact Report (EIR) is a public document required under the California Environmental Quality Act to describe potential environmental impacts associated with a project. An EIR also describes measures to mitigate the impacts.
Effluent	Treated wastewater that is discharged from a treatment plant.
Influent	Raw or untreated wastewater that flows into a treatment plant.
FOG	The Fats, Oils and Grease Program administered by the City of San José's Environmental Services Department.
Headworks	Facilities that first receive influent at a wastewater treatment plant. The headworks screen and remove sticks, grit, and other solid material from influent to protect downstream equipment in the treatment process.
NPDES permit	Under the federal Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) Permit Program regulates point sources such as pipes and other conveyances that discharge pollutants into water. In California, NPDES permits for the discharge of treated wastewater are issued by the Regional Water Quality Control Boards.
Polymer	Primarily used to help manage the process of drying and consolidating sludge.
Preliminary treatment	The preparatory wastewater treatment stage, in which influent passes through headworks, which screen and remove sticks, rocks and debris; and grit chambers, which remove sand and gravel.
Primary treatment	The initial treatment for incoming wastewater, in which gravity settles solid material and rotating bars skim floating fats, oil and grease from influent.
Secondary treatment	The second stage of wastewater treatment, in which aeration tanks pump air into wastewater to promote the growth of naturally occurring bacteria that remove organic pollutants.
Stormwater	Water from rain that does not seep into the ground but instead flows into storm drains as runoff.
Tertiary treatment	The final stage in advanced wastewater treatment, in which wastewater flows through filter beds, then through chlorinated tanks to become 99 percent clean.
Wastewater	Water that enters the sanitary sewer system for treatment at a pollution control plant.
Wastewater Cake	Sludge that is compressed after dewatering.
WAS	Waste-activated sludge, or the excess quantity of bacteria and microbes removed from the secondary wastewater treatment process.